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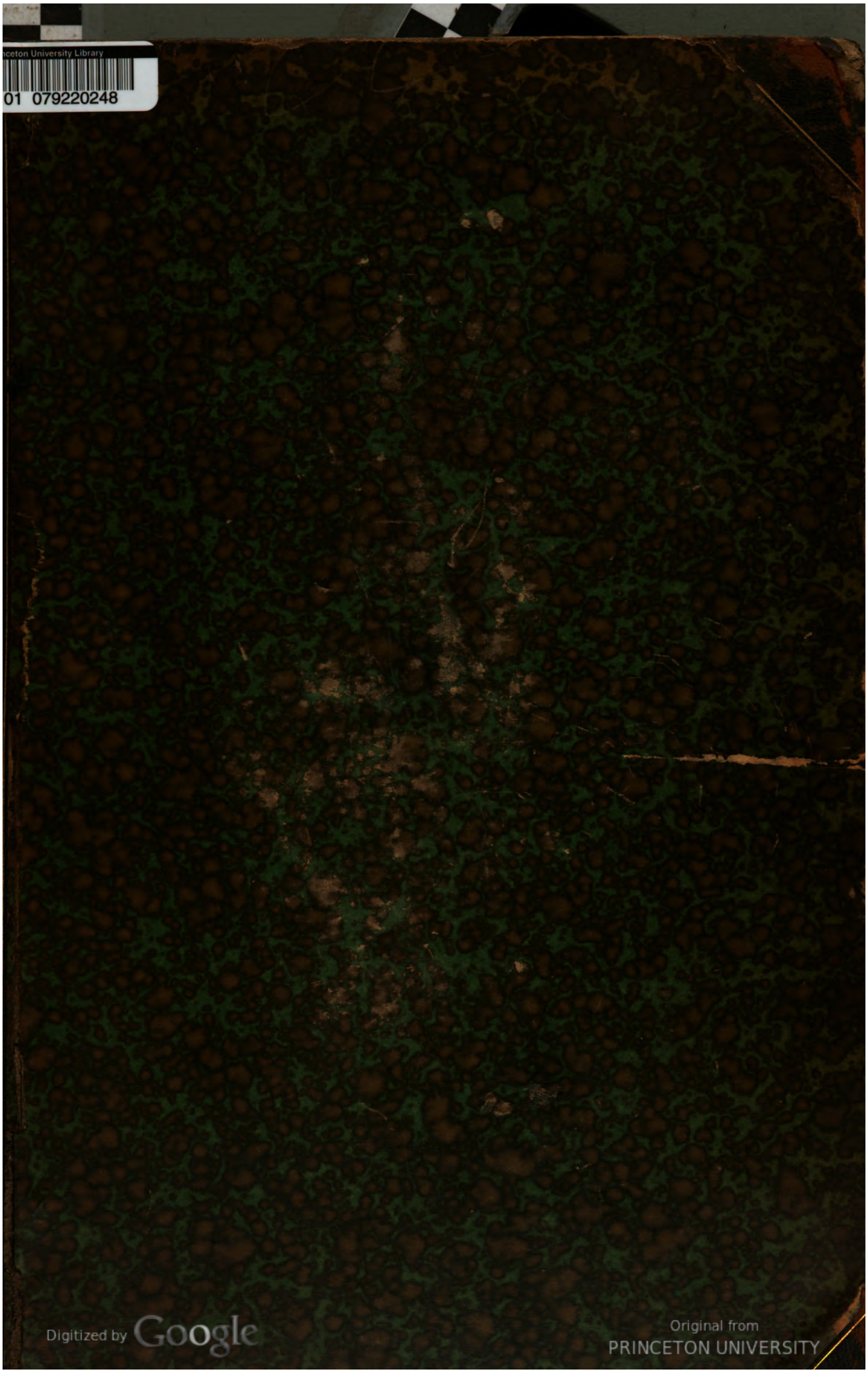
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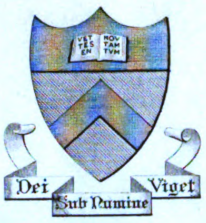

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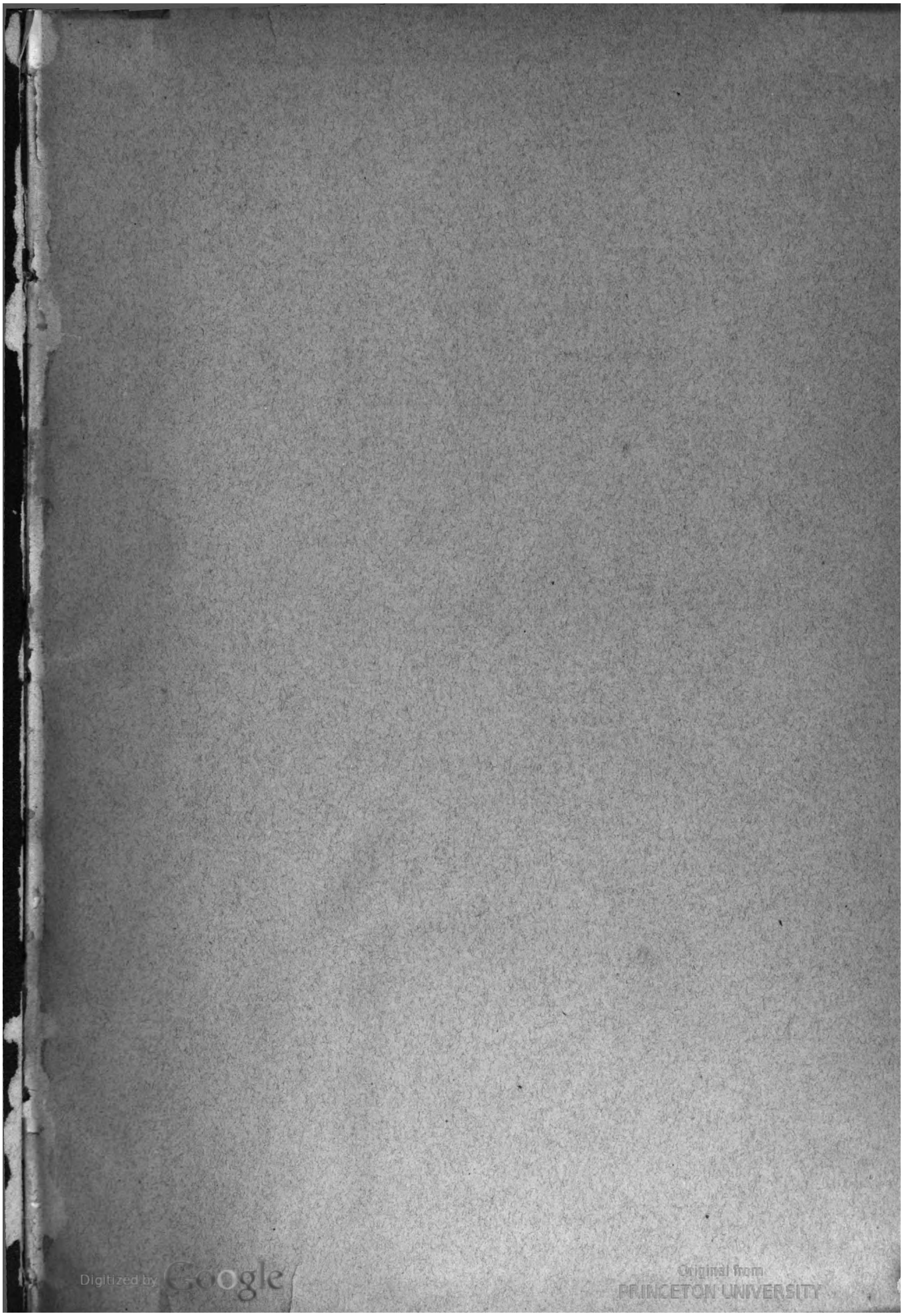
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VOL. XIII.—1891.

NEW YORK:
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CARPENTRY AND BUILDING.

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JANUARY, 1891.

A New Year Begins.

Whatever there was of 1890 is now in history. The year is done and behind us, for we ever face the future. We are on the threshold of a new year, and while counting the gains and losses of the twelve months that are past, we also estimate the year that is to be, and make good resolutions for the future. Has business been bad of late? We carefully consider the causes, and determine to struggle for better results. Have we made mistakes? We take the lessons to heart, and resolve to be wiser for the future. Are we dissatisfied with our attainments, or out of patience with our habits? We make resolutions to strive harder after knowledge, and to improve by the most rigid discipline. It is the natural season for turning over a new leaf, for starting on new plans and for formulating new resolutions.

HISTORIES IN BLAZONRY AND POEMS IN STONE.—*Ouida.*

A Good Motto.

Sometimes a thought or sentiment impressed upon the mind at this particular season, when by common consent and long habit we are in a receptive mood, exerts an influence for good throughout the year, and serves to make it a more profitable year than would otherwise be possible. This is especially true with young people, and it is of them we naturally think when writing. What, then, shall be the motto for the year? There is an abundance of good material to choose from, but is there anything more appropriate or more likely to serve a good purpose wherever applied than this: "Do it well or not at all?" In any event we are disposed to offer this thought for the reader's consideration and ask that by way of trial he apply it to his daily work, whatever it may be, for the next few weeks. If it is not a satisfactory rule, then throw it aside, but if it does prove to be a good thing, then hold fast to it for the year.

RICH WINDOWS THAT EXCLUDE THE LIGHT, AND PASSAGES THAT LEAD TO NOTHING.—*Gray.*

Our New Department.

As promised in the brief prospectus sent out with our December issue, we introduce a new department in our monthly work with this issue. It is entitled "Building Ways and Means," a name that is sufficiently elastic to enable us to include in it enough variety to interest and instruct our entire circle of readers. Every builder and every mechanic is interested in knowing how things are done by others. He remembers how he has solved difficult problems that have been encountered in his own practice, and he wonders what has been the experience of others in similar directions. Further, the practice of mechanics and builders in different parts of the country varies greatly in common matters, and some of the methods are better than others, and would be followed if they were but known. This new department thus affords the opportunity for those who have good methods to explain them for the benefit of others, and for observers in general to record whatever seems worth while to submit to the attention of our readers. We invite cooperation in filling the page devoted to it, and shall welcome suggestions from whomsoever offered.

ALL BELOW IS STRENGTH, AND ALL ABOVE IS GRACE.—*Dryden.*

Choice Excerpts.

Whoever has read standard authors has experienced surprise at the frequent allusions to building matters that are found scattered through their works. What Shakespeare (or Lord Bacon), for example, has left scattered through his numerous plays regarding architecture and building is enough to make a small volume in itself, and even casual inspection serves to show that the building crafts afforded him many beautiful similes and metaphors. The same is true, though in lesser degree, of the works of numerous other authors. We invite our readers' attention to a few excerpts of this kind which we have sandwiched among the paragraphs on this page. If the feature pleases we shall repeat it in successive issues. If our readers have any choice quotations they would like to have preserved in this way, we shall be glad if they will send them to us.

THE POETRY OF BRICKS AND MORTAR.—*Horace Greeley.*

Interest in Carpentry and Building.

Among the many evidences of the interest manifested by the readers of *Carpentry and Building* in what appears in its columns and the enterprises undertaken by it may be noted that found in connection with building operations. It is well known that for a number of years in the past we annually distributed circulars among the carpenters of the country asking for information relative to building operations, in order that we might present a brief outline of what was going on in all sections of the country, and show, in some measure at least, what might be the outlook for the future. These circulars were spread broadcast over the country with the request that they be returned not later than a certain day in order to be of special service to us. While in the vast majority of cases they came to hand at or before the time specified, there were those receiving them who were evidently not in a position to at once reply to the questions asked. They, however, did not forget our request, and the result was that from time to time a circular would come to hand showing the building operations in a certain city or town. One of the most recent cases of this kind is a circular which wassent out in the early part of the year 1882 with a view to obtaining particulars with regard to the prospects of the building business for that year. In our mail a few days since one of these circulars came to hand from a town in Pennsylvania, all the questions asked being fully answered and some general remarks presented relative to a new town recently established in that vicinity. This clearly shows that while the person to whom this circular was addressed in 1882 was not, by reason of circumstances, in a position to comply with our request at that time, he kept the matter in mind, and eight year's later, on December 1, filled out the circular and sent it to us. Of the interest which this reader has in all that pertains to *Carpentry and Building* no better evidence is needed.

THE ARCHITECT MUST UNDERSTAND NOT ONLY DRAWING, BUT MUSIC.—*Goethe.*

Strikes Diminishing.

To the careful observer who has watched for several years past the labor situation of the country it becomes apparent that radical differences between employers and workingmen are becoming less and less the subject of serious strikes. It would appear very much as if capital and labor had to a large extent joined hands and were now working in the direction of a more satisfactory condition of affairs. Mechanics seems to have come to the conclusion that the strike as a weapon for accomplishing their purpose is no longer the power which it was a number of years ago. They are taking a more conservative view of the situation and are beginning to realize that there are other and better means of accomplishing their ends. On the other hand, it is probable that the numerous strikes that have occurred in the past have done much to bring employers to the point of realizing that organization upon their part is an absolute necessity, and it may be safely stated that there is scarcely an important industry where the employers are not as closely bound together for protection as are the workmen. This is a better state of affairs than for either side to be without organization. Agreements are quicker reached and disputes sooner adjusted. While it is true that no great activity, comparatively speaking, has been manifested in the immediate past upon the part of the various labor unions, it is a well recognized fact that they are stronger and more compact at present than ever before. On the other hand, they are more thoughtful of the consequences of radical measures. The leaders and members of the different organizations among mechanics at the present day are more largely thinkers

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and real workers than ever before. They believe in keeping quietly at work, depending upon the justness of their cause, rather than publishing to the world their troubles and grievances in the old fashioned way. The experiences of the past has taught them that recklessness and lawlessness do not by any means pay, but that arbitration is a most excellent means of amicably adjusting those differences which arise between them and their employers. The men who are at the head of the labor organizations of the country at the present day are, it may be said, well educated on all labor questions, and for this reason are far better leaders than many of those who have preceded them in the past. Where they see that it is impossible to gain all that they ask, they are quite willing to compromise, instead of inaugurating a hopeless strike. In a word, it may be said that labor unions have been brought down to a solid working basis, and are composed more largely than ever before of men of good judgment and hard common sense. Employers likewise have grown wiser by experience, and very generally manifest a willingness to meet their men half way in all reasonable measures.

SPIRES WHOSE "SILENT FINGER POINTS TO HEAVEN."—*Wordsworth.*

The Use of Smoke Bells.

It is a very common practice to place over lamps or gas jets, plates or bells of porcelain, glass or other refractory material, for the purpose of preventing the blackening of the ceiling. It is generally supposed that a lighting flame gives off a large quantity of unconsumed carbon, which, if not interrupted, will rise to the ceiling and produce the dirty spot so often noticed above gas flames. There can be no doubt that an unprotected flame does give rise to a discolored ceiling, and it is likewise true that a disk above the flame will, in a great measure, overcome this disagreeable effect. The cause, however, we think, is entirely misunderstood, for there is every reason to believe that the blacking is not due to the unconsumed carbon from the flame, but rather to the depositing of dust particles driven against the wall by the ascending current of hot air. If a sheet of paper is held above a gas flame or lamp, in which the combustion is perfect, no accumulation of soot will be noticed, and we feel safe in saying that the products of combustion from all fairly perfect illuminating flames do not include any perceptible amount of unconsumed carbon or soot. If any of our readers are in doubt of the truth of this statement we would refer them to rooms or apartments where there are ventilating registers in the side walls. If the room be moderately dusty, as is the condition of all occupied apartments, such as offices and the like, and the ceilings be white, it will be a very short time after the registers are introduced before the ceiling becomes dirty near the registers. This is due to the outflowing current of air carrying the particles against the plaster or paper, and as more and more of the dust particles stick the blackening becomes increasingly evident. The purpose of the plates and bells referred to is simply to break up and distribute the current of hot air, the result being that instead of a small column carrying all the dust directly to the ceiling, there is a dispersed current that distributes the dust particles over a very broad area, so broad, in fact, that the discoloring effect is not soon noticeable.

THE GOTHIC CATHEDRAL IS A BLOSSOMING IN STONE, SUBDUED BY THE INSATIABLE DEMAND OF HARMONY IN MAN.—*Emerson.*

World's Fair Engineering Features.

It is altogether probable that the Chicago World's Fair will develop a number of unique features not hitherto attempted in connection with enterprises of that character. A discussion is now in progress relative to the motive power to be used for the machinery exhibits. Many objections are urged against steam, and the advocates of electricity are numerous and influential. One of the significant signs of the times is the disposition in this case to relegate steam to the background as a motive power for isolated machinery and to use it simply as a basis for other means of transmitting power. It is regarded as an excellent thing in its place, but its place is to be restricted. Engineers who visited the Paris Exposition point out the fact that the great machinery hall, which was one of the most interesting buildings on the grounds, was almost unendurably hot, owing to the steam boilers in its vicinity and the steam pipes passing through it, while the atmosphere was disagreeably laden with moisture from escaping steam and foul smells from heated oil. Advocates of electricity come forward triumphantly and claim that no such fault can be found with their agent for the transmission of power, while, on the other hand, the World's Fair will afford an opportunity for illustrating the advantages and conveniences of electricity such as is seldom presented. The dynamos could be located at some central point, convenient for receiving fuel supplies for the steam service, but sufficiently out of the way to annoy nobody visiting the exposition.

TOO LOW THEY BUILD WHO BUILD BENEATH THE STARS.—*Young.*

Source of Power.

But electricity is not to be allowed to have a clear field in this matter while such an agent as compressed air is available. Those who advocate compressed air point out serious objections to the use of electricity. One of the most important is the fact that a great deal of the machinery to be exhibited cannot be driven by belting, but must have power directly applied in steam cylinders. If electricity were the sole power in use such machinery would not be shown in motion. Compressed air, however, would operate anything intended to be operated by steam, and with it in use no machine would be obliged to stand idle. It could be piped from a central station to any point on the grounds and when exhausted from machines and escaping in the buildings it would improve the character of the atmosphere, instead of vitiating it. No heat would be radiated from the pipes conveying it, and in that respect it would be as satisfactory as an electric wire. An air compressing plant of very large capacity would be required, which could probably be utilized after the close of the exposition by the city of Chicago in supplying power for general purposes to quite a considerable section.

Local Transportation.

Another matter which is the subject of discussion in engineering circles is the means of conveying visitors from one part of the grounds to another. Electric railroads are no longer a novelty and tramroads themselves are now the subject of attack by progressives. One engineer proposes a moving platform in two sections, the outer section being propelled at a slow speed, so that any person can step on or off it with ease and safety, while the inner section passes along more rapidly, but not too fast for persons to step on it from the outer one with ease. The hydraulic railroad exhibited at Paris, and which is capable of securing the highest speed yet known among feasible vehicles, has its advocates who are anxious to see it incorporated among the special features of the exposition, and thus for the first time put in regular service.

The Pratt Institute.

The Pratt Institute of Brooklyn, N. Y., brought its fall term to a close on Thursday, December 18, with a very large attendance, there being enrolled in the various departments of the institution 2275 pupils. Since last year several new lines of study have been taken up, and in the department of art and design classes have been formed for the training of teachers in normal methods. One of the interesting features of the institution is the course of instruction in domestic science, and so large have been the applications to this department that many, it is stated, have been unable to gain admission. Among the new departments organized the present year is a course in phonography and typewriting and a class in steam for the training of engineers. The library of the institute now contains nearly 25,000 volumes, and has a circulation of over 100,000 volumes a year. The Pratt Institute is gaining for itself a wide reputation, and numerous inquiries concerning it are received from all sections of the West and South. At a recent convention of the National Educational Association at St. Paul the exhibit of the institute was very favorably commented upon by some of the teachers present. The report of the Committee on Exhibits at the meeting is an interesting evidence of the influence the work of the Pratt Institute of Brooklyn has had on the teachers of the country. The new term begins January 5, and as several new classes have been organized to commence at that time, a largely increased number of pupils is expected.

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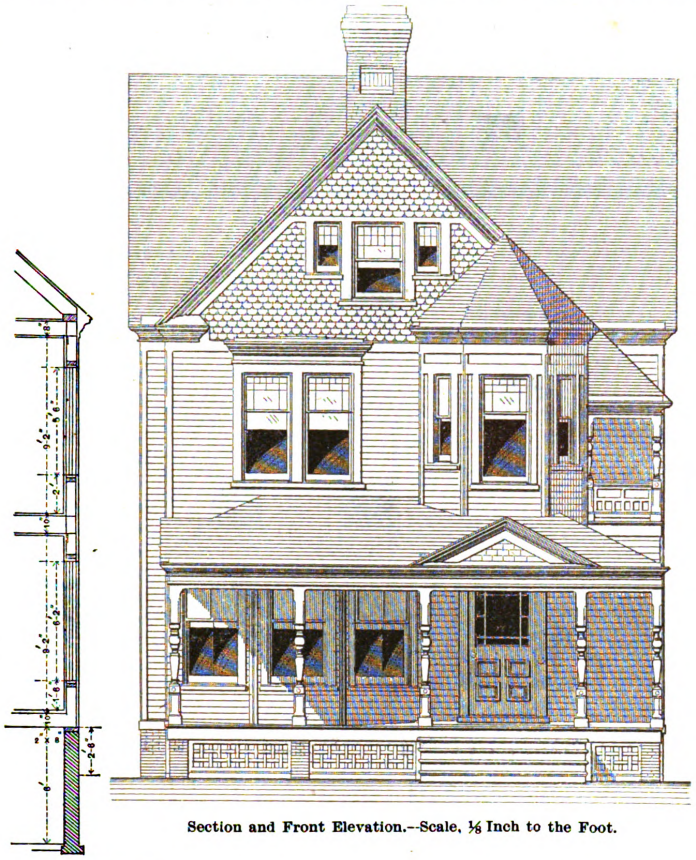
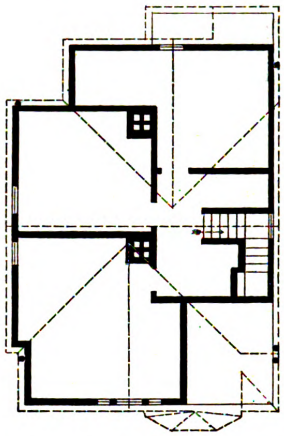
A HOUSE IN ELIZABETH, N. J.

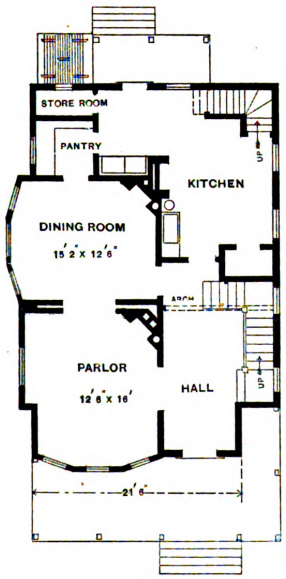
IN OUR DECEMBER ISSUE we presented floor plans, elevations and details of the first of the row of houses we now take pleasure in showing the floor plans, elevations and details of the second house in the row referred to. The architect of both houses is David B. Provoost of Elizabeth, N. J. The floor plans of the house now presented provide three large rooms and a commodious hall upon the first floor, and four sleeping rooms and a bathroom upon the second floor. In the present arrangement it will be observed that the dining room and parlor are upon the left of the hall, while in the case of the first house in the row these rooms were upon the right. The parlor and the dining room, which are connected by means of folding doors, are each provided with an open grate, affording means for heating those apartments as well as being an assistance to ventilation. From the hall, which is of such a size that it may be used for reception purposes, rise the stairs leading to the second floor. In the rear of the hall, and separated from it by a door and an arched way, is the kitchen, its position being such as to permit a person to reach the front door from that apartment without passing through any of the other rooms. The dining room is reached from the kitchen through a commodious pantry provided with modern conveniences and



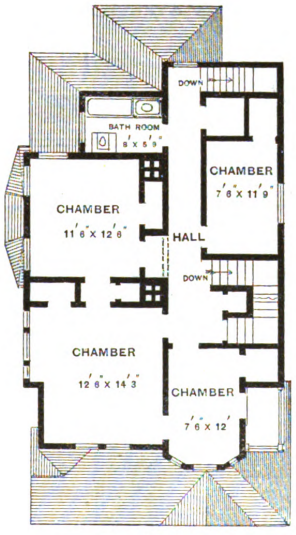
Section and Front Elevation.—Scale, ⅛ Inch to the Foot.



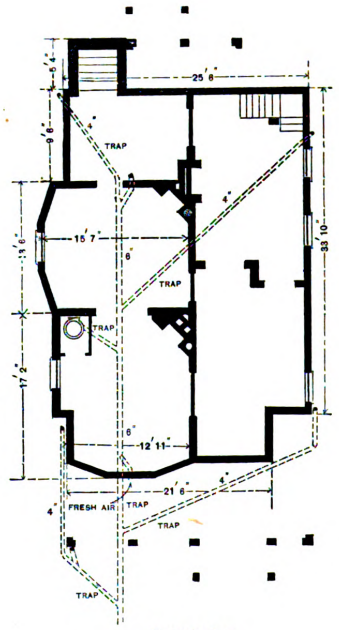
Attic Plan.



First Floor.



Second Floor.



Foundation.

Floor Plans.—Scale, 1-16 Inch to the Foot.

House in Elizabeth, N. J.—D. B. Provoost, Architect. (*For Perspective View see Second House on Supplement Plate for December.*)

illustrated by means of the plate forming the supplement to that number. Upon this and the following pages

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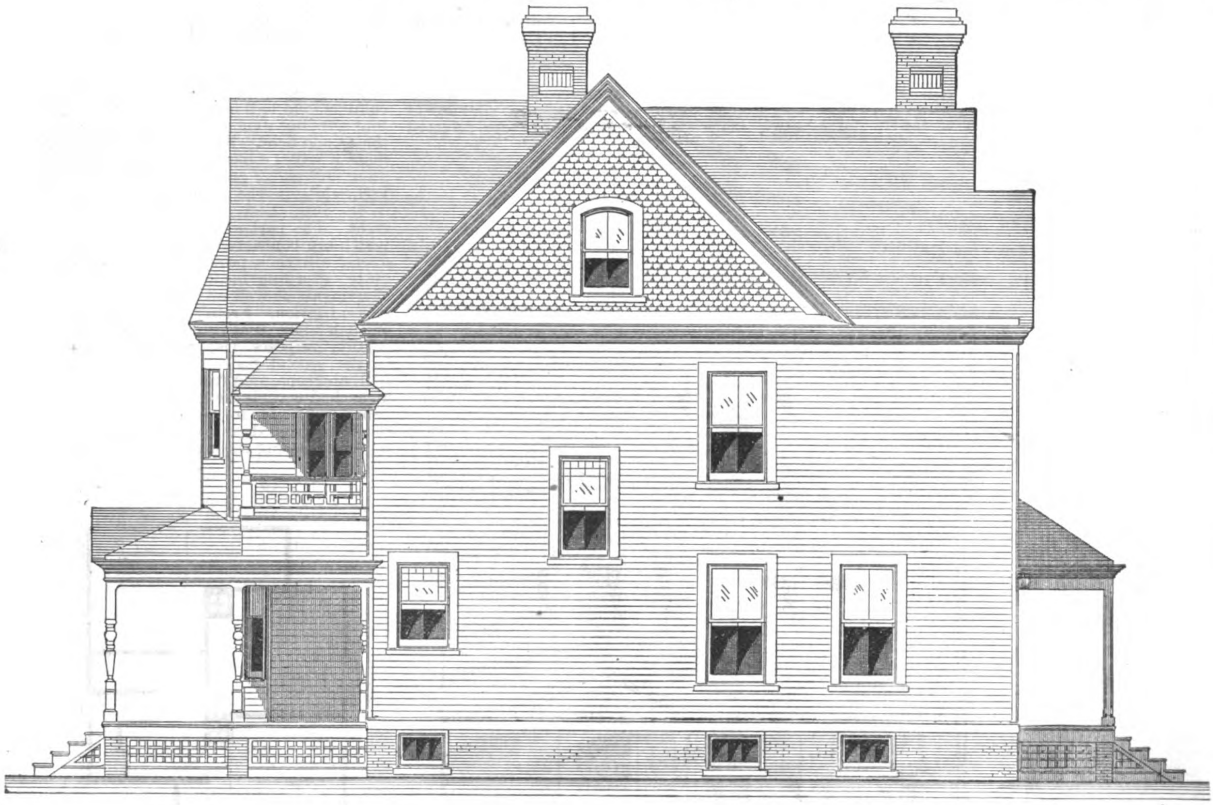

Side (Right) Elevation.



Side (Left) Elevation.

House in Elizabeth, N. J.—Elevations.—Scale, ⅛ Inch to the foot.

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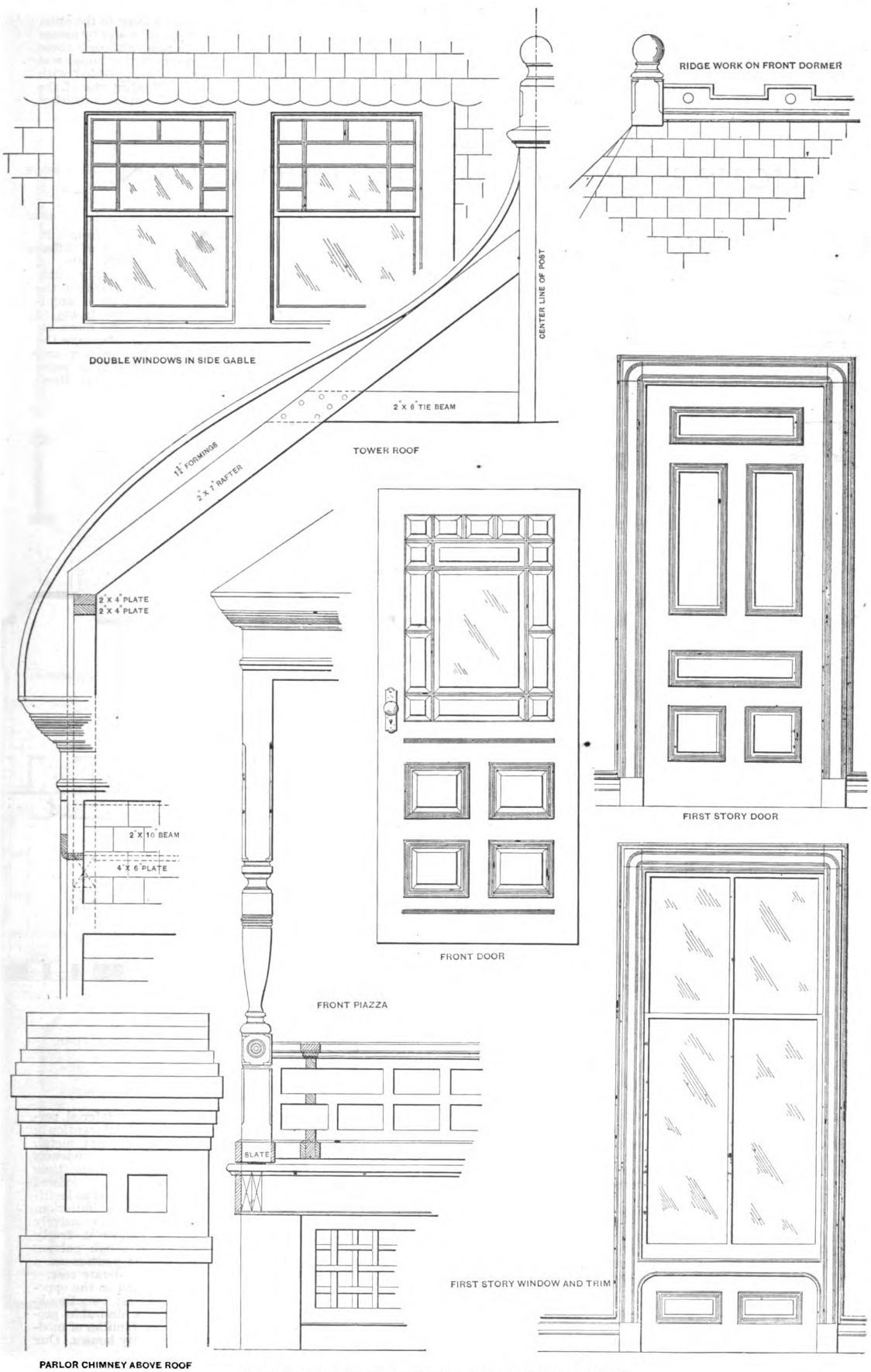

House in Elizabeth, N. J.—Details.—Scale, ½ Inch to the Foot.

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lighted by a window. A rear stairway leads from one corner of the kitchen to the second story hall. In the arrangement of the house the architect has had in mind the provision of two good front rooms upon the second floor, one of which might be used as a sewing or sitting room, as desired. The arrangement of the stairway is such as to occupy as little space as possible, it being so disposed that all the sleeping rooms on the second floor may be easily reached from the head of the flight of stairs. The bathroom is in the rear near the end of the hall. In the attic are two finished rooms. The house is fitted with all modern improvements, the water supply being drawn from a tank in the attic. This tank is supplied with water by means of force and lift pumps, although these would not be necessary if the house was located in a city or town provided with public water works. The interior of the house is finished in yellow pine, varnished and polished.

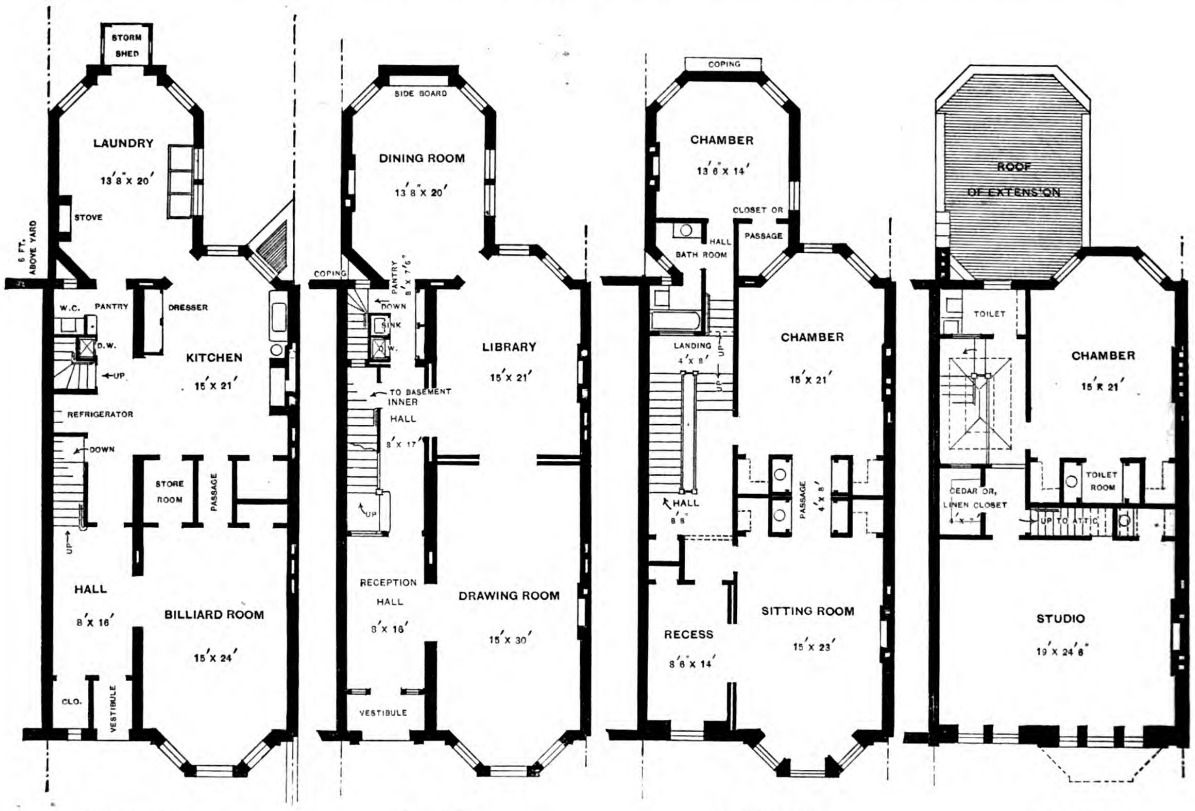
HOUSE PLANNING IN BROOKLYN.

EVERY ONE WHO HAS examined residences in each of several of the large cities must be impressed with the idea that each place in a sense is a law unto itself, so far as the planning of its houses go and the way in which its average people live. So much is this the case that some cities have given their names to distinctive features of planning. It is not uncommon, for example, in several of the larger cities to encounter houses which will be described as being upon the Philadelphia plan or having a Philadelphia extension. We ask the attention of our readers this month to some samples of current work in Brooklyn. It is only fair to that city to say that it has not originated a style, and that upon an average its people do not live in so nearly the same way as to make a Brooklyn house distinctive. On the other hand, variety is the rule. We do find, in going through its streets, however, various features which attract attention, and which, if fully described in our columns, would interest the reader, and at the same time be creditable to the city named, for it is a city of comfortable houses, as well as of fine churches. For the present we are obliged to confine our investigations to a small number of examples, far less than would be necessary to show Brooklyn house planning in its completeness.

Like various other cities, in the past few years Brooklyn has introduced diversity in planning and pleasant variety in the fronts of its dwellings, and, accordingly, the monotonous blocks of houses, uniform in arrangement and outward appearance, which in the past characterized some portions of the city, and for which Philadelphia and New York have likewise been eminent, are not to be found in those parts which have been recently built up.

Architects at the present day in Brooklyn, as well as elsewhere, vie with each other in securing for their clients convenient houses and utilize all the space to the best advantage. There is more care given to details of planning now than ever before and relatively more money is spent in the interior of houses than upon the exterior. At present, according to the thinking of many people, it is more desirable to have a house conveniently arranged and tastefully furnished than it is to have one of imposing exterior, but lacking in other particulars. Nor would we have it supposed that the exterior of houses is being neglected; far from it. What with the use of bricks of different sizes and kinds, with bits of terra cotta to add character, a little cut stone to still further brighten the front and the free employment of architectural sheet metal work, the fronts of the dwellings of the day are far more attractive to the eye, more tasteful from the standpoint of the general observer and in many cases more correct from the point of view of artist and architect than those of other periods. There is no material, perhaps, that deserves more special mention in an article of this kind than sheet metal. The material has outgrown the crudeness of its earlier years, and at the same time overcome the prejudice that existed against it. It is now recognized as legitimate, not merely a servile imitation. Formerly it was almost exclusively galvanized iron; now copper is freely used for the best work, although galvanized iron has not lost its position as a favorite in the houses of moderate cost.

The floor plans on this and on the opposite page show what, at least, two Brooklyn architects consider a desirable provision for the wants of families of moderate means who live in city houses. Our



Basement. First Floor. Second Floor. Third Floor.

Scale, 1-16 Inch to the Foot.

House Planning in Brooklyn.—Charles Werner, Architect.

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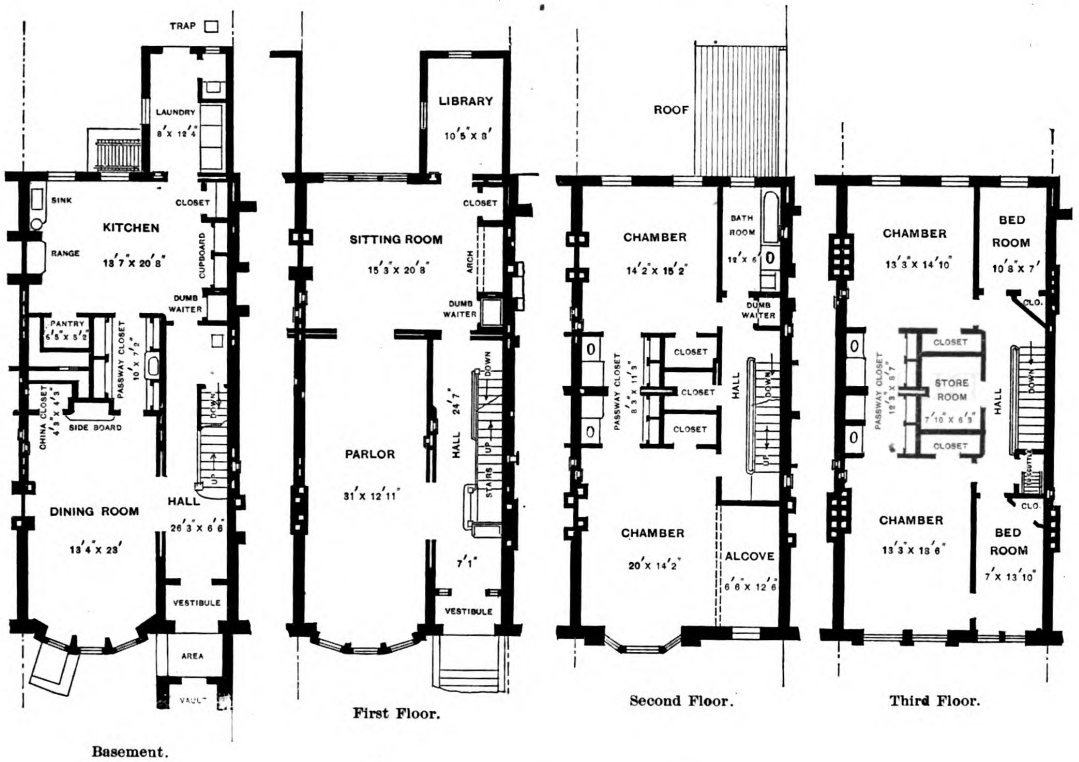
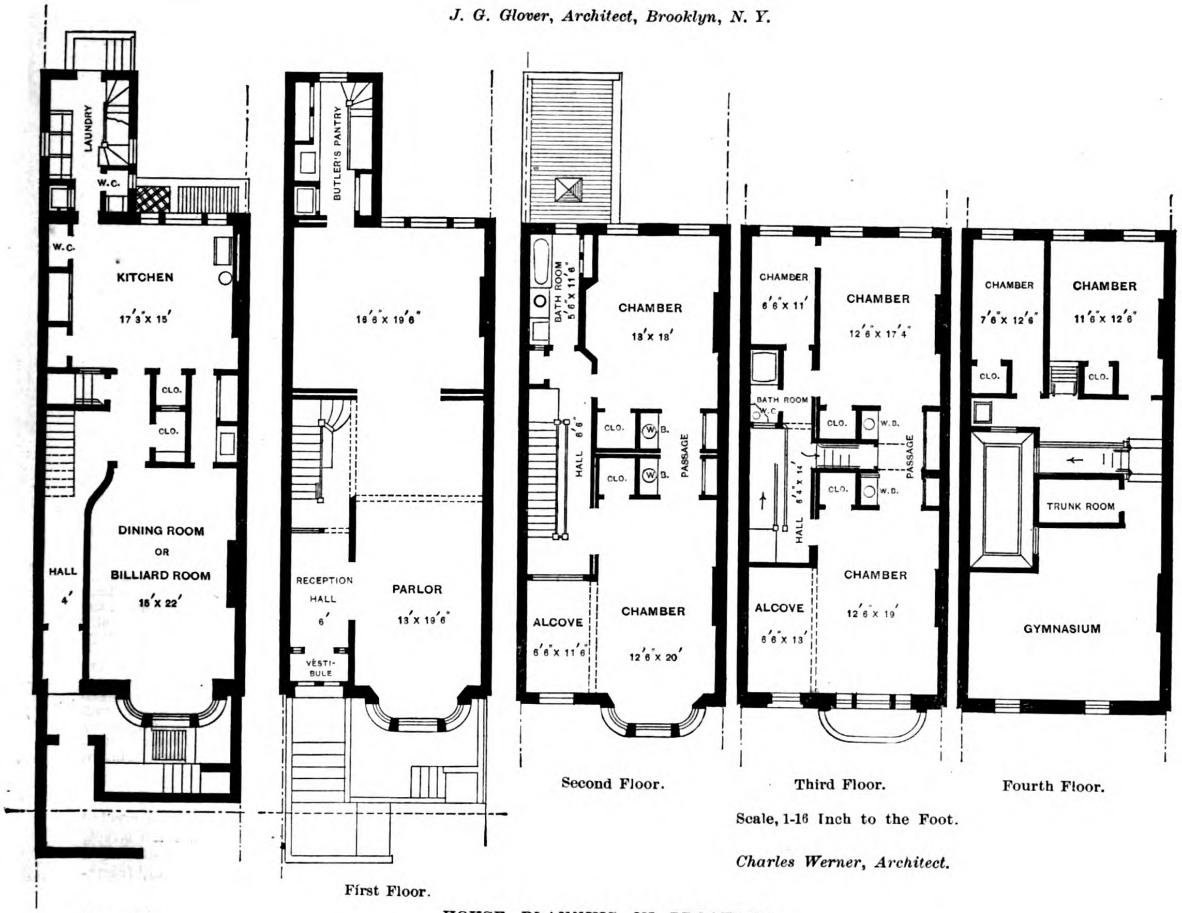


Basement. First Floor. Second Floor. Third Floor.

J. G. Glover, Architect, Brooklyn, N. Y.



Basement. First Floor. Second Floor. Third Floor. Fourth Floor.

Scale, 1-16 Inch to the Foot.

Charles Werner, Architect.

HOUSE PLANNING IN BROOKLYN.

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plate supplement shows a row of houses in Brooklyn, and indicates what another architect, working under the direction of a contracting builder, has seen fit to do in the way of fronts of houses of about the same grade. The houses presented were erected a short time since in Arlington place, near Fulton street, and are excellent examples of average current work, very happily illustrating the general appearance of buildings of their class, so far as the outside is concerned. The fronts of the two houses at the extremes, and also the one in the center, were laid up in brick above the first story with the projection and pediments in the cornices done in sheet metal. The fronts of the other two buildings, including the lower story of the three already mentioned, are in cut stone. All of the houses are of the high stoop variety, which at present is the prevailing style. The steps, it will be noticed, go straight up, although it is quite common at present for stoops to be arranged with a broad step in the flight and the lower steps made parallel with the front of the house, instead of at right angles to it. The sheet metal work, which is a very prominent feature of these buildings, includes the entire finish of projections on the fronts of the alternate houses, and also the cornices of the others. It is likewise an excellent specimen of what is being done in Brooklyn at the present time in this line, and was supplied from the shop of James White, 446 Adelphi street.

The floor plans presented herewith, as already mentioned, do not belong to the houses shown in the plate. In fact, their planning is quite different from either of the studies submitted, although very satisfactory to owners and occupants. One of the sets of plans presented herewith, as noted in the caption, is by J. G. Glover of 186 Remsen street, Brooklyn, and the other two are from Charles Werner, whose office is in the Garfield Building, No. 26 Court street, Brooklyn. Two of the sets of plans shown are adapted to houses three stories and basement in hight, while the other set indicates a house four stories high. It is not necessary to enter into a detailed description of these plans for all of them so clearly show their features that the reader can follow them in all their details without assistance.

BUILDING WAYS AND MEANS.

BUILDERS are frequently called upon to put up ambitious structures in cities which do not afford a natural foundation for the purpose. A case in point is the new City Hall of Kansas City, which was located by the common council on the spot where some years since a ravine crossed diagonally. On either side were abrupt bluffs and hills. In the course of time these bluffs had been cut away and the ravine filled up, making, to the casual observer, a nice plot of ground, but in reality a fill of some 50 feet under about two thirds of the building, as it had been located, a solid clay bank extending under the remaining third. Every builder who appreciates the necessity of a uniform bearing for the foundation will realize the difficulties that confronted the contractor and the architect in this case. The fill referred to had been made at different periods with rubbish of all kinds, including almost everything from pieces of brick to tin cans. In short, the place had been used as a "public dump," and was in all respects a most unsatisfactory site on which to erect a large building. The problem presented there was for some tangible method for securing an adequate foundation that would neither bankrupt the city nor endanger adjoining property. Piles were rejected as being bad in this particular locality, owing to the dryness of the earth in the fill and the tendency of the timber to dry rot in such soil. To dig a trench would not only be expensive but dangerous. It was finally determined to use a system of piers for the whole sub-structure; but to dig square holes or pits and crib the excavation would not only be laborious, but also expensive as well as dangerous. Finally a cylindrical form of piers was adopted and the excavation was made with a large auger operated by steam power, and a 3-16-inch iron caisson was made to follow the auger. This much decided upon, the question of material was taken up. Concrete naturally suggested itself, but after mature deliberation and investigation vitrified brick was adopted as the material best suited for the filling of the caissions. These bricks singly, in a testing machine, required a pressure of 140 tons to fracture. Piers 4 feet 6 inches in diameter, laid in hydraulic cement and grouted solid in each course, and well bonded in all directions across the pier, were then constructed. The result has proved them to be all, for solidity, tenacity and strength, that had been hoped for at the outset. The piers were sunk to rockbed of limestone about 8 feet in thickness and were capped with cast iron webbed plates, on which rest steel I-beams all bolted together. The interstices between the beams and the excavation of 1 foot each side and 1 foot under the beams and caps are filled with concrete. The upper surface was capped with boiler plate, ¼ inch in thickness, bolted to the flanges of the beams. On this surface the walls of the building were started. The piers under the tower and smoke stack, and other portions of the building, having excessive weight in addition to the ordinary loads imposed upon them, were reinforced by 12 inch Z bar columns, which also rest on the rock bottom. The whole system, in essence, is the direct transmission of the entire weight to the solid bed rock, by so arranging the interior construction that the whole weight is subdivided, each subdivision being carried by an isolated pier capable of sustaining its own individual load. The building in question is proceeding under the management of S. E. Chamberlain, architect.

WHAT I HAVE TO SAY here refers to small flues for any kind of an establishment, be it house, factory, church, or what not. There is not, ordinarily, enough care taken to see that all flues are smooth inside and free from sudden bends or chokes. In every flue there is a certain dead-air portion, to which there clings a motionless or nearly motionless layer of air or of gases of some sort or other. The rougher the flue surface the thicker this dead layer, and the more projections there are the thicker it will be also, because under and above each projection there will be a pocket. It adds very little to the cost, but very much to the drawing power of a chimney, to make its flues smooth inside by building and parging to a cylindrical mold, or to one of rectangular form having the corners either chamfered or rounded to a convex curve of large radius. This form being made of convenient length, say, 3 or 4 feet, is drawn up as the walls are built up to and around it, so that the flue is practically a cement pipe having the same form and area of cross section as the mold.

G.

A CORRESPONDENT writing from Ithaca, N. Y., describes a form of arrangement of the front of store buildings which he thinks should meet with a great deal of favor by reason of the advantages shown to result from it. Instead of placing the door or doors in the center of the store front, and having an ordinary show window on each side, the door is placed a little to the side of the center, thus allowing space for a larger and more conspicuous show window than would result if the store door was exactly in the middle. This large window occupies probably one half of the entire front, while the door and a smaller window suitable for a special display of a particular line of goods take up the remaining part. Our correspondent states that he does not know that this plan is a novel one, or whether it may not be employed in other places to a greater or less extent. He calls attention to it, however, for the reason that it is not at all a common arrangement in the city where he lives, and during a long and extensive acquaintance with the trade he has failed to observe an arrangement exactly like the one of which he writes.

FEW FLOORS are stout enough and stiff enough to remain level more than a few months at most after being laid. They will sag between supports, so that even a 16 foot room which will permit of a marble being laid near the washboard without its rolling toward the center is a rarity. The sag in most ordinary dwelling houses soon amounts to ¼ inch, and often reaches ½ inch. Putting the beams close together, or using thicker beams, does not seem to improve the matter much, and deepening them is rarely admissible, because people want all the head room that they can get, and begrudge every inch of joist depth. Besides this, increasing either the number or the thickness or the depth of joists costs money. But there is a way by which a level floor may be had without greatly increasing the timber bill, and that is by cambering all the joists from ¼ to ½ inch, and slanting with a floor rather higher in the middle than at the two sides at which the joists end. An upward camber of ½ inch in 16 feet of a 10 inch joist, the camber being measured with the joist lying on its side, will become only about ¼ inch when the joist is in place, without the flooring being laid. The weight of the latter will at once sag it until it is very nearly level, leaving for time and the weight of furniture to relieve, not any more than—perhaps not so much as—the sag which would have been in the new floor if the joists had been sawed straight.

A HOUSE CAN BE sold or rented more readily if it has handy little arrangements for the women of the family, than if entirely devoid thereof. The housewife often does the renting, and generally has the deciding vote in either renting or buying. There are few kitchens in modern houses—particularly in modern city houses—which have enough table room, that is, room for a large enough table, or for more than one. This can in great measure be offset by a very simple contrivance, consisting of a leaf 24 inches wide hinged to the chair strip, and having hinged to its under side a strut 3 x 1 inch, which, when the board is raised level, reaches to the top of the base board. The cleats or battens do not extend the full width of the leaf, but are of such length that when the leaf is down against the wall, they reach from the bottom edge of the chair strip to the top edge of the base board. The hinge of the strut is fastened by two or more screws in one leaf, and by but one in the other, so that the strut may be so swiveled around when the leaf is down as to lie snug and flat between the cleats and between the leaf and the wall.

THE TEMPERATURE of the earth below the top 10 or 12 feet seldom varies very much, particularly where the surface is covered with a building, so as to prevent the sun heating and the winds cooling it. Taking advantage of this fact, one may at no very great expense make the water of any city dwelling much cooler in summer than it is apt to be without such measures being taken. A trench is dug as narrow as possible, and as deep as may be convenient, running the entire length of the cellar. In this there is laid an iron pipe "coil," as a zigzag or alternate run is generally called, the pipe being at least double the capacity of the service line of the house. Upright lines are run from this above ground for connection with the street mains and with the house pipes and the trench then filled in. When the connections are made, the water from the street (warmed as it generally is by exposure to the sun's rays in a shallow reservoir, and often not improved by its passage through shallow laid mains) has to make several turns through the earth cooled coil before it reaches the house service pipe. The same effect may be produced, where well digging or boring apparatus are at hand, by sinking a vertical cooling pipe of several turns, in a well of small diameter, and then filling in the well

The new Temple Beth-el, to be erected on Fifth avenue and Seventy-sixth street, will have a copper dome surmounting a tower 140 feet high, and the roof and framework of the dome will be of iron. The entire cost of construction will be $400,000.

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MEASUREMENT OF ROOFS.*

BY TRIANGLE.

THE REAR ROOF.

IN ESTIMATING the surface of the rear roof, some would estimate directly from the plan in Fig. 91, not taking into consideration the pitch. The difference between the length in plan and elevation is shown in Fig. 94, where *w r* represents the distance from side of house to eaves in plan; *r s* the altitude, or the distance from *c b* to *o* in Fig. 90. By drawing *w s* we have the slant of roof, as shown by *c o* in Fig. 90. The difference in length between *w r* and *w s* shows the loss if the roof was measured on the plan without taking into consideration the slant. By laying the scale on *w r* and *w s* we see that the former measure 9 feet 2 inches and the latter 9 feet 8 inches, so there is a difference of 6 inches between the two. If

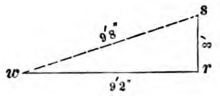

Fig. 94.—Diagram Showing Pitch of Rear Roof.



Fig. 95.—Diagram Showing Length of Hip.

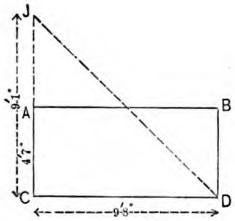

Fig. 97.—Area of Nos. 1 and 3.

one-half of the altitude C J, which results in the rectangle C A B D. The result of the various rules for obtaining the areas of figures is to reduce them to a square or rectangle, as has been done in the above illustration. As there are two triangles similar to *c s o*, Fig. 96, it must be evident we could obtain the area of the two by multiplying the altitude *c s* by the base *s o*.

In Fig. 96, *c' g' n' o'* is the shape of No. 2 of rear roof; the projection over porch, shown by *c' d' e' f'*, is a simple rectangle that can be figured separately. As the diagram is drawn to scale, the distances obtained from the plan and elevation can be used for determining the area of the figure, as will be shown. We lay the scale or rule on the plan and see that *c g* measures 3⅛ inches, and as the plan is to the scale of ⅛ inch to the foot, we have 25

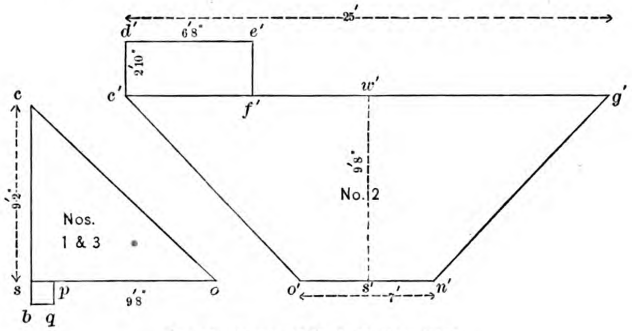

Fig. 96.—Shapes of Parts of Rear Roof.

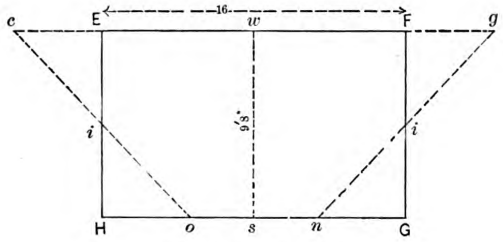

Fig. 98.—Area of No. 2.

it was desired to determine the length of the hip in rear roof, we would draw *t u* in Fig. 95, in length equal to either of the hip lines in roof plan. At right angles to *t u* would be set off *u v*, equal in length to *r s* in Fig. 94. By connecting *t v* we have the length of hip shown on plan by *c o* or *n g* In Fig. 96, *c s o* is the shape of parts Nos. 1 and 2 of rear roof; *s b a p* is the shape of the returns shown on Fig. 91 by *b a p* and *m k h*. By laying the scale on *c p* of side in Fig. 90 we see that the distance is 9 feet 2 inches, which we mark on the diagram in Fig. 96 as the distance from *c* to *s*. We will assume the slant of this part of roof to be the same as the larger part, and so will call the distance from *s* to *o* on diagram 9 feet and 8 inches, as shown by *w s* in Fig. 94. An inspection of the roof plan shows that parts 1 and 3 are alike in shape, and are each right-angled triangles. The rule for finding the area of a right-angled triangle is to multiply the base by half the altitude. This operation is shown in Fig. 97, where the base C D is multiplied by

* Continued from page 279, December issue.

eighths, or 25 feet, for the distance. This is marked on the diagram in Fig. 96, as shown. We also see that *o n* of plan is ⅞ inch, or 7 feet, which distance is placed at *o' n'* of diagram In the side elevation in Fig. 90 we have found that *c o* measures 9 feet and 8 inches, which we mark on diagram as the distance from *s'* to *w'*. For the projection over porch, in the side elevation, Fig. 90, we obtain the projection of *d c*, and in the plan, Fig. 92, the length *d e*. We see that No. 2 of rear roof is a trapezoid in shape, to obtain the area of which multiply the altitude (*s' w'*) by half of the sum of its paralell sides. Referring to the letters on No. 2 in Fig. 96, the operation would be as follows: *c' g'* + *o' n'* ÷ 2 × *s' w'* = area. By using the figures to perform the operation we would have 25 feet + 7 feet = 32 feet ÷ 2 = 16 feet × feet 8 inches = 154 feet 8 inches. The result of the rule in the case of the triangle is to reduce or change the figure to a rectangle, as shown in Fig. 98. When we add the distances *c g* and *o n* and divide by two we obtain the distance *i i*, and the area of the rectangle E F G H is obtained by multiplying the altitude E H by the base H G, or 9 feet 8 inches × 16 feet, as in the previous example. Another way of changing *c g n o* in Fig. 98 to a rectangle would be cutting off the triangle E *c i* and placing it at H *i o*; also cutting off F *g i* and placing it at G *n i*. Our intention is to show the reader that it is not necessary to remember the rule that applies to every known figure in order to be enabled to obtain the area, as the operation of changing the figure to a square or rectangle suggests a rule.

We have now obtained the area of the parts of the rear roof, as shown on plan, and referring again to the plan in Fig. 91, it might be necessary to allow for the projection if the roof was to be covered with slate or shingles, or for turning over at the outer edges, if it was to be covered with tin. We will suppose that a strip of material 6 inches wide is to be used for the flashing against the main building. The position of the flashing would be shown on plan in Fig. 91 by *a p*, *p o*, *o n*, *n m*, *m k*. These distances do not give the length of flashing on the roof, as *p o* and *n m* of plan represent the part of roof that has a pitch. Referring to the roof shapes in Fig. 96, we could obtain the length of flashing by taking *a p o* twice, and *o' n'* once, which would give 26 feet and 4 inches as the result, instead of 25 feet, as shown by *c' g'*.

THIS YEAR LEADS in the building record of Chicago. A close estimate for the closing months, added to what has already been accomplished, shows that 240,000 linear feet of new buildings will have been erected during 1890, or a frontage of about 45 miles. Averaging 25 feet to a house it means 10,000 houses, and at 20 feet 12,500 houses, or about 35 houses every secular day in the year.

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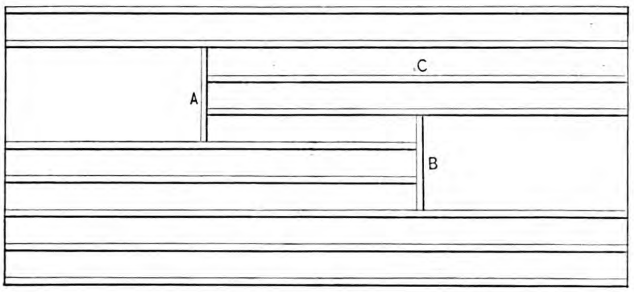
CORRESPONDENCE.

A Problem in Floor Beams.

From W. P., *Omaha Neb.*— I have a question that I would like to submit for consideration. It is illustrated by the enclosed diagrams. The drawing represents floor joists, A and B being headers. The question is, will they sustain or carry the weight when put in, as they are shown in the drawing, as well as they would if one of the headers was extended to the nearest joist running through? I trust I have made myself clear in the matter.



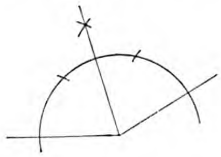
A Problem in Floor Beams.

Note.—We have reproduced our correspondent's sketch, and think we understand his inquiry. We think also the reader will comprehend his want. It does not require looking at the cut twice to perceive that the construction as shown is very weak and therefore quite objectionable. We should expect that portion of the floor between A and B to break down with a comparatively light load. Four of the joists are cut in the middle and are slightly held together by single headers.

We do not think there is any better rule in framing a floor than that of good common sense. Of course this is to be intelligently applied and all possible experience utilized. Certainly the present problem does not require deep mathematical knowledge in order to determine the real strength or the expediency of employing a certain plan. Our correspondent does not indicate the span, nor does he mention the presence of any supports under either of the headers or under that portion of the floor lying between A and B. Common sense, we think, would suggest a plan of carrying the headers through from joist to joist that cover the entire span, and in turn reinforcing these joists by doubling. Heavy stirrups should be employed to fasten the headers to the walls in this way. Then in turn the headers themselves should perhaps be doubled, in view of the larger joists which they are obliged to carry. By taking into account the span or load to carry, the presence or absence of supports underneath the floor, the intelligent builder ought to be able to judge what it is expedient for him to do. In any event we would suggest that he get enough strength, and not decide the question upon the basis of how little can be made to answer, but rather how strong or how safe can the floor be made.

Crown Mold Intersecting Gable.

From L. S. H., *Bolivar, N. Y.*—The problem to which the illustration is given by "O. A. H.," Chariton, Iowa, on page 262 of the November issue of *Carpentry and Building*, would seem to be a very easy one. It does not appear to be a very difficult matter to get the bevel of the molding at the angles after obtaining the angle, as shown by Fig. 1 of the sketches which I enclose. Let the molding lie in the miter box when being sawed, as shown in Fig. 2. All this, however, has nothing to do with what I think must have been the original question—and that is the joining of a rake molding to a crown molding, nailed to a plumb facia. Referring to Fig. 3 of the sketches, the space A B on the line representing the facia under or behind the crown molding should be divided into equal spaces, and lines drawn from those spaces at right angles to A B and intersecting the ogee. Then lines should be drawn from those points of intersection at the same angle with A B as the pitch of the roof. Then draw the line C D. Make 1, 1, on the rake equal to 1 1 on the crown; 2 2 on the rake equal to 2 2 on the crown, and so on with all the lines. Connect the points thus obtained and the shape of the rake molding to fit crown molding will be the result. The crown molding would be cut a miter, or at 450,



Crown Mold Intersecting Gable.—Fig. 1.—Method of Obtaining the Angle.

and held in the miter box just the reverse of the illustration. As for cutting a rake molding I do not know of any rule, and it would be almost impossible to obtain a cut in a miter box for it, for an ordinarily steep roof.

Note.—Our correspondent is correct in thinking that the sketch accompanying the letter from "O. A. H.," and published on page 262, was not intended to illustrate his method of cutting a rake molding to intersect a level molding. The sketch presented on that page was intended to accompany the letter from "O. A. H.," found on page 260 of the same issue, under the title of "Crown Mold Intersecting Gable," and the engraving published in connection with that letter should have appeared on page 262 in place of the one there printed.

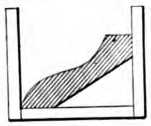


Fig. 2.—Position of Molding in Mitre Box.

Meaning of the Term "Penny."

From J. H. S., *Albuquerque, N. M.*—I very much wish some of the readers of *Carpentry and Building* would inform me what the term "penny" in connection with nails signifies? From what does the word come and how did it come to be applied to nails? I should be very glad to have this information and I have no doubt other readers of *Carpentry and Building* are equally interested.

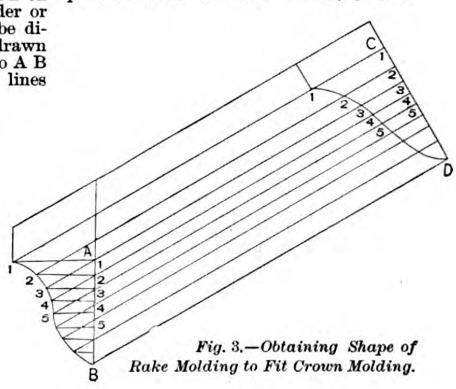
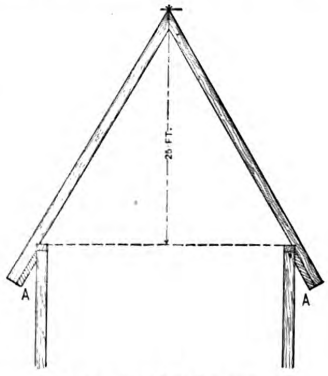


Fig. 3.—Obtaining Shape of Rake Molding to Fit Crown Molding.

Note.—The term "penny," as applied to nails, is variously interpreted, and among the explanations which are current the following may interest our readers: The word penny is understood to mean a certain number of pounds to the thousand nails, as, for example, "four penny" means 4 pounds to the 1000 nails; "six penny" means 6 pounds to the 1000 nails; "ten penny" means 10 pounds to the 1000 nails, and so on. The term is an old English one and first meant "ten pound" nails (the 1000 being understood). The phrase was, however, later contracted to "tenpun," and afterward it degenerated until "penny" was substituted for "pounds." At the present day when a thousand nails weigh less than 1 pound they are generally called tacks, brads, &c., and are reckoned by ounces.

A Question in Planceers.

From W. H. C., *Lenox, Mass.*—I trust the majority of the readers of *Carpentry and Building* appreciate the true worth of that journal as I do. I have taken it many years and have the different volumes bound. If young carpenters will only consider that what it took many years of patient study to understand can often be had for 10 cents, they would never miss a single number and would read each one thoroughly. I would like to ask through the columns of the paper, the following question: I would like to know how to draw the plan for the planceer of the cornice to a conical tower of say 20 feet



A Question in Planceers.

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diameter. A good idea of what I mean may be obtained from an inspection of the sketch which I send herewith. It will be observed that the planceer is not level but is under the lower edge of the rafters, as shown at A A in the sketch. If it were level then there would be no trouble about it.

Convenient Door Holders.

From J. N. H., *Cincinnati, Ohio.*—The trestle door holder recommended by "W. K. H.," illustrated in the November number of *Carpentry and Building*, and which, according to my judgment, is the most sensible one yet shown, reminds me of a device con-



Convenient Door Holder.—Fig. 1.—*Position for Planing One Edge.*

siderably employed in the States of Mississippi and Louisiana. It possesses the advantage over "W. K. H.'s" trestle of being entirely automatic in its action. Fig. 1 of the sketches which I send herewith shows the device in use when it is desired to plane one edge of the door or when fitting on the hinges. If it is desired to manipulate the opposite edge of the door it is only necessary to give a gentle rap with the plane, hammer or screw driver at the point A. This reverses the holder in the direction indicated by the arrow, the device automatically resolving itself into the second position indicated in Fig. 2 of the sketches. By a sharp blow on the projecting spring B, sometimes called the shin, we obtain the

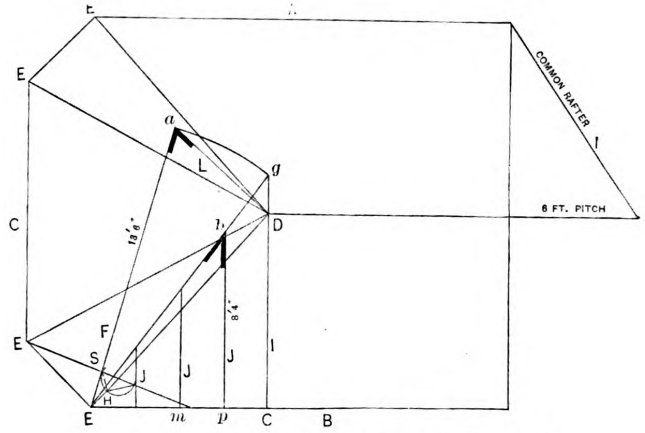


Fig. 2.—*Position for Planing Opposite Edge of Door.*

third position, which is an admirable one for all purposes where the ordinary horse or trestle is employed. The device is also useful to stand upon when adjusting the top hinges. This last position is shown in Fig. 3 of the sketch.

Framing Jack Rafters.

From D. C., *Berkeley, Cal.*—I have been an interested reader of the *Carpentry and Building* for some time, and in the September number I notice "O. A. B." of Yerka, Cal., desires to know the proper way of framing and obtaining the length and bevels of hips and jacks for his house, having an octagon end. The plates of the house are 18 feet from face to face. In the belief that a proper illustration may benefit this correspondent, as well as many others, I will give my method of solving the problem. If others have a better way I should like to see it, for the comparing and criticising of such methods is the education of the trade. Referring to the sketch which I send herewith, let A B represent the side plates of the house 18 feet wide, and C the octagon end. Now find the intersection point D formed by the sides A B and the octagon angles E E E E of the end C. Connect E E E E



Framing Jack Rafters.—Reply of "D. C." to "O. A. B."

of the point of intersection D, which is the seat of the hip rafter F. Then assuming that the common rafter is one-third pitch, that is, 6 feet, draw the line L perpendicular to the base line E D, 6 feet long, which gives the length of the hip rafter F. The angle at *a* is the plumb cut for the upper end of the rafter F. In order to find the length of the jacks draw a line at right angles to B through D, the full length of the common rafter I as shown by C *g*. Connect E with *g* which will be seen to represent the full length of the hip F. Then let J be the seat of the jack rafter, set 2 feet from the common rafter on B, as *p m* drawn until they intersect the line E *g*. That gives the length of jacks, and the angle at *b* gives the bevel for the level cut, the perpendicular cut being the same as the common rafter. To find the bevel for backing the hip, draw the line S and scribe a circle, whose center shall be the intersection of S and E D and intersecting with F. Then draw lines through the intersecting points, as shown at H. It should always be borne in mind that a line drawn through the center of the hip and jack rafters is, of necessity, the point for calculating the lengths. If the mechanic loses that point he is as much at sea as the mariner without his compass and chart.

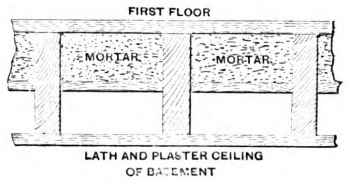
The Effect of Mortar on Timber.

From S. S., *Ithaca, N. Y.*—Several years ago a gentleman in this place erected a beautiful brick block designed for store purposes, and for some reason—probably to lessen the sound between floors, as well as to lessen fire risk—the builder filled in a part of the spaces between the floor joists with mortar and laid the floors before the moisture had evaporated. The mortar was put in between the joists about 4 inches deep, as indicated in the sketch which I send herewith. The flooring was then laid in the usual manner. The ceiling—that is, the lath and plaster in the basement—was put on the underside of the joists. The laying of the floor and the putting on of the ceiling before the mortar was thoroughly dry seems to have occasioned disastrous dry rot so far as the timbers are concerned. The work was done in cold, wet weather in winter, and its completion was unduly hastened in order to make the building ready for occupancy in the spring. As the basement of the building was not rented, it was kept closed, thus preventing the proper drying out process. The building has been used by clothiers, which probably accounts for the condition of the joists not having sooner been discovered. It is probable that serious damage might have resulted if the building had been used as a hardware store, or for one where a stock of heavy goods was carried. At the present time workmen are employed in tearing out the decayed flooring and joists and replacing with new. The odor emanating from the decaying mass has been exceedingly unpleasant for some time past.



Fig. 3.—*The Third Position.*

Note.—The letter of our corresponden ab ove is an exceedingly interesting one and relates a circumstance in building construction which appears to be the exception rather than the rule. It is



The Effect of Mortar on Timber.—Sketch Submitted by "S. S."

possible, however, that cases of a similar nature are known to readers of *Carpentry and Building*, and, if such be true, it would prove interesting reading if they

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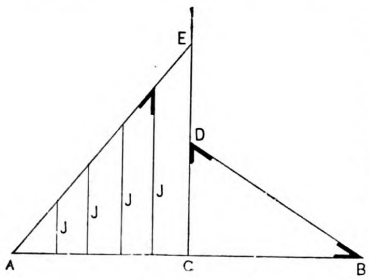
would send for publication a brief account of them and the conditions which probably caused them.

Problems in Roof Framing.

From I. P. Hicks, *Omaha, Neb.*—It is indeed surprising to read the numerous inquiries and solutions of hip and valley roof framing which have appeared in *Carpentry and Building* from time to



Problems in Roof Framing.—Fig. 1.—Plan of Finding Lengths and Bevels of Hip Roofs, Suggested by "I. P. H."

time. Roof framing is an interesting subject and seems to be a lasting one. If all the articles which have appeared on it in *Carpentry and Building* were put into book form it would make a very interesting and useful work for those seeking information in the art of roof framing. In the August number of the paper "J. H. P." has presented a very good plan of obtaining the length and bevels of rafters for hip roofs. His ideas are mainly correct and his sketch shows that he knows how to find the proper lengths and bevels, although, by some inadvertence or mistake, he has miscalculated the length of the jack rafter. If the rafters were 2 feet apart the run of each succeeding jack would be 2 feet more than the one before it. Now, taking the rise of a one-third pitch roof, it would make the length of the first jack placed 2 feet from the foot of the hip 28¾ inches. Consequently each succeeding jack rafter would be 28¾ inches longer than the one before it.

In answer to "C. E. S.," whose communication appeared in the June number of *Carpentry and Building*, I will say the subject of hip and valley roof framing

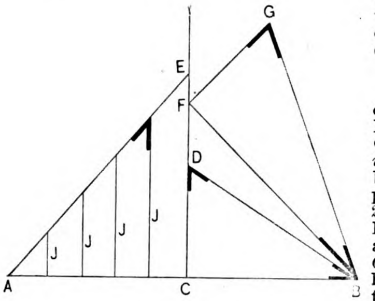


Fig. 2.—Another Plan for Doing the Work.

has been very freely discussed, yet do not think it has been exhausted. I am not very much on making geometrical demonstrations, and must confess that I never heard the term "broken back" hip and valley roof framing before. However, I have an idea of what I think my worthy contemporary would like to see illustrated. I have had a share of that practical experience in roof framing of which he speaks, but do not know as I will be able to clear up the question. Since the art of hip and valley roof framing has been so thoroughly illustrated in *Carpentry and Building* it would seem that the question now is, Who can present the simplest plan or produce something new? With this point in view, I will begin with the plainest form of a hip and climb up by degrees, until I reach a combination of hips and valleys that somewhere in the world may be designated by the term "broken back."

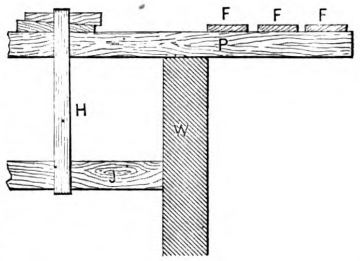
First I will introduce a plain hip. To find the lengths and bevels in the simplest manner with the fewest lines possible, and no lines crossing one another, tending to confuse the inexperienced, I will refer the readers to Fig. 1. First draw a horizontal line twice the run of the common rafter A. B. From the center of this line at C erect a perpendicular, continuing it indefinitely. Next measure off on the perpendicular line the rise of the common rafter C to D; connect D and B for the length of the common rafter. A bevel set in the angle at B will give the bottom cut and at the angle at D the top cut. Next measure off on the perpendicular line the length of the common rafter, C to E, which is exactly the same length as the line D B. Connect E and A for the length of the hip. Next space off the jacks on the line A to C, and draw perpendicular lines joining the hip. These lines, J J J J, will be the lengths of the jack rafters, and a bevel set in the angle where they join the hip will give the top bevel of the same. The plumb cut or down bevel of a jack is always the same as that of the common rafter. Now, I have shown all the lines necessary to be drawn. The plan shows everything but the cuts of the hip rafter; and this, it may be remembered, is always 17 for the bottom cut and the rise of the common rafter to the foot for the top cut. As some may think a system which does not show the cuts of a hip as well as its length is incomplete, I will take the same plan and by the addition of three more lines show everything that can be desired.

Referring to Fig. 2, draw the lines the same as in Fig. 1, then measure off on the perpendicular line the run of the common rafter C to F. Connect F and B for the run on seat of the hip. Next square up the rise of the hip from F to G and connect G and B for the length of the hip rafter. A bevel set in the angle at B will give the bottom cut and at the angle at G the top cut. It will be noticed in Fig. 2 that the lines A E and G B are of the same length and in both cases represent the hip rafter, but show it in different positions. The line A E shows the hip in position to find the lengths and bevels of the jacks, while the line G B shows the hip in position to find the length and bevels of the hip rafter. The plan will work on roofs of any pitch, and has only to be slightly varied for roofs of unequal pitches.

From A. L., *Napa, Cal.*—In looking over an article entitled "Problems in Roof Framing," by I. P. Hicks, in the October number of *Carpentry and Building*, I observe an error in regard to the top bevels for jack rafters in roofs of unequal pitches. I think if he will look over Fig. 2, which appeared in connection with a letter of mine written from Stockton, Cal., and published in the March number of *Carpentry and Building*, he will discover his error. A B and A H of that figure taken on the square give the bevel at H for the short side of the roof, while A F and A E give the bevel at E for the long side. It will be seen that the base and the hypotenuse are reversed to obtain the bevel. There are typographical errors in the correspondence to which I refer, but a little attention upon the part of the reader will render the meaning clear.

Stagings.

From R., *New York.*—In these days of towering buildings a fall from a scaffolding or staging means more than it did when three, or at most, four stories was the limit, and care should be taken to have the supports of the strongest character, while ease of putting up and taking down, as well as cheapness, be not forgotten. It may be taken for granted that the old way of cutting or leaving holes in the walls, through which to pass joists, has about passed away; also that the erection of a forest of rough boards and round or square timber, nailed, bolted or lashed together in a crude manner, is not in accord with the spirit of metropolitan constructive arts. Staging for bricklayers requires to be strong, stiff and light, and must be of a character to be esily put up and taken down by unskilled



Stagings.—Fig. 1,—One Way of Putting Up a Staging.

laborers. Assuming that a wall has been run just past the second floor line—say to the window sills: the joists, of course, being in their place, what is the best way to put up staging to accommodate the men and materials? One way is as shown in Fig. 1, in which W is the wall, J one of the joists under a window, P a 3 x 10-inch, or better yet, a 3 x 12-inch piece, one of several which are to support the 1½ inch boards F, which constitute the staging floor. A double hook, H, shown separately in Fig. 2, is made of strap or bar iron 3 inches wide, ½-inch thick; slipped under the joist J, and held while

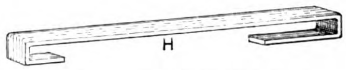


Fig. 2.—View of Double Hook.

the plank P is slipped under its upper end; wedges are driven in to bring P level, and the plank is then ready to receive the weight. The hooks should be forged so as to take in the joists and planks snugly. If there is any lateral looseness, a wedge should be driven in to keep the planks P from rocking. Trestles may be put in the floor F, if desired, but never rested on bricks, as is a common custom, in order to gain a couple of inches.

Another method of hanging or supporting external stagings is shown in Fig. 3,

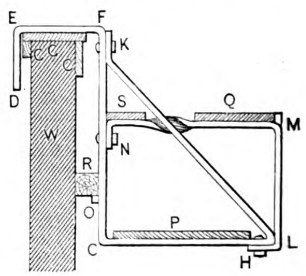


Fig. 3.—Another Method of Supporting a Staging.

in which the line D E F G H K represents an iron bar 1 x 3 inches, bent as shown, and L M N another, bent and twisted in the line indicated and bolted to the other, if desired. Omiting L M N, the bar D E F G H makes a good hanger, which may hooked in the window, W representing the wall and C the casings. The plank P serves as a staging for painters, pointers

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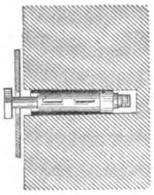
and other workmen who do not require hods of material to be brought to them. Q gives a higher reach if desired. An offset, M, prevents the plank Q being displaced laterally, and another, O, serves as a rest for whatever blocking, R, may be required to keep the hanger vertical when affixed to a wall thinner than the maximum to which it can be applied. If desired, L M N may be of sufficient length between L and M to raise the plank Q to the level of K; the same bolt going clear through three thicknesses instead of two. This will give a "second reach" considerably higher than that shown in the illustration at Q. The hanger as arranged may be used to support trestles, a narrow plank, S, being inserted for that purpose. Instead of the twist in the line M N, there may be one in K L, which will allow a wider board to be used at Q; or there may be lateral offsets, without twists, in both K L and M N, those in every strap similar to M N being say to the right, as viewed from M, and those in all similar to K L being to the left, as viewed from the same point.

Putting In Shutter Eyes.

From S. & R. M. C., *Philadelphia, Pa.*—In looking over the article which appeared in *Carpentry and Building* for December, 1889, entitled "Putting In Shutter Eyes," we would say that there is another way of doing the work and one



Putting in Shutter Eyes.—Fig. 1.—Sectional View, Showing Expansion Bolt.

which is proposed by the fire underwriters here. It is to fasten the eyes to the brick and stone surface by means of expansion bolts. This makes a very strong fastening and one which is exceedingly durable. In fastening the eyes to the wall all that is required is a hole drilled not larger at the top than at the bottom, and of sufficient size and depth to receive the expansion part of the bolt. The eye plate is then placed in position, the bolt inserted, and by turning the head as with a common bolt the malleable iron expansion parts are drawn toward the head of the bolt. This operation opens the cases and causes them to bind in the strongest manner possible. The method suggested will perhaps be more readily comprehended by the readers of the paper by referring to the accompanying sketches. Fig. 1 shows a section of a wall with the expansion bolt clearly indicated, while Fig. 2 represents a view of the shutter eye

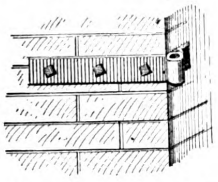


Fig. 2.—View of Shutter Eye in Position.

securely fastened in place. From this it will readily be seen that any strain on the bolts only tends to expand the cases more and more, and the greater the tension the firmer the bolt holds the eye to the wall.

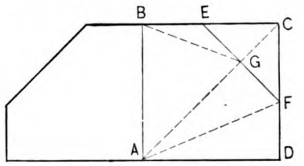
Our Novelty Department.

From B. I., *Fort Supply, Indian Ter.*—Will you permit an old subscriber to make some remarks about *Carpentry and Building?* There have been some vast improvements since the first number was issued, but somehow the paper does not appeal to my feelings as did the first number. Novelties, I think, ought to be a part of the body of the work and also the Trade Notes. In other words, I would have the arrangement restored to the plan that at first prevailed. If the novelties are worth engraving and publishing, they are worth preserving as a matter of reference. No one cares to bind in his volumes any odd numbered pages or advertisements of the ordinary character, that appear from month to month, but the Novelties are of that kind that should be kept. I have all the papers from the first. I am not a carpenter, but rather an all-around tinker. I have done some house carpentering and have built myself some pieces of cabinet work and also a novel tool chest, all of which have been praised and admired.

Note.—It is scarcely necessary to say to the old readers of *Carpentry and Building* that we are always glad to have letters of criticism and suggestion. A while ago we received a number of letters from readers in different parts of the country objecting to the presence of novelties in the main part of the paper, and in the spirit of meeting expressed wants we transferred them to our advertising pages. We have not been altogether pleased with the arrangement and we know that some of our readers have regretted the change. This letter is a frank expression of opinion, which we submit, hoping that it may call out the views of others, and that thereby we may have an idea of how our readers at large regard this question. What we want to ascertain is this: Do you like the present arrangement of the paper better than that which formerly prevailed, or would you prefer to have NOVELTIES brought back into the position that they formerly occupied? We want 10,000 letters in answer to this question within the next three weeks. When we get this number we shall then have heard from only a small fraction of those who read our monthly issues. We do not propose to publish all of the letters but we will take the reader into our confidence concerning a few of them, to show him just how the thing goes.

Drawing an Octagon.

From E. P. B., *Winter Park, Fla.*—I send herewith a simple, though mathematically correct, method of drafting an octagon. Referring to the sketch, let the side of the square A B C D be equal to one-half the width of the required octagon. Draw the diagonal A C, and on A C take A G equal to the side of the square.

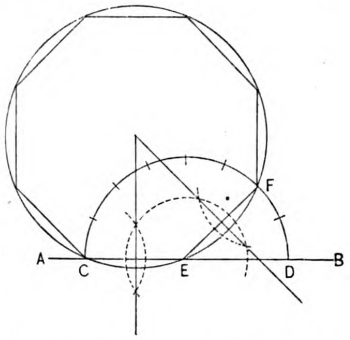


Method of Drawing an Octagon, Suggested by "E. P. B."

Through G draw E F at right angles to A C. Then will E F be a side of the required octagon. For drawing A F we have two equal right angle triangles, A F G and A F D, having a common hypotenuse and two sides made equal; therefore, F D the one-half of one side of the octagon equals F G the half of another.

Laying Out an Octagon.

From S. E. D.—I inclose herewith a sketch in answer to "C. D.'s" request which recently appeared in *Carpentry and Building* for further information in regard to octagonal figures. Space on the line A B the required length of one side of the octagon. With this as a radius, describe the semicircle C D. Space off C D with the required number of sides of the figure between the intersections of the line A B with C D. Draw the line from E to F. Find the center of the whole circle, as shown in the sketch, and space off the circle with dividers set at C E. The same rule will answer for any sided

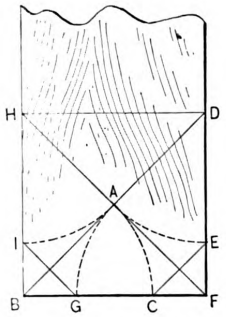


Method of Laying Out an Octagon, Suggested by "S. E. D."

figure by spacing the semicircle C D with the required number of sides in same.

Laying Out an Octagon Shingle.

From A. C. H., *Farley, Iowa.*—I saw in the November issue of the paper a diagram from "C. D." of Denver, Col., representing the manner of laying out an octagon. If the editor of the paper will allow me space I will explain my method, which may prove interesting in this connection. Suppose we desire to lay out an octagon shingle 7 inches wide, as represented by the sketch which I inclose: First, see that the shingle is square at the butt and exactly 7 inches in width. Then measure 7 inches from the butt and draw a line square across the shingle. Next find the exact center by drawing lines diagonally from corner to corner. Take a pair of compasses and set them from the center A to one of the corners. Then set the compasses at B and make a point at C. Then set them at D and make a point at E. Next set them at F and make a point at G, and then set them at H and make a point at I. Now, all there is to do is to draw lines from I to G and from C to E. Cut off the shingles at the lines indicated and an octagon is the result. I think this plan is more simple than the one in the November issue, although that presented by "C. D." is correct. If there are any



Method of Laying Out an Octagon Shingle, Adopted by "A. C. H."

readers of *Carpentry and Building* who can give me a simple method of laying off an elliptic, I would like to hear from them through the columns of the paper.

Brohard's Checks and Sash Locks.

From BROHARD & CO., *Clarksburg, W. Va.*—We note in the December number of *Carpentry and Building* an inquiry from a correspondent for Brohard's Door Checks and Window Locks. In reply we would say that we manufacture door checks and sash locks, and should be glad to hear from the correspondent making the inquiry.

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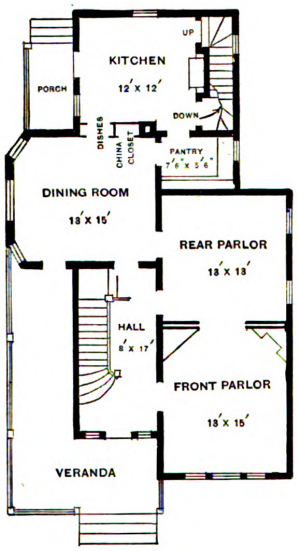
A STUDY IN HOUSE DESIGN.

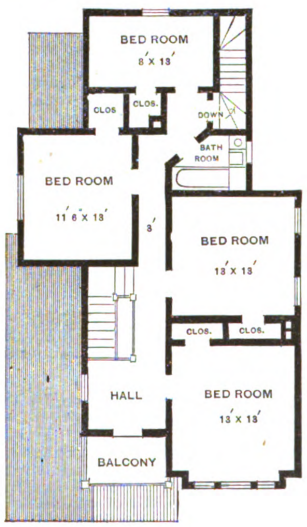
THE ELEVATIONS, floor plans and details of the house which we present upon this and the following pages are reproduced from designs furnished by Architect S. A. Bishop of Buffalo, N. Y. A cellar extends under the entire house, which is constructed after the style known as balloon framing. It is sheathed with surfaced hemlock boards, covered with building paper, upon which are placed clapboards. The roof and gables are shingled with a good quality of pine shingle, the whole exterior being painted in tints in two-coat work. The arrangement of the rooms show careful study on the part of the designer, a convenient feature being the amount of closet room. Upon the first floor are double parlors, dining room and kitchen, the latter communicating with the dining room by means of a pantry. The front and rear parlors are connected by folding doors, the front room being fitted with an open grate. The hall, dining room and parlor have reeded easings and base, the balance of the finish being O G. The furring is of ⅞-inch pine. The stairs, with turned and molded newel, balusters and rail, are finished in hard oil. Upon the second floor of the house are four sleeping rooms, bathroom and commodious hall. A rear stairway is provided, enabling one to pass from the kitchen to the second floor without entering the front portion of the house. The bathroom is fitted with tub, closet and basin, and is located toward the rear of the dwelling. Both the kitchen and the bathroom are wainscoted.



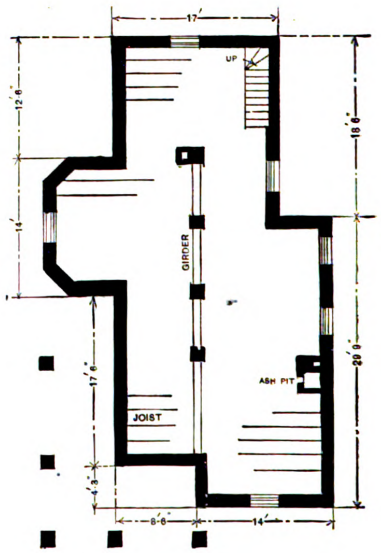
Front Elevation.—Scale, ⅛ Inch to the Foot.



First Floor.



Second Floor.



Foundation.

Scale, 1-16 Inch to the Foot.

A Study in House Design.—S. A. Bishop, Architect, Buffalo, N. Y.

Brickmaking in Bagdad.

The British Consul-General at Bagdad in his latest report has some interesting observations on brickmaking in that town. All Bagdad, with a population of about 116,000 souls, may be said to be built of kiln dried bricks. Stone is little used there, as it is in Mosul, in house building, and, although the tenacious clay of Irah gives good material, its use is confined chiefly to huts and agricultural squattings along the Tigris banks. There is thus an enormous demand for bricks. These are all hand made and kiln dried. There are about 25 large and small kilns at work, in the hands chiefly of Jews and Christians, but the turn out is far behind the demand. Half built houses sometimes remain so for long periods for want of bricks. The kilns are dotted over the desert outside the city. Often in spring, when the Tigris or Euphrates lays acres of ground under water, these stand like islands in the inundation, and brickmaking is suspended. The usual prices of bricks at the kiln side is £1.16 per 1000 of 12 inches square, and 18s. per 1000 of 7 inches square. The bricks are carried from the kiln on small donkeys, each taking not more than 10 large or 25 small bricks. In the course of transit they get much broken, as the best, though good to look at and of a chrome yellow color, are very brittle. Another great promoter of the demand for bricks is the absorption of water every winter, bricks suffering equally with the mortar in which they are laid, owing to their porousness.

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A ROW OF HOUSES IN ARLINGTON PLACE, BROOKLYN, N. Y.

SEE ARTICLE ENTITLED HOUSE PLANNING IN BROOKLYN, PAGE 6.

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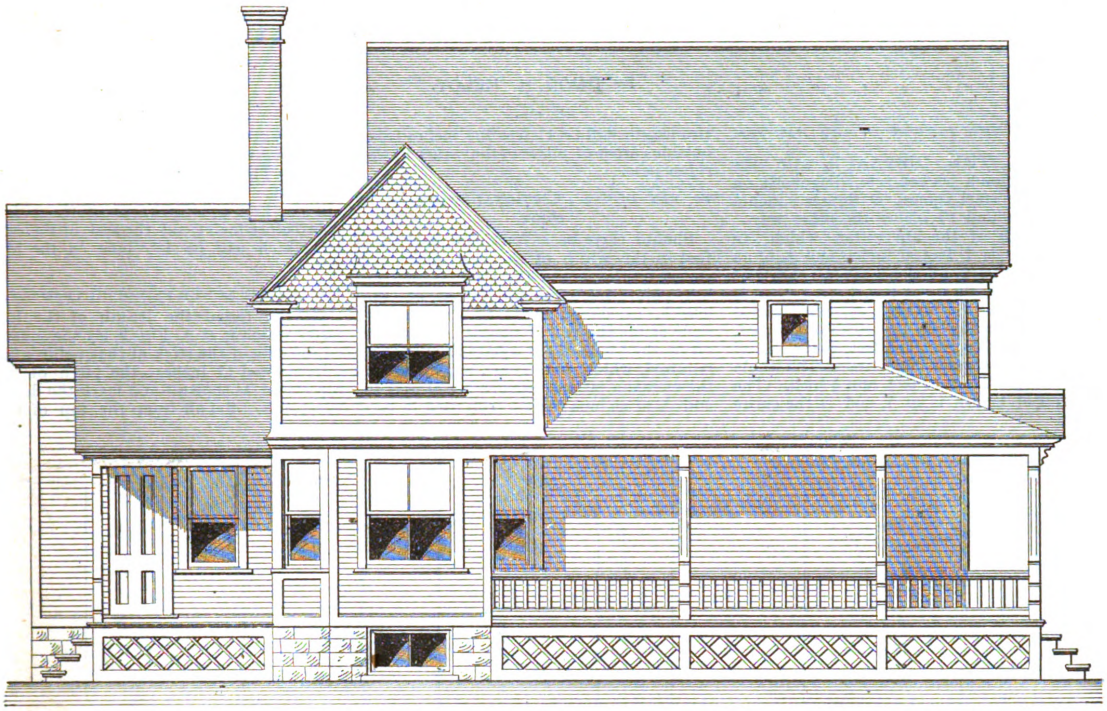
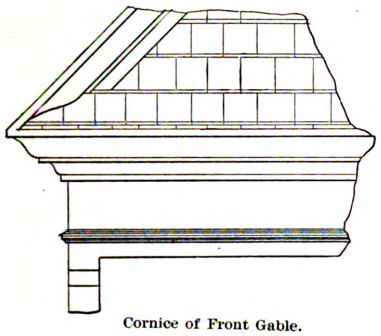
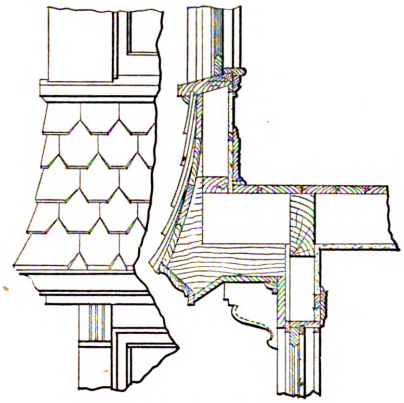


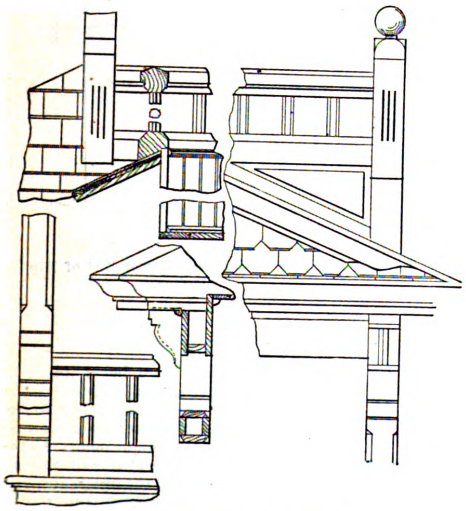
Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.



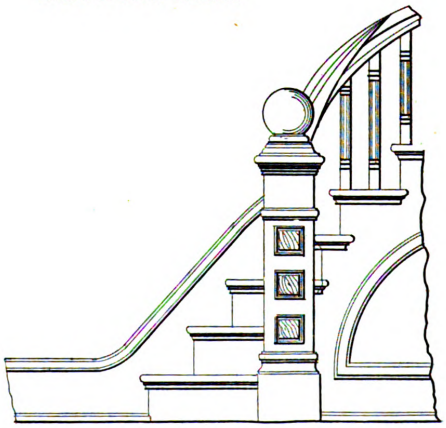
Cornice of Front Gable.



Details of Front Windows.



Details of Balcony and Porch.



Detail of Main Stairs.

A Study in House Design.—Details.—Scale, ½ Inch to the Foot.

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A SYSTEM OF FRAMING ROOFS.*

BY DAVID H. MELOY.

TO FIND THE LENGTH OF HIP RAFTERS.

TAKE THE DISTANCE with the common pocket rule, diagonally on the steel square, at figures 6 inches one way and 17 inches the other way—the pitch of the hip rafter, which, in this case, is 1 foot 6 inches and $\frac{1}{32}$ of an inch, and lay it off along the top corner of the stick, as shown in Fig. 7, from G to H and H to I. So continue as many times as there are feet in half the width of the roof, which, in this case, is 8 feet, so the lay off should be repeated eight times. The whole distance will be 12 feet and $\frac{1}{4}$ inch. The point of length is at I, and is the entire length of the hip rafter from outside of the plate to the center of the ridge pole. Always remember to take out half the thickness of the ridge pole, which in this case one-half the thickness is 1 inch, and remember, also, that for 1 inch of the ridge pole on the common rafter you must take out $1\frac{5}{12}$ inches on the hip rafter. So then, move the square back $1\frac{5}{12}$ inches, as shown at J, and mark the down bevel J K through that point which will give the exact length of the hip rafter, and in this case the entire length will be 11 feet $10\frac{3}{4}$ inches from outside corner of plates to the corner of the ridge pole.

TO LAY OUT A FRACTIONAL PART OF A FOOT.

Should there be a fractional part of a foot in the width of the roof, place the square on the side of the stick below the last point made in the layout of the length, as shown at D E, Fig. 8, the same as for the run of another foot. Set off on the blade of the square the distance required, which, in this case, is 2 inches on the common rafter. Remember always to add $\frac{5}{12}$ of an inch to each inch used in laying out hips, because, as for 1 foot on the common rafter, 17 inches or $1\frac{5}{12}$ feet is required in laying out the hip rafter; so also for 1 inch on the common rafter, $1\frac{5}{12}$ inches is required in laying out the hip rafter. Therefore the distance to be set off on the blade of the square for the extra 2 inches on the hip rafter is $2\frac{10}{12}$ inches and is shown at F. Now move the square down on the stick, keeping it at the same figures 6 and 17, as shown by the dotted lines, and mark the down bevel A B through the point F, which will give the exact length of the hip and the place of beginning to lay out the seat of the hip rafter. The rule for the lay out is given in Fig. 9. Here again remember to take out one-half the thickness of the ridge pole before laying out the seat of the rafter, which will be $1\frac{5}{12}$ inch on the hip rafter.

TO LAY OUT LOWER END OF HIP RAFTER.

Having found the length of the hip rafter which is at A, Fig. 9, lay the square on the side of the stick at that point with 6 inches and 17 inches—the pitch of the hip rafter, as shown—and mark the down bevel A B. Set off from the top of the rafter at A, on the down bevel line A B, the hight the hip rafter is to stand above the plate, which, in this case, is 3 inches from A to C. Move the square up so that the outer edge of the blade comes to the point C and mark the seat line of the hip rafter along the blade of the square through C. Find the distance across the top of the plates where they lock together from outside to inside corners, and where the hip rafter is to rest, setting it off on the seat line from C to D. Make another down bevel line E F, through the point D. Find

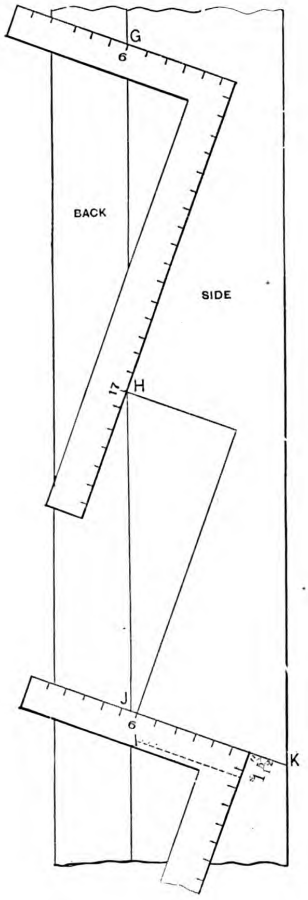

Fig. 7.—Finding the Length of Hip Rafters.

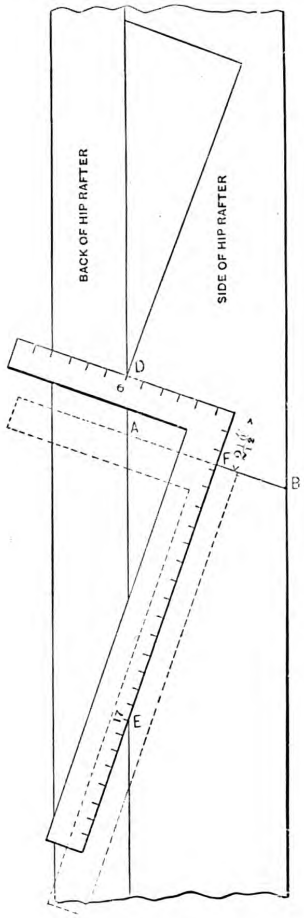

Fig. 8.—Diagram Showing Method of Laying Out Fraction of a Foot.

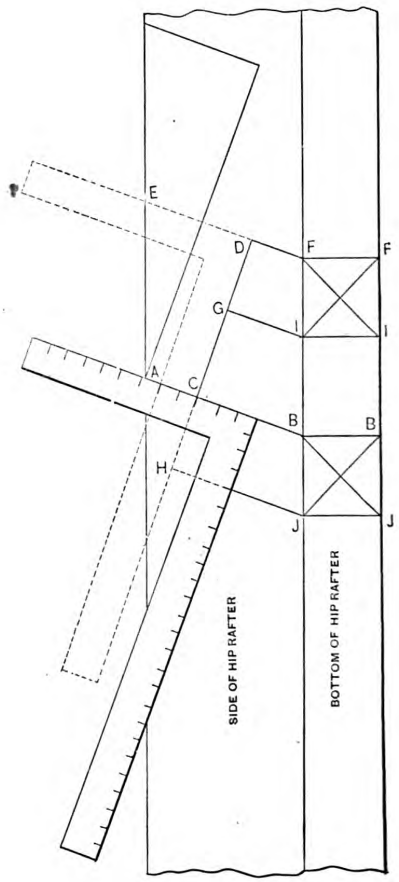

Fig. 9.—Laying Out Lower End of Hip Rafter.

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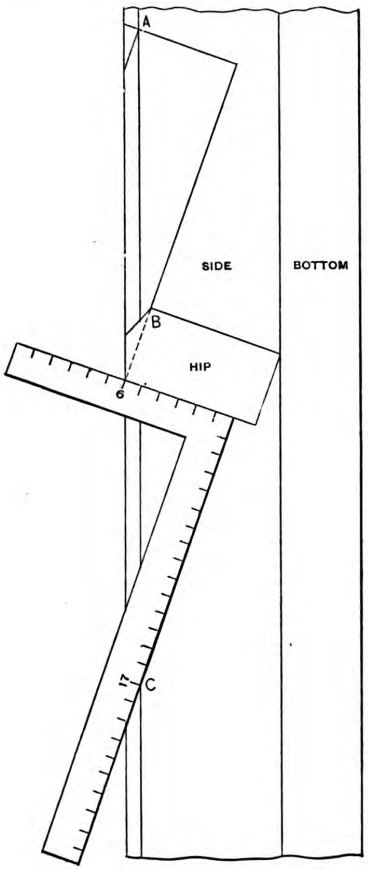

Fig. 10.—Backing a Hip Rafter

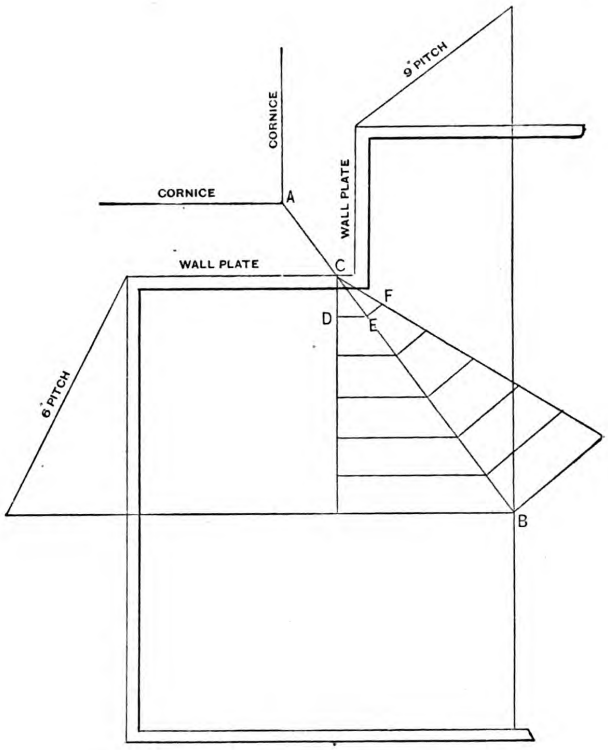

Fig. 12.—Laying Out Valley Rafter for Roofs of Different Pitches.

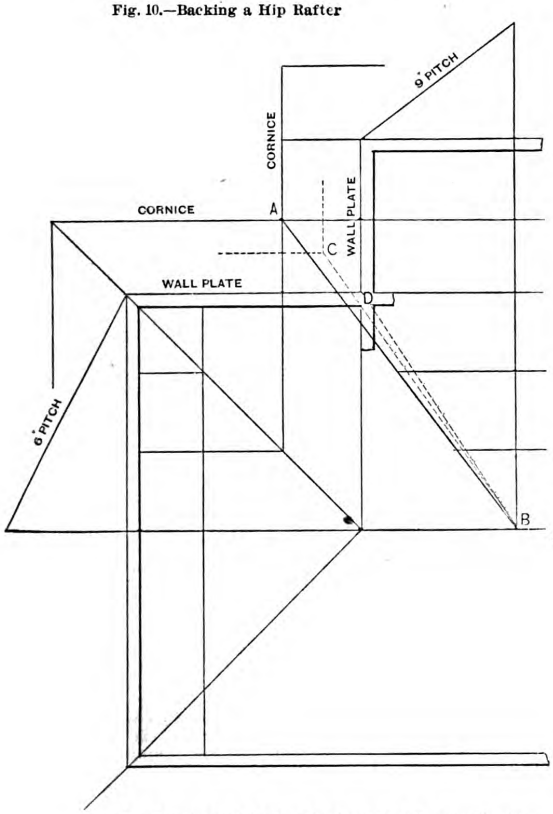

Fig. 11.—Laying Out Rafters for Roofs of Different Pitches.

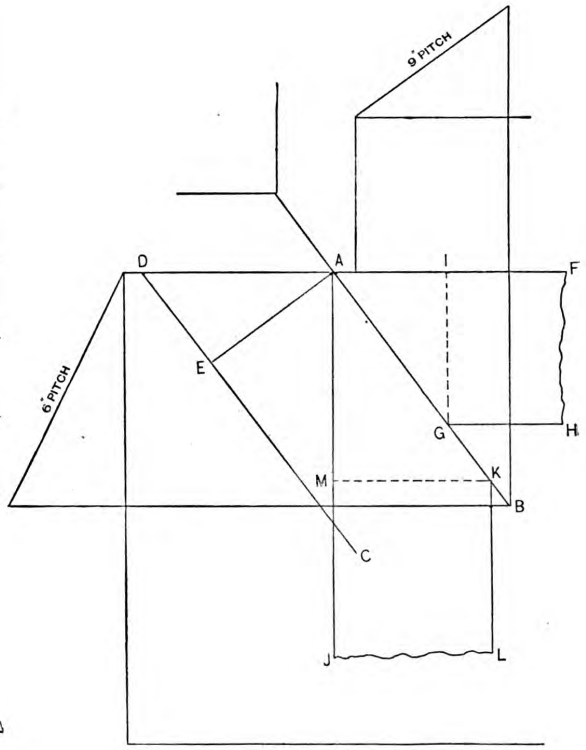

Fig. 12.—Laying Out Side Bevels for Two Pitches.

A System of Framing Roofs.

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the exact thickness of the hip rafter at this place and set off the distance on the seat line from D to G and from C to H; mark two more down bevels from G to I and from H to J. Square across on the underside of the hip from F to F, I to I, B to B and J to J, and lay out on the other side of the rafter the same as above. Make the diagonal marks on the underside of the hip F I and B J, both ways. Cut through all diagonal marks to the seat lines H C G D, on both sides of the stick, and the layout of the hip rafter is complete. Cut the lower end outside of the plates to suit the detail of the cornice.

TO LAY OUT BACKING OF HIP RAFTERS.

This rule is so simple that everybody wonders why it has been overlooked so long, or why it has not been used before in other works on framing rafters. It is easy to explain, and easy to understand. Take half the thickness of the hip rafter, and set it off from the top corner of the hip at right angles to any down bevel, as shown at A, Fig. 10. Or set off half the thickness of the hip on any level or seat line, as shown at C, Fig. 10. Gage through these points on both sides of the hip, and bevel to the center on the back, as shown at B, Fig. 10. It is not very important that the hip and valley rafters be back beveled, and this extra work is often omitted even in many good buildings. When it is required, the bevel should be laid out and gauged on the sides of the stick before the seat of the hips are laid out, because the hight of the hip above the plate is to be set off from the gauge line, instead of the corner of the stick. The valley rafter will also be set so much higher on the plate, and the jack rafters will be set even with the top of the valley if they are back beveled. When the valley rafter is not back beveled, the top of the jack rafter must be set that much above the corners of the valley rafter.

TO INTERSECT ROOFS FOR TWO PITCHES.

To lay out the rafters where roofs of different pitch intersect is much more difficult than in those of one common pitch, and is also much more difficult to illustrate and explain, therefore little has been said in other books on the subject. The roof we are to lay out has a pitch of 6 inches on one side and a pitch of 9 inches on the other side, as shown in Fig. 11, and the two roofs intersect in a valley shown by line, A B.

Before laying out such a roof it is necessary to know the exact projection of the cornice, which, in this case, is 2 feet from the outside face of the plate to the outside of the crown moulding on the cornice, as shown at A. If the projection of the cornice was only 1 foot, the lower end of the valley rafter would be nearer the angle of the building at C, as shown by the dotted lines C B.

If there were no cornice on the building the lower end of the valley rafter would be at the angle of the plates D, and the top of the plates would be even, but when there is a projecting cornice the plate on the 9-inch pitch roof must be raised above the plate on the 6-inch pitch roof just in proportion to the projection of the cornice, and in proportion as one roof rises faster than the other roof. In this roof the plate on the 9-inch pitch will be 6 inches above the plate on the 6-inch pitch, the difference of rise in the two feet projection of the cornice.

TO LAY OUT THE VALLEY RAFTER FOR TWO PITCHES.

We have now found the position of the valley rafter, as described in Fig. 11 and shown in Fig. 12, by the line A B, which is the location and base line of the valley rafter and by which we can now obtain figures for laying out the work. Square in on the plan 1 foot from the outside face of the plate where the valley rafter is to stand from C to D. Mark D E parallel with the plate, cutting the valley rafter at E. From the point E set up the rise of 1 foot, which in this roof is 6 inches, from E to F, and mark the pitch line C F. By these lines if correctly laid out full size, we will find the distance on the level or run from C to E to be just 15 inches, and this distance, C E, represents 1 foot run on this valley rafter the same as 17 inches represents 1 foot run in the common one pitch rafter. The rise from E to F is 6 inches and the pitch line from C to F will be $16\frac{3}{16}$ inches, so then we will lay out this valley rafter the same as the regular valley, using the figures 15 inches for the run, and 6 inches for the rise. The entire length of the valley rafter will be 8 feet $1\frac{3}{4}$ inches or $16\frac{3}{16}$ inches six times. Remember to take out one-half the thickness of ridge pole. The side bevels of this valley rafter, and the side bevels of the jack rafter against the valley are given in Fig. 13.

TO LAY OUT SIDE BEVELS FOR TWO PITCHES.

The line A B, of Fig. 13, represents the plan and position of the valley rafter. To find the side bevel of the valley rafter against the outside face of the plate, lay off on the plan the exact thickness of the rafter parallel with the line A B, as shown by line C D; then square across from A to E, and the distance from E to D is the distance between the two down bevels on that side of the rafter. Mark the diagonal A D on the underside of the rafter, which will fit exactly against the outside face of the plate. The side bevels of the jack rafters are found by the same method. The line A F represents one side of the jack rafter for the 9-inch pitch roof. Find the exact thickness of the rafter and lay it off on the plan parallel with A F, as shown by line G H; then square across from G to I, and the distance from A to I is the distance between the two down bevels on the jack rafter. Mark the diagonal A G, which will be the side bevel against the valley for the 9-inch pitch roof. The side bevel against the hip for the 6-inch pitch roof must be found by the same method, but the bevel will be longer. The line A J represents one side of the jack rafter and K L the other side or thickness. Square across from K to M and the distance from M to A is the distance between the two down bevels. Mark the diagonal A K and you have the side bevel against the valley for the 6-inch pitch roof.

(To be continued.)

THE FEDERATION OF LABOR.

THE American Federation of Labor began their sessions in Clawson's Hall, Detroit, Mich., on Monday, December 8. Eighty delegates were then present, and the convention was called to order by the president, Samuel Gompers. The opening session was largely taken up by the annual address of the president, in which the eight-hour movement was referred to at considerable length. It was stated that since the last convention the movement has been successful in 137 cities, and has benefited 46,197 workmen in the carpenter's trade, besides countless others in allied industries. During the year the federation has established 247 local branches, and the National Trades Union reports 913 local branches established. The president also referred to the strikes reported by the National Association, the number being given as 1163, of which 989 were successful, 76 being lost and 98 compromised. The strikes were generally for a reduction in the hours of labor, an increase of wages or maintenance of the rights of workers. The president commended the project of an international labor congress in 1893, to be coincident with the World's Fair; asked for the enforcement of the eight-hour law in Government work; also for a suitable federal alien labor law; suggested the extended observance of Labor Day as an annual holiday; condemned child labor and called upon trade unions in general to take prompt action. He also declared for international copyright and ballot reform. Following the president's address was the report of the Committee on Credentials, after the reception of which the convention adjourned until the following day.

A large portion of the time of the convention during the second day's proceedings was taken up with the consideration of the credentials of the representatives of the New York organization. The committee to which the matter was referred reported in favor of returning the credentials, and after a warm discussion of three hours and a half it was so voted. During this discussion President Gompers took the floor, and in an address lasting something over an hour reviewed the entire situation. Numerous resolutions were submitted touching various matters of general interest, among them being one that each member of local, national or international unions be assessed 10 cents per quarter to form a strike fund, from which all men on strike should receive $2 per week. Various resolutions looking to the boycotting of manufacturers, the supporting of various union strikes and requests for co-operation and assistance to organize a number of unions of the federation were also offered. The second day's session was attended by 99 delegates. In the evening the different bodies were given receptions by local unions.

The morning session of the third day was a short one, in order to allow the Committee on Resolutions to occupy the hall. During the afternoon this committee made its report, and a number of debates occurred. It was voted after much discussion to print the reports in German only when the demand was great enough to justify the expense. In the evening the members were tendered a banquet by the Detroit Council of Trades and Labor Unions.

During the following sessions the convention sent greetings to the Farmers' Alliance Convention and International Labor Congress at Brussels. Support was pledged to the painters who will strike for eight hours May 1, and the legislatures of Georgia, Kentucky, Tennessee and Alabama were asked to forbid convict labor in mines. The convention decided that only *bona fide* members of trades can hereafter be delegates. A motion to make a new executive council of four and leaving out the officers except the president was lost. The bonds of the secretary and treasurer were raised to $5000. During the afternoon of the last day of the convention the first business was the election of officers, and with the exception of treasurer all the old officers were continued. The new treasurer, J. B. Lenmore, was elected by acclamation. After the officers had been elected Ida M. Van Etten read a paper on "The Condition of the Women Workers Under the Present Industrial System." The discussion of the report of the Committee on Constitution was then taken up and the various points remaining from the morning session were considered at some length. Birmingham, Ala., was selected as the place for holding the next convention.

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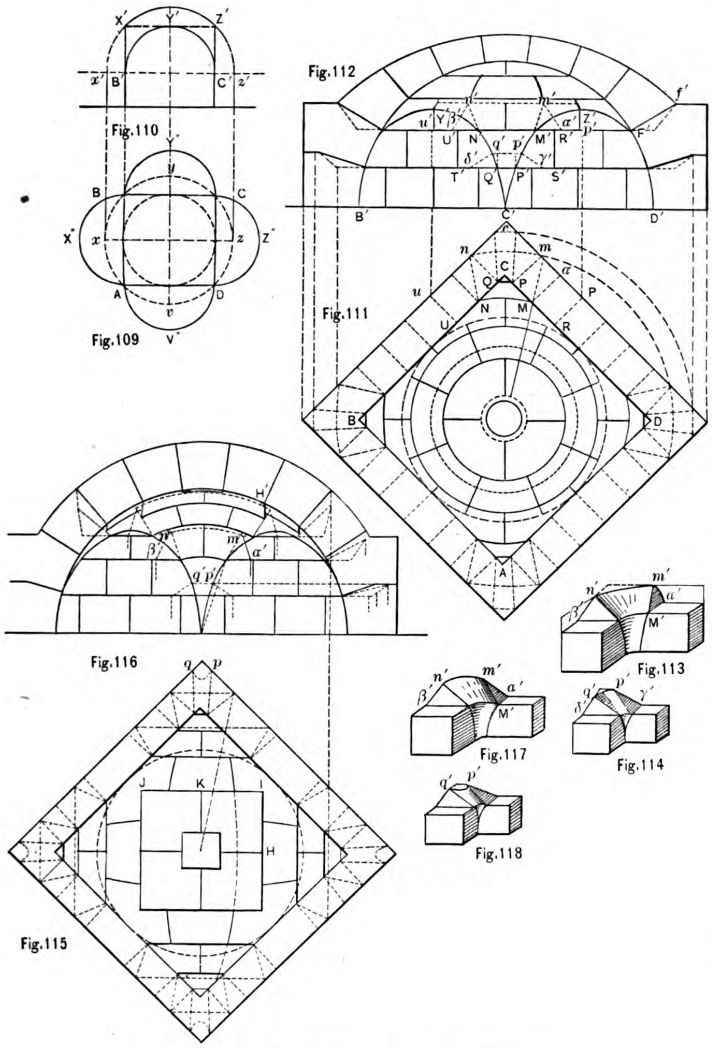
MASONRY AND STONE CUTTING.*

CUPOLA ON PENDENTIVES WITHIN FOUR WALLS.

LET Fig. 109 *v x y z* be the circle forming the springing line of a semicircular cupola. Inscribe therein a square, and let that square be the plan of the interior wall face of four vertical walls. These walls will cut off from the sphere four segments; the sections of the sphere by the wall faces are circles which are shown plan these will be circles. By marking the points where the circular joint lines are stopped by the inclosing lines, we get the projections B′ Y′ C′ and C′ Z′ D′ of the circular sections of the sphere by the vertical planes of the walls. A horizontal joint line at the level of the crown Y′ or Z′ of the side arches must be avoided, and the division of arch stones must be modified accordingly.



Masonry and Stone Cutting.—Figs. 109 to 118 Inclusive.

turned down in A X″ B, B Y″ C, C Z″ D, D V″ A. Then of the hemisphere there will remain the crown of the dome within the circle V X Y Z inscribed in the square, and four triangular spaces A V X A, B X Y B, C Y Z C, D Z V D. These triangular spaces are called "pendentives." Fig. 110 gives the elevation of the truncated hemisphere.

In Figs. 111 and 112 we show the section of the vault by a vertical plane taken on the diagonal of the plan. The section of the vault is in that case the full semicircle on the diameter B′ D′. We divide the section in an odd number of arch stones, and from each point of division we draw the horizontal bedjoint lines; on

The portion of the cupola which is clear above the side walls is constructed as usual. The stones blonging to the pedentive are partly parts of the cupola, partly parts of the wall; such is the stone formed of the three following parts, M′ P′ Q′ N′, M′ P′ S′ R′, N′ Q′ T′ U′, the first being spherical, the other two planes. Along the circular joint line M N on plan, M′ N′ on elevation, the joint will be a truncated cone as usual, formed by the normals to the surface of the sphere. The joint at the back of this part will be the line *m n* on plan and *m′ n′* on elevation. As the joint M′ *m′* of that stone has exactly the same inclination as F′ *f′* on the right hand side of the section, we determine the level and the radius of the joint, *m n m′ n′*, by means of the point *f′*. The lower bed joint, P Q, P′ Q′, has its conical part constructed in identically the same way.

Now to connect the conic joint of the pendentive with the horizontal bedjoint of the wall, a small triangular plane is introduced, such as M *m a*, M′ *m′ a′*, M *a* being made square with the face of the wall. The stone when completed will appear as in Fig. 113, and the stone below it is given in Fig. 114.

To cut the stone, we begin by producing a prism with base equal to R, M, N, U, *w*, *c*, *r*, on plan, and the hight of which is equal to the difference of level between T′ S′ and *m′ n′*, Fig. 112. On that prism we draw the lines T′ Q′, Q′ P′, P′ S′, *u′ β′*, *β′ n′*, *n′ m′*, *m′ a′*, *a′ r′*, and by the means of these lines all the plane surfaces of the stone can be worked. The arc M N can be marked on the cylindrical surface, and then the conical joints can be worked, and also the spherical soffit.

OTHER CONSTRUCTION OF THE SAME VAULT.

Sometimes, instead of making the lines of the bedjoint horizontal, they are made in vertical planes, which are projected on the plan either as squares parallel to the walls, or parallel, as in Fig. 116, to the diagonals of the plan.

The division in arch stones is made as in the former construction, and every point of the divisions, such as H′, is projected down in H on the diagonal of the plan. Then the square H, I, J, K . . . is drawn; and the vertical planes produced on the sides of that square will cut the sphere along four arcs of circles, which, taken together, will form the bedjoint lines of that course of stones. The lower joints form vertical arcs of circles on the pendentives, and horizontal bedjoints on the inclosing wall. The joints will be horizontal planes in the parts of the stone belonging to the walls, and they will be convex conical surfaces in the pendentives. On the springing course, as the conical joint is cut by a horizontal plane, *p′ q′*, the conical will be limited there by an hyperbola. Figs. 117 and 118 show the stones of the pendentives constructed on this last system.

Monarch of the Forest.

A correspondent in San Francisco, Cal. writes as follows: In the October issue of *Carpentry and Building* I read an article on big trees which interested me to such an extent that I inclose an article descriptive of what, I think, is the largest tree in California, if not in the world. The following is the clipping: "The largest tree in the world has just been discovered in Fresno county. Frank Lomis, an old mountaineer, and party, returned to-day to Sanger from a bear hunting expedition in the Sierra east of Centerville. They wounded a bear, and in pursuing it ran across a big tree in the most rugged portion of the mountains, about 2 miles north of Kentucky Meadows. The tree was circumscribed by a radius of a mile or more of almost impenetrable underbrush, so that the hunters were compelled to use both knife and axe to reach the center. It is certain that no man has ever traversed the same ground, at least no evidences of that fact were found. The tree was measured about 4 feet from the ground, and a rope 129 feet 5 inches long was necessary to span its circumference. The truth of this statement is vouched for by several who saw the tree. It was christened by those discovered it "The Orejano."

* Concluded from page 254, November, 1890.

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DAVID A. WOELPPER, Builders' Exchange, Philadelphia, Pa.

Legislative Committee.

WM. HARKNESS, JR., 247 South Seventh street, Philadelphia, Pa.
JAMES BOLAND, 427 Elk street, Buffalo, N. Y.
WM. A. KELLY, 1316 Charlotte street, Kansas City Mo.

Committee on Resolutions.

W. J. STAPLETON, 97 Cherry street, Detroit, Mich.
D. J. HAMILTON, Builders' Exchange, Pittsburgh, Pa.
JOHN DE CLUE, Ninth street, St. Joseph, Mo.

Committee on Builders' Surety Company.

A. MCALLISTER, chairman, 20 Newton street, Cleveland, Ohio.
GEORGE C. PRUSSING, 13 National Life Building, Chicago, Ill.
J. MILTON BLAIR, 45 Johnson Building, Cincinnati, Ohio.
EDWARD E. SCRIBNER, 355-361 Washington street, St. Paul, Minn.
JOHN J. TUCKER, 37 West Twelfth street, New York, N. Y.
JOHN S. STEVENS, 130 North Sixth street, Philadelphia, Pa.
WILLIAM H. SAYWARD, 164 Devonshire street, Boston, Mass.

Sub-contracting Committee.

JAMES A. MILLER, 121-129 South Clinton street, Chicago, Ill.
STACY REEVES, Builders' Exchange, Philadelphia, Pa.
W. A. KELLY, Builders' and Traders' Exchange, Kansas City, Mo.
SAMUEL FARQUHAR, 22 East street, Boston, Mass.
ABRAHAM RASNER, Builders' Exchange, Pittsburgh, Pa.

Committee on Statistics.

W. H. GROSLINE, 243 Powers Building, Rochester, N. Y.
H. W. EDDY, 8 Norwich street, Worcester, Mass.
BARCLAY COOPER, 1111 Hennepin avenue, Minneapolis, Minn.

Committee on Uniform Contracts.

GEO. C. PRUSSING, 13 National Life Building, Chicago, Ill.
A. MCALLISTER, 20 Newton street, Cleveland, Ohio.
MARC EIDLITZ, 123 East Seventy-second street, New York, N. Y.

The next convention will be held in New York City, on the second Tuesday of February, 1891.

Missionary Tour of the Secretary of the National Association of Builders for 1890.

Since the formation of the National Association it has been the custom of its secretary to make an annual tour of such Exchanges as could be reached in the time available for the purpose and that desired him to pay them a visit.

The object of these visits has been to give the local bodies the benefit of a wider range of experience regarding methods and lines for the conduct of a Builders' Exchange that have been proved successful, than they would be likely to receive from local members or to evolve from within themselves.

The first trip was taken more as an experiment than anything else, and the result was such that the next year's tour was made at the request of the Executive Committee, and thereafter was considered an established duty. When the end will come is only a question of time, as there are a sufficient number of builders' organizations in the United States at present that should have a visit from some representative of the National Association to keep two secretaries on the go all the year around.

One of the greatest difficulties which the secretary has to struggle with on these trips is the discouragement that seems to take possession of members of local bodies who have the interest of their organization most at heart, because the wrong conditions, which were the cause of the formation of an Exchange, did not vanish as soon as such an organization was effected. The mere existence of a Builders' Exchange, no matter how lofty its aims or how excellent its intentions, will not secure the desired changes and reforms. Work—persistent, conscientious, hard work by the members who have the present and future welfare of their business at heart—is the only thing that can accomplish what must be done to place the building business where it belongs.

It is not manual labor which will accomplish the end, either, but the gathering together of such men as represent the confidence and integrity of the trade, in a given locality, and each standing firmly by the other and the plan that has been adopted by them all to improve the conditions under which undisturbed custom compels them to transact their business. The younger Western associations show beyond question what can be done by a properly organized and conducted Builders' Exchange. As a rule they are composed of young men, some of whom have gone West to escape the close competition of the old established East, where the reputation and capital of their older competitors was too strong for them, and they are anxious to help along everything that will tend to improve their business and the place of their adoption. This spirit, together with lack of long continued practice under ancient customs, makes them particularly excellent material to incorporate into an Exchange, as they have no long established customs, save by teaching and not practice, they are willing to accept and test any plan that will insure improved practices and methods. They have, besides, the benefit of the experience of the older associations and all the experiments that have been tried, and have the privilege of choosing from what has been proven successful.

This, then, is the mission of the National Secretary, to carry to all Exchanges, new and old, the plans and devices that have been proven successful, and to show to these associations the fallacy of plans that have proven failures, also to give what encouragement he can to those who fail to see the end which their too great enthusiasm led them to imagine close at hand.

It is the plodders who have secured the reforms in history, the men who cling to their beliefs, and it is the same today.

Syracuse, N. Y.

The first city visited was Syracuse, N. Y., where a very satisfactory meeting

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was held. Members of the association show an ever increasing interest in the affairs of their association and fully appreciate the importance of having a well defined organization of builders in their community, as well as the benefits to be derived from associating themselves together for the purpose of securing better conditions, uniform practices and the improvement of the methods existing in the building business. The greatest difficulty here, as well as in many of the other cities, is the fact that the members of the association do not seem to recognize the value of the 'Change hour.

One of the fundamental principles of the Exchange idea is an established hour during the day, usually from 12 to 1 o'clock, when every member of an Exchange or his representative may be found in the 'Change room. It is impossible to state the specific benefits which accrue from this custom any more than those which have been given over and again in these columns, just the same as it is impossible to compute the actual benefit to any business man who is thrown into daily contact with his fellow men in similar cases. But that there is an inestimable benefit no one thinks for a moment of disputing, and it should be recognized by the builder as quickly as the man in other lines of business.

The field of labor has been undisturbed for some time past in Syracuse and vicinity, and there is no prospective complication at the present time. Everything in connection with the Syracuse Association promises a creditable relationship with the National Association and continual progress.

Rochester, N. Y.

At Rochester, in spite of a heavy rain storm, there was a good attendance at the meeting addressed by the National Secretary. While the general tone of the Exchange is healthy, and members are active and interested, there is the same defect here that appears in so many other similar bodies, which is, lack of comprehension of the importance of the 'Change hour, and the immense reduction of time and expense contingent upon the assurance of finding the men with whom the builder must transact his business in the Exchange at a stated hour every day. The establishment of the custom being at the Exchange room during the 'Change hour every day would create a feeling of fellowship that would in time do away entirely with the lack of reliance upon other members of the trade, which seems to be quite as pronounced in Rochester as elsewhere. This is a condition of things that exists in many localities, and naturally begets a lack of confidence among builders which is unjustifiable and unwarrantable. There is no excuse for this condition, because of the reason that the very purpose of an Exchange is to gather together a class of builders who are organized and associated with the distinct and avowed intent of benefiting each other and securing fair dealing. New associations should never include in their membership men in whom there is lack of confidence, simply for the purpose of increasing the numerical strength of an organization, nor should the established associations hesitate to refuse to admit men of a similar character. That there are men in whom their fellows place little or no reliance is a fact, and it would be a matter of wonder if none among them should be builders.

Buffalo, N. Y.

At Buffalo the Exchange showed great improvement since the visit of last year and the members all actively engaged in securing the objects of the association. The "'Change hour" idea is being rapidly understood and with the glimpse of what it will be in the future as a factor in bringing the builders into more harmonious relationship, that they have already had, there is no doubt of the final outcome of the effort to establish it as a fixed custom.

In Buffalo there is a peculiar condition which does not exist, at least to the knowledge of the secretary, in any other Builders' Association in the United States —and that is a woman as an active member.

Some time ago a committee was appointed to secure a site for a new building to be erected by the Exchange, but have as yet failed to decide vpon a favorable investment. There is no doubt, however, but that the near future will see the Buffalo Association in possession of a fine building of its own.

Cleveland, Ohio.

The Builders' Exchange of Cleveland, where the secretary made his next stop, had been for some time in a state of inactivity that finally resulted in its dissolution, and the object of the secretary's visit was to assist at the establishment of an Exchange upon such principles and lines as would insure its permanent and successful existence. Plans for such an organization were laid and the project set in motion, and recent advices since the secretary's return state that a new Exchange has been formed with every promise of success.

Detroit, Mich.

A very successful meeting was held at Detroit, not only in point of numbers, but in intelligent interest in the possibilities of an Exchange and the National Association. While there is much yet to be done to place the Builders' Exchange on the footing and plane it should stand upon as an association of builders in a city of the size and importance of Detroit, the National Secretary did not find that there was cause for the discouragement which some of the members seemed to feel at the prospect for the Exchange, as they see it.

It is an impossibility to create in the mind of the builder, a radical reform, a direct change of practice by the simple establishment of an Exchange.

Years upon years of custom and precedent have brought about a condition of things in the building trade that are wrong, unjust and are the source of endless complications that do not arise in other lines of business. With the habits, fixed by years of drifting about, settled upon the place where methods should be in the builder's business, it is not to be wondered at if time, seemingly long to the enthusiastic, were required to reorganize a business so diverse in its nature as that of the builder.

Uniformity in practices, changes in methods that are wrong, the establishment of harmony in a business which is secured in a majority of cases by competition, creating just relationships between general and sub-contractor, and between employer and employee, the institution of a "code" for the submission of bids, the trade education of the youth of the country, are a few of the objects of a Builders' Exchange that cannot be brought into perfected existence in a day. To-day, every proposed plan for the purpose of placing the building business upon an equal footing with banking or any other commercial pursuit, is the best that can be devised. To-morrow a better plan for some one branch is proved, and an improvement in some other portion is discovered, and so on and on until the strongest are at times discouraged by the limitless complications which are developed.

Notwithstanding all obstacles in the path of visible progress, the mark has been set high by some of the Exchanges, and what has been done can be done again, especially with the examples in plain sight of all. The secretary urged upon the Detroit Exchange the importance of owning a building of its own, and bringing together therein the interest of their business, centralizing the trade into a locality that shall become recognized as belonging to builders and to their interests.

Since the trouble with the carpenters early in the season, which was settled to the satisfaction of the contractors, no labor disturbance has occurred, and there are no further troubles apparent at present.

The members expressed themselves as greatly encouraged by the secretary's "talk," and to their minds the future of the Exchange lacks any symptom of uncertainty.

Saginaw, Mich.

Saginaw, Mich., the next city on the list, has a small but interesting Exchange, of comparatively recent formation, and needed some coaching upon the possibilities of their organization. The good material in the association, together with the manifest interest of the members, argues well for its future.

Saginaw is the most important point in that part of Michigan, and the lumber and shipping interests are very heavy. There is a good field for an Exchange, and a good Exchange in the field.

Everything is quiet as relating to the relationship between employer and employee, and plenty of work in prospect.

Grand Rapids, Mich.

The Builders' and Traders' Exchange of Grand Rapids, Mich., has been greatly improved during the past year, both as an association and as to the quarters. In the early part of the year the Exchange moved from its former location into a very well arranged building, adapted especially for the use of the association, situated in a very favorable locality for the purpose for which it is intended.

The meeting addressed by the secretary was a large and very satisfactory one. The Mayor of the city made a few preliminary remarks before introducing the speaker of the evening, and the builders of Grand Rapids then listened with close attention for some time to a discussion of the subject of a Builders' Ex-

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change properly conducted and the merits of the National Association.

From what has been done in the past and the condition of the Builders' and Traders' Exchange at present, there is no question of the importance that will be eventually attained by that organization.

Chicago, Ill.

Chicago gave evidence, as it always has, of the vast enterprise that seems to be an inherent characteristic of its citizens, and the secretary found the builders busier than ever. There is a marked increase in the activity of this great people that is owing, in a measure, to the work entailed by the World's Fair, the effect of which is plainly visible in the building business. It seemed hardly necessary to interrupt the activity of the members of the Builders' and Traders' Exchange.

The builders of Chicago, representing the building interests in one of the great cities of the world, should have a building of their own, owned and managed by themselves, and one in every way commensurate with the magnitude of the business which they represent.

It is the earnest hope of the National Association of Builders that the Chicago Exchange will take immediate steps toward carrying out the project of erecting a building of their own, which they have had under consideration for some time. It would be a great benefit to builders of the world if visitors to the World's Fair could visit, together with the Board of Trade and kindred objects of interest, a Builder's Exchange, complete in every detail and properly conducted. The vastness of the building business, and the dignity which so intricate a calling should carry with it would receive some portion of the consideration and respect which is so seldom accorded it.

In great cities like Chicago where the building interests are so immense they are harder to manage than in smaller communities, and surely a building owned by the Exchange would be a strong element in establishing and holding the position in which it should exist. At Milwaukee the secretary found much discouragement among the members of the local association, and had hoped to find more improvement in the management and development of the Exchange since his last visit.

The interests here are great and the material of which the Exchange is formed warrants a much higher standing than has yet been assumed. Much encouragement was found to be necessary to the ones whose interest in the Exchange was the greatest to preserve their interest and efforts, until they have reached a point where their association is a satisfaction to themselves and to the National Association.

This condition is favorable rather than otherwise, for it is the best evidence that could be shown, that the members are fully aware that it is no easy task to secure a reform in established methods of doing business, when half the men whom a reform would benefit are either too deep in the rut of years of neglect, or too apathetic to assist at an effort made in their own behalf by other members of their trade who are not content to sit quietly by and submit to most unfavorable conditions.

The season just closing has been free from labor troubles and everything in that respect has been very satisfactory.

The project of owning a building has been considered by the Exchange, but nothing has been definitely accomplished. The National Secretary took occasion to urge the importance of such a step, as it would undoubtedly wake some of the inactive ones up to a livelier interest.

St. Paul, Minn.

St. Paul builders show a visible advance in matters pertaining to their Exchange, but hardly sufficient for the importance of the city which they represent. The present quietness in the building business results in a lack of interest in the affairs of the association, but in view of the fact that much has been already done in an organization that is not old, the future of the Exchange is assured.

Minneapolis, Minn.

The secretary was greatly pleased by the manifest interest displayed by the Minneapolis builders regarding everything that affected their Exchange.

A very full mid-day meeting greeted the secretary and very flattering attention was shown to all that he had to say, and they were very glad of any suggestions offered by him for the improvement of the association. Particular attention was given to all that related to methods by which the Exchange could secure a building of its own for its own use. It was plainly evident that all fully appreciated the opportunity for concentrating the building interests of Minneapolis through the joint ownership in a building to be devoted to the builder and his business.

The builders of Minneapolis have always shown keen interest in the affairs of the National Association ever since they become connected therewith, and at the time of the convention held in St. Paul last January were eager to extend the delegates every courtesy and attention that could be accorded them. They vied with their sister city in the elaborateness of their banquet, theater party and other entertainment, with true Western hospitality.

Omaha, Neb.

The Omaha Exchange, which is only about a year old, shows much cause for congratulation and wonderful progress and development. The best elements of the building trades are identified with the Exchange, and if the association keeps pace with the "booming" spirit of Omaha another year will show wonderful improvements.

There was an apparent necessity for cautioning the active and energetic members not to expect to be able to accomplish all that is desirable in a day, for in all new efforts of this character anticipations are not fully realized at once. When this is the case, those who are often most enthusiastic are apt to become discouraged without reason and to let the fight drag because success does not make itself manifest in the same manner that it appears in a mercantile transaction. The elements of success are almost in every exchange, and the Omaha builders have but to maintain the course in which they have set out to accomplish all that they desire.

The defeat of Prohibition in Nebraska has given a great impetus to business in all lines, and the building trades will get their share.

The good prospect of constantly increasing interest in the association, together with past progress, gives the secretary hopes for the future great importance of the Exchange.

Denver, Col.

The well established Exchange in this city offers less opportunity for criticism than do many others that are much older and larger in numbers, and located in the older cities of the East.

A word of encouragement was spoken by the secretary to those who were allowing themselves to take less interest in the affairs of the association than they should, by reason of the inability of the Exchange to create all the desired reforms at once, simply by its mere existence and without a large amount of hard work.

The officers of the association find great difficulty in instilling into the minds of the members the importance of being in the 'change room at the 'change hour, and the result is a disappointment to them, because all members do not evidence their appreciation by making a point of being daily in the rooms.

The recognition due the 'change hour of an association of builders is bound to come, just as the necessity for stock exchanges and chambers of commerce has brought about their existence and demonstrated their value. The secretary is of the opinion and so expressed himself, that the Denver Builders' Association should feel proud of itself and the success it has thus far obtained, and that there is every reason for them to feel assured that the object for which it was organized will be secured and developed by persistance in the effort, and constant attention, which are needed for the successful accomplishment of the desired ends of every association of a similar character.

St. Joseph, Mo.

At St. Joseph, Mo., there was a lukewarmness among some of the members of the small but vigorous Exchange, resulting from local conditions, trouble among the members, &c.

A short talk during the noon hour seemed to create renewed confidence in the ultimate success of the Exchange, and the Secre- tary departed, greatly encouraged over the prospect for the association.

At St. Joseph, while not as large as some of the cities represented in the National Association, the individual elements in the Exchange are such as to warrant the highest hopes for the future. This Exchange, like some of the new organizations, has accomplished some things in which many of the older bodies have failed of success, which is a good evidence of the truth that the methods and principles that the National Association is striving to inculcate are worthy and advantageous.

Kansas City, Mo.

At Kansas City, although the secretary found general business somewhat dull, the affairs of the Builders' and Traders' Exchange are very prosperous, which fact is largely due to the successful carrying

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out to complete fulfillment the erection of a building.

The Kansas City Association to-day owns what is probably the finest building devoted to the interests of the builder, in the United States, with possibly the exception of Philadelphia. It is a noteworty fact that this is the only Exchange so far that has erected an entirely new building, from foundation to capstone, for their own use, and it is certainly of great credit to the association that they have so firmly grasped and thoroughly understood the benefits and advantages that are bound to accrue from such an undertaking.

The building is most satisfying in all its architectural features and in its adaptability to the wants of its occupants and possessors.

At his personal request a very large photograph of the building was forwarded to the secretary to reach him a few days after leaving the city, and it, together with smaller photographs of portions of the interior, was used to the very best advantage in the rest of the trip. The greatest interest was shown in other cities in what their Kansas City brothers had done to bring the builders together, and Exchanges were anxious to become fully acquainted with the best method of establishing a building fund and carrying out a similar project.

A very full meeting was given the national secretary, and the builders listened to his "talk" with enthusiastic attention, and altogether his visit was most fully satisfactory to himself and for the National Association.

With the revival of business which must come soon the Kansas City builders will realize more than ever the great benefit and advantage it will be to them to have such commodious and appropriate quarters in a building of their own, surrounded as they will be by interests tributary to the building trades.

St. Louis, Mo.

At St. Louis the secretary found among the builders connected with the Exchange a hearty welcome and manifest regret that his stay could not have been longer with them. It was evident that personal contact with individual members was necessary to produce the result for which the Exchange has been striving since his last visit.

The genuine revival of business on a strong and healthy basis during the past year has so thoroughly occupied the builders that they have not found time to develop the scheme suggested, either in line of getting a building or in a more effective remodeling of the association itself.

St. Louis is one of the largest cities in the country, with a business so thoroughly established that there is no question as to its future and demands, and should have an organization of builders equal to the aspirations of its most enthusiastic members; but the secretary found that, while this fact was fully impressed upon the minds of the active members of the Exchange, there was an apathy among the bermemship at large that is entirely unaccountable. Too many members were satisfied with moving along in the old ruts, contented with the conditions that exist, many of which were well enough 50 years ago, but which are not up to the level of the present generation.

It was evident to the secretary that elements are quietly but surely at work, which will surely renovate and rejuvenate this body of builders, which has existed for an extended period upon lines that now need thorough revision. These elements will surely move in time, and, although the secretary was disappointed to find that a larger advance had not been made since his last visit, he was encouraged to believe that, long before the time arrives for St. Louis to welcome the National Association at its seventh convention, the exchange will be thoroughly remodeled, and will be occupying a building of its own of a character that will reflect credit upon itself and upon the building interests of the city in which it is located,

In spite of the large amount of building during the year just past, builders have been free from any serious labor troubles, and there is no present prospect of any disturbance.

Here, as elsewhere, the secretary found certain customs and practices prevailing which are an improvement over those of other cities, through opportunities afforded by the National Association, and St. Louis will be of great benefit to her sister communities of builders by conveying to them such practices for their guidance and government.

Louisville, Ky.

Louisville was the most southerly city visited on the trip. Memphis and Atlanta, where there are new organizations, were originally included in the schedule, but owing to lack of time on the part of the secretary it was found impossible to reach them.

A very good meeting was held in Louisville, although not as large as the one addressed a year ago. The members here do not utilize the 'Change hour as much as they should, and on that account there is some lack of interest among the members.

Some very efficient work has been done in certain lines, which is far in advance of work done in similar directions by any of the older associations. This was particularly noticeable in the action taken by the Exchange to compel architects to award their contracts on business principles; also in the line of establishing a record of delinquent parties, owners or contractors who are dilatory in financial settlements. While the plan adopted appeared somewhat crude, it certainly offered some very suggestive points for future use, and can unquestionably be developed into a great benefit by all exchanges.

This illustrates what the secretary has often mentioned and frequently emphasized, that the interchange of methods and practices adopted by an individual Exchange will be of vast importance and assistance in building up a general system for the guidance of all bodies of a similar character all over the country.

It was very noticeable to the secretary that the Exchange in Louisville needs more ample and appropriate quarters for the assembling of its members, and when this is accomplished he feels sure that the interest of the builders in their Exchange will greatly increase. The project of securing a building of its own is in hand but needs pushing. An effort on the part of those most interested will undoubtedly produce the much hoped for result.

Cincinnati, Ohio.

At Cincinnati the secretary's visit was productive of some good in creating a revival of interest in the remodeling of the Exchange administration, and while there are some temporary discouragements to acknowledge, the final and complete re-establishment on a more satisfactory basis is assured.

There have been no serious labor troubles in Cincinnati during the past year.

Indianapolis, Ind.

The secretary was delighted to note the great improvement in the general condition surrounding the Exchange, both as regards the meeting place and the general interest of the members.

The rooms occupied by the Exchange have been greatly enlarged and thoroughly renovated, and the whole tone of the association seemed to be greatly improved.

A very fully attended and enthusiastic meeting was held, and the secretary felt that the fruits of the visit of the previous year were already in sight. Much, however, yet remains to be done, as always will be apparent in every live organization of this character. New and worthy features, plans and devices will constantly come to the surface, demanding the active and constant attention and advanced thought of every member who has the welfare of his Exchange at heart.

The project of owning a building, as again outlined by the secretary in his talk, was earnestly received, and he hopes that the desired result may be realized in the near future.

A visit to Wheeling, which was planned to follow Indianapolis, was regretfully omitted on account of lack of time at the disposal of the secretary. The necessity of reaching headquarters at a specified time and the delays which had unavoidably occurred during the trip, conspired to prevent the secretary from reaching Wheeling.

This was particularly unfortunate, as the builders of Wheeling have been passing through a very serious trial during the season just past, and the secretary had been most anxious to compare notes by a personal visitation.

Pittsburgh, Pa.

The Pittsburgh Exchange was found in the throes of an attempted enlargement and development of membership. A very large meeting had been held the evening before the arrival of the secretary, which detracted somewhat from the attendance at the special meeting called for his reception. Those who were present at the meeting, however, exhibited much interest in the plans which were urged for their improvement, and the outlook is most hopeful for the future.

Pittsburgh, with its adjoining neighbor, Allegheny City, is a very large community, and is worthy of an Exchange of the finest character, and this is sure to result in time, provided but a few of the more active members persistently push the project which they have in hand.

The secretary found here an existing condition similar to that mentioned in

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other places, namely, the development of certain practices in a more effectual way than has seemed possible by some of the older bodies—for instance, the use of the uniform contract has become an established practice in Pittsburgh, and virtually no other form of contract is used. This is a most encouraging sign, and should be an incentive to all other organizations connected with the National Association.

Philadelphia, Pa.

The balance of the secretary's trip was devoted to a hurried visit to the Philadelphia and New York Exchanges, in relation to which there is but little to say, inasmuch as the Philadelphia Exchange is in a most satisfying condition, having probably done more than any other Exchange in the country thus far to establish and develop the theories and recommendations of the National Association. This is particularly apparent in their fine building, which in itself comprehends a demonstration of the Exchange possibilities, in the finest building material exhibit in this country, if not in the world, and the establishment of the trade school idea under the control and direction of the builders themselves.

New York, N. Y.

At New York the secretary found the members of the Exchange absorbed in making preparations for the coming convention, and thoroughly alive to the importance of making the fifth convention a complete success in every detail.

In closing this report the secretary desires to say that at every point touched he was received in the heartiest manner, which was, of course, extremely gratifying, from a personal point of view, as well as a most satisfying demonstration of the interest all local bodies feel in the work of the National Association and their connection with it, and although the trip was a most exhausting one, owing to the constant demands which naturally followed, it was a conclusive proof of the value of personal visits from some officer of the National Association of Builders.

TRADE NOTES.

GOODELL & WATERS, Philadelphia, Pa., are distributing to the trade a very attractive circular illustrating the Mohawk Dutchman Band Saw Guide. In addition to a description of this device and illustrated directions for ordering numerous testimonials are given showing the estimation in which it is held by those who have practically demonstrated its merits.

THE EGAN COMPANY, Cincinnati, are distributing a poster of large size showing a great variety of machines specially adapted to the requirements of the woodworker. The statement is made that this poster shows only a small proportion of the machines built by the company, and the latter request that the poster be displayed in a prominent place

THE FRONT RANK STEEL FURNACE COMPANY, St. Louis, Mo., are offering the trade the Front Rank Steel Hot Air Furnace, so arranged as to burn any kind of fuel. The statement is made that this heater is free from gas and smoke, and that it is powerful in operation. An illustrated catalogue and price-list of this device will be sent to any address upon application to the manufacturers.

THE WARREN-EHRET COMPANY, 432 Market street, Philadelphia, Pa., state in another part of this issue that any one can easily apply their two and three ply roofing, which is furnished to the trade ready to put on. The company request those interested to send for circulars, which fully describe the merits of this roofing, and which also give prices at which it can be obtained.

THE BRIDGEPORT GUN IMPLEMENT COMPANY, 17½ Maiden lane, New York, are pushing with a great deal of enterprise the sale of the Forstner Bit, which, it is claimed, may be guided in any direction, regardless of grain or knots. It is especially adapted for letting in bolt heads, and it is said to be much superior to the old center guided bits. It is so constructed that it will bore smooth round and oval holes, while being adapted for use in connection with scroll and screen work, scalloping, mortising, escutcheons, &c.

C. B. ROGERS & Co., Norwich, Conn., call attention in another part of this issue to their line of woodworking machinery which includes devices adapted to meet the varying requirments of woodworkers. The firm manufacture their goods at the place named, while they have warerooms at 109 Liberty street, New York City, and 94 Pearl street, Boston, Mass.

THE INDIANA MACHINE WORKS, Fort Wayne, Ind., state that they furnish their Eight Inch Four Side Molder with the latest improvements and can offer it to the trade at a lower figure than any one of the old style molders. Reference is made by them to the efficient and substantial workmanship employed in the construction of their woodworking machinery, and in another part of this issue they request those contemplating purchasing to correspond with them before placing orders.

PATENT FOLDING GATE is the subject of an announcement presented in another part of this issue by E. T. Barnum, with office at 179 Jefferson avenue, Detroit, Mich. Attention is also invited to roof cresting, tower ornaments, finials, brass and iron window grills, bank and office wire railings, elevator inclosures, builders' wire and iron work, &c. Mr. Barnum has issued a catalogue in which these goods are fully illustrated and he requests those sending for a copy of it to mention *Carpentry and Building*.

THE MONROE MFG. AND LUMBER COMPANY, Lima, Ohio, show elsewhere in this issue an illustration of the Hill Inside Sliding Blind, with the merits of which, we have no doubt, many of our readers are more or less familiar. A catalogue illustrating and describing these blinds and giving prices will be furnished upon application to the company.

W. F. & JOHN BARNES COMPANY, 71 Ruby street, Rockford, Ill., manufacture an interesting assortment of foot and hand power machinery suited to the different requirements of carpenters and builders. The manufacturers state that with an outfit of the machines which they make the carpenter is in a position to compete on favorable terms with steam power machinery, and is not only able to hold his fair share of the business, but to extract therefrom a larger profit than would otherwise be possible, Elsewhere in this issue the company show several illustrations of machines which they manufacture.

THE CARTON Hot Air and Combination Hot Water and Hot Air Heaters are referred to in another part of this issue by the Carton Furnace Company of Utica, N. Y. The company were established in 1847, incorporated in 1883, and have built up a business which is assuming constantly increasing proportions. The goods which they manufacture are meeting with much favor at the hands of the trade and possesses constructive features which render them durable and generally satisfactory in operation. What the company have to say in their announcement cannot fail to interest carpenters and builders generally.

THE TAYLOR MFG. COMPANY, Chambersburg, Pa., report an increasing demand for the Beck Automatic Engine which they manufacture for electrical and general power service. Among their recent sales are several through Messrs. Cooke & Co. of 22 Cortlandt street, New York, for a number of ferry boats belonging to the New York, Lake Erie and Western Railroad; a 100 horse-power complete steam plant for electric railway work to the Uniontown Street Railway Company, Uniontown, Pa.; an 11 x 12 engine to the Rosenheim Company of Nashville, Tenn.; two engines with complete steam plant to the Thomson-Houston Electric Light Company for Bloomsburg, Pa, as well as several others.

THE DIXON CRUCIBLE COMPANY of Jersey City, N. J., state they have enjoyed during the year of 1890 a greater volume of business than for any previous year. The output has taxed their facilities, and in order to meet the demands of the season of 1891 they propose to increase their works. The outlook for the new year they consider good, except as it may be qualified by timidity born of the recent financial troubles. Competition has been active, and while sales have largely increased, prices have declined.

W. HASKELL KING of 83 Court street, New Haven, Conn., is offering the trade King's Sash Support and Bolt, which is claimed to hold the sash in any position desired. The manufacturer states that the device is durable, inexpensive, simple and quickly adjusted. In another part of this issue he calls attention to the device and presents sectional views of it.

THE PULLMAN SASH BALANCE COMPANY, Rochester, N. Y., propose making an important improvement in the sash balance which they are offering the trade. This improvement will consist in making the tapes with which the balance is provided of aluminum steel, a material which possesses great strength and durability, and which the company feel will add in no small degree to the popularity of the balance.

THE IRWIN AUGER BIT COMPANY, Wilmington, Ohio, are distributing a four page circular in which the merits of the Irwin Patent Solid Center Steam Auger Bits are set forth in an interesting manner. The illustrations are of a somewhat humorous character, some of them showing the advantages gained by using bits manufactured by the company, while others show the results of using bits of other manufacture. Attention is called to auger bits, boring machine augers, carpenters' augers, machine bits and screw driver bits.

THE CINCINNATI CORRUGATING COMPANY of Piqua, Ohio, are making a specialty of their metallic lath, and it is said to be meeting with much favor at the hands of architects and builders. It is claimed to have sufficient perforation to properly key the plastering and such rigidity as to give the requisite stiffening to the walls, in order to avoid the cracking so common in connection with certain forms of lathing. The company are running their works full capacity, and their output is meeting with general satisfaction.

THE SALES of slate tiling, &c., made by C. E. Holley & Co. of Cincinnati, Ohio, for the year just closed are said to have been very satisfactory, while the prospects for an increased trade for the year 1891 are considered very flattering. A number of prominent contracts are at present under consideration, and the company expect to secure them.

THE CINCINNATI *Enquirer* of recent date is authority for the statement that the members of the Builders' Exchange have adopted a resolution declaring the initiation rules suspended until March 1, 1891. All applications for membership will be admitted upon payment of $18, which carried them over until March 1, 1892. In December 17 delegates were selected to attend the annual meeting of the National Association of Builders.

WE HAVE RECEIVED from C. L. McDonald, secretary of the Builders' and Traders' Exchange, Kansas City, Mo., a folded card describing its new building, located on the northwest corner of Central and Seventh streets. The exchange was organized about three years ago, but in order to meet its requirements has built and now occupies a very handsome structure located as above described. The building was formally opened on Tuesday evening, December 16 The membership numbers 250, and daily sessions are held from 11 to 12

THE CORDESMAN MACHINE COMPANY of Cincinnati, Ohio, report much satisfaction at the volume of their business during the past year, the statement being made that their sales have been nearly double what they were for the corresponding previous 12 months. As the company have been running their works full capacity up to eight o'clock in the evening in order to keep up with their orders, they have decided to erect an extensive addition to their present plant. This new building will be equipped with planers, lathes and drills, besides a great variety of smaller tools. They feel that with these improvements they will be in a much better position to handle their constantly increasing business.

FOR THE PURPOSE of meeting the demand for what is known as an English oak finish, the Bridgeport Wood Finishing Company, with works at New Milford, Conn., and branches at 244 Pearl street, New York, and 211 East Randolph street, Chicago, Ill., have for some time past been busy manufacturing what they designate as Breinig's English Oak Water Stain. This is applied by means of a brush, and when dry the surface is lightly sandpapered. The oak is then filled with the company's No. 3 Wheeler Wood Filler, and finished with a light varnish. If a darker shade is desired, two coats of the stain are applied; the first coat, when dry, being sandpapered before the second coat is applied. The company are issuing a little circular giving instructions for using this stain.

ARCHITECTS who have their offices in the city and are compelled to produce their drawings in rooms which are not always provided with the best of light or in every way conveniently located, probably fail to realize to the fullest extent the comforts in the way of space, light and charming surroundings enjoyed by their brothers in the country. While the city architect is sweltering under the heat of a summer sun and stifling in an atmosphere which is only to be found in a crowded city, his brother is enjoying the cool breezes of the country, surrounded by comforts of which his city brother, we venture to say, has only the faintest idea. We are constrained to make these remarks by reason of a photograph which is before us showing the office of J. D. Sibley of Middletown, Conn. The structure is what may be termed a story and a half cottage, setting back from the street, and surrounded by ample foliage to render it cool and comfortable in the heat of summer weather.

(*Continued on page* xxvi.)

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CARPENTRY AND BUILDING.

A MONTHLY JOURNAL FOR THE BUILDING TRADES.
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DAVID WILLIAMS, - - PUBLISHER AND PROPRIETOR.
A. O. KITTREDGE, - - - - EDITOR.
JOHN S. KING, - - - BUSINESS MANAGER.
96-102 READE STREET, NEW YORK.

FEBRUARY, 1891.

Workmen and Employers.

A correspondent in York, Pa., sends us a most interesting letter on the general subject of the condition of the workingman and the proper length of the working day. In this communication, which will be found on another page, our correspondent takes issue with certain statements we made in the October number of *Carpentry and Building* under the headings "The Eight-Hour Day" and "Getting On in the World." At the outset our correspondent intimates that this journal has undergone a change, and that instead of advocating the cause of the workingman it is now seeking more particularly to advance the cause of the employer. Against this charge we wish to enter a distinct protest. *Carpentry and Building* has always been a friend to the workman, and it does not propose at this late day to change its purpose. Another mistake is that the interests of the workman and employer are opposed, and that to attempt to serve both is simply trying to work for two masters. This statement we also protest against, for we believe that the best interests of the workmen and their employers lie in exactly similar lines, and that anything done to the injury of the workman amounts to a definite harm to the employer, and correspondingly whatever injures the employer works to the disadvantage and ultimate injury of the workman. The two classes will reach the best ends by working in harmony, and while this is not always to be expected in the present unsettled state of the world, when strife and competition are pervading every department, we nevertheless hold the hope that an advancing civilization will recognize the fact that the interests of all classes in the industrial community are practically identical, and that whatever raises dispute or differences brings loss to all concerned.

IN DESIGNING A HOUSE AND GARDENS, IT IS HAPPY WHEN THERE IS AN OPPORTUNITY OF MAINTAINING A SUBORDINATION OF PARTS; THE HOUSE SO LUCKILY PLACED AS TO EXHIBIT A VIEW OF THE WHOLE DESIGN.—*Shenstone.*

Means of Obtaining Leisure.

We heartily sympathize with what our correspondent says about the need of more leisure that the workmen may improve their minds and learn of other things beyond what is directly related to their trade. There are, however, two ways of securing this leisure. One is for every workman to agree to labor at a certain figure for a limited number of hours per day, and thus save a little time daily. This system, however, makes it necessary that the workman shall labor all his life long, and look for recreation only to the hour of the afternoon, the evenings and the Sundays. But there is another means for gaining time for interests beyond his trade, and that is to so advance himself that he shall occupy a higher position, which commands more pay and at the same time commands more leisure, in the ultimate hope that he may some day be entirely his own master. The latter plan is what commends itself to the ambitious and progressive workman, and some there be who will always follow it out. As a means of gaining this pre-eminence we stated that a man should have the right to work two days for one day's pay if he thought that it would bring him an ultimate return. Our correspondent questions this position, and points out that the ambitious man is like those among the audience of a burning theater who rush for the door regardless of others and secure safety at the sacrifice of many lives. We do not think this parallel is a good one, for in the case of a progressive workman he is striving for a distinct prize, and furthermore, he need not in his upward struggle trample upon any fellow man. The unthinking and frightened giant in an audience rushing for a door when an alarm of fire is sounded is not trying to win a prize, but is simply running from a danger. One is drawn upward and the other is impelled forward. The simile furthermore is faulty in that it predicates that the rising workman can only get up by sacrificing his fellow craftsmen.

AH, TO BUILD, TO BUILD! THAT IS THE NOBLEST ART OF ALL THE ARTS.—*Longfellow.*

The Distribution of Labor.

It is true that every man has a right to a day's work, but it is altogether a mistake to assume that in this world there are only a certain number of days' work, to one of which every man upon the face of the globe is entitled. This theory assumes that any man who does two days' work throws some fellow being out of employment, which is altogether contrary to facts. He may in rare cases throw him out of a job near at hand, but there is always work for him to do elsewhere. Work is an elastic institution, if we may so describe it, and it is impossible to so economize labor that employment shall be taken away from people. We would ask our correspondent to consider the whole matter of the introduction of machinery. A labor-saving machine devours, so to speak, more days' work than could any overenergetic body of laborers. Here is a machine that will do each 24 hours what it formerly took 100 men to do by hand labor. Is it so that these 100 men have been robbed of their birthright of employment? When labor-saving machinery was first introduced this was the argument the laboring classes urged, and it was a difficult argument to meet. Nevertheless, experience has justified the introduction of every new device, and although this labor-saving machinery has multiplied, almost beyond comprehension, it is nevertheless an indisputable fact that the whole world of labor is now as well employed as it was before the steam engine came into existence, and brought with it its train of machinery. We would go even further, and say that it is an indisputable fact that labor is now better employed than heretofore, and that the individual workman enjoys more luxuries, works less hard and has opportunity for more intellectual progress than his prototype of the last century. We know that it is hard to look upon the suffering of the unemployed, and when we contrast the plain living and abstemiousness to the point of starving of those who get small wages with the luxuries others enjoy, there would appear to be room for reform. We confess that the social conditions are too uneven for an ideal world, but we cannot but regard the present hopefully and look confidently toward the future when we compare the present state of society with the past. History does not lie, and whoever cares to study the condition of the workingman many years ago will have reason to thank Providence that he is living now in a better age.

LET USE BE PREFERRED BEFORE UNIFORMITY.—*Bacon.*

Need of Individual Liberty.

But we cannot end these general remarks without touching upon the all important question of individual liberty. The workman is not a machine, but a living and thinking human being. No two men have exactly the same tastes and ambitions. One man will spend his leisure drinking beer and playing cards, another in improving his mind, and still another will apply his spare minutes to the comfort and pleasure of his family. Every well-made machine will perform a certain amount of work under certain conditions, but no two men will return the same results when given the same opportunity. We hold, therefore, that every man should be permitted to exercise every faculty and exert every endeavor for his own advancement, provided he does not injure his fellow men in so doing. By thus letting each man attain to the best he is capable of the general state of the working classes will be advanced. But it is easy to imagine a system of strict laws regulating labor, wages and all matters in which the workman is interested, the effect of which would be to keep them all at a dead level. The conscientious and ambitious man would be bound down to the state of the ignorant and slothful, and superior natural qualifications would have no opportunity to make themselves felt. The world is not a playground, neither is it a community of slaves, but every intelligent man is given opportunity to make the best of his abilities and secure material advantages through individual effort. Unduly long hours of work are not to the advan-

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tage of the employer, but natural causes will bring about certain established practices in this matter. There is much to be said against legislating upon all these conditions. In the long run we think the community will be better served by submitting to the natural laws of competition, supply and demand than by conforming the industrial population to strict legal enactment.

NOVELTY IS THE FOUNDATION OF THE LOVE OF KNOWLEDGE.—*Sydney Smith.*

The National Association of Builders.

The committee from the Mechanics' and Traders' Exchange, together with the officers and members of the Building Trades Club of New York City, are actively engaged in preparing for the reception and entertainment of the delegates and visitors at the coming convention of the National Association of Builders of the United States. At the headquarters the secretary is absorbed with the details of the various matters on hand, which seems to indicate complete success in the undertaking of providing for the comfort and pleasure of the large number anticipated. He is not prepared to furnish at present a programme of the entertainment to be offered, but we understand that many pleasant features are contemplated. The convention will be held at the Masonic Hall on February 9, 10, 11 and 12 next, and the subjects offered for discussion will be of great importance to the entire building interest.

BUILDING WAYS AND MEANS.

A NOVEL METHOD of construction is that adopted in connection with the McVicker Theater, now in progress in Chicago. On top of a huge scaffolding is an open hall, over 40 feet high, inclosed with a roof and lighted by windows, skylights and a number of arc electric lights. Two wooden trusses of 90-foot span have been thrown from the wall dividing the office building from the theater proper to the wall between the auditorium and the stage, and between these trusses a series of minor trussed girders have been constructed for the purpose of carrying the roof between the large trusses. From the large trusses to the walls rafters have been laid. The main trusses are covered with sheet iron, and over the rafters is a felt roof, the whole forming a temporary inclosure supported entirely from the walls and covering a space of 80 x 90 feet, without a post or a brace to obstruct the operations of the men working under it. The main longitudinal trusses have been stayed against wind pressure by a number of wire cables carried to the smoke stacks of the adjacent buildings. It is intended to construct over the theater proper, and on the level of the fifth and sixth stories of the present office building, two stories of offices. These will be entirely of fire-proof construction, with cast-iron pillars and steel beams, tile floor arches, and tile partitions. Their weight will be carried on six steel trusses, having a span of 80 feet each. These trusses, however, will not be supported by the walls, but by riveted steel pillars, set alongside of and anchored to the walls, and carried on concrete and steel foundations constructed for this especial purpose. These steel pillars are already in place, and the work of setting the trussed girders is about to begin. It is estimated that even if there is no extraordinary bad weather, at least a month's time will be saved in the prosecution of the work by the introduction of this novel method of temporarily inclosing a building.

DURING THE ERECTION of a building there are frequently narrow escapes on the part of the workmen from serious injury. An instance occurred not long since which aptly illustrates the danger in which men are frequently placed during the progress of a building, and shows by what slight precautions serious accidents may be prevented. In front of a seven-story structure was a sort of derrick or shears, while opposite the sixth story was a staging carrying the bricklayers. The shears inclined probably 10° from the vertical, and were supported by a guy rope running from a stake driven into the ground at one side up to the top of the shears, where it passed through the sheaves of three pulleys and down to a stake on the opposite side. The arrangement of blocks was such that a workman on the ground could vary the inclination of the shears from the vertical by simply slackening a rope connected with one of the three blocks through which the guy rope passed, and by tightening the rope the shears could be brought more toward a vertical position. To the top of the shears was lashed a long boom, which extended in a nearly vertical position upward to the front edge of the staging on which the workmen were engaged, leaving only room between it and the staging to permit the material to be hoisted. The driver of a heavy wagon, in backing up to unload near the shears, ran over one of the guy ropes, straightening the shears and letting it fall against the edge of the staging with considerable force. The shock was enough to jostle and disarrange the staging and to throw the workmen to their knees. Had the wagon crossed the rope a little further from the stake, or had the rope been cut by the sudden jerk, it is probable that the whole staging would have been brought down and the men seriously injured, if not killed. The form of shear employed is quite common and very convenient in handling, so that any change of form would be undesirable. They, should, however, be so arranged as to prevent the possibility of accidents of the kind referred to. If two stout wooden stakes were placed on each side of the shears and connected by a piece of 2 x 4, or wider, in a direction at right angles to the face of the building they would protect the guy ropes and prevent any wagon wheels coming in contact with them. In the instance to which reference is made serious results were escaped more by good fortune than good management.

THERE HAVE BEEN numerous schemes for clubs and co-operative houses lately formulated for the purpose of meeting the advanced ideas of the times, but the one which has perhaps attracted the most attention is that devised by a New York builder. He has lately begun a series of experiments in the erection of flats, designed with a view to keeping husbands at home during the evening. He has now in process of erection a double-flat building, six stories high, the top one to be used as a billiard room. In the basement is a bowling alley extending the full length of the lots. This permits the pins to be at the further end of the alley in a vault, so that the noise of knocking them down will not in any way annoy the tenants of the building. It is designed to build the alleys in such a way as to deaden the noise of the balls. The author of this plan of bringing flat dwellers together in a sort of flat-house community proposes to give each tenant a separate night in each week on which to have the full use of these modern improvements for himself and friends. The tenants can, of course, exchange these privileges at will, but with this the owner has nothing whatever to do. It is said that the rent will be the same whether or not tenants avail themselves of the privileges of the billiard room and bowling alley. The builder is doing this as an experiment, and if it does not pay he proposes to rent the pleasure hall for dwelling purposes.

IN PUTTING UP a building of any considerable hight it is always necessary to employ some quick method of hoisting material to the workmen, especially after the structure has progressed several stories. Numerous devices are employed for this purpose, but one of the most ingenious, perhaps, is that recently used in connection with the construction of a hotel in a prominent city of the West. In general shape the device has the appearance of an overgrown coffee pot, resting upon a platform furnished with wheels. Reaching out from the machine is a powerful steel boom 30 feet long, which can be raised to a perpendicular, or lowered to a horizontal, position. At the end of the boom is a rope and pulley for hoisting purposes. The machine has four levers, one being used in connection with the hoisting gear, another for the swinging gear, and still another to propel the car when traveling on its track, and fourth, a reversible lever to run the machine back and forth. The engine attached is double and reversible, having two cylinders, and is geared with a vertical motion, so that there is no lateral vibration. The engine and gearing as stated are mounted on a small platform provided with trucks which run upon a track like a railroad car. It is provided with two sets of wheels in order that the car may be run in two directions, one being at right angles to the other. The floor of the building upon which the apparatus is placed is provided with tracks so that the car can be run to any place desired. In the construction of the hotel referred to steel beams, each weighing probably 1000 pounds, are used. They rest on the ground about the building, and the hoisting machine which is placed on one of the upper stories, runs to the edge of the building and lowers the long steel boom, which extends out a number of feet over the sidewalk. From the end of the boom a ⅝-inch steel wire rope, capable of sustaining 12 tons, is run down. The beam is attached to the rope and then drawn to the story on which the machine is placed, when the latter is made to travel along on its track like a street car until it is in a position to deposit the beam where it is destined to go. The hoisting apparatus is under the control of one man, who is thus enabled to do the work formerly requiring a number of men to accomplish. When the hotel, which is to be 14 stories high, is completed, the machine will be run down to the ground on inclined tracks extending from one story to another.

IT IS ALWAYS interesting to study the manner in which successful men, whether engaged in building operations or other lines of trade, manage their business. While many have achieved success in the same line of trade, each one has his own way of doing things. I have in mind a man who is engaged in the building line and who has a great deal of superintendence, estimating, and other similar work to do, while also directing the efforts of several managing men in different departments. He does a large business and gives employment to anywhere from 75 to 150 men, according to the season. A constant companion is a memorandum book, arranged something after the style of a flexible card case. The back part is a pad on which he notes, as he talks, any special point that must come up on a future occasion. Enter into conversation with him when you will, and say that you will see him in regard to such and such a matter, or that on a certain day is an appointment concerning something else, and without interrupting the conversation he will make notes of these matters on separate leaves of the pad. These are then detached and are made to take their place among other loose leaves in the case. In the same way if he calls to see you, out comes the memorandum case, and the loose sheets in it are handled as one would shuffle a deck of cards until the exact errand that has brought him to your desk has been found. His talk is to the point, and his movements are, perhaps, what might be termed abrupt. His errand finished he is off to another part of the town, being prompted entirely by his series of memorandums. Call at his office and ask any one who may meet you concerning something that belongs to him to manage, and out comes a duplicate memorandum pad, upon which the question is noted or upon which a memorandum is made of whatever has been brought up for his consideration. Enter the man's private office and you will find a series of these tickets, or memoranda, stretched across his desk in such a way that his eye can take them all in before he fairly gets into his chair. Glancing over the assortment one might read: "Jones wants you to call at 2 o'clock to see about a set of plans;" "Smith was at the telephone and will talk with you as soon as you come in;" "Gray says the men will be ready for our work to-morrow," and so on to the end. This man is one who seldom fails to keep an appointment, seldom fails to be on time in any respect, and never forgets anything. He carries his memory around in his card case.

V.

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HEATING A DWELLING BY HOT WATER.

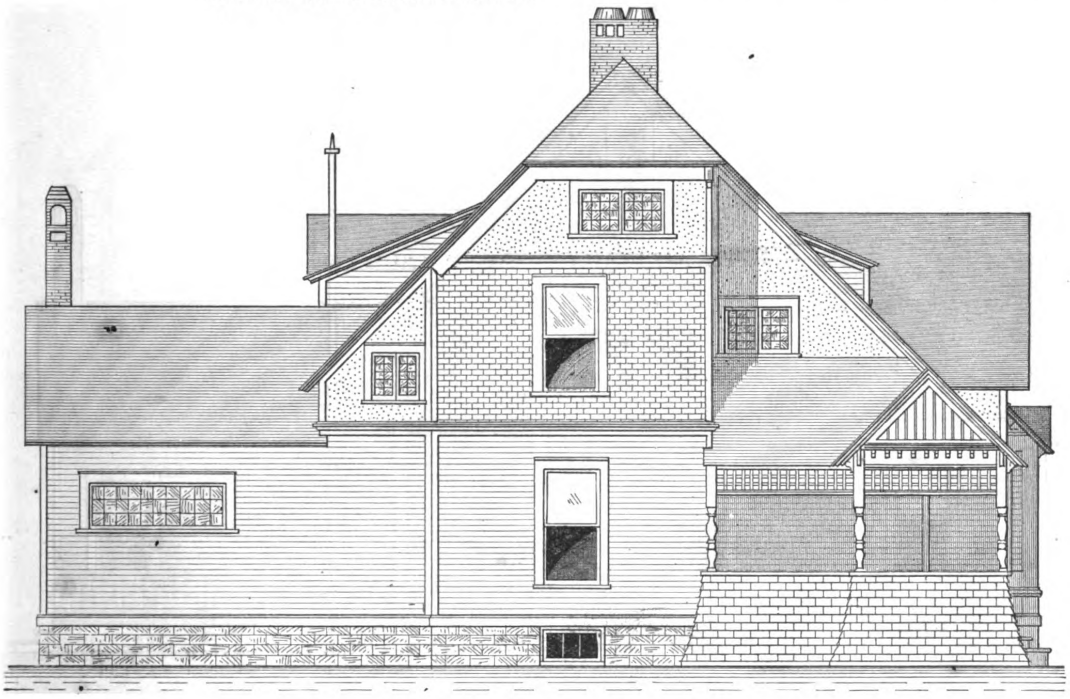
THE HOUSE which we show by means of the illustrations upon this and the following pages was designed by A. R. Brink of Red Wing, Minn., and as will be observed, has been arranged to meet the requirements of a family of moderate size. The plans indicate that provision has been made upon the first floor for four rooms, of which one is a sleeping room, while upon the second floor are three chambers, out of one of which opens an alcove 7 feet 3 inches by 8 feet in size. The sitting room or parlor upon the first floor is provided with an open grate, by means of which ventilation is facilitated. The dining room, which is in the rear of the sitting room or parlor, is connected with that apartment by means of *portieres*, or a wide door may be used, as the taste of the owner determines. The kitchen occupies an extension at the rear of the house, and is provided with modern appliances, including a force pump. According to the architect's specification, the studding used in connection with the house is 2 x 4 inches in size; rafters, 2 x 4 inches; the first and second story joists, 2 x 8 inches, placed 16 inches on centers, and the attic joists, 2 x 6 inches. The inside and outside of the building is sheeted with shiplap boards, filled between studding with sawdust. The exterior of the first story is covered with clapboards 4½ inches to the weather, while the second story is shingled. The gables and other parts, as indicated by the elevations, are plastered with rough-cut work, made of coarse gravel.

A feature of the house which cannot fail to interest the readers of the paper is the provision for the heating and ventilation. The author states that the dwelling is to be warmed by means of hot-water circulation, and all the rooms except one vented into a warm flue. Fresh air from the outside is supplied through a large indirect coil in the cellar, and what other heat may be required to warm the house is obtained by means of direct radiation. The parlor and sitting room are warmed by direct and indirect radiation, the sleeping room and dining room by indirect, the hall, bathroom and rear room on the second floor by direct, and the east chamber and a part of the front chamber on the second floor by indirect radiation.

The indirect coil is made of 1-inch pipe with return bends, each pipe having a slight inclination. The coil contains 180 square feet of heating surface. There are two 1⅛-inch flow pipes, which enter a box at the top, the box having three 1¼-inch outlets leading to the coil. The construction of the box is such as to divide



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



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

Heating a Dwelling by Hot Water.—A. R. Brink, Architect, Red Wing, Minn.

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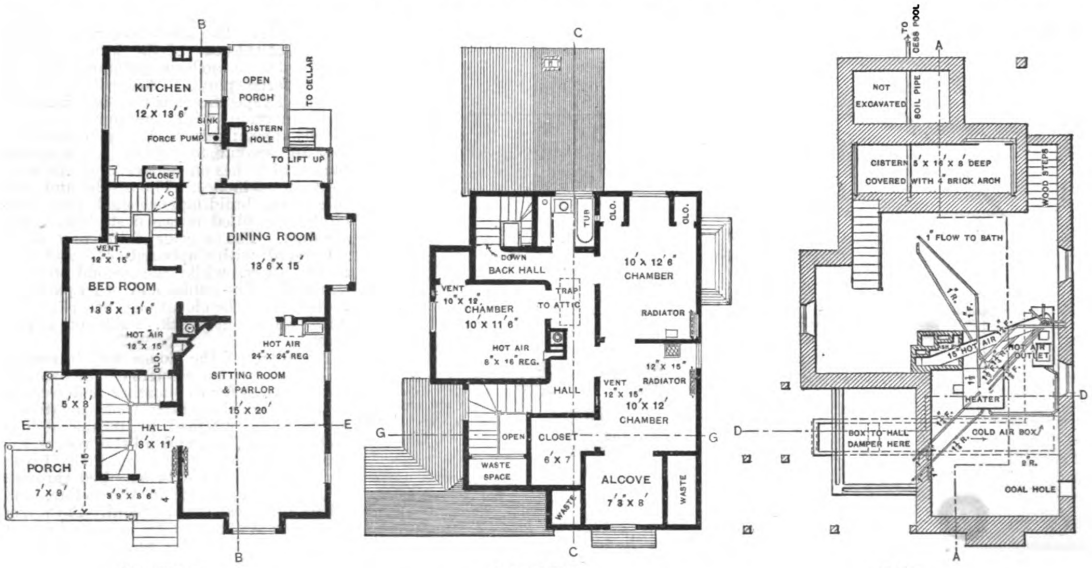
the flow before it enters the coil, as it is stated that where there is only one outlet to such a large coil, the water is liable to circulate in a few pipes only. The return pipe is 2 inches in diameter and connected

The parlor radiator contains 35 square feet, the hall radiator 30 square feet, the front chamber (second floor) radiator, 35 square feet, the rear chamber on that floor 25 square feet, and the radiator in the coil, this pipe being connected with the top of the expansion tank, shown by H in the cut indicating the house supply and expansion tanks. No valves are placed upon this ⅛-inch pipe at any of the radiators.



First Floor. Second Floor. Cellar.

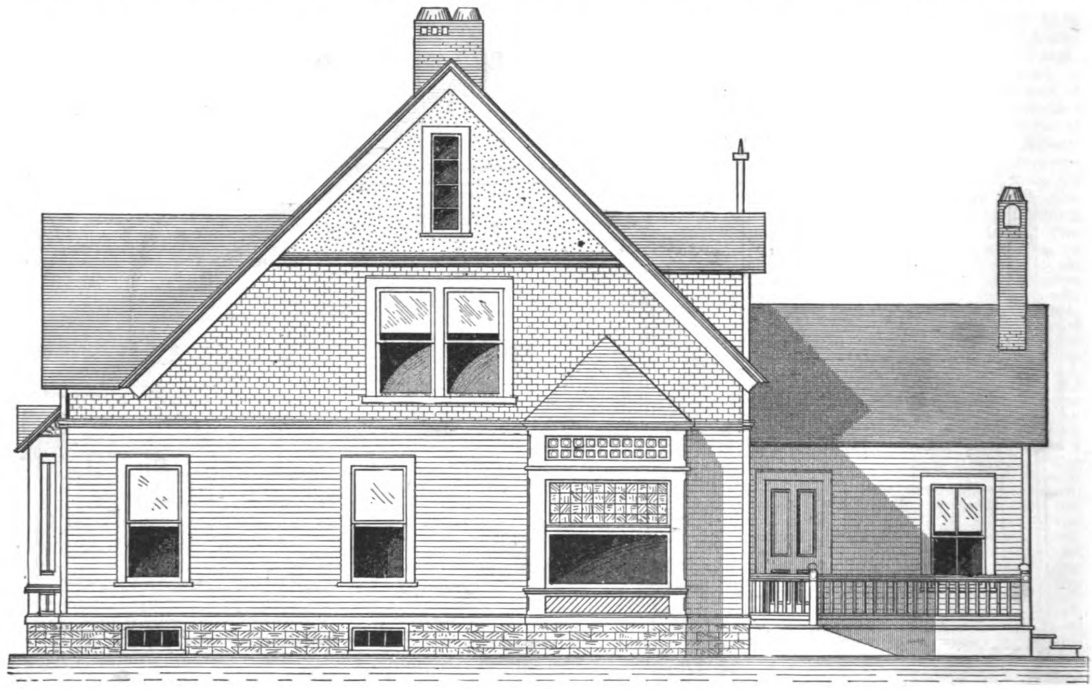
Scale, 1-16 Inch to the Foot.

with a box, similar to the one referred to above, placed in the lower part of the coil. The coil is supported by means of hangers from the joist. The cold air to the coil is taken from the bottom, as indicated in the sectional elevation taken through the lines D E G of the floor plans.

bathroom 7 square feet. All the radiators are of the Bundy pattern.

Where possible to do so, 45° L's or Y's are employed on all pipes. Each flow and return pipe has a valve close to the heater, and so placed that the handles may be removed. All the valves are

The expansion tank is made of No. 22 galvanized iron, is 12 inches in diameter, 48 inches long, and is soldered water tight. The pipes are connected with the tank as indicated in the sectional views. Referring now to the engraving showing details of the house supply and expansion



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

Heating a Dwelling by Hot Water.

The coil is inclosed in a 4-inch brick wall, having holes in the top, as shown, for the hot air to escape. The wall is begun on the cellar floor after the coil is hung in place, and is kept 1 inch away from the pipes in the coil.

straightway and open the full size of the pipe. A valve is also placed at the lowest point of the heater, so that the entire system may be emptied when necessary. There is a ⅛-inch air pipe attached to the highest point of each radiator and

tanks, A is ¼-inch telltale pipe leading to the sink in the kitchen; B is 1¼-inch pipe leading from the pump for the purpose of filling the tank; C is a 1-inch pipe for supplying the expansion tank; D is a 1-inch pipe running to the bottom o

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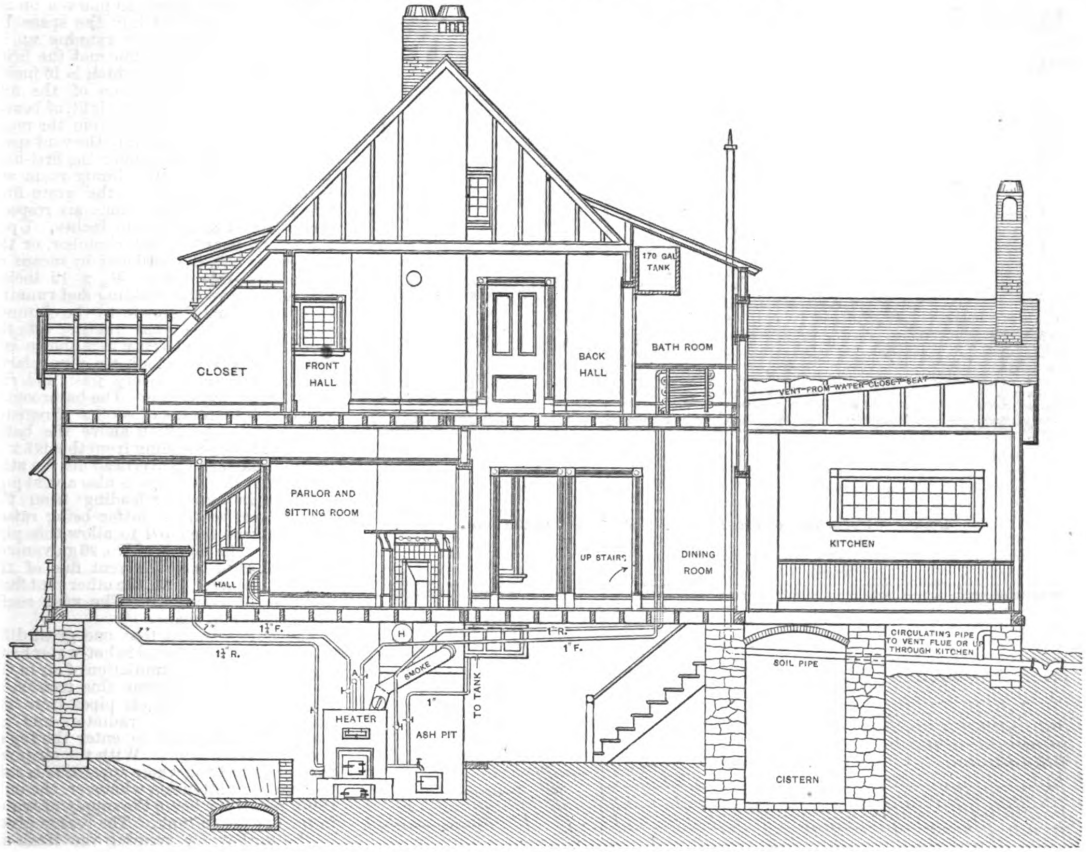
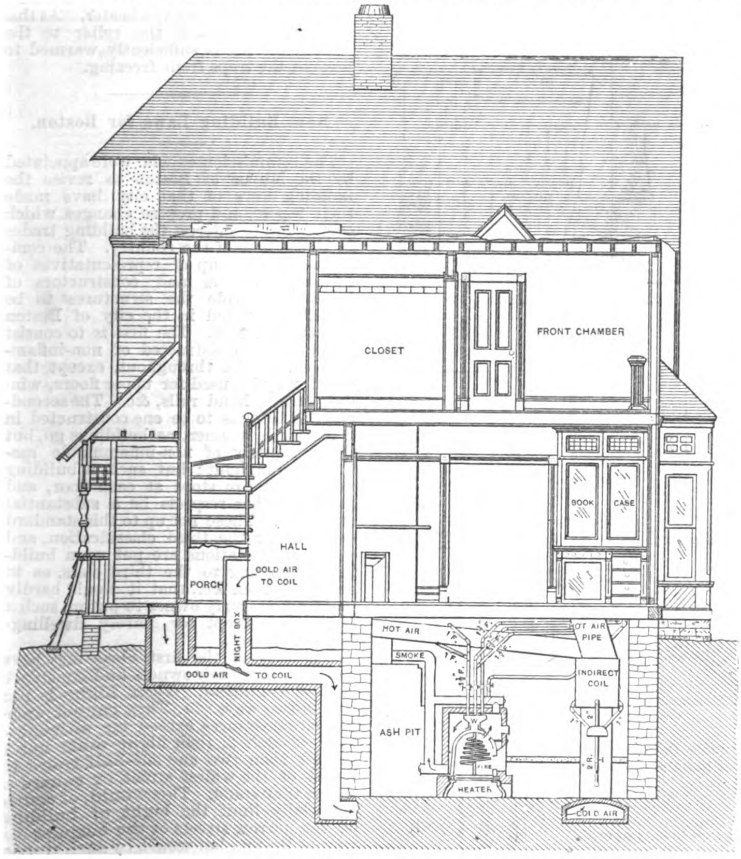


Sectional Elevation Taken Through AA of Basement, BB of First Floor and CC of Second Floor. Scale, ⅛ Inch to the Foot.



Sectional Elevation Through Lines DD, EE and GG of Plans, Viewed from Front of Building. Scale, ⅛ Inch to the Foot.

Heating a Dwelling by Hot Water.

the heater for expansion, and E is a 1¼ inch cold water pipe running to the tub and closet tank; also to the kitchen sink. The pipe F is a 2-inch overflow made of No. 26 galvanized iron, while G is a ⅛-inch air escape running from the expansion tank.

In the bathroom is a tank which is placed at an angle of the main tank and the wall at the left of the bath. The expansion-tank pipe is connected with the supply pipe of the main tank as shown in the engravings. A T is placed in the top pipe of the hot-water heating coil in the bathroom and a 1-inch pipe connected to the coil for the purpose of drawing hot water into the bathtub. When this is done it must be remembered to watch the gauge on the expansion tank, and if the latter becomes reduced it must be immediately refilled. To do this it is only necessary to open the valve on the pipe C, clearly shown in the sectional engraving, and close it when the water reaches the water line in the tank.

The parlor and hall radiators are connected to one flow and return pipe, Y's being employed for branches. A No. 26 galvanized-iron collar is used around all pipes where they pass through floors and partitions. The hot-air box in the parlor and dining-room partition is arranged as shown in the cuts. The cold-air outlet in the hall has a 24 x 24 inch register.

The heater employed is of the Beehive pattern, made of cast iron, with a coil of 1¼-inch pipe over the fire. It is set in brick, the walls being 4 inches in diameter. The space between the heater and the brick walls is divided with plates, so that the hot gases may pass over the outside of the heater before leaving it. The heater is located in the lower portion of the cellar, as indicated in the sectional engravings. The flow and return pipes run as indicated on the drawings and slope at least ¼ inch to the foot toward the radiator.

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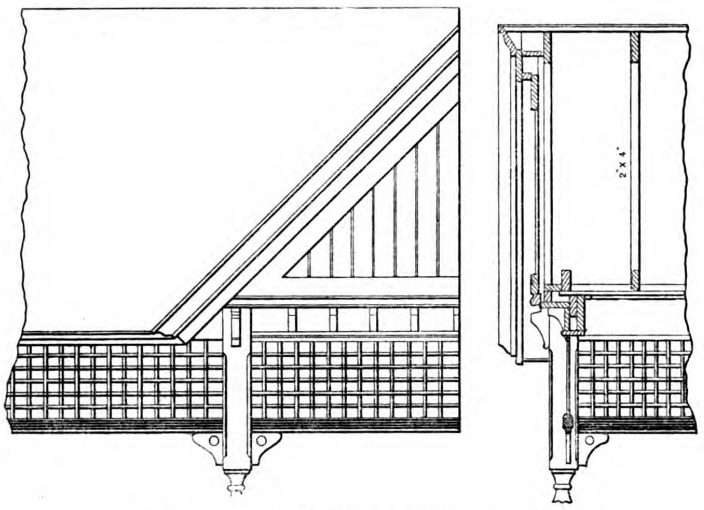
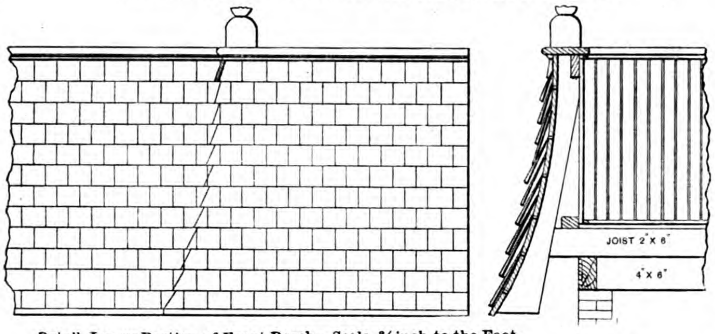
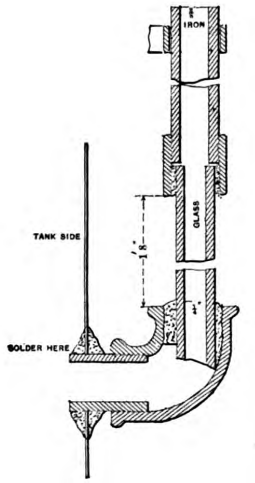


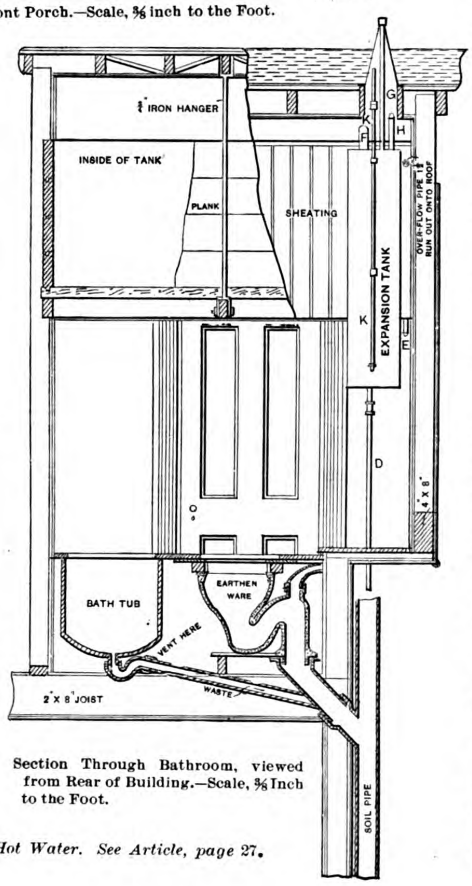
Details of Upper Part of Front Porch, Scale, ⅜ Inch to the Foot.



Details Lower Portion of Front Porch.—Scale, ⅜ inch to the Foot.



Sectional View of Water Gauge. One-half Full Size.



Section Through Bathroom, viewed from Rear of Building.—Scale, ⅜ Inch to the Foot.

Heating A Dwelling by Hot Water. See Article, page 27.

All the rooms, where so marked on the plans, are ventilated into the space between a 10-inch clay pipe running up inside the main chimney flue and the brick of the main chimney, which is 16 inches square. The sleeping room of the first floor has a vent flue, made tight, of boards 10 x 12 inches. This runs from the register shown on the plans into the vent space of the main chimney, under the first-floor joist. The parlor and dining room are ventilated by means of the grate flue. The registers in these rooms are respectively 24 x 24 and 12 x 15 inches. Upon the second floor the east chamber, or the one on the left, is ventilated by means of a register into a pipe 3½ x 12 inches placed between the studding and running up overhead in the attic to the chimney vent space. The vent register of the front chamber is placed where shown and vents into a 7 x 12 inch tin pipe placed between the second story joist and run into the main vent flue. The bathroom is ventilated by means of an 8 x 12 register placed in the partition above the bathroom. The pipe leading from this is 3 x 10 inches, and runs up overhead in the attic to the vent flue. There is also a vent pipe 2 inches in diameter leading from the water-closet seat, the latter being raised 2 inches from the bowl to allow this pipe to enter. The pipe is of No. 26 galvanized iron and runs into the vent flue of the kitchen chimney. All the other vent flues are made of roofing tin. The vent register is convex in shape.

The author states that one great difficulty he has experienced in hot-water heating has been the accumulation of air in the radiators. To overcome this trouble he has arranged ⅛-inch air pipes from the highest point of the radiators and extended them upward to enter the top of the expansion tank. With the air pipes thus arranged the whole apparatus is said to require no attention whatever, the only thing necessary being the supply of water in the expansion tank. The reason given by the author for running the fresh-air inlet the whole length of the cellar is to have the air raised above the freezing point before reaching the heater. As this flue passes through the cellar to the heater, the air is sufficiently warmed to prevent the traps from freezing.

New Building Laws for Boston.

The commissioners who were appointed by the Mayor of Boston to revise the building laws of that city have made their report, and propose changes which cannot fail to interest the building trades in all sections of the country. The commission, made up of representatives of owners, planners and constructors of buildings, divide the structures to be hereafter erected in the city of Boston into three classes. The first is to consist of buildings constructed of non-inflammable material throughout, except that wood may be used for upper floors, window sashes, hand rails, &c. The second-class building is to be one constructed in a thorough manner, as buildings go, but not absolutely of non-inflammable material throughout; but such a building must have fire stops at each floor, and must in other respects be a substantial structure. Those not up to this standard come under the third classification, and so many limitations are put upon buildings belonging to the third class, as to their location, &c., that it would hardly pay for a property owner to put up such a structure, except for purely dwelling-house purposes.

Buildings of the first class may have any area that their owners and constructors can command. Their hight is limited in two ways: 1. They cannot under any circumstances exceed an altitude of 120 feet, and, 2, their hight must not be greater than two and one-half times the width of the widest street or square on which they stand. This would, of course, materially limit the hight of buildings on the narrow streets of the business district of Boston, but would by such restric-

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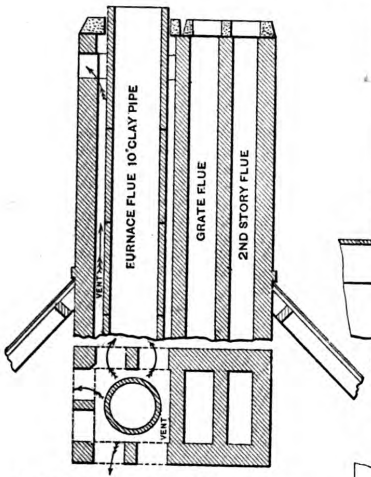
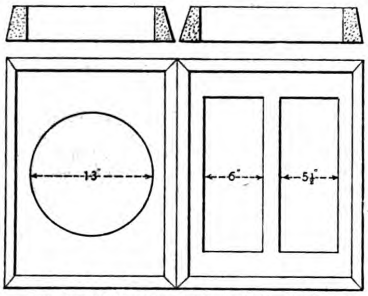
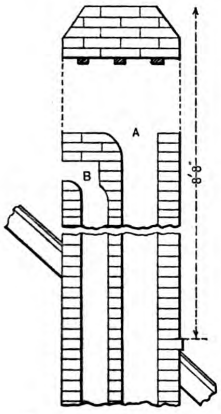
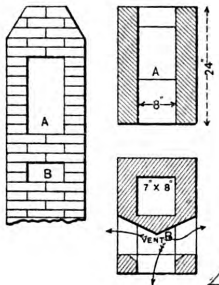


Vertical Section through Main Chimney.—Scale, ⅜ Inch to the Foot.

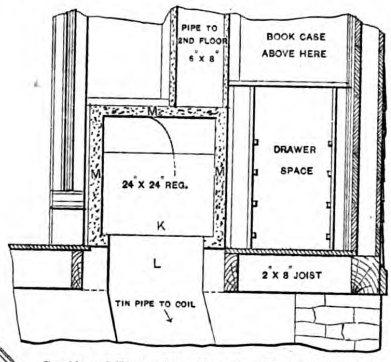


Horizontal Section through Main Chimney.—Scale, ¾ Inch to the Foot.

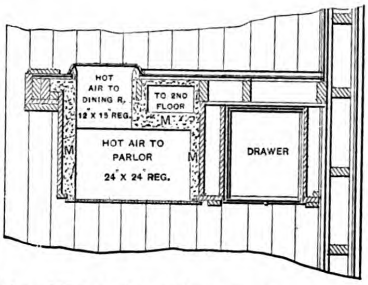




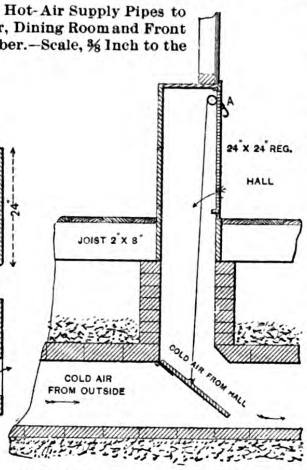
Details of Kitchen Chimney.—Scale, ⅜ Inch to the Foot.



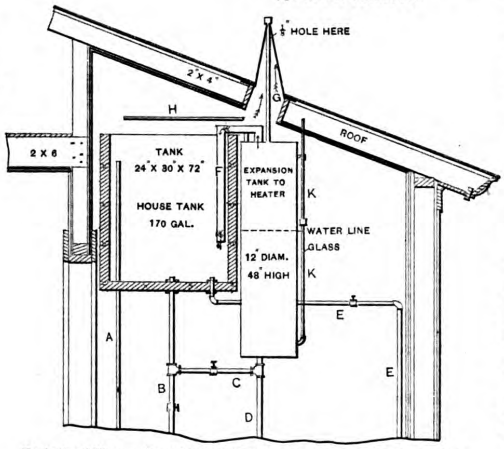
Sectional Elevation, Showing Hot Air Supply to Parlor, Dining Room and Front Chamber on Second Floor.—Scale, ⅜ Inch to the Foot.



Plan of Hot-Air Supply Pipes to Parlor, Dining Room and Front Chamber.—Scale, ⅜ Inch to the Foot.



Cold-Air Register in Front Hall.—Scale, ⅜ Inch to the Foot.



Detail of House Supply and Expansion Tanks.—Scale, ⅜ Inch to the Foot.

HEATING A DWELLING BY HOT WATER.—For Elevations, &c., See Page 27.

tion save to the owners of adjacent property that light and air which are considerably restricted by the presence of the great overshadowing modern office buildings and apartment houses. Buildings of the second class cannot have a greater hight than 70 feet—that is, 10 feet less than the present building law would allow them to have—and cannot cover a greater area than 6000 feet, an entirely new provision, but one which experience demonstrates the necessity of applying. If a real estate owner or merchant desires to build or possess a great warehouse or manufactory, covering, as some of our modern buildings do, ½ acre or more, the building must be constructed throughout of incombustible material. If he is not willing to do this, then he must limit the area of his store to 6000 square feet, though, of course, this can be connected by properly protected openings through the walls with adjoining buildings.

Another improvement suggested by the commissioners is that all weight-bearing metal in the first and second class buildings hereafter built shall be protected by brick, terra cotta or plastering on metal laths and furring, or other incombustible material; also all upright supports in those buildings hereafter erected or altered, of other material than brick, below the first floor, shall be protected by a jacket of brick or terra cotta, or by a coating of plaster on wire lathing. This is undoubtedly, says the Boston *Herald*, a great improvement on the present system, for those who have looked at all into the matter must be aware that there has been of late years a growing disposition to use iron supports in the lower stories of buildings intended for mercantile purposes—supports which are light and attractive, but which in case of a fire might easily be so warped and deflected as to allow the entire building to fall in ruins.

Another change recommended by the commissioners as a means of strengthening the authority of the Inspector of Buildings is the appointment of a board of appeal, to consist of a lawyer, to be appointed by the Mayor; an architect, to be appointed, with the approval of the Mayor, by the Society of Architects, and a master builder, to be appointed, with the approval of the Mayor, by the Master Builders' Association. The members of this board of appeal are to have a regular term of three years, one member retiring each year, and their services are to be called into requisition whenever an owner of property, architect or builder objects to the requirements of the inspector. Their decision is to be final, and by it a support will be afforded the inspector that he has never before been able to obtain.

Granite Composition.

A new composition is made from finely-crushed granite, which when formed into shapes by molding, and afterward burned and hardened, is to all appearances as hard, strong and durable as the solid stone itself, which it also closely resembles. It is claimed by those who have brought forward this process, says an exchange, that all kinds of ornaments for architectural purposes, such as window taps or sills, cornices, friezes, and all other articles of this nature, can be molded to accurate shapes and forms, and manufactured by this process at one-tenth the cost of cutting the same out of solid rock. They can also be vitrified so that they can take on a permanent gloss as fine as polished granite, and at a mere fraction of its cost. The composition follows closely the color and texture of the stone from which it is made, Roxbury granite making a light-colored block, Quincy granite a darker one, and so on. The composition can be produced from waste stone, of course, as well as any, and the process is applicable to other stones as well as granite, the stone, of whatever description, being first crushed in a stone crusher, and afterward more finely powdered by passing between iron rollers.

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ARTISTIC IRON WORK.

IT IS HIGHLY GRATIFYING to note the progress made in artistic iron work, cast and wrought, whether in architectural constructional work for dwellings and other buildings, or countless movable objects that combine utility with ornament, or simply present ornamental features. Bronze itself is rivalled in the sharpness and clearness with which designs can be rendered in cast iron. The manifold colorings that can be given to iron surfaces, says an exchange, have resulted in altogether changing the character of house hardware fittings, now as attractive as they were formerly unsightly. In more elaborate artistic work the facility with which designs can be multiplied assures the possession of fine productions at modern cost. The apparent freedom of treatment largely contributes to the effectiveness of wrought iron. Slight variations, the evidence of manipulation, show themselves in repeated parts. More, too, can be accomplished by it in open work. Under the hammer of the smith the iron with its rigid strength assumes the ductile facility which allows it to realize, to a certain degree, the fantasies of the filagree work. Technical difficulties are constantly encountered only to be conquered. Instinct and touch appear to share in the rapid manipulative processes. In this art industry, brass, copper and bronze are often combined with the iron as giving increased richness of effect when carried out in such ornaments as leafage and strap work. Deep red copper particularly assorts well and facilitates the production of delicate details by its pliability.

A happy combination of elegance and utility is presented in plant vases for halls, stairway landings and gardens. Eminent landscape painters, as for instance, Claude, have introduced just such vases in their garden like landscapes to add to the charm of human art that of human nature. The range of these extends from the classical to the most capricious forms. One of square form, with sporting cupids at corners, has relief panels representing the four seasons, apparently replicas from sculptural designs. Another is supported by a pillar with leafy capital, which is engirt by the arms of two children in the round; the vase composed of closely wedged stalks developing into outspreading leaves at edge. Antique models show serpents and dragons for handles and medallions on each side, with similar ones at base. Some are engirt by pendants held up by children, cast partially in the round or sustained by bosses. Scattered objects, floral and leaf, in basso relievo on body of vase; these connected by tendrils are favorite devices, also medallion heads set in scroll or strap work. A vase worthy of attention rests on a pillar embraced by the arms of two children.

It is in garden fountains that some of the most successful efforts of designers in cast iron have been achieved. One of these displays at the base the figure Neptune among breakers, partly molded in the round; the stem is composed of imitative coral encircling a sea syren, while the fountain plays from out of a large nautilus shell. It has been laid down as a principle of design that the weight of ornament should be at the base, but this is a decided error. The bars and side supports represent the combined strength, and although the base need not be neglected, ornaments between bars, either strictly geometric or apparently developed from them, or foliations filling the panels, may properly be surmounted by wrought work of the latter description of a lightsome color character, determined by its extent. The eye is led upward. whether by straight lines or foliations, and is against the sky or surrounding foliage. Open cresting work, composed of curves, whether simple lines with twisted extremities or a design representing flowers and leaves, arranged in a somewhat pyramidal form, may be made to constitute a satisfying finish. A stately gate, with arched frame, itself consisting of straight rods with slight ornaments at half their length, has the inner portion of the arch again surmounted by still finer work. Connected railing consists of alternating pillar standards supporting vases with panels in character with the gate.

Exquisite examples of chandeliers, for entrance halls, have the body suspended by chains composed of slender links intermingled with various angles to reflect the light, and about which, for further varying of the surface here and there a small leaf projecting or curling in upon itself. The branches for lights are finely wrought. This slenderness of construction is an appropriate tribute to the inherent strength of the material, and contrasts well with more massive surroundings. What artistic iron work requires is inspiring ornamental treatment possessing some of the solid features of Italian work in wood and stone, which is free from mere prettiness. Breadth of treatment is the great requirement, with absence of innumerable details which display ingenuity of manipulation rather than taste. At the same time in minor articles, apt to be scrutinized, a nicety of precision should be evinced in the details. Such an article is seen in a tripod in *cinque cento* style, enriched with lions' feet, masques and moldings, representing war, music and the vintage, and supporting a circular receptacle with representation of a pastoral scene on cover. Gilding is little resorted to in artistic iron work, except in a style of mosque ornamentation in which a gilded surface is cut through with outlined ornaments showing the metal beneath.

Wrought iron grills, now much in use, afford admirable opportunities for delicate workmanship. A mode adopted at times of rendering a grill more highly ornamental is, instead of filling the whole aperture with one panel, to surmount the main design with a bar crested with light scroll devices. An open double frame, with slight connections, imparts an airy effect to a delicately wrought grill. Although artistic improvement is visible in not a few balconies, there is apparent the want of more original treatment in the fillings. The front of a balcony, usually above the direct line of sight, needs special adaptations, which appear generally to be overlooked. The scroll form of projection is decidedly more favorable than the horizontal for viewing the design, and we refer to designs possessing special merit, and not mere skeleton outlines of form, which at an elevation do not show to advantage. Where heads or figures in the round are introdnced they might advantageously be so adjusted as to meet the upward gaze of the spectator. It is a mystery elaborately designed balcony fronts should be almost invariably in monochrome, when where composed of floral compositions, heads, scrolls, flowing and even stiff renaissance patterns color would give them such brilliance, emphasize their details and bring them out from the dull background as attractive additions to the general monotony of facades.

In artistic iron work beauty of outline is to be regarded as the first consideration and more attended to as art knowledge and art taste increase. In rendering ornament subservient to fine form we give it a distinct vantage ground. To settle all the principles that ought to govern artistic iron work is no easy matter, but there is no question that where figures are introduced, whether in relievo or in the round, they should not be united with branches—a combination, by the way, seldom found in the work of French artificers, who incline to admixture of these with scroll work. Surface decoration in relief will always be more pleasing than ornamental adjuncts almost independent. Where relief designs are introduced to decorate construction they should be clearly defined. With all that has been accomplished we anticipate that under the diffused light of artistic feeling it is all but preliminary to the higher attainments.

New Church Architecture.

Speaking of Brooklyn, says an exchange, there is a church going up there now on the corner of Clark and Henry streets, not a stone's throw from old Plymouth, and just one block from where the great Plymouth pastor died, which might well be called one of the seven wonders of the spiritual world. It is being erected by the congregation of the old Sands street Methodist Church, which stood nearly opposite the entrance to the great Brooklyn bridge. Shade of John Wesley, spirit of Summerfield, ghost of Parson Bangs, what a church! Why, what's the matter? Isn't it handsome? Ah, yes; there is nothing to compare with it in Brooklyn or New York, or I might almost say anywhere else. As to the style, I approach it with fear and trembling, for I fear I am getting into deep water and I might put my royal foot in it. It might be Byzantine, but it is not. You could call it conglomerate, but if you did you would make a mistake, and yet if you were to exhaust the nomenclature of architecture you would find no other that would describe it, for there are Gothic pillars with Doric bases and Corinthian capitals, Ionic faïences, cheverons, crenelated moldings, festoons, foliations, Gyna reversas entablatures, buttresses, gargoyles, lanunais, helices, &c. The effect is bewildering, the more so as it illustrates the difference between ancient and modern Methodism.

I well remember the old Methodist Church in New Haven, where that lion of the tribe of Judah, Nathan Bangs, of blessed memory, used to preach. The sight of necklace, or earrings or bracelets was just "pizen" to him, and a common country dance was enough to drive him into a galloping consumption. There was no modern frippery or foolishness about Brother Bangs. When he denounced sin he jumped on the devil like a pile driver, and made things warm for old Satan and all those who approved of his doings. There were no friezes nor cheverons nor baldachins about that old meeting house. The pews were straightbacked, without cushions, a wicked modern invention to make rich and comfortable sinners believe they were on the road to Paradise without suffering or repentance. No, sir, nothing of that sort. It stood on a side street, not a stone's throw from old Yale College, and while they were singing Greenland's Icy Mountains at Center Church, you could hear Parson Bangs giving out the Doxology on Temple street.

The Sands Street Church of Brooklyn was very much like that, just such a plain, unpretentious building as was put up by the practical fathers of Methodism 50 or 60 years ago. When the big bridge was completed the removal of the church became a a necessity, and it was bought by the bridge corporation, the Sands Street Methodist Church receiving enough for the old and ruined meeting house to put up the present splendid edifice. Do not understand me as finding fault, for the building, when finished, will be one of the richest ornaments of the City of Churches. If it had been a Catholic Church or an Episcopal Church I should not have been surprised, but as an examplar of modern Methodism it is certainly a revelation, and I'm inclined to think with Brother Snow, "Shu as ye live de worl do move.'

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HOW NEW YORK BUILDERS SCAFFOLD A TALL HOUSE.

THE MARGARET APARTMENT HOUSE, BROOKLYN, NOW IN PROGRESS OF ERECTION.

FRANK FREEMAN, ARCHITECT, NEW YORK CITY.

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How New York Builders Scaffold Tall Houses.

THE USUAL RULE in showing buildings in papers and magazines is to represent them as completed. This is the most satisfactory plan for the general reader, as well also for the architect. Few designers care to have their work inspected until it has been completed, and the general reader is not interested in technical details. With the practical builder it is different; while he takes interest in visiting buildings already finished, he is far more interested in looking over those that are in progress, because they reveal methods of construction and the handiwork of all the mechanics employed. We have thought that a variation in our plates, at this season of the year, when, as a rule, active building operations are suspended, would be appreciated by our readers, and we therefore have shown one of the most conspicuous buildings in progress of erection anywhere near New York just as it stood a short time since and just as it was caught by the artist's camera. The general reader may not think the picture a pretty one; he may say it is most all scaffolding. Well, that was one of the reasons why we chose this subject. We intend to talk about the scaffolding and to call attention to the difference in methods of managing such work in the seacoast towns and in the interior. For the benefit of those who wish to know how the building will appear when it is finished, we present a second view, being a photograph from the architect's perspective sketch, and which represents the building as it will appear a short time hence, when it is completed and the scaffolds are removed. The building is notable in other particulars besides the scaffold, and we shall direct attention to some other features of its construction, although the first thing is the scaffolding.

Comparatively few men other than sailors understand how to use ropes, but to a sailor a rope is the most natural thing in the world. He can do more things with a rope perhaps than a Yankee can with a jack knife. Builders are not slow to appreciate this, and accordingly in seaport towns lashed scaffolds very generally have the preference. A lashed scaffold running up to the third, fourth or fifth story of a building, however is of comparatively small importance when we take into consideration the extraordinary hight of the building represented in our plate. And yet the "riggers," as the sailors who do such work are called, went about this work as coolly and with as little regard for hight as though it was a building of the most ordinary size. Every builder knows how much depends upon his scaffold both for himself and his men; unless a good scaffold is provided disatrous results are sure to follow. Nailing is at best a temporary resort. It is unreliable, and at the same time injurious to the material. Lashing is firm and safe, the material is never injured in the least, and in taking down the scaffold the work proceeds as systematically as when it was put up.

The usual plan of erecting a scaffold of this kind is to place upon the ground a few feet outside of the walls of the building a row of empty barrels, into each of which is placed a pole of requisite strength for the purpose and of sufficient length to reach upward two or three stories. To give good anchorage the barrels are filled with earth or sand. At intervals as the work proceeds, say from the different stories, horizontal pieces are run outward and lashed to the uprights. When the work has been carried up until the top of the first set of poles has been reached other poles are lashed to them and the same general operation continued, and so on until the structure is completed.

Close observation will show that there are several styles of lashing employed in this work. These are dependent upon the character of the parts held together, and in order to better convey to our readers just how the work is done we have had the details, Figs. 2 to 4 inclusive, made. Perhaps some of the younger members of our readers will see fit to try their skill at rope work, using small sticks and pieces of cord for the purpose. We do not want to discourage them from such an effort, but we venture to say that to score a success at the first effort would be somewhat remarkable. This job of scaffolding, it may interest our readers to know, is claimed to be the tallest of its kind ever put up.

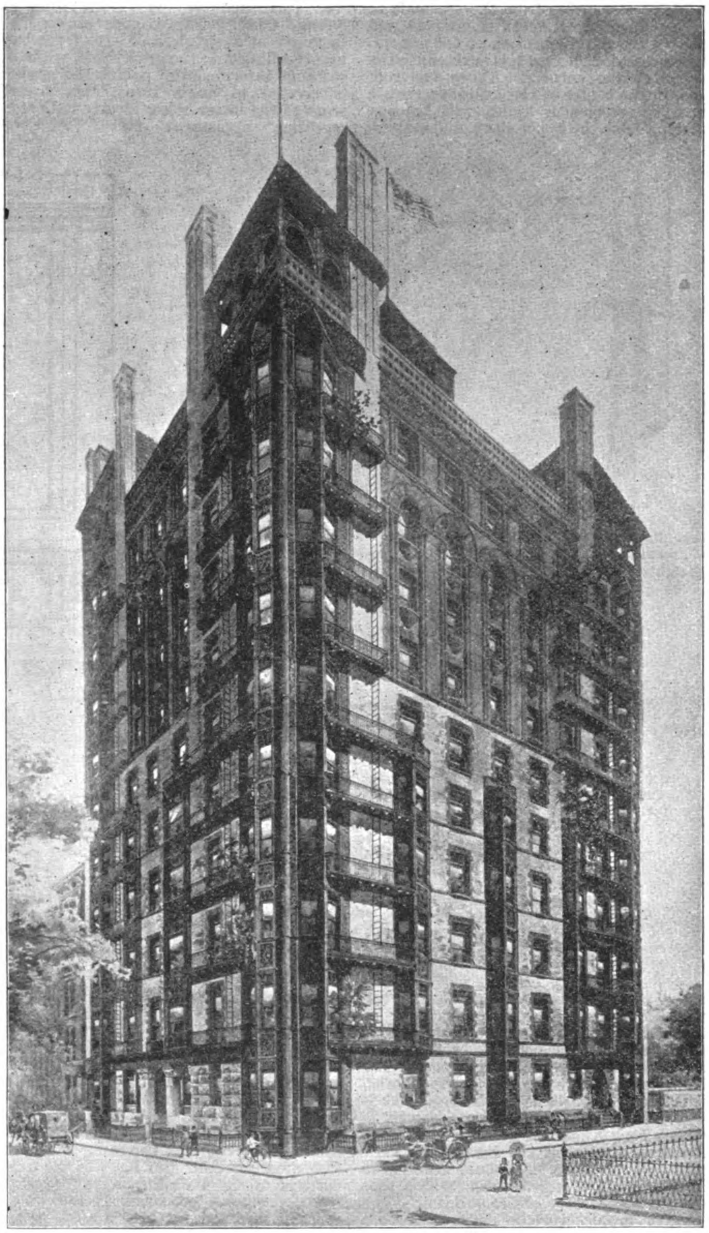

Fig. 1.—View of the Margaret Apartment House as it will Appear When Completed.

Some buildings are scaffolded on the outside, and some are erected entirely from the inside. Only a short distance from the building here described is another structure, devoted to commercial purposes, it is true, but nevertheless quite a pretentious building, the walls of which rise to a considerable hight, of which the work has been done entirely from the inside. The only outside scaffolding employed anywhere has been for the stonecutters in doing the carving called for by the design about the pilasters, window caps, &c. The character of the work and the materials employed, it is scarcely necessary for us to remark, determine the question of the employment of the scaffolding.

The building shown in our plate, as we have already indicated, is an apartment house, and as such it represents some advanced ideas in construction and arrangement. It is scarcely neces-

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sary to say it is an imposing structure, and as it stands upon what are known as "Columbia Heights," Brooklyn, a bluff overlooking the lower bay, it commands a magnificent view of New York harbor, including even Sandy Hook and the Twin Lighthouses on the Highlands of Navesink. The structure covers a ground area of 75 x 100 feet, is 10 stories in hight and arranged to accommodate 39 families, with seven rooms to each suite of apartments. The building is 160 feet in hight, measuring from the sidewalk to the top of the tower cornice, and as will be seen from an inspection of the general view presented in Fig. 1, is surmounted by towers at the corners. Above the roof line, in the center of the building, rises a dome two stories in hight, with balcony opening from the upper story, and making may be termed a bay window extending from the first to the tenth story. In general shape it closely resembles four of the sides of an octagon, with a circular projection between the second and third sides to cover the cast-iron post supporting the beams. The four panels between each of the different stories are made up of 16-ounce copper, two of them in each case being embellished with a design in *bas-relief*. The ornamental copper work, some examples of which are shown in Fig. 6, was furnished by W. H. Mullins of Salem, Ohio. The copper sheets are fastened at the right and left of the bay by extending into the brickwork, while at suitable intermediate points the copper is riveted to angle irons, the frame work of the latter being clearly indicated on the supplement plate. A good the roofs of the dome and towers, is being done by William Martin of 248 Washington street, Brooklyn.

Still another interesting feature is the provision for escape in case of fire, without which even fire-proof houses are incomplete. It will be noticed by reference to Fig. 1 that each story at the three corners of the building is furnished with a wrought-iron balcony readily accessible from one or more windows, and that by means of the iron ladders a person may quickly descend from the tenth story to the ground. The building has an iron stairway, spiral in form, running from the basement to the upper stories and encircling the space occupied by the elevator. The ironwork was furnished by the Union Iron Works, and the building erected by J. D. Kenney, both of Brook-



Fig. 2.—Method of Securing the Uprights Together.

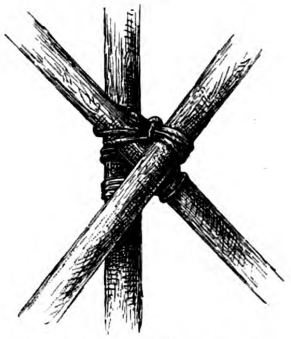

Fig. 4.—Manner of Lashing Braces.

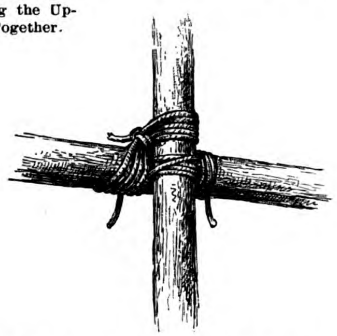

Fig. 3.—Lashing of Cross Piece to Upright.

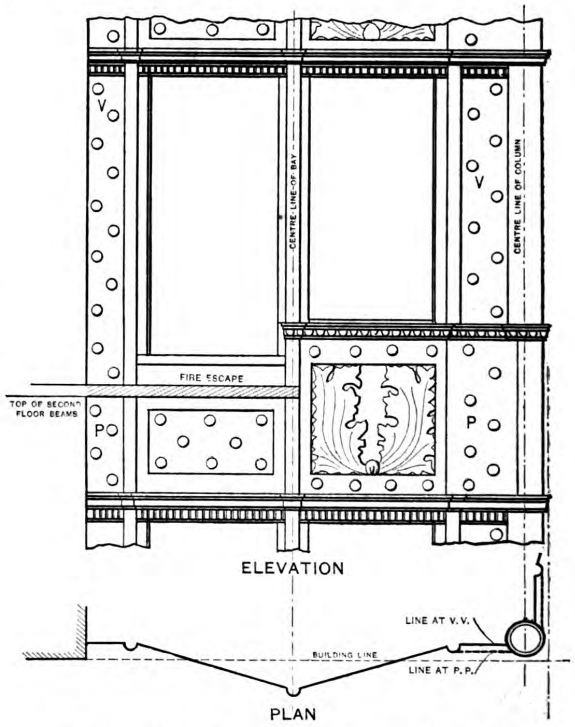

Fig. 5.—Elevation and Plan of Two Sides of Copper Bay Window at Street Corner.

How New York Builders Scaffold a Tall House.—Details of Work on the Margaret Apartment House.

one of the finest observation points in the vicinity of New York. The exterior of the building up to the seventh story is made up of buff-colored brick, while above is red pressed brick, the whole being enriched with terra-cotta jambs, sills and arches. The brick employed is 1½ x 12 inches in size and is known as "NewYork Anderson Company's Make." An examination of the perspective view will show a very handsome frieze and cornice made of terra cotta, which tops out the upper story of the building. The style of architecture is claimed to be a blending of the Moorish with the Romanesque.

Another feature in connection with the construction of this building which is likely to interest the builder is the character of the sheet-metal work. The building is, in fact, an excellent illustration of the rapidly-growing tendency to freely employ sheet metal in places where heretofore its use would not have been considered, even if practicable. Each corner of this building, which is called "The Margaret," is finished with a copper bay terminating in a tower above the roof line. The most important of these is the street corner shown in the foreground of Fig. 1 of the illustrations. This is made up of what idea of the character of the work and the manner in which it is executed may be obtained from an inspection of Fig. 5 of the illustrations, which shows a plan and elevation of two panels employed between different stories. The rings or circles at the right in the plan view indicate the cast iron post supporting the beams with the copper finish extending around it. Copper of the same weight as that mentioned for the bays at the three corners of the building is employed in connection with two rows of windows extending upward for six stories on the sides fronting the two streets. It is also used to a greater or less extent in other portions of the building, it being found over the main entrance, which is to be through an ornamental room and archway in the Columbia Heights front; also for the sides of the three corner towers and for the dome which rises above the roof line in the center of the building. The ceiling of the main hall is covered with embossed 16-ounce copper of striking design. At the rear of the building are rows of projecting windows extending to the tenth story and made of No. 26 gauge galvanized iron. The sheet-metal work in connection with this building, as well as the Spanish tiling covering lyn. The cost of the structure completed is estimated to be about $450,000. The owner of the building is Charles Arbuckle and the architect is Frank Freeman, New York City.

Relations of Mediæval Arts.

It must ever be borne in mind, says F. Delamotte, that the science of architecture and the sister arts of illuminating, metal working, wood carving, embroidery, and perhaps we may add fresco painting, passed on hand in hand through a nearly parallel course of development through the Middle Ages, all culminating together, as far as chasteness of design and elegance of execution were concerned, in the thirteenth and fourteenth centuries, and as far as profuseness and richness of ornamentation were concerned, in the fifteenth; and all together sinking out of sight during the Reformation. And the reason why, in obtaining a general view of the progress of one—as illumination—it is wise to keep the others in mind is that each serves, and especially architecture, as a sort of *memoria technica* to the rest. Thus, while the severe straight lines and semicircles of the Norman school prevail, a corresponding simplicity

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of outline characterizes the illuminations of the period; the same grotesque lizard shaped monsters which twine themselves round the capitals of the columns form steal into the pages of the MS., they are to be found also forming the capital of the column, though here it must be confessed the former somewhat outruns the latter—when flowers are added to foliage in the one they appear in the other; when the angular principle is introduced into architecture it shows itself in illumination;



How New York Builders Scaffold a Tall House.—Fig. 6.—Details of the Pressed Copper Work Used on the Margaret Apartment House.

the components of terminals of the initials in the service books; and even a resemblance may be traced between at least one kind of beading and the exterior ornamentation of the writing. When the graceful and luxuriant curves of foliage begin to a style of illumination generally known as the *opus Anglicum*, and claimed as the peculiar invention of this country, having been in use more than a century before the foliage, which is one of its characteristics, appears in the capital. Further on, and when outline is in the one almost buried under prodigal elaboration of detail, the other seems to have all the riches, animal as well as vegetable, of the park and the flower garden poured over its pages to smother its text

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A SYSTEM OF FRAMING ROOFS.*

BY DAVID H. MELOY.

TO FIT PURLIN PLATES AGAINST HIP RAFTERS.

PLACE THE SQUARE on the stick or on a board at figures 6 inches and 12 inches, which is the pitch of the roof, as shown in Fig. 14. Lay off the exact size of the top and face sides of the stick both ways from the corner of the square B to A, 6 inches for the top side, and B to C, 6 inches for the face side, or the exact size of the stick, whatever it may be, either more or less. From these three points A B C square across the stick or board A to 1, B to 2, C to 3. Now square the end of the stick on face, D E, and on the top D F. Take the distance from 1 to 2 and set it off on the bottom corner of the face, from E to G, and mark G D, which is the required bevel for the face of the purlin plate against the hip rafter. Take the distance 2 to 3 and set it off from F to H and mark H D, which is the required bevel for the top side of the purlin plate against the hip rafter. Cut to the marks G D H. The opposite sides of the stick may be marked by the same bevels, as shown by the dotted lines J G and J H. Use the top bevel for the bottom and the face bevel for the back. The bevels will be the same on any size stick having 6 inch pitch. Sticks of any size and pitch may be laid out by this rule, as is more clearly shown in Fig. 15.

TO MITER STICKS OF ANY SIZE AND PITCH.

Lay out the exact size and form of the stick in the position it is to be placed, as shown in Fig. 15. In Fig. 16 is represented a stick 6 x 8 inches, set to the pitch of 8 inches to 1 foot. Draw perpendicular lines from and touching all the corners. Now square the end of the stick to be mitered on the top A B and on face, A C. Take the distance from 1 to 2, Fig. 16, and set it off on the back corner of the top of the stick, from the square line B to D, and mark D A, which is the bevel required on the top side of the stick. Then take the distance from 3 to 4 and set it off on the bottom corner of the face of the stick from C to E. Mark E A, which is the bevel required on the face side of the stick. Cut to marks E A D. The opposite sides of the stick may be marked by the same bevels, as shown by the dotted lines F E and F D. Fig. 17 represents a stick same size as that shown in Fig. 16, but is set to a piteh of 12 inches to 1 foot. The bevels for Fig. 17 are laid out by the same rule as in Fig. 16. Mark the perpendicular lines from all the corners and take the distance from 1 to 2 for the bevel on the top of the stick, and the distance from 3 to 4 for the bevel on the face of the stick. Cut to marks J K L and the dotted lines M on the opposite side of the stick.

TO MITER ROOF BOARDS AT HIPS AND VALLEYS.

Lay out a section of the board full size and in the position that it is to be placed on the roof, 6 inches to 1 foot, as shown in Fig. 18, A B showing the width and face of the board and B C the thickness. Draw a perpendicular line from the upper corner of the face from B to D. Draw level lines from the lower corner of the face from A to D and from the under corner from C to E. The distance from A to D, Fig. 18, is the bevel required for the face or width of the board, and the distance from C to E is the bevel for the edge or thickness of the board. The bevels on the hips and in the valley will be alike, except the bevels on the hips will be shortest on the upper edge and on the under side of the boards, but in the valleys the bevels will be the reverse —they will be longest on the upper edge and on the under side. The bevels for the roof boards at hips and valleys on any pitch roof may be found by this same rule. Fig. 19 shows how to obtain the bevels of the board on a roof having 12 inch pitch. A B shows the width of the board, and B C the thickness of the board. Draw the plumb line B D and the level lines A D and C E, as before de-

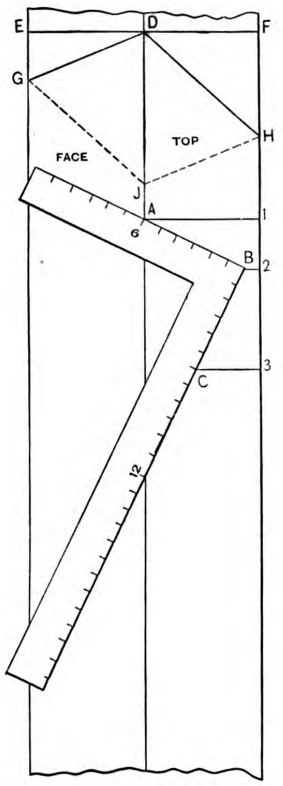
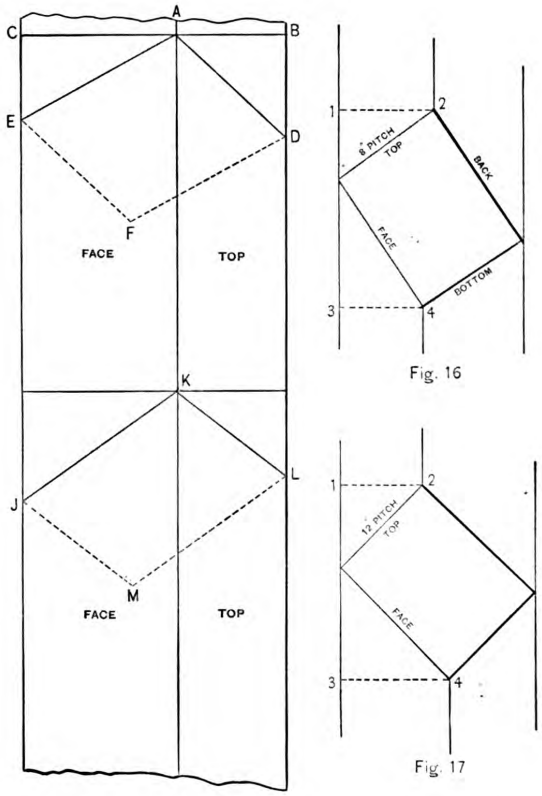


Fig. 14.—Fitting Purlins Against Hip Rafters.



Figs. 15, 16 and 17.—Method of Mitering Timber of Any Size and Pitch.

A System of Framing Roofs.

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scribed and shown in Fig. 18. The distance from A D in Fig. 19 is the bevel for the face of the board, and the distance from C to E is the bevel for the edge or thickness of the board.

TO MITER BOARDS IN VALLEY OF TWO PITCHES.

Lay out sections of the boards to be used full size, whatever the width or thickness may be, in the position they are to be laid on the roofs, as shown in Fig. 20. A B C D represents a section of the covering board having 6-inch pitch, and A B C D of Fig. 21 represents a section of the covering board, having 8-inch pitch. Draw level lines from the top face corner of the boards from B to E. Draw a plumb line touching the lower face corner of the boards at A, from E to F. The lay out of

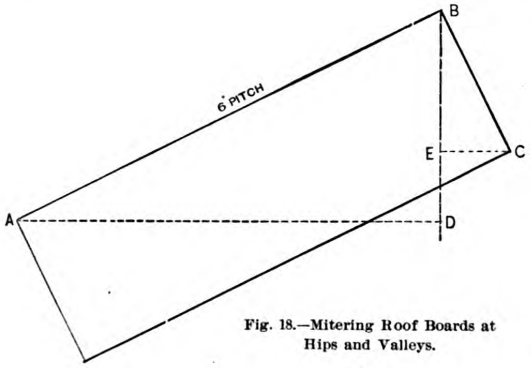

Fig. 18.—Mitering Roof Boards at Hips and Valleys.

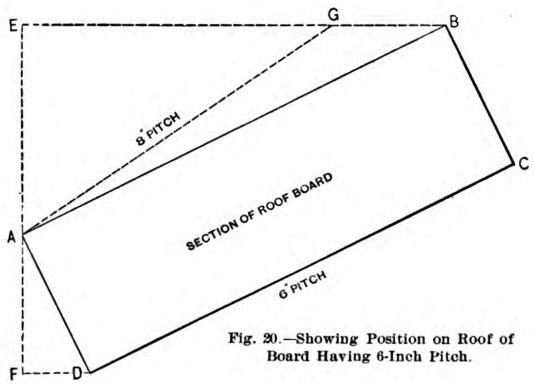

Fig. 20.—Showing Position on Roof of Board Having 6-Inch Pitch.

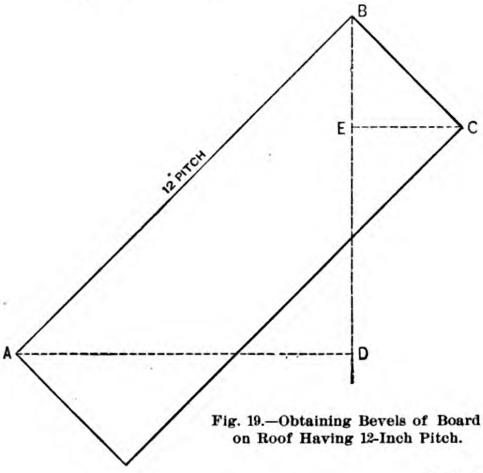

Fig. 19.—Obtaining Bevels of Board on Roof Having 12-Inch Pitch.

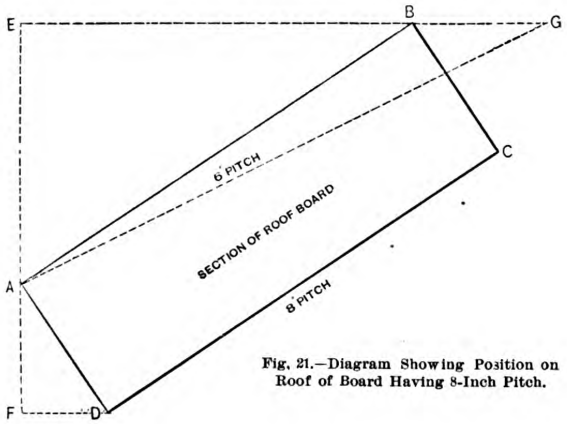

Fig. 21.—Diagram Showing Position on Roof of Board Having 8-Inch Pitch.

A System of Framing Roofs.

the covering boards so far in Figs. 20 and 21 is the same as in Figs. 18 and 19, and will give the bevels for mitering the covering board in the valley, having one common pitch. But to find the bevels required for mitering the covering board in the valley where two roofs of different pitch intersect, proceed as follows: Draw a line 8 inch pitch, as shown from A to G, Fig. 20. The distance from G to E is the bevel for the face of the board on the 6-inch pitch roof, and the distance from D to F is the bevel for thickness of the board on the 6-inch pitch roof. Make a line 6-inch pitch, as shown from A to G, in Fig. 21. The distance from G to E is the bevel for the face of the board on the 8-inch pitch roof, and the distance from D to F is the bevel for the thickness of the board on the 8-inch pitch roof.

PUTTING TOGETHER ROOF FRAME WORK.

It is just as important to know how to put together the framework of a roof properly as it is to know how to lay it out correctly. First know that the wall plates are straight on the outside face and on the top side. If the plates rest on brick or stone walls and are not uniform in hight they should be wedged up underside until the top is perfectly straight. Roofing slates of various thickness or points of shingle make good wedges and should be placed directly under where the rafters are to rest on the plates. When the plates are firmly secured to the walls with the proper wall anchors all the interstices between the wedges should be underpointed with mortar. The next thing to do is to set up the deck plates or ridge poles on stanchions of exact hight. Then set up the hip rafters, and if they are fitted correctly they will bring the deck or ridge pole into its proper position, but keep the stanchions under until the roof is covered. When the hip rafters are secured at the bottom and top see that they are straight all ways and that the sides of the hips are plumb. Brace and stay the hip rafters straight and plumb before setting the jack rafters, then all the jacks will fit them nicely and hold them straight. Stanchions should remain under valley rafters for all time.

(To be continued.)

THE NEW YORK BISCUIT COMPANY have arranged for the erection of one of the largest buildings in the city on Tenth avenue, near Sixteenth street. The buildings will be erected on four sides of a hollow square, which will be 206½ by 427 feet in dimensions. The factory will contain 40 patent revolving ovens of enormous capacity, and will employ in the various branches of the business nearly 10,000 men. In the center of the block will be an engine room containing enormous Worthington and Corliss engines and a most perfect electric plant for lighting the factory. Outside of the engine room will be a furnace and boiler room containing the largest bank of steam boilers in the United States, and surmounted by a smoke stack 125 feet in hight. The cost, exclusive of ground, is estimated at $2,000,000.

Marble Production in the United States.

The Census Office has recently issued a bulletin upon the subject of marble production in the United States, in which it is stated that the demand for marble in this country is for the most part supplied by the State of Vermont. There are 12 States in which marble is produced, but Vermont furnishes more than all the other States combined. There are now 103 quarries in operation, and the total value of the annual output is $3,488,170. Of this amount Vermont produced $2,169,560; California, $87,030; Georgia, $196,250; Idaho, $2500; Maryland, $139,816; Massachusetts, $35,000; New York, $354,197; Pennsylvania, $41,850; Tennessee, $419,467, and Virginia, $42,500. Of the capital employed $9,346,928 is in Vermont, $2,373,627 in Georgia, and $1,033,461 in New York.

The average wages of quarrymen and mill men is stated to be $1.26 a day, mechanics, $1.98; laborers, $1.28; foremen, $2.87. The value of the importations of marble during the calendar year 1889 was $701,518; in 1888, $534,263; in 1887, $529,933. Italian marble, principally Carrara, forms over three-fourths of the total imports. A small proportion is Mexican onyx. It has been found to be impossible to obtain an accurate idea of the growth of the marble industry during the last decade, inasmuch as in the last census marble and limestone were considered together.

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CORRESPONDENCE.

Unfolding the Circle in Handrailing.

From J. B., *Omaha, Neb.*—In the illustration which I send herewith I have endeavored to show my method of unfolding the circle. Fig. 1 represents a plan of stairs and Fig. 2 an elevation, showing true quarter-circles developed on stretchout. Referring to Fig. 2, *a f* is the stretchout of the large quarter-circle of Fig. 1 and *g h* of Fig. 2 is the stretchout of the small quarter-circle of Fig. 1. Draw the dotted line as shown on Fig. 2. Make *d* a fixed point, and lifting the rail at *c* gives paper. The line 8 14 10 equals the corresponding line of Fig. 3, and 8 11 of Fig. 4 equals 8 11 of Fig. 3. The remaining portions of the figure are self-evident. The line 14 20 of Fig. 4 equals the radius of the large circle. To find the bevels and joints on the mold, Fig. 4, first find the joint 9. Lay a straightedge at 11 14. Extend square out from this straightedge up to 9. Also find the joint at 10. Apply the straightedge on 9 10; and extend square up or out from the straightedge. For the bevels, take the distance square up from the straightedge to 10 and also which appeared in an issue of the paper several years ago. I am unable to secure a copy of *Carpentry and Building* of the date in which this article appeared, and I am of the opinion that the republication of the article at this time would prove valuable and interesting to a great many other readers of the paper as well as myself.

Note.—As we are unable to supply the copies of *Carpentry and Building* containing the article to which our correspondent above refers, we take pleasure in reproducing it, with the accompanying engravings.

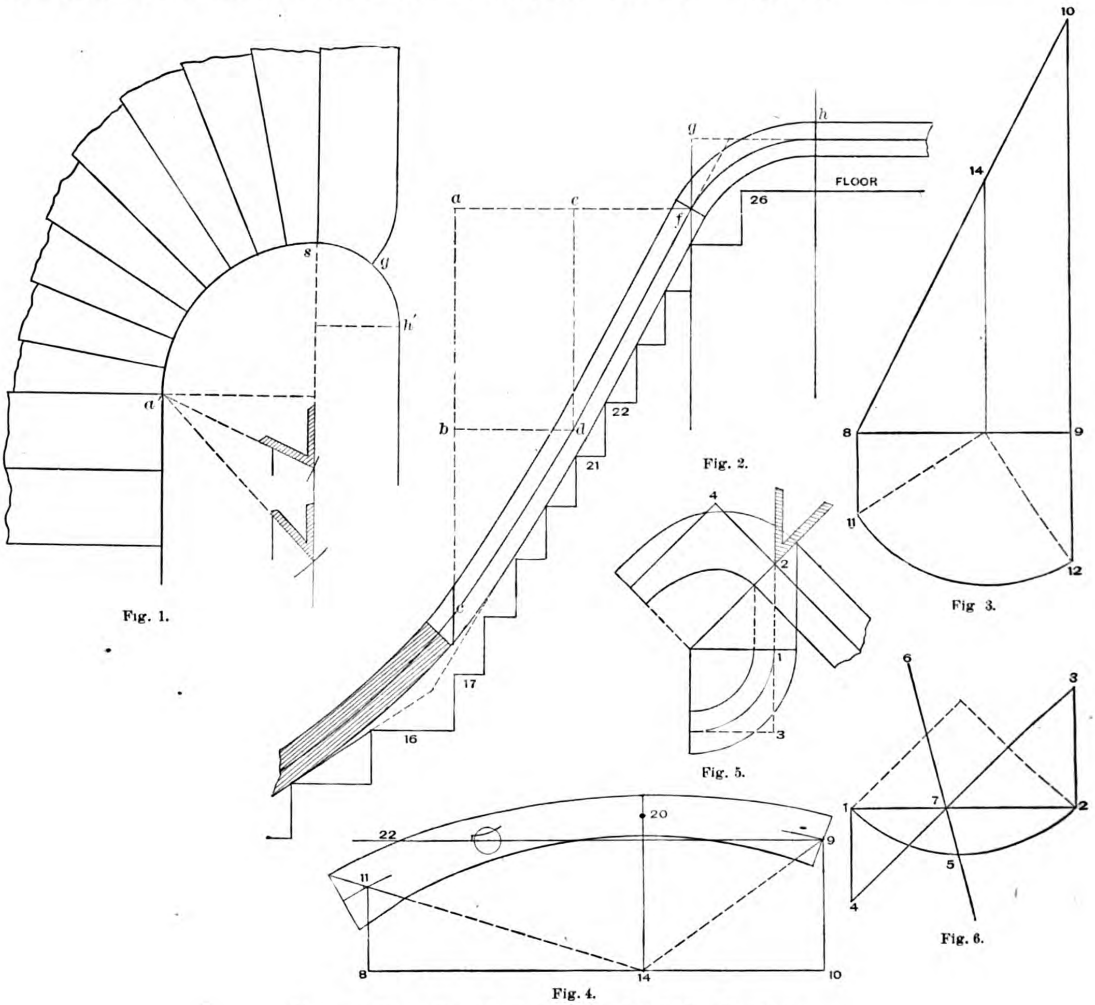

Fig. 1. Fig. 2. Fig. 3. Fig. 4. Fig. 5. Fig. 6.

Diagrams Illustrating "J. B's" Method of Unfolding the Circle.

two unequal pitches over winders, and true bevels are required. For the purpose of avoiding a confusion of lines on Fig. 3 we will turn to Fig. 6. Equal to the large quarter-circle on the plan draw 1 2 square out and then draw 2, 3. In order to occupy less space on the drawing I make 1 4 of Fig. 6 equal to one-half of *b c*, Fig. 2, and 2 3 equal to one-half of *a b*. When this has been done draw 3 4, also the chord 1 2 at 7. Draw 5 7 6. This gives a line which is commonly called the leading ordinate. Note 5 in the center of the curve 1 5 2. Returning now to Fig 3, the line 8 9 is drawn square with the ordinate. By drawing the same line on Fig. 3 as we have on Fig. 6, it is very plain that 9 10 of Fig. 3 equals *a c* of Fig. 2. Now draw the mold represented by Fig. 4. Stretch out a piece of building 9, and this distance transferred as shown on plan Fig. 1. Note the fact that 14 20 is the minor axis and 8 10 the major axis; 9 22 is the slide line parallel to the major axis. The small circle on the slide line is the cut through the mold at each end, round or square. We can see by so doing whether the slide line on the mold is over the line on the mold. Fig. 5 represents the small mold. Referring to this drawing, 1 2 equals *f g* of Fig. 2 and 2 4 equals 1 3.

Framing Hip Roofs.

From B. S. N., *Rochester, Minn.*— I would very much like to see published in the columns of *Carpentry and Building* the letter from "G. W.," Wauseon, Ohio, on the subject of framing hip roofs

From G. W., *Wauseon, Ohio.*—I have been reading your paper for two years, and I have seen several designs for framing hip roofs, but none that I considered quite as good as the plan I have been using for the last 25 years. I find it practicable in all hip roofs, and hip and valley and octagons, equal or unequal pitch in same soof. I have framed a great many roofs of equal pitch, also where main roof rises 9 feet in 8 feet, and front and rear gable rising 9 feet in 5 feet, and find the length and bevels of the jacks all fit exactly; consequently, I conclude it is just as easy to draft and frame any roof as it is to frame a simple gable roof, and no more need of making a mistake. As I think it may be of benefit to young carpenters who wish to understand the business of correctly framing all kinds of

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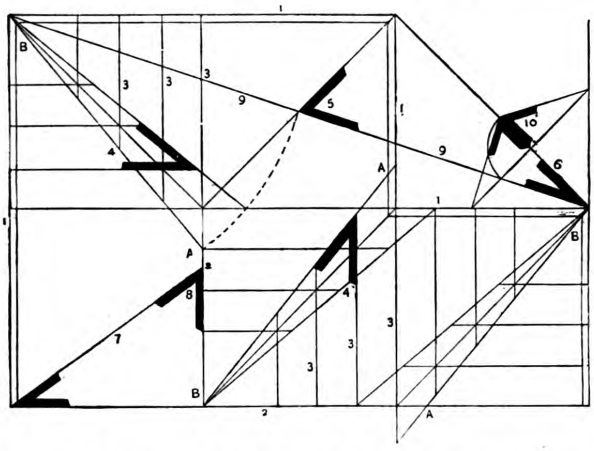
roofs, I will give you a sketch of my plan of working—not my invention, for I found it in Smith's "Architect."

Fig. 1.—On the plan 1, 1, 1, 1, 1 represents the outside of the plate; 2, 2, the ridge line; 3, 3, 3, 3, 3, 3, the jack rafters



Framing Hip Roofs.—Fig. 1.—The Cuts for Hip, Valley and Jack Rafters As Suggested by "G. W."

of hip and valley; 4, 4, the side bevel of jacks and the length of jack from corner of plate and ridge to side of hip and valley; 5, bevel at foot of hip and valley rafter; 6, bevel at foot of hip and valley rafter; 7 is a common rafter; 8, the bevel at head of common rafter, is the down bevel for all jacks on hips and valleys; 9, 9 is the length of hip and valley rafter; 10 is the method of getting the bevel of back of hip. Draw a line at right angles with base line of hip, then set one foot of the dividers where this line crosses the base line, and the other where it crosses the hip-rafter line, and set the same distance on the base line, and draw lines from that point to the plate each way, which gives the bevel for hip, and, turned the other way up, it gives the hollow for the back of the valley. Line from *a* to *b* is the length of hip and valley, dropped down to get the length of jacks. Lengths and bevels of all hips and valleys the same in same roof of same pitch.

Fig. 2—Is a plan for framing a valley in a roof where one side is much steeper than the other, as, for instance, one side rises, say, 10 feet in 8 feet, and the other rises 10 feet in 4 feet. 1, 1, is the wall line; 2, 2 is the ridge line; 3 is the valley rafter; 4 is the bevel at the foot; 5 is the bevel at the head; 6 is the bevel of the jacks on the lowest pitch, also the length of same; 7 is the bevel of and length of jacks on the steep side; 8 is the common rafter on steep side; 9 is common rafter on the lower pitch; 10 is the down bevels on jacks of each side; 11 is the hight of roof; 12 the base line of valley. The rafters will not match on the valley as on an equal-pitch roof, as Fig. 1. It will be seen that it will take seven jacks on the steep side, while it requires only four on the other side, but the bevels will all fit, as I have framed similar roofs, and find no trouble in putting them up.

Question in Door-Making.

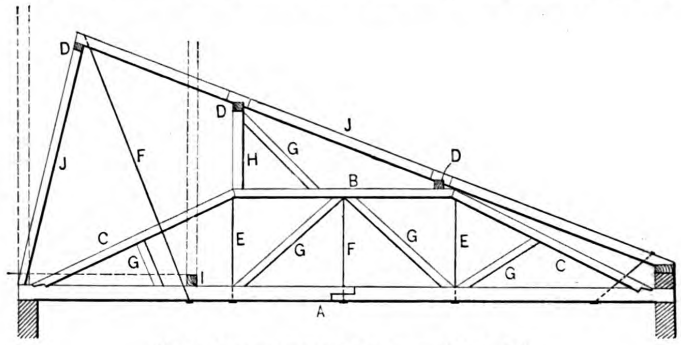
From A. W. W., *Sudbury, Ont.*—Being a constant reader and admirer of *Carpentry and Building* I desire to ask some of its practical readers a question with regard to making doors. I was engaged in making the front doors for a private residence, there being glass panels above and wood below. The glass was put in with ordinary ovolo sash, plain margin lights all around and large light in the center. I planted the lower panels outside with a large 2½-inch mold, which was in keeping with molds outside of the building. Inside I planted them with 1½-inch ogee to match other doors and surroundings. After I had completed the work a person came around and said I should have put large molds inside as well as outside, in order to make both sides of the door alike. Why he should make such a statement I cannot for the life of me understand, but he persists he is right, while I think that the way I performed the work is correct. I would like to hear from the practical readers of the paper upon this point.

Wooden Traveler for Raising Iron Bridges.

From H. H. F., *Denver, Col.*—Will some of the practical readers of *Carpentry and Building*, who are interested in the subject, kindly furnish sketches and description of a wooden traveler used for raising iron bridges, either by hand or steam-power?

Roof Construction.

From J. L. F., *Maryville. Mo.*—I submit the following scheme in reply to the article entitled "Problem in Roof Framing," by "H. L. W.," Macon, Ga. I do not claim for it perfection, but submit it with a view to learning something. I respectfully invite criticism from the practical readers of *Carpentry and Building*. Referring to the accompanying drawing—A is the tie-beam, 6 x 10 inches; C C, the principal rafters of the same dimensions; D D, purlin plates, 6 x 8 inches; E E, Queen bolts, 1¼ inches in diameter; F F, king bolts, ¼ inches in diameter; G G G G G G, the struts, measuring 6 x 6 inches; H, the purlin post, 6 x 6 inches; I, the end of the



Sketch Accompanying Letter from "J. L. F."

still carrying tower and measuring 8 x 10 inches, while J J are the common rafters, 2 x 8 inches. The dotted lines in the sketch indicate the tower. My idea would be to space these trusses 6 feet apart from centers, and then jump in short joists between the chords or tie-beams to which to apply the plaster. All joints in the trusses should be well strapped and bolted. I would like to know what other readers of the paper think of this construction?

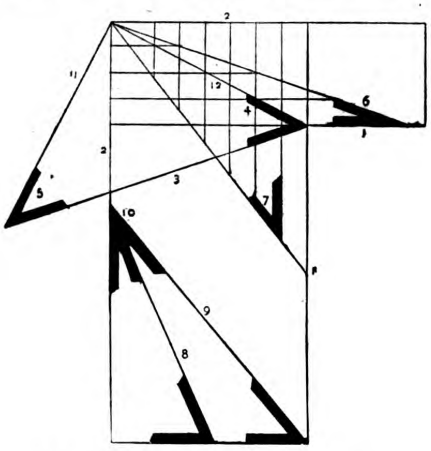


Fig. 2.—Valley Between Slopes of Unequal Pitches.

Laying Off an Octagon Bay Window.

From J. H. D., *Knoxville, Tenn.*—In accordance with the request of "C. B.," which appeared in the November number, I submit the following method for laying off an octagon bay window, which may be

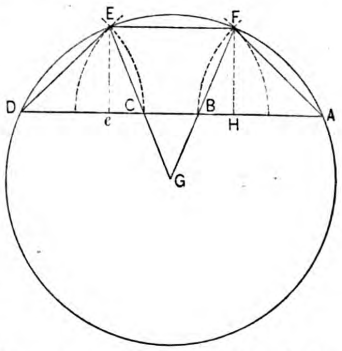


Diagram Brought Forward from September Issue, Showing "J. H. D.'s Method of Laying Off an Octagon.

of some interest to him. Referring to Fig. 1 of my article, published under this head in the September issue of *Carpentery*

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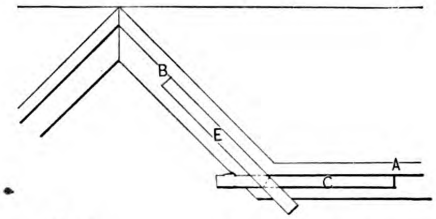
and Building, take the line A D and multiply it by 0.2929, which gives for a result the distance A H. Erect the perpendicular F H and make it equal to A H. Then the line A F equals one side of the required octagon. The side D E is found in the same way. The bay window can be laid out full size in this manner with the aid of a straight-edge and steel square. Those readers of the paper who understand the use of decimals will, I think, find this method accurate as well as concise. The line A D is equal to the diameter of the inscribed circle, and to find the side of any octagon multiply the diameter of the inscribed circle by 0.4142 and the circumscribed diameter by 0.3826.

Note.—For the sake of convenience we have brought forward Fig. 1 accompanying the article of "J. H. D.," which appeared in the September issue of *Carpentry and Building* for 1890, and present it herewith.

Rake Molding Intersecting a Level Molding.

From A. R., *North Indianapolis, Ind.*—In the November number of *Carpentry and Building* I notice an article from the pen of "O. A. H.," Chariton, Iowa, in which he says he knows of no way whereby a rake molding and a level molding can be made to member when the level mold stands plumb. If he will permit, I will endeavor to explain how I proceed in the solution of the problem. Referring to the sketch which I inclose, first take a piece of molding, as C, and hold it under the nosing or cap of the gutter A. Mark under it as far as the molding is to come, in order to member. Then take a piece of molding, E, and hold it under the nosing on the rafter B, marking under it, as in the previous case. Then make a mark with a knife on the molding where the two lines intersect. Also on the upper part of the molding, directly under the point where the two nosings join. This will be found to give the exact cut on any pitch of roof.



Sketch Accompanying Letter from "A. R."

Note.—What our correspondent has shown above indicates how a molding running along on a level—that is, at the eaves of the building—may be mitered so as to extend up the gable or rake. His plan is adequate and will be appreciated by many of our readers. The question lying underneath all that has been published in our columns of late relating to gable miters, rakings, moldings, &c., is scarcely touched in this. Under many conditions a change of profile is absolutely necessary, but this correspondent has not attempted to show how he proceeds in such cases. His rule is of interest to our readers, and as such it is herewith submitted.

Patterns for Hand Carving.

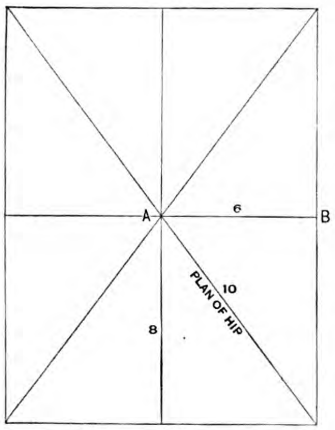
From I. T. S., *Huntsville, Ala.*—I wish to ask the readers of *Carpentry and Building* where I can obtain patterns for hand carving? I think there must be such things kept in stock in first-class book stores, though our dealers here, in Huntsville, know nothing about them.

A Correction.

From I. P. HICKS, *Omaha, Neb.*—In reading the columns of *Carpentry and Building*, I notice that "A. L." of Napa, Cal., has discovered an error in my article of October last in regard to the bevels of jack rafters in roofs of unequal pitches. That is all right. I am in favor of pointing out the mistakes every time, and if I make a mistake I will be glad to have it pointed out. As the articles that appear in *Carpentry and Building* are supposed to be of a practical kind the greater the degree of accuracy attained the better the articles. Therefore I say again, point out the mistakes. The typographical errors were in using the word "level" for "bevel" a few times. The error in obtaining the different bevels for the jacks was in taking the wrong runs of the common rafters. Thus, instead of taking the run of the common rafter, 6 inches, on the tongue and the length, 8½ inches, on the blade, to give the cuts of the jacks on the short run, as stated in that article, I take the length of the common rafter on the short side of the roof, 8½ inches, on the blade, and the run of the common rafter on the long side of the roof, 8 inches, on the tongue. The blade gives the cut. To find the bevel of the jacks on the long side of the roof take the length of the common rafter on the long side of the roof, 10 inches, on the blade, and the run of the common rafter on the short side, 6 inches, on the tongue. The blade gives the cut.

Problems in Roof Framing.

From C. E. S., *Tacoma, Washington.*—I notice in the October issue of *Carpentry and Building* an article by I. P. Hicks on the subject of roof framing. In this article Mr. Hicks explains his method of dealing with the hip rafter problem. Now, as I understand his hip rafter plan to be the hypotenuse of a right angle triangle, the sides of which are 6 and 8, I cannot see why he applies rules for cutting bevels which belong to a regular hip roof—that is, a roof in which the plane of hip is 45 degrees to the plates. The sketches which I inclose may serve to make my meaning clear. If I understand the explanation given by Mr. Hicks, he uses the run and length of the common rafter, the plan of which is represented in Fig. 1 by A B, to cut the bevel of jacks on that side of his roof. The figures 6 representing the run and 8 5 the length, cut the jacks in a roof in which the plane of hip is 45 degrees to the plates. The same is true of his other combination of figures for the other side. The simplest way that I know for obtaining any hip and jack rafter bevels, and especially those of different pitches is as follows: Square across from the plumb cut of any rafter its thickness, as indicated in Fig. 2, the marks being for hip or jack of regular run.



Problems in Roof Framing.—Fig. 1.—Plan of Roof.

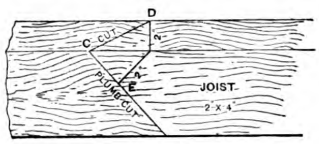


Fig. 2.—Method of Cutting Bevels Suggested by "C. E. S."

In the method given by Mr. Hicks, the plan of the hip is the diagonal of 6 and 8, and now instead of marking the jack from C to D, as in the diagram, Fig. 2, use the figures 6 and 8 on a horizontal line extended from E indefinitely, and which would be at the same angle from the plates as the plan of said hip—namely, 6 x 8. In this case take 6 on the tongue, and 8 on the blade, when the blade cuts the hip to fit the ridge board. The jacks on the long side are cut the same way. For the short jacks mark on the 6 side or tongue. It is to be understood, of course, that the down or plumb cuts of hips and jacks are first obtained. I illustrate my ideas for both hip and jack by the same diagram, assuming the cut (plumb) in either case to be the cut of the hip or jack desired.

Improved Tool Chest.

From C. G. K., *Lincoln, Neb.*—Will some one kindly give me a plan for an improved tool chest? I want something that will do away as much as possible with tills.

Position of Corner Blocks.

From I. T. S., *Huntsville, Ala.*—As it seems to be the rule among correspondents to note the length of time they have been reading *Carpentry and Building*, I will not vary from the rule. Although I am not a direct subscriber I have been a constant reader of the paper since 1885, and have obtained a great deal of useful information from its columns. I am well pleased with the changes which have been made in it, except the heading. These are, however, preliminary remarks. I started out to say that in the November number I noticed a letter from "R. R. S.," Pittsburgh, Pa., wishing to know the proper manner of placing corner blocks. As I see no one has given him any information, I desire to tell him my method and why I do it in the manner indicated. I let the grain of the block run with the grain of the head of the casing, because no matter how well seasoned the lumber may be it will shrink more or less. I think the mechanic should study how to conceal a bad joint in case it is impossible to make a good one. I think the open joint cannot be seen under the corner block as easily as at the side of it.

A System of Framing Roofs.

From J. W., *Paterson, N. J.*—I would like to ask D. H. Meloy, whose serial article on framing roofs is now running in the columns of the paper, to examine his Fig. 13, and the description for finding the side cut of jacks. I would ask if he has not made a mistake when he says "the line A B of Fig. 13 represents the

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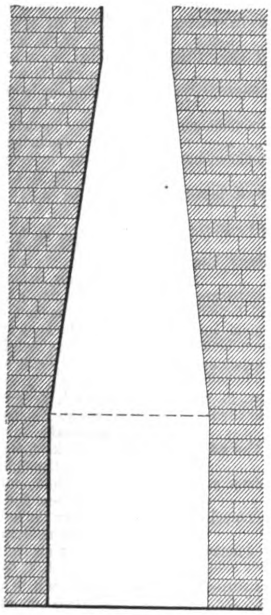
plan and position of the valley rafter?" This description and lines will apply to level work, but when raised to the pitch the joints will be open, and, I think, incorrect.

Flue Construction.

From E. A. JACKSON & BROTHER, *New York City.*—Referring to the excellent suggestion in the departmunt of *Carpentry and Building* entitled "Building Ways and Means," to the effect that flues should



Flue Construction.—Fig. 1.—Gradually Tapering Flue.

be made smooth inside and free from sudden bends, permit us to refer to some other points in flues that are generally neglected by builders. Beginning at the fire place it is practically the universal custom with builders to very gradually contract the flue from the full width of the fire place at the beginning to the regular size near the second story of the house. An idea of what we mean may be gathered from an inspection of Fig. 1 of the sketches which we send herewith. It is often the case in city houses that one finds even a worse construction, being one in which the flue is carried up the full width of the fire place as far as the ceiling of the first story, as shown in Fig. 2. Flues thus contracted inevitably have a poor draft, and are the sure cause of smoky fire places and grates. The proper shape of a flue is that shown in Fig. 3, in which the width is contracted in such a way as to form a line which makes an angle of 45° from the perpendicular. This, in our opinion, is the very best form for the lower end of the flue. In all ordinary fire places the normal width of flue should be reached at a point not more than 18 inches above the top of the fire place.

Floor Dimensions of Rooms.

From S. W. R., *Boonville, Mo.*—I would like to call the attention of brother architects to an important matter, and that is the floor dimensions of rooms. In looking over the stereotyped plans sent broadcast by dealers in lumber, the various architects' associations, and even some of the prize plans published in *Carpentry and Building*, I often wonder if carpets were intended to be used on the floors, or if architects who draw such plans are aware that brussels carpet is 27 inches wide, and all others (at least most of them) 36 inches wide. What must be the feelings of a man who has paid for plans and spent $4000 or $5000 on a nice house, when he finds that he cannot put down brussels carpet either way of his parlor, or dining room, or best chambers, without cutting off 6 or 8 inches, or worse still, turning under the edge? Yet I have in mind plans in which there is not a room or hall in the entire building in which brussels or ordinary yard-wide carpet can be put down without cutting or turning under. The carpenter may say the lumber would not cut right. This is bosh. I would rather waste a few inches of timber once than buy carpets to cut off and throw away the balance of my life. I have before me a plan of a prize house published in *Carpentry and Building*. The parlor is 14 x 15. In this room one cannot put down brussels carpet either way; yet by adding 9 inches one way, or taking off 6 inches the other and making the room 13 feet 6 inches by 15 feet, or 14 feet by 15 feet 9 inches, the owner could have used brussels—in the former brussels laid one way or yard-wide carpet the other way. The same remarks are applicable to the dining room, which is 14 x 15 feet, and a bedroom 11 x 14 feet 6 inches. To the latter 3 inches could have been added one way and 6 inches the other, making the room 11 feet 3 inches by 15 feet, when it would accommodate either brussels or yard wide carpet. This is only one set of plans picked up at random. Many sets are much worse. Such defects are absolutely inexcusable on the part of the architects. When builders purchase stereotyped plans from associations for the purpose of saving a few dollars, or allows a carpenter to furnish a plan to suit his lumber, it is all right for them to be

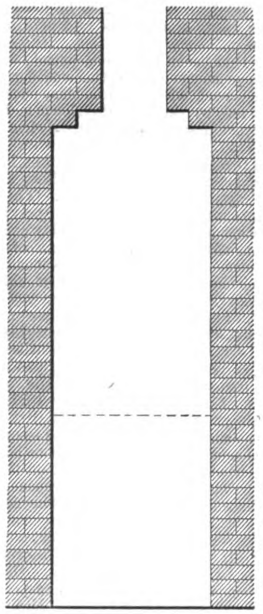


Fig. 2.—Flue Same Width as Fire Place up to Ceiling of First Story.

bitten; but when they pay an architect for special plans, they are certainly victims of misplaced confidence who are thus treated.

White Versus Red Beech.

From C. J. W., *Norfolk, Va.*—In the September number there is a communication from "Apprentice," Vineland, N. J., asking for an explanation of the difference between white beech and the white or sap of red beech. Not having seen any answer to this question I will endeavor to answer it for him. I would rather have heard from others, but they being silent upon the subject and not wishing the question to go unanswered must be my excuse for occupying space at this time. Sap wood of all kinds is wood in an immature state, and when present in great quantity is owing to an unhealthy

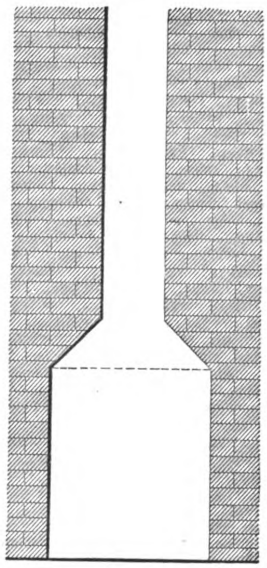
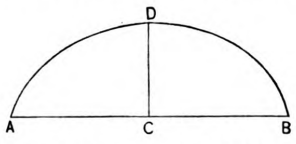


Fig. 3.—Proper Shape of Chimney Flue.

condition of the tree. There is more or less sap wood to every tree that grows, and if the tree is in a healthy state it soon is assimilated and forms what is known as "heart" or perfect wood. If the tree is unhealthy, the assimilation is imperfect and sap wood in quantity is the result. Although the unhealthiness may not prevent the tree from growing, the wood is not so desirable. The principal objections to sap wood may be stated as follows: It is harder to season; less impervious to moisture and to atmospheric changes; more liable to attacks from insects; is softer than heart wood, and works woolly, especially in hard woods. If "Apperntice" desires a fuller explanation of the relative properties of sap and white wood, I will endeavor to give it to him. I was one of the first to subscribe to *Carpentry and Building*, but for four years I was engaged in other business and let my subscription lapse. About a year ago, however, I took it up again, and propose to keep it. In looking back and comparing the present December number with the first number that was issued, there is a vast difference and improvement.

Finding the Diameter of a Circle to an Arc of which a given Center is to be Built.

From C. E. S., *Tacoma, Wash.*—I desire to submit to the practical readers of *Carpentry and Building* a problem, in connection with which I inclose the accompanying sketch. In the drawing A B represents the width of an opening for which a center is to be made, C D repre-



Finding the Diameter of Circle to an Arc of which a Given Center is to be Built.

sent the hight or spring. When the distances from A to B and from C to D are known, who can tell me how to figure out the diameter of the circle of which the center is an arc? Center here refers, of course, to the form over which an arch is built. I know how to do it by other methods, but desire to learn how to figure

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it out, as the plan would prove handy in connection with other work.

The Length of the Working Day.

From H. G., *York, Pa.*—I have been a subscriber to *Carpentry and Building* for a number of years, and have always read the journal with great interest and profit, So much did I become convinced that the journal was doing a good work that I spent considerable time and energy in adding to its subscription list, sending from 15 to 25 names each year for some years past, nearly all being journeymen carpenters. The Correspondence department has generally been considered a very desirable feature, as well as the independent and impartial stand taken from time to time by the Editor in regard to questions affecting workingmen and their employers. Since the criticisms and opinions of subscribers regarding the journal have in the past been invited, I take this opportunity to express my views.

Had the journal been continued in its former channels, with improvements in size and general make up, to the interest of a majority of its readers—namely, journeymen carpenters—my good opinions and subscription list would certainly have increased accordingly; but I have lately come to the conclusion (with quite a number of my fellow subscribers) that the journal has forsaken its former mission and is to be intended published henceforth solely in the interests of master builders. It is certainly evident that it cannot "serve two masters," and that its sympathies are not "always with the workingmen," as has been asserted a number of times.

These conclusions have been reached after a careful study of the clippings and editorials that have appeared from time to time. As an instance, in the October number appeared an editorial under the head of "The Eight-Hour Day" thus: "We are not disposed to assert that the eight-hour day is not desirable, but it does seem only right to call attention to the fact that the eight-hour day is not universally accepted by mechanics as being the best thing for them." Now, let me assure you that if the publishers of *Carpentry and Building* or any like journal could successfully canvass the vote of its readers who are workingmen on the question, the result would be almost unanimous in favor of a shorter work day—not that such journals as a rule teach it or agitate the question, but because such readers are always among the most intelligent of their class, and with such intelligence goes hand in hand a natural desire for a shorter work day—a desire for more knowledge either of a mechanical or of a general order. An intelligent workingman wants time to observe the beautiful in art as well as the beauty and beneficence of nature, wants time to embellish his home and make it comfortable and attractive, by his own handicraft make things convenient; wants time to help educate his children by spending a half hour or more each day with them, either in a walk or over some useful books, pictures, or some innocent, instructive pastime; wants time in the evening to rid himself of the filth and sweat of a hard day's work, and for a few hours feel like a new man. He can then return to his work in the morning with renewed vigor and energy, and an intellect befitting the present state and progress of civilization.

While work is the means by which all should live, it should by no means be the only object of life.

Further on in the editorial appears the following, "Getting on in the World." "Those who 'get on' in the world have to work if not struggle for their own advancement." Very true. Such has always been the case, at least as far back in the line of human events as history runs. Let us also note the fact that this wild ambition for supremacy has to a greater or less extent been responsible for the downfall, degradation and annihilation of many nations and individuals who were among the most noble, virtuous and conscientious, but who were lacking that one characteristic—ambition. I can at present think of no better manner of illustrating my idea on this point than by taking as an example a large hall or building packed with human beings of all age and both sexes. There is an alarm of fire. Most certainly the first impulse of every one understanding the situation will be to get out. We can best imagine the consequences by referring to the many thousands of instances of a similar character on record. Those who are strong, selfish and ambitious lose no time in "getting on," not thinking or caring who they "get on" either, not only trampling beneath their feet those who are weak and more timid, but by their undue selfishness and ambition for supremacy obstructing the passage of those who are content to move in order and carry with them such of their fellow-beings whom Providence has not endowed with the fullest portion of strength to help themselves. According to the article referred to: "For such the very idea of a union by which men are bound to move when the crowd moves, and only then and with the crowd, is obnoxious. They clearly see that it is opposed to their best interest." Most certainly they would so conclude. From time immemorial nations, municipalities and organizations have found it necessary to enact certain laws and regulations to protect the weak and timid from the strong and courageous. The laws governing trade unions do not in any way oppose or hold in restraint a man who is ambitious to place himself in advance of the rank and file of his fellows in the way of enlarging his mechanical abilities or securing for himself better pay than the average. In short, a man is allowed, as in our civil laws, all the rights and privileges he desires so long as he does not infringe upon the rights and privileges of others.

Further on in the same article appears: "A man to get on in the world must be free to work when he has the opportunity and free to do two days' work for one day's pay if some object justifying the effort is to be accomplished thereby." Now, there is a point that trade unions have for years been aiming at, to allow all men "the opportunity" to work. Therefore, when one man is allowed the privilege to do "two days' work for one day's pay" he is certainly depriving some one of the opportunity of doing that day's work which of right belongs to him, and at the same time not only reducing his own pay by one-half, but also the standard wages of his fellow workingmen, thereby bringing want and degradation in many families, crippling consumption, stagnating production, and instead of advancing the general cause of civilization—for which every workingman as well as journalist should strive—men would be bringing upon themselves and their children a condition but slightly above serfdom. But on the other hand, let workingmen organize, enact wholesome laws to govern the members of their respective organizations, strive to shorten the hours of labor, educating themselves and each other, increase the wages of workingmen so that their consuming powers may be correspondingly increased, thereby widening the field of manufacture and commerce, giving better opportunity for all who wish to work, and making it more difficult for drones to live without working, or in some way making themselves useful.

I will try to give an instance which I am confident is being repeated many times over in every city and town in the country where there is no regulation of the hours of labor. There is a firm in this city (planing mill) which in the past few months has been overrun with orders. The firm wishing to put out all the work they could, induced their men to work thirteen (13) hours per day, which some of the men were very willing at first to do, thinking that it would increase their wages handsomely. The men were paid an average of about 15 cents per hour, a number of them being non-residents of the city. The mill kept running at that rate for several months until the work had been pretty well run through and some of the men were perfectly worn out and disgusted. One of them remarked to me that it seems as though one was made to work and nothing else, had barely time to eat and sleep, no time to spend with his family or attend to their wants, no time except Sunday to read or find out what was going on in the world outside of the shop. In the past few weeks another firm who have for years been one of the leading firms in the city have run short of work, and have been compelled to lay off numbers of their men whom they have had working with them for years, and who are now walking the streets in search of employment, with very poor prospects, and the winter before them, and if they think of going to some other city in search of employment the reports face them, "everything overcrowded." At the same time, scores of men are coming to this place from the country and smaller towns in search of a winter's job. Now, then, had the work here been properly distributed by a regulation of the hours of labor, how much better it would have been for all concerned.

Just one word yet in regard to the article, "Action of French Workmen." The fact that a vote taken among the class of French workingmen referred to is not to me at all surprising to have resulted largely against a reduction of the hours of labor to eight. A class of men being accustomed to working 12 and more hours per day would certainly not vote to be reduced to eight. Such measures would, in the minds of such overworked and ignorant creatures, mean nothing less than starvation, and I am really surprised that the editor of a journal like *Carpentry and Building* should refer to this instance as being an indication of what workingmen want or what would be best for them.

In conclusion, I feel very much like giving my own experience in the way of a man cultivating in himself an ambition to advance himself above his fellows, "Climbing up in the night while others sleep," &c., but feel that the patience of the reader must certainly be strained considerably before this point is reached, if the whole matter has not already been consigned to the "waste." I would not under ordinary circumstances have found time to write out this much were it not for the fact that I have in the past few weeks been confined to the house unable to work. Will just add that there are numbers of good carpenters in this city of about 23,000 inhabitants working to-day at from $1.60 to $1.80 per day, men who have tried to advance themselves and who are capable of superintending the erection of any building from the foundation to a finish, but who are, through a lack of certain necessary business qualifications, or from lack of capital, or some other cause, unable to take the advice of the writer of the article referred to and "aspire to manage a contract." Besides that, all cannot be contractors. A man who has advanced himself above the rank and file of his craft loses nothing by stooping to help others after. His helping others up does not in the least interfere with or deprive him from still keeping himself proportionately above the average. And those who are most able to help themselves should, for humanity's sake, be encouraged and prevailed upon to help others who are not so qualified.

Note.—Our comments upon the above interesting letter may be found upon the editorial page of this issue.

Paint for Brick-work

From J. C. W., *Pine Hill, Pa.*—Will some one give me the best receipt for mixing red paint for the outside of brick buildings? Some paint with which I have had experience does not seem to stick very long. If blue is to be mixed with it, how much must be put into the gallon of paint, and in what manner should it be mixed? I am a carpenter by trade, but sometimes I am called upon to do a little job of painting, and when so requested I desire to see satisfactory results.

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MASONRY AND STONE CUTTING.*

CUPOLA ON PENDENTIVES OVER THE CROSSING OF TWO BARREL VAULTS.

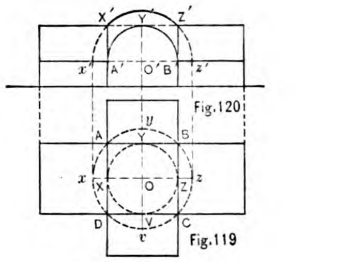
AS SHOWN in Figs. 119 and 120, this structure consists of a hemispherical cupola intersected by two barrel vaults of circular section, and rising from the same level as the springing line of the cupola. The cylindrical soffits of the barrel vaults cut the spherical soffit of the cupola along two equal and parallel half circles. The span of the barrel vaults is taken equal to the side of a square inscribed within the circle formed by the springing line of the complete cupola. As shown in Fig. 119, after inscribing the square A B C D in the circle $v\ x\ y\ z$, the segments A x D, A y B, B z C, C v D are cut off from the sphere; but instead of closing these sections by walls, as in a former structure, they are left open, and form the base of cylinders which intersect the cupola. As in the former structure of the initial hemisphere there only remains—1, the portion of sphere within the circle V X Y Z inscribed in the square; 2, four triangular portions of the sphere projected on the spaces A X Y A, B Y Z B, G Z V C, D V X D; and these last are called the "pendentives."

Figs. 121, 122. After drawing on plan the structure as described above, we draw the section at right angles with one of the cylindrical vaults. We begin by drawing the meridian $x'\ w'\ z'$, Fig. 122, of the cupola, and divide it into any odd numbers of arch stones. Then we divide also the section of the cylindrical arch in arch stones, but we take care that the points E′ F′ G′ be at a lower level than the joints 1, 2, 3, 4 of the cupola; otherwise the jointing of the vault would present unsightly and nearly unworkable complexities, as will be seen further on. To carry out this condition, we have in our drawing made E′ at the same level as the first joint of the cupola. This insures all the other joints in the arch to be lower than their corresponding joints in the cupola, and offers some simplifications in cutting the first course of stones.

The joint line of the first bed joint on the soffit of the vaults will now be composed of only three parts: 1, the joint line E′ E E_2 of the bed joint, the plane of which contains that line and the center line of barrel vault O′ Y; 2, the joint line L′ L″, L L_2* on the soffit of the other barrel vault; 3, the arc of a circle, E′ L′, E L, which is the intersection of the soffit of the cupola by its conical bed joint. This conical bed joint of the cupola will be cut by the planes of the barrel vault bed joints along the lines O′ E′ e', O E e and O′ L′ l', O L l, which radiate from the center of the cupola. On the other hand, the three parts of the first bed joint are limited by a horizontal plane shown, Fig. 123, on the section through one of the barrel vaults; the upper arrises of the bed joint are therefore the arc $e'\ l'$, $e\ l$ and two straight lines parallel to the barrel vaults.

Now, let us consider any other bed joint—for instance, the one of which the arrises on the soffit of the barrel vaults are the lines, G′, G G_2, N′ N″, N N_2, and which rises on the soffit of the cupola to the level of the arc P′ Q′, P Q, which is the arris of the conical joint 3. Then the plane of the bed-joint G′ will cut the sphere along the arc of a meridian circle, G′ Q′, G Q, which appears on plan as a portion of an ellipse. Several points of the curve on plan can be found by marking the points where the bed joint cuts the parallels or horizontal joint lines of the cupola. The bed joint of the other barrel joint G′ until it met the joint P′ Q′, we would have to prolong the conical joint, and find its intersection with the surface of the barrel vault until it reached the horizontal joint G′. The operation of stone cutting would be rendered thereby extremely difficult, and the result would be hideous.

The plane N″ N′ P′ p' of the bed joint of the barrel vault will cut the extrados of the cupola along the arc $p'\ r'\ p\ r$ of a meridian circle, and it will cut the extrados of the barrel vault along the line $r''\ r'\ r_2\ r$ parallel to the arris of the bed joint on the soffit of the vault; the level of this line is found in r_2, Fig. 123. We can also find the point $r'\ r$ by drawing a vertical, $u'\ r'$, for this vertical will be the elevation of the circle along which the extrados of the arch cuts the extrados of the cupola. We find in the same way the plan of the bed joint of the other arch projected on $G_2\ G\ q\ t\ t_2$; then the points r and t are connected by the arc $r\ t$. If our drawing be correct, we shall find that the radius of the arc $r\ t$ is equal to the distance



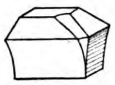


Fig. 126.

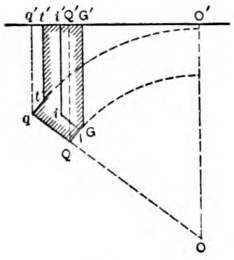


Fig. 124.

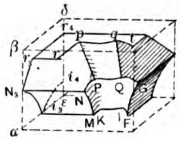


Fig. 125.

Fig. 121.

Masonry and Stone Cutting.—Figs. 119 to 126 Inclusive.

* Continued from page 19, January, 1891.

* In our notation the first letters indicate the elevation, the second letters the plan.

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of w' on the elevation of the center line O′ Y′, w' being the point where the plane $r_3 r_4$ meets the meridian of the extrados of the cupola.

Above joint 4 the courses of stone belong only to the cupola. After delineating the horizontal bed joints we subdivide each course with vertical joints which will be vertical meridian planes in the cupola, and planes at right angles to the center lines in the barrel vaults. Care should be taken that each stone should clearly extend on the barrel vaults as well as the cupola, as in the case of the stone M μ ν N P Q G γ ϕ F I K M, M′ μ' ν' N′ P′ Q′ G′ F′ I′ K′ M′.

Molds Required.—The soffits of the portions of the stones on the barrel vaults do not require any molds, as they are cut exactly as the soffit of any right archway. The only molds required are those of the bed joints. These we obtain by turning down the planes of the bed joints, round center line of the arch, as has been done in Fig. 124. From O′ we have carried the distances taken on the elevation O′ G′, O′ Q′, O′ t', O′ q', and we have carried the distances taken on the plan G′ G, Q′ Q, t' t, q' q; we have then drawn from the center O the arcs q t and Q G, and our bed mold is complete. The mold of the lower bed is shown on the same drawing as G′ G I i i'. The same molds serve for both barrel vaults, as they are identical.

Working of the Stone.—We begin by working a right prism, the base of which will contain the plan of the stone, and the hight of which will be equal to the difference of level between its highest and lowest arris, as shown in Fig. 125. On the lateral face α β δ ε of that prism we draw the face mold of the arch taken from Fig. 123, and we do the same for the face of the stone on the other arch. We then work the soffits of each arch and the planes of the upper beds. We draw on these beds their outlines by means of the molds taken from Fig. 124. We do the same for the lower beds, but have to work progressively, as the intersection of the plane beds and the conical bed are, in that case, valleys, instead of projecting arrises. We then draw the arc p q on the upper face of our prism, and the arc P Q by means of a templet cut to plan P Q, Fig. 121, and held horizontally. By means of the arcs p q and P Q the conical joint can be cut, and taking the outlines N P Q G and M K I F as directing lines, we work the soffit of the cupola by means of a templet cut along the meridian, and held successively in the position of the meridian planes, to obtain which result guiding points should be marked beforehand on the outlines by drawing on plan several rays to the center of the cupola. The horizontal plane which forms the upper horizontal joint of the stone is easily worked from the lines delineated; the arc from r to t is then drawn thereon, and the extrados of the cupola is then worked.

Fig. 126 represents the springer of the pendentive.

LAW IN THE BUILDING TRADES.*

THE FOLLOWING summary of recent decisions of the courts relating to matters in the building trade will be found of interest to our readers:

LIEN ON WIFE'S ESTATE UNDER CONTRACT WITH HUSBAND.

Where a wife consented that her husband should build houses at his own expense on land which the record of title showed to be held by her "to her sole and separate use" a contractor who furnished materials and built the houses under the supposition that the husband was the owner of the land is not entitled to a lien, as it is his business to know in whom the title is vested and to know that the materials he is furnishing and the service he is rendering "are furnished and rendered under an agreement with or by the consent of the owner of the land." Nor does the fact that the wife knew that the contractor was at work upon the houses amount to constructive consent by her, because she had a right to assume that the contractor had informed himself from the public record of the condition of the title, and was relying upon the personal liability of her husband and not upon the land for security.—Huntly *vs.* Holt, Court of Errors of Connecticut, 20 At. Rep., 469.

REGULATION OF PROJECTING WINDOWS.

A city ordinance which prohibits the construction of any "jut or bulk windows" projecting into the street more than 28 inches is a reasonable regulation and is valid, but the explicit prohibition against building a projecting window more than 28 inches carries with it an implied permission to build 28 inches, and therefore a window projecting that far and no further is a lawful structure.—Livington *vs.* Wolf, Supreme Court of Pennsylvania, 20 At. Rep., 551.

MECHANICS' LIEN ON PROPERTY OF MARRIED WOMAN.

Under the statute of Pennsylvania relating to mechanics' lien on separate estate of married woman, if the materials for which a lien is claimed were furnished with her knowledge and consent, at her request, for the improvement of her separate estate, within six months from the filing of the claim for and about the erection and construction, and upon the credit of the building, a lien may be enforced if these facts are set forth in the claim for lien.—Kelly *vs.* McGehee, Supreme Court of Pennsylvania, 20 At. Rep., 623.

LIABILITY OF EMPLOYEE.

An employee who is engaged under a contract which requires him to devote all his time to his employer is liable to the employer for the value of any time he may devote to his own business, and where he uses in business of his own property delivered to him to be used in the business of the employer, he is responsible for its value. — Waterhouse *vs.* Stebbins, Supreme Court of Errors of Connecticut, 20 Atl. Rep., 480.

CONTRACT OF EMPLOYMENT TO "CLOSE OF SEASON."

Where a contract of employment is entered into for "the season," in construing the contract, the court will ascertain by proof what constituted a "season" according to the usage of the trade or calling in which the contract was made, and if the happening of any contingent event would ordinarily have the effect of closing for the season the operations of the employer, then the happening of that event at any time would operate to terminate the contract.—Strakosch *vs.* Strakosch, City Court of New York, 11 N. Y. Supp., 251.

CONSTRUCTION OF AGREEMENT CONCERNING PARTY WALL.

Where a person purchases a vacant lot, which supports the half of the wall of the building erected on the adjoining lot, and such purchaser is, by the terms of a previous party wall agreement entered into by his grantor, obliged to pay a part of the costs of the wall in order to use it, such agreement and wall constitute an incumbrance. A covenant against incumbrances covers incumbrances unknown to purchaser, as well as those known.—Burr *vs.* Lamaster, Supreme Court of Nebraska, 46 N. W. Rep., 1015.

MECHANICS' LIEN FOR UNAUTHORIZED IMPROVEMENT OF PROPERTY IN CHANCERY.

Where the guardian of minor children without any authority from the court reconstructs an old and practically valueless building so as to make it productive of an income, those who furnished material for such improvement, though not entitled to a lien under the statute, will as a matter of equity be reimbursed out of the fund which arises from the difference between the rental value of the property before and after the improvement.—Bent *vs.* Barnett, Court of Appeals of Kentucky, 14 S. W. Rep., 596.

ABSENCE FROM WORK AS GROUND FOR DISCHARGE.

Enforced and temporary absence from work, which does not interfere with the fulfillment of the contract of employment as a whole, is not good ground for the discharge of an employee. If such an absence, however, is willful and intentional, without just or necessary cause or excuse, it is an infraction of duty which will justify discharge.—Fisher *vs.* Monroe, City Court of New York, 11 N. Y. Rep., 207.

PROPERTY SUBJECT TO MECHANICS' LIEN IN IOWA.

The Iowa statute regarding mechanics' liens provides that every person for whose immediate use or benefit a building is erected shall be included in the word "owner" for the purpose of establishing a lien. In an action by wife to set aside a judgment establishing a lien for material furnished to her husband, the plaintiff cannot establish her case simply by showing that she was the owner of the land at the time the materials were furnished, but she must go further, and show that the building was not for the immediate use or benefit of the husband.—Estabrook *vs.* Riley, Supreme Court of Iowa, 46 N. W. Rep., 1072.

DEVIATION FROM SPECIFICATIONS BY CONTRACTOR.

Where the terms of a written building contract provide that the drawings and specifications of the architect are a part of the contract, it is a material and substantial defect in the performance of the contract for the builder, without permission from either the owner or the architect, to construct the rear part of the house 5 inches lower than the hight called for by the specifications, and this is such a failure as will prevent recovery on the contract.—Oberlies *vs.* Bulinger, Supreme Court of New York, 11 N. Y. Supp., 264.

RESPONSIBILITY OF PRINCIPAL FOR ACTS OF AGENT.

While it is true that one who transacts his business through an agent is bound not only by the authority which he actually gives, but as well by that which the legitimate exercise of the authority he actually gives would reasonably lead one to infer was given, Authority for an agent to buy and ship goods and make cash advances thereon does not raise a presumption that the agent is authorized to guarantee that a certain price be paid by the principal at the end of 30 days. This implied authority, which will bind the principal by the acts of the agent, is such authority as the agent appears to have by reason of the authority which he actually has, or which he is shown to exercise with the knowledge of his principal, and without objection.—Oberne *vs.* Burke, Supreme Court of Nebraska, 46 N. W. Rep., 839.

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The next convention will be held in New York City, on the second Tuesday of February, 1891.

The Importance of Continued Correspondence from Local Secretaries.

The following interesting letter from the secretary of the St. Paul Exchange, Mr. H. R. P. Hamilton, contains a good indication of the progress of his association, and is a good example to other secretaries of the importance of keeping the National Secretary fully posted as to movements in the interests which affect the Exchange and the builders.

Local secretaries cannot write too fully nor too often to the National Secretary upon matters relating to the interests of their members.

It is by comparison that the best results are obtained, and if the National Secretary is in constant communication with local secretaries, and is in possession of information, full and complete, relating to the conditions which surround the builder in each of the various localities, how much better able he is to judge of the necessities of each association and to assist with information or advice regarding plans and methods which he sees are proving successful under similar conditions in some other Exchange.

The work of the Executive Committee would be greatly facilitated if local secretaries would keep the National Secretary thoroughly informed of the conditions surrounding the building interests in their vicinity, and the recommendations of that committee could be more intelligently directed if the methods in vogue in each Exchange were in the hands of the National Secretary at all times.

The actual labor of writing a letter once a month at least, that shall contain a brief description of experiments that may be made in the conduct of the Exchange, the demonstration of success or failure of any plan under trial, or the transmission of any information affecting the interests of the building business, is very small, but the result is greater than the local secretary might suppose. The importance is not attached to any one letter, perhaps, but a systematic course of correspondence keeps the National Secretary in possession of information as to the value and importance of pursuing certain methods and practices or the futility of advocating the same.

The annual tour of exchanges by the National Secretary is in a sense a voyage of discovery, simply from the fact that his repeated requests for information from secretaries have failed to extract from them half the benefits they are striving to accomplish for their various associations.

The following is Mr. Hamilton's letter:

BUILDERS' EXCHANGE OF ST. PAUL,
ST. PAUL, MINN., December 12, 1890.

Wm. H. Sayward, Esq., Secretary National Association Builders. Boston, Mass.—DEAR SIR: The fifth annual meeting of our Exchange was held on Thursday last, with a large and interested attendance. The report of Board of Directors for the past fiscal year showed a very satisfactory condition, especially so considering the depressed state of business.

Our membership has been increased by 14, making it now 110. The receipts have so far exceeded disbursements as to leave a good surplus, monthly increasing, toward a building fund. The Committee on Arbitration has had but one case in which the city Board of Water Commissioners formed a party, which was settled by the committee agreeably to both parties. The Room Committee did good work in furnishing and decorating our present quarters, which were first occupied 16 months ago. The special committees on Eight-Hour Ordinance, Building Ordinance, &c., have performed their duties in a manner favorable to the interests of the Exchange, and so as to bring the Exchange before the public eye as a body worthy of respect and consideration. The good results of the labors of the Committee on Promotion of Interest are already apparent in the largely-increased attendance during 'Change hour, and the directors hope to see it soon embrace nearly the full membership.

The change of corporate name from "Contractors' and Builders' Board of Trade" to "Builders' Exchange of St. Paul" had proven convenient and appropriate, as have also other amendments.

The great event of the year was, of course the fourth annual convention of the National Association of Builders, and the efforts to entertain our guests have more than been repaid by the local interest aroused by the convention, and by the many gratifying expressions of approval by visiting delegates and their associations.

In the death of our honored and esteemed first vice-president, M. Breen, the Exchange had an irreparable loss which has been much felt, but our leading spirit, Edward E. Scrib-

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ner, is again in harness as one of the directors, who, by the way, form an excellent board.

At the annual meeting of the Board of Directors yesterday the following officers were elected: President, J. W. Mankinson; first vice-president, J. W. L. Corning; second vice-president, Chas. A. Fowble; third vice-president. J. M. Carlson; treasurer, A. J. Hoban, and the former secretary was reappointed.

Yours very truly,
H. R. P. HAMILTON, Sec'y.

A Mechanic's Lien Law.

The variety of lien laws that are in existence in different parts of the United States and the manifest defects and need for improvement make the subject one of the most important that are presented for the consideration of the contractor.

The following law, which is in existence and governs in Louisville, Ky., and Jefferson County, is given as a basis upon which to work, and from which comparisons may be drawn and improvements suggested.

The copy of this law was submitted by John E. Carpenter of the Builders' and Traders' Exchange of Louisville, without comment and is given here simply as material with which to work in considering the subject.

The copy was gratuitously compiled by Mr. Callaway, a prominent attorney, in the interest of the Exchange, and his letter to Mr. Carpenter precedes the transcript of the law.

LOUISVILLE, Ky., December 10, 1890.

John E. Carpenter, Esq.—DEAR SIR: Accompanying this note you will find copy of what is known as the local Mechanic's Lien law of the city of Louisville and county of Jefferson, Ky. It is confined in its operations to said localities. Also you will find extracts from the leading decisions of the Court of Appeals touching "Mechanics' Liens," &c., since passage of said law. Yours truly,

JOHN I. CALLAWAY.

An Act to Provide a Mechanic's Lien Law for the City of Louisville and County of Jefferson.

Section 1. Be it enacted by the General Assembly of the Commonwealth of Kentucky:

That all persons who shall perform labor or furnish materials, fixtures or machinery for constructing, finishing, altering, adding to or repairing any house, building, mill, manufactory or other structure within the city of Louisville or county of Jefferson, by or under any employment or contract, expressed or implied, shall and may have a joint lien upon such house, building, mill, manufactory or other structure, and upon the interest of the employer in the parcel of land on which such structure may be situated, and in the previous structure added to, altered or repaired, to secure the payment of their several demands, which lien shall be prior and superior to all other liens and encumbrances on any such house, building, mill, manufactory or other structure, and the fixtures and machinery so constructed, when the structure is wholly new; and upon any machinery or fixtures, alterations, additions or repairs to a previous building, which are capable of being severed or removed from such previous building without material injury thereto, and shall be prior and superior to all other liens or encumbrances upon the interest of the employer in the lot or parcel of land built upon, and upon any previous structure so altered, repaired, or added to, created after the commencement of constructing the house, building, mill, manufactory or other structure, or adding to, altering or repairing a previous structure. Provided that no lien shall so attach for any sum amounting to less than $10.

Sec. 2. That any person or persons having a lien under this act may enforce the same by petition in equity in the Louisville Chancery Court, or in any court of similar jurisdiction, which may hereafter be established or exist in said county or city, provided such petition be filed within one year from the completion of the work or furnishing the materials. All the persons having a lien may join in the petition, or one or more may file a petition against the employer and the other persons or any of them having a lien. Any person having a lien not a party to the case may, on his motion, be made a party defendant; and all defendants having liens may set up their respective claims by answer, without the necessity of making the same a cross-petition.

It shall be the duty of the owner or employer to make distinct answer to each claim set up in the petition or answer, without other service of process except the summons or original petition.

In all respects other than as herein provided, the case shall proceed and be conducted according to equity, law and practice and the rules of the court in which the same may be prosecuted. No lien shall exist in favor of any person or persons by virtue of this act who shall not have proceeded within the time aforesaid to enforce the same; and the lispenens shall be construed to commence as to the several demands from the time of filing the petition or answer asserting or setting up the same; and any party in interest other than the employer may, by motion of record previous to judgment, without answer, require any claimant, or all claimants, to prove their demands as if controverted by general denial; and the plaintiff, on service of summons, and each defendant, on filing his answer and claim, may proceed to take evidence to prove the same.

Sec. 3. That any journeyman, laborer, mechanic, artisan, lumber merchant, brick maker, or other person performing labor or furnishing materials for any of the purposes described in the first section of this act, not under contract or employment of the owner, but as sub-contractor, may avail himself of this act by giving notice in writing to the owner or employer before payment is made to the contractor or building mechanic that he looks to the property for payment of what may be due to him for such labor done or materials furnished; whereupon he shall have and acquire a lien as valid, and to be enforced in the same way as if he had contracted with or furnished to the owner or employer. Provided, that the lien or liens so acquired by sub-contractors shall not swell the aggregate payments or indebtedness of the owner or employer beyond what he would be bound for by contract, where the work has been done on contract, or in other cases beyond what he would be lawfully bound for upon the *quantum meruit*, after giving credit for payments made before notice by sub-contractors; and it is further provided, that the demands of sub-contractors shall be severally paid out of what may be due to the contractor or building mechanic under whom they claim, if so much be due him, after giving credit to the employer as to each demand of sub-contractors for payments made to the contractor or building mechanic, prior to notice as above provided; and no sub-contractor shall be prejudiced on account of any payment made by the employer to the contractor or building mechanic, after notice as aforesaid by such sub-contractor; and if payments are made by the employer after notice by any one or more sub-contractors, and prior to notice by another or others, such notice or notices so given, prior to such payments, shall have preference to the extent of such payments; and in such cases the sub-contractors shall be classified; and under these regulations the court shall distribute the fund among the parties according to their respective rights and equities.

Sec. 4. It shall and may be lawful for any such owner or employer, upon receiving notice from any sub-contractor, as provided in the third section, to assume the amount justly due to such sub-contractor, and thereupon at once become entitled to credit therefor as a payment as between himself and the contractor; provided, that this be not done to the prejudice of any sub-contractor who may have given previous notice of his claim and lien.

Sec. 5. Any sub-contractor may, before furnishing any materials or performing any labor as aforesaid, give notice to the owner or employer of his intention to furnish or peform the same, and the contract price or probable value thereof, and that he looks to the property for payment; and if within the next day after receiving such notice the owner or employer does not warn or notify such sub-contractor not to furnish such materials or perform such labor on the credit of the property, and the sub-contractor goes on to furnish the materials or perform the labor, he shall have a lien, as in the first section provided, for the sum justly due to him, not exceeding that named in the notice, not to be scaled or lessened on account of any payments made by the owner or employer to the contractor or building mechanic, whether before or after such notice, and after doing work or furnishing materials, either without notice or under notice as aforesaid, the sub-contractor may give like notice, and do or furnish other work or materials with like effect and upon like conditions, as above herein provided.

Sec. 6. The liens herein provided shall be enforced by appropriate orders, judgments or decrees, for the sale of property on which the lien exists, according to equity usage; and if it shall appear that the employer did not own or had no right to bind the land for a sufficient estate to satisfy the liens, then the court may provide for the sale and removal of the house, building, mill, manufactory or other structure, where it is wholly a new structure, or of the fixtures, machinery, alterations, additions or repairs upon which the lien exists, so far as the same may or can be removed without material injury to the former structure not owned by the employer, or to rent the same for the benefit of lien claimants if it shall appear the rents will pay the lien claims in a reasonable time, in cases where the owner of the land or former structure consents to the renting, on election given.

Sec. 7. And if the land upon which such structure is erected, or the land and structure upon which any such alterations and repairs are made, shall be owned and held for any infant or *cestui que* trust, or as the separate estate of a married woman, without power of sale or incumbrance, and the court shall be of opinion that the contract or employment was not such as to bind the land or any interest therein sufficient to raise the amount necessary to satisfy the liens, then it may and shall be competent for the guardian of such infant or the trustee or married woman to exhibit his, her or their petition, or, by answer to any petition pending under this act, allege and prove to the satisfaction of the court that it would redound to the interest of the infant or *cestui que* trust or married woman to cause said property so built upon or improved to be either sold or leased or rented out, to pay the lien claims established, rather than remove the structure or improvements, or to ascertain the comparative value of the property independent of the improvements, and to have the whole, or so much thereof as may be necessary, sold, and the lien claims paid, or the proceeds distributed between the married woman, infant, or *cestui que* trust and the lien claimants, the court making proper orders for the safe keeping or the reinvestment of the portion going to such infant or *cestui que* trust, or married woman.

Sec. 8. If the interest of the employer in the land on which the work or materials were done or furnished is that of a lessee for years, or other interest less than a fee simple, the court may either sell the house or other improvements, with the privilige to the purchaser or his assigns to enter and remove it, may sell the interest of the employer during his term, with privilege of removal of the house or other improvement, or may sell the land, subject to the contingency affecting the title, or may order the property to be rented, whichever may seem best for the interest of all parties consistent with the liens and equities herein created.

Sec. 9. In case any lumber merchant, brick-maker or other material man shall have furnished or sold materials to any contractor or building mechanic who shall be engaged in building more than one structure at the same time, and it shall be beyond the power of such material man to make it appear in proof how much of his materials went into any one structure, the court may permit his lien claim to be proved and established against any and all such structures, and the interest in the land as herein provided, provided that no valid lien of any other mechanic or material man is lessened or impaired by any such allowance beyond the amount actually proved to each structure, and provided also that the rights by this section provided shall take effect only from the date of its being claimed by suit, and subject to prior conveyances and equities.

Sec. 10 Any notice provided for in this act may be served by the Sheriff or any constable of said city or county, by delivering a true copy thereof, and whose return thereon shall be received in evidence without further proof, or the service of the notice may be proved, by disinterested witness, or as provided by existing laws as to notices generally.

Sec. 11. The act providing a general mechanic's lien law for certain cities and counties, approved February 17, 1858, so far as it is inconsistent with this act, and only as to the city of Louisville and county of Jefferson, be repealed; but as to the matters provided for by amendments, approved June 3, 1865, as to the said city and county, and in all other respects as to the other cities and counties to which those acts extend, they shall continue in force.

Approved March 2, 1869.

AUTHORITIES CITED:

Decisions by the Court of Appeals of Kentucky, construing the Mechanics' Lien law.

The letter of that law as applies to the city of Louisville and County of Jefferson accompanies this paper.

In Foushee, &c., *vs.* Grigsby & Robinson, &c., 12 Bush, page 75, the court, among other things, held:

1. That the liens of the contractor and material man were subordinate to an innocent vendee or mortgagee without notice; also

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2. That where the owner mortgages the property during the progress of the work, and while the materials are being furnished to an innocent mortgagee, the lien of the mechanic and material man will be lost and unavailable as against the mortgagee.

3. That being an innocent mortgagee, the claims of the mechanic and material man existing prior to the mortgage created no lien as regards the mortgage debt.

The above decision was rendered in construing and applying the general Mechanic Lien law of the whole State, subsequently, in Nuner, &c. *vs.* Wellisch, &c., 12 Bush, page 364.

The court, in construing the local Lien law of Louisville, above referred to, re-affirmed the doctrine laid down in case first cited, 12 Bush, page 75.

It is now well settled as the law of this State, and contractors, builders and material men are put on notice at the time of contracting, as to the character of the owner's title and any subsequent changes that may be made by the owner during the progress of the work.

Vol. 13, Bush Rep. (Hardin, &c., *vs.* Marble, &c.), it was held that where the contract between material man or mechanic and the owner of the land exceeded limitation prescribed by statute, then such material man or mechanic could not claim lien under said statute. The contract must conform to its requirements.

In 12 Bush, Foushee *vs.* Grigsby, the court held that an architect or superintendent was not embraced by the statute giving liens to mechanics, laborers and material men.

Mechanics' liens superior to dower rights.—1 B. M., 258.

Interest of lessee of a house subject to aforesaid liens.—4 B. M., 81.

In Jones *vs.* Jeffries, 11 Bush, 637, it is decided that "a lien created by suit to subject the equitable title to real estate upon return of *nulla bona* has preference over liens created after the institution of the suit for materials furnished and work done," &c.

1886, September Term, Vol. 84, Ky. Reports, Roberts *vs.* Riggs & Smith. The court held in above case: 1. That "the release or waiver of the homestead exemption to be valid as against a mechanic's lien for *additional* improvements must be in writing, 'subscribed by the defendant and his wife, and acknowledged and recorded in the same manner as conveyances of real estate': otherwise, the lien of the mechanic is subordinate to the right of the homestead. The mechanic's lien has the preference, however, where the lot was vacant when the mechanic entered upon it to make the improvement and the improvement created the homestead." 2. "To entitle a mechanic to a lien upon the general estate of a married woman for improvements thereon, he must allege that the improvement was necessary for the comfort of the wife and her family."

The Buffalo Association.

The members of the Association Builders' Exchange held their annual meeting at their rooms in the Jewett building Monday evening, January 12. The meeting was called to order by President McNamara. Secretary Edward L. Cook read his annual report, which showed that the association had held 11 meetings during the past year and the trustees 18. The secretary expressed the opinion that the association was entitled to some credit for the amicable settlement of the difficulty between Hardwick & Ware and Schmidt Bros., which was brought about by the trustees.

The Kelly manual training school scheme was strongly indorsed by the secretary. According to the report the membership stands as follows: January 1, 1890, corporate class 93, non-corporate class 31, retired list 1; January 1, 1891, corporate class 84, non-corporate 33, retired list 1.

Treasurer George M. Stowe read his report, showing cash on hand, general fund, January 1, 1890, $267.93; stock and interest $3703.23; received from various sources $3205.63; disbursements during the year $2239.30. Cash on hand January 1, 1891, general fund $678.56; stock and interest, $4258.93; total $4937.49.

Both reports were adopted and ordered printed.

W. D. Collingwood, the newly-elected president, was then escorted to the chair and introduced by the retiring president, who made a neat speech thanking the members for many courtesies and bespeaking for his successor the same kindness.

President Collingwood made a strong speech and outlined his policy. The association appeared to be in a state of dry rot and needed some decisive action to wake up the sleeping members. Every man who furnishes material to builders and every builder should be brought into the association, and he hoped that the members would do more work with less talk, make every effort to increase the membership and awake interest in the organization.

Few builders had made money this year; they were afraid of each other, and had cut prices until there was little or no profit in the business. Mr. Collingwood thought the practice of opening bids in public a good one. Some architects took a mean advantage and acted in a prejudiced manner when bids were opened privately. He was also strongly opposed to the system of payments on contracts. The retention of large percentages until after the completion of the work was a serious inconvenience to many builders, and he hoped they would combine to inforce their rights.

The president then announced the following committees for the ensuing year:

Rooms—John Feist, J. H. Tilden, C. A. Rupp.

Arbitration—E. M. Hager, G. W. Carter, H. Schaefer.

Admission—George Duchscherer, P. G. Straub, M. J. Byrne, James Boland, H. C. Harrower, A. A. Lyth, John Lorenz, George Keller, A. Berrick.

The Builders' Exchange of St. Paul.

A regular meeting of the Builders' Exchange was held January 16, at which considerable routine business was transacted. The Board of Directors announced the election of the following officers: President, J. W. Makinson; first vice-president, J. W. L. Corning; second vice-president, C. A. Fowble; third vice-president, John M. Carleson; treasurer, A. J. Hoban. The Arbitration Committee was announced as follows; Messrs. Grant, Bazille, Bell, Cameron, Fifield, Fiske, Ness, Dunnigan, Whitehead, Uban, Deslauriers. The Room Committee will be composed of Messrs. Rheaume, Libbey and Draper.

The principal thing to come before the Exchange was the report of the committee, consisting of Messrs. Abbott, Chapman and Corning, to consider the recommendations of the committee of the Board of Education that the Manual Training School should be closed. The report recommended that the following address be sent to the Board of Education:

To the Honorable Board of Education of St. Paul: The Builders' Exchange, called together to consider the recommendations of your committee concerning the retrenchment of expenses and greater economy in the administration of our public schools, commend most heartily your devotion to public good, and the members pledge themselves to sustain you in your efforts to conduct that branch of the public weal in an honest, business-like manner. But we most respectfully and earnestly appeal to you to encourage and maintain that one feature of the public school system which so strongly appeals to this organization. We refer to the manual training school, whose mission is to create a band of thorough American mechanics. Your attention is called to the fact that this school is yet in its infancy, having been established in its present location less than a year, and that its many advantages are almost unknown to the great mass of our fellow citizens. We are creditably informed that the present attendance of 85 pupils will be increased by the addition of 40 or 50 at the close of the present half year, and we believe that in the near future the accommodations of the school will be taxed to supply room for all who will wish to attend, and that the increased number will add but little to the present expense. It is proper to remind you that similar schools have been established in other cities throughout the country, notably in Philadelphia, Boston, New York, Cincinnati, Chicago, Minneapolis, Kansas City and Des Moines, and that they have everywhere been received with the greatest favor as soon as known, and are regarded as a consistent and logical part of the public-school system.

The report of the committee was unanimously adopted.

NEW PUBLICATIONS.

PRACTICAL GRAINING. By William E. Wall; 60 pages; illustrated by 47 colored plates; bound in stiff board covers. Published by the House Painting and Decorating Publishing Company. Price $2.50.

This work is comprised in 18 chapters and presents a description of colors employed and tools used in practical graining. The various points with which it is necessary for the practical grainer to be acquainted are touched upon in a manner that cannot fail to prove exceedingly interesting and valuable. In the opening chapters attention is given to groundworks for graining, the graining color, graining oak in distemper, Hungarian ash, chestnut, satin wood, pollard oak, cherry, black walnut, in oil and in distemper, varnish, walnut burl in distemper, mahogany, rosewood, hard pine and white wood. Other chapters give attention to varnishing over grained work, the tools used by grainers, patent graining machines and the imitation of carved work, molding, &c. The colored illustrations, as already stated, are 47 in number, and represent the various woods in use in interior finishing. At the close of the volume is an alphabetical index, not only of the text but also of the colored plates, which will be found to greatly facilitate reference.

The Carpenter's Wooing.

O I a door you, darling one,
I hall ways loved your laughter;
And window you intend to grant
The hand my hopes are rafter?

You're roof if you imagine that
I've not enough to board you;
We'll have a good square meal, for I
Can hammer steak afford you.

I sawyer father yesterday,
'Tis plane be'd have us marry.
Oh let us to the joiner's hie!
Nor let us shingle tarry.

The cornice waving now, my love;
The gables are all ringing;
A lath? Why let me longer pine?
I'm sawdust when I'm singing.

NEW BUILDINGS were erected in Pittsburgh last year valued at $7,000,000, as compared with $6,391,000 during the previous year.

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TRADE NOTES.

THE MURRAY & PORTER LEVEL COMPANY report a largely increased demand for their Pendulum Level. They advise us that for accurate work it has no equal, as it is the plumb-bob principle mechanically adjusted. They are receiving a gratifying number of testimonial letters from those who have used it, and request those who have not as yet seen the level to write for circulars, prices, &c.

WE HAVE RECEIVED from Funk & Wagnalls, New York City, the prospectus and sample pages of a new work entitled "The Standard Dictionary of the English Language," which is now in preparation. This work is said to differ widely in some important points from the plans of other dictionaries, there being, 1, the "locating" of the varying quotations; 2, the use in the pronunciation of words of the scientific alphabet adopted by the American Philological Association; 3, the placing of the etymology after the definition; 4, the placing of the most important current definition first and the obsolete last, and, 5, in the case of disputed pronunciation, giving the pronunciation preferred by other dictionaries as well as that preferred by the authors. It is said that no word is admitted to the vocabulary plates unless passed upon by the men in charge of this department. These include such names as J. H. Seelye of Amherst College; E. S. Sheldon of Hartford, Edward Everett Hale, Charles A. Dana and Howard Crosby.

THE THORN & HUNKINS LIME AND CEMENT COMPANY, manufacturers, dealers, importers and agents of lime, cement and other lines of building material, have their main office at Eighth and Chestnut streets, St. Louis, Mo., while the business is handled from various work houses located about the city at convenient points. They have also branch houses at Kansas City, Mo., and East St. Louis, Ill. They handle the higher grades of German and English Portland Cement and are agents for the well-known American Portland Buckeye brand, which is said to be equal to any imported at a less cost. They are manufacturers of black and white lime, and dealers in various brands of plaster paris, plastering hair, fire brick, fire clay and masons' and builders' supplies. They make a specialty of the Acme Cement Plaster, which is said to be superseding the old style lime mortar, as well as other patented compositions.

AN EXCEEDINGLY NEAT CALENDAR for the new year is being sent out by the Simonds Mfg. Company of Fitchburg, Mass. It consists of a tinted card measuring 4 x 8 inches, to which are attached 13 leaflets, 12 of these being for the months of the year, while the last one is devoted to a yearly calendar. Above the leaflets is a steel engraved design by Livermore & Knight, Providence, R. I. In this design is a bird's-eye view of the company's works, as well as representations of band and circular saws. A red cord is arranged in the top of the card for hanging it up. The company state that this is the tenth time they have issued their New Year greeting in the shape mentioned.

THE ARCHITECTURAL ASSISTANT COMPANY, with business office at No. 7 Warren street, New York city, have issued a circular calling attention of architects to the fact that they prepare working drawings from rough pencil studies for public buildings, churches, city residences, &c., in any style of architecture, and that elevations are drawn from plans on short notice. They also refer to their color "wash" perspectives suitable for competition work.

CHARLES A. STRELINGER & Co., Detroit, Mich., report that their business during the past year has been much larger than ever before, and they extend to the readers of *Carpentry and Building* who have contributed to this end their most hearty thanks The firm are looking forward to an increase in the volume of their business for the coming year, and state that they send out nothing but first-class goods. Their catalogue of tools for carpenters, pattern makers, carvers and all wood workers will be sent to any address on the receipt of eight cents in stamps to cover postage. The catalogue is made up of 200 pages, and contains 700 illustrations.

SAMUEL H. FRENCH & Co. of Philadelphia, Pa., are distributing an exceedingly neat folded card calendar for the new year. Upon what may be termed the covers of the card, which is of a size and shape to be carried in the pocket, are tasteful designs, lithographed in colors, while on the two inside pages is the calendar for the 12 months of 1891. Below the calendar is the name and address of the company and the statement that they are manufacturers of paints and builders' supplies.

IN ANOTHER PART of this issue the Egan Company, Cincinnati, Ohio, show two illustrations of wood-working machinery. One of these consists of a sash and door mortiser, while the other is a planer and matcher. The latter machine has a capacity for planing 24 inches wide and 6 inches thick and matches 12 inches wide. The company state that they are in a position to furnish complete outfits for contractors, inside finish manufacturers, sash, door and blind factories, planing mills, &c.

ST. LOUIS EXPANDED METAL COMPANY, St. Louis, Mo., have recently completed the erection of a building in Fort Worth, Texas, to be occupied by their local agent at that point. This house is built on the new plan of fireproof construction. They state that the house, though but lately finished, has resulted in giving them several orders for buildings.

AS INDICATING the extent of the business of the Pike Mfg. Company, Pike Station, N. H., we are informed that recently 1,000,000 whetstone wrappers were printed for them. Some idea of the magnitude of the job may be gained from these statements: That over 2 tons of paper were used in the work, and that the wrappers laid on top of one another would make a pile 300 feet high; that placed end to end they would reach 190 miles, and if spread out would cover 12 acres of ground.

ELSEWHERE in this issue J. T. Towsley of 232 Main street, Cincinnati, Ohio, presents a card of interest to the trade. Attention is called to the fact that he is making a line of glue heaters, swing saws, factory trucks and wood-working machinery, and that in cases where *Carpentry and Building* is mentioned an extra discount is allowed.

THE MONTAGUE-WOODROUGH SAW COMPANY, 19 Lake street, Chicago, Ill., are introducing the B. M. T. Patent Hand Saw, which is claimed to be a rip, cross-cut and miter saw, all in one. The manufacturers state that the saw is guaranteed to do all they claim for it, and that it is easier to file than the common saw. The announcement which they present in another part of this issue will be found of general interest.

THE WARREN-EHRET COMPANY of 432 Market street, Philadelphia, Pa., announce to builders that they now have ready for distribution new circulars and handsome sample books, which will be sent to any address upon application. The company manufacture a varied line of building papers and roofing felts, for which they make strong claims.

THE AMERICAN SCREW COMPANY, Providence, R. I., call attention in another part of this issue to Rogers' Drive Screws. Two illustrations are presented, one showing a common cut-thread screw as ordinarily inserted, while the other shows the Rogers' Drive Screw driven with a hammer its entire length. The manufacturers state that samples will be sent to any address upon application.

CHARLES E. RICHARDSON of Minneapolis, Minn., has taken out a patent for a double-paneled sheet-metal fire-proof door for dwelling houses, which he claims to be of simple, economical and durable construction. The invention consists of an interior door composed of a frame of wood, which is covered or cased with two sections of sheet metal, which entirely conceal the wooden frame. The sections of sheet metal are stamped, rolled or pressed to represent paneling, and are provided with edge flanges, which fit over and upon the edges of the wooden frame. The uprights and end pieces of the wooden frame are provided on their outer faces with grooves, into which the flanges of the metal sections are forced. In these grooves and upon the flanges bent or forced therein are secured metal strips at suitable intervals, provided with openings for the purpose of receiving screws or other fastening devices. The inventor states that a door so constructed may be painted or otherwise finished so as to have the appearance of an ordinary wooden door.

ELEVATORS is the subject of an announcement published elsewhere in this issue by Sulzer-Vogt Machine Company of Louisville, Ky. The company are in a position to furnish hydraulic, steam and hand elevators, as well as ice machines.

M. S. HUEY & SON, Indianapolis, Ind, are offering the trade an interesting assortment of wood mantels, some reference to which is made in their card in another part of this issue. The firm manufacture a large assortment of mantels of various designs, calculated to meet all reasonable requirements

THE CINCINNATI CORRUGATING COMPANY, Piqua, Ohio, present elsewhere in this issue a rather startling announcement bearing the headline "Steel or Steal." It refers to roofing plates, the company stating that they roll, anneal, square, trim and form their own sheets and know precisely the quality and grade of their productions. They say that they manufacture but one grade and turn out all kinds of iron roofing. To those interested the company will forward a catalogue and samples on application.

GOODELL & WATERS of 3301 Chestnut street, Philadelphia, Pa., and branches in Chicago and San Francisco, state in another part of this paper that they will mail to all applicants a copy of a catalogue embracing a full line of high-grade wood-working tools. The manufacturers request the applicant to address the nearest office.

"HOME STUDY IN ARCHITECTURE" is the title of a little pamphlet issued by C. Powell Karr, architect, of New York City. Within the covers of the work information is presented with regard to several courses of instruction in architecture by mail conducted by the gentleman named, as well as remarks with regard to special courses and tuition fees. The address of Mr. Karr is 23 Warren street, New York City.

WE HAVE RECEIVED from W. J. Burton & Co., Detroit, Mich., an attractive little calendar for the new year, consisting of a card of small size, to which are attached 12 white leaves, upon which the figures for the different months are printed in black. Upon the card is a representation of Shakespeare's house at Stratford-on-Avon, while above and about the design is advertising matter relative to the Eastlake Metal Shingles, which the firm manufacture. The make up of the calendar is very effective, and it will be found a convenient article for desk use.

"THE DUNNING HOT-WATER HEATER" is the title of an interesting publication which we have received from the New York Central Iron Works Company of Geneva, N. Y. It is a volume of 20 pages of carefully arranged and neatly printed letterpress, amply illustrated and containing a great deal of information about the Dunning hot-water heater, which is intended for warming dwelling houses, stores, schools, churches, conservatories and all classes of buildings by the gravity system of hot-water circulation. The work is bound in colored paper covers and will be found of interest to those engaged in the building trades.

WE HAVE RECEIVED No. 5 of Vol. VII of the "Proceedings" of the Engineers' Club of Philadelphia, which are published quarterly at No. 1122 Girard street, Philadelphia, Pa. The issue for January is devoted to an article by M. Bazin, Inspector-General of Bridges and Highways' on "Recent Experiments on the Flow of Water over Weirs." The article is a reprint from a French journal, and has been translated by Arthur Marichal and John C. Trautwine, Jr.

THE LINCOLN IRON WORKS of Rutland, Vt., favor us with a copy of what they are pleased to call "Catalogue E." It is a well-printed volume of 76 pages, profusely illustrated, and having as a frontispiece a bird's-eye view of the company's works. The goods shown within the covers consist of machinery for working and handling stone and marble, and in the preparation of the volume the aim has been to give such information as will enable those desiring machinery of this kind to understand what is the best modern practice, as well as to enable those who are not familiar with the matter to state clearly and exactly what they require. The engravings are well executed, while the printing is of a high order of merit. A number of tables occupying the closing pages of the volume will be found of interest in this connection.

THE PULLMAN SASH BALANCE COMPANY of 177 West Main street, Rochester, N. Y., have been meeting with a good demand for their specialties, and are enjoying an extensive trade with various railroad companies. Among the orders which they have recently received may be mentioned one from the Lehigh Valley Railroad Company, calling for their Special Car Window Balance, which is being extensively employed throughout the country. The company state that they have been behind with their orders for this device, but are now in better shape, and expect to enjoy for next year a large and prosperous business.

THE TAYLOR MFG. COMPANY, of Chambersburg, Pa., are meeting with a very good demand for the Beck Automatic Engine, which they manufacture, and among recent sales refer to the following: One 13 x 15 engine to Tayler Brothers & Hall, Macon, Ga; one 8½ x 10 engine to the Singerley Paper and Pulp Company, of Elkton, Md.; one 8½ x 10 engine, with complete steam plant, to Schuler & Co., Meridian, Miss.; two 9½ x 12 engines for the Manhattan Bank Company, New York City, as well as many others. The company have also received a fourth order for a 125 horse-power engine, with two boilers, from the Watervliet Turnpike and Railroad Company, of Albany, N. Y., where they have a 400 horse-power steam plant now operating an electrical railroad.

HARRY D. BUSH, of New York City, has patented a form of building construction in which a series of Z-formed studs have flanges turned alternately in opposite directions, and to which are secured a series of panels alternately from opposite sides of the wall. The adjacent ends of the panels at the union between the two walls interlock, thus holding them securely in position. The panels are composed of an inner and an outer thickness, which are separated by a filler. The object of the invention is to improve the manner of constructing partitions from boards or slabs.

CHARLES E. FRANCIS & BRO., of Cincinnati, Ohio, are distributing a number of leaflets relating to some of the machines manufactured by them. Illustrated descriptions are presented of a varied assortment of improved wood-working machinery, including wood turners' lathes, saw benches, shaping machines, finishing planers, swing cut-off saws and iron frame rip saws, together with a view of the factory and mill supplies, which the firm are prepared to furnish upon short notice

WE HAVE RECEIVED, with the compliments of William Connors, 677-679 River street, Troy, N. Y., a very convenient blotting pad for desk use. It consists of four sheets of different colored blotting paper, bound to a cardboard cover bearing upon its face advertising matter relative to the Brookside Roofing Cement, which is prepared ready for use in three colors. This cement is designed for laying or bedding slate, tile or metal roofs, and is also useful for repairing leaks around chimneys, dormer windows, skylights, scuttles, fire walls and all kinds of roofs. Upon the opposite side of what may be termed the cover is a calendar for the year 1890 and one for the year 1891. The pad is very neat and will serve a useful purpose.

(Continued on Page xxvi.)

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CARPENTRY AND BUILDING.

A MONTHLY JOURNAL FOR THE BUILDING TRADES.

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DAVID WILLIAMS, - - PUBLISHER AND PROPRIETOR.
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MARCH, 1891

The Builders' Convention.

A full report of the fifth annual convention of the National Association of Builders of the United States, which was held in this city during the week ending February 14, will be found in another part of this issue. It was the most important meeting of any of that body since its organization, and its results must be favorable alike to employers and employees. The attendance at the sessions was large, and the delegates present represented most of the more important cities of the country. The elaborate programme which had been prepared for the business session was carefully carried out, and in all particulars the proceedings were managed in a way which might well be emulated by other business organizations, as well as by certain deliberative bodies. As will be seen by our report, the questions brought up for consideration were of great importance to the building trades. The discussions of the questions of arbitration, sub-contracting and the use of a uniform contract were exceedingly interesting and instructive. The occasion afforded an excellent opportunity for contrasting the methods of conducting the building business in different parts of the country. Not the least interesting, even though less important, were the features of the programme which were altogether social in character. These included a theater party, a banquet—both of which ran to great proportions—and the freedom of the Building Trades Club. The latter dispensed its hospitality with a most generous hand.

THE ARCHITECT BUILT HIS GREAT HEART INTO THOSE SCULPTURED STONES.—*Longfellow.*

A Model Business Gathering.

During the time the convention was in session many of the papers extended pleasant courtesies, none of which, perhaps, were more deserving than the following, taken from the *Sun:* "The National Convention of Builders that has held its daily sessions in the city this week has been a model convention all along, from a business point of view. The proceedings have been carried on as though they were under the direction of experts. The proper rules have been duly observed by all the delegates. The most important practical questions have been taken up and put through with all desirable expedition. In the election of officers of the association there has been no improper rivalry between candidates. There have been no long-winded debates, no wrangling, no tomfoolery at the sessions. The members have striven to do the business that brought them together in an orderly and sensible way. The convention of builders may truly be spoken of as a model that deserves to be studied by the managers of all other bodies of the kind, or even by the members of the Legislature of the State of New York."

HUMAN NATURE CRAVES NOVELTY.—*Pliny.*

John W. Root.

In the death of John W. Root, of the firm of Burnham & Root, Chicago, which occurred just as our last number was issued, the architectural profession has lost an honored and gifted member. He was born in Atlanta, Ga., in the year 1851, his father being Col. Sidney S. Root, a well-known planter of wealth and position. Mr. Root was educated in this country and abroad, and after graduating from college he entered the office of Renwick & Sands and later that of John B. Snook. In after years he removed to Chicago and was employed in the office of P. B. White. In 1873 he associated himself with D. H. Burnham, under the style of Burnham & Root, and built up a business which made their name familiar everywhere. Mr. Root was prominently connected with the Western Association of Architects, and in the second year of its organization occupied the office of secretary, and later was called upon to fill the president's chair. When this association united with the American Institute of Architects he was honored with the office of secretary of the newly consolidated society, and it was but a short time since that he was again called upon to fill the same office for the current year. Mr. Root was ever prominent in social intercourse and hospitality on the occasion of architectural conventions, his rare gifts of mind, ready wit and pleasing disposition making hosts of friends on every side.

NOVELTY IS THE STOREHOUSE OF PLEASURE.—*Ninon de Lenclos.*

Studies of Inexpensive Dwellings.

The editor of *Carpentry and Building* will be glad to correspond with any and all architects who happen to read this paragraph concerning studies for publication in this journal. What is wanted particularly at this time is small houses—that is, inexpensive dwellings—fully illustrated with details to scale. We are quite as willing to show structures which have been built as those which have only been projected, and a photograph of the finished work is a very desirable substitution for the conventional perspective sketch. We shall be glad to have letters in response to this paragraph, explaining in detail what there is to offer that may interest the readers of this periodical.

WHICH OF YOU, INTENDING TO BUILD A TOWER, SITTETH NOT DOWN FIRST AND COUNTETH THE COST, WHETHER HE HAVE SUFFICIENT TO FINISH IT?—*Bible.*

Sixty Years of Peace.

A curious fact has recently been brought out in connection with the proposed establishment of a Western branch by a large and very wealthy Eastern manufacturing concern. The company's intention of transferring a large part of their business to the West had no sooner been made public than the managers were, as usual, overwhelmed with offers of free sites, bonuses and all sorts of other inducements from enterprising town boomers. It would have been easily possible for them to have made arrangements in some localities that would have given them immense advantages over their competitors, if the matter had resolved itself into the simple question of an available site in close proximity to their Western market. The best offer would then have won the prize of securing this reputable establishment. But there were other considerations of greater weight to the management than a free site, a bonus, free fuel, exemption from municipal taxation or any other pecuniary inducement. The original concern, employing thousands of men, had never had a strike in its existence of more than half a century, and the managers proposed to lay the foundation for a similar record for their Western branch. They had enjoyed 60 years of peace, of entire immunity from labor troubles, and desired these happy relations with their workmen to continue. The selection of a site involved the choice of a location which would be healthful for their employees and enable them to enjoy agreeable surroundings. This was regarded as the most important point to settle, consistent with favorable transportation facilities and other essential requirements for cheap manufacturing.

ARCHITECTURE IS THE ART WHICH SO DISPOSES AND ADORNS THE EDIFICES RAISED BY MAN, FOR WHATSOEVER USES, THAT THE SIGHT OF THEM MAY CONTRIBUTE TO HIS MENTAL HEALTH, POWER AND PLEASURE.—*Ruskin.*

Pleasant Relations with Workmen.

From this statement of the company's position, the keynote of its universally pleasant relations with its workmen will be apparent. They are not regarded wholly as machines performing certain functions in accordance with the requirements of the company. They are human beings, with tastes, desires and ambitions, and their welfare is a matter of sufficient solicitude to be a leading consideration in the selection of a site. Employers who display such kindly impulses in this respect must surely be influenced by the same sentiments in the daily treatment of their working force. It is not a mere accident, a curious exception to the usual history of industrial establishments, that this concern has for 60 years escaped without a labor trouble. Wise counsels and prudent management must have contributed to this remarkable record. The time covers a succession of periods of prosperity and intervals of depression which must have affected wages in this estab-

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lishment as well as in all others, and skillful management must have been required to preserve harmonious relations both in times of very high prices and very low prices. The peculiarities of the case are intensified by the statement that these works manufacture iron and steel.

THE BUILDING FITTED ACCURATELY TO ANSWER ITS END WILL TURN OUT TO BE ADMIRABLE.—*Moller.*

Neither Co-operation nor Profit Sharing.

So far as we are aware, no special remedy nor ingenious conciliatory device for preventing labor troubles has ever been adopted by this establishment. Co-operation does not exist in any form, nor is profit-sharing with the employees practiced. The works are run in the orthodox way, with the managers of the company managing affairs in their own style, employing hands of their own selection, and paying them what they consider fair wages. There is no socialism nor communism nor any other theoretical method of reforming human affairs in vogue in the workshops of this company. The owners own and manage, and the workmen perform their tasks and receive their pay. In this case the element of fair dealing between master and man appears to be the sole influential power that has been able so far to makes strikes unknown. This remarkable industrial history proves that strikes can be avoided, that there is a way of circumventing labor agitators and of allaying discontent in advance and not allowing it to ferment until it reaches fever heat. Surely the most successful manager is not he who always beats a strike, but he who is always able to avoid one.

NO PERSON WHO IS NOT A GREAT SCULPTOR OR PAINTER CAN BE AN ARCHITECT. IF HE IS NOT A PAINTER OR SCULPTOR, HE CAN ONLY BE A BUILDER.—*Ruskin.*

Winter Building.

Many of the manufacturers of hot air furnaces have expressed surprise that the demand for their goods has continued active so late in the season, some, it is said, having all they can do to meet current demands. In other years this has not been the case, for the winter has been the slack building season, and the rush for goods has not come until the houses were well along toward completion. An explanation of the unusual demand now prevailing, as offered to us by one who is very familiar with the furnace trade is that the frequency of building trades strikes in the spring during the past few years has prompted many builders to begin their work during the autumn and carry it through the winter, thus having their houses so near completion in the spring that they shall be less dependent upon the demands of labor. A great many houses in this way were begun in the early fall, so that the foundations were completed before the frost came. Then, as soon as the building was inclosed, the furnace was put in and temporary arrangements made for register boxes. The furnace being in place, the plasterers could begin their work, and by making use of furnace heat, continue it independent of the cold weather. Another advantage of doing building work during the winter is that the best mechanics can be obtained, and employers are not dependent upon indifferent or inefficient workmen. Whether this offered explanation will entirely account for the demand for building material late in the season we cannot say. It is, at least, a plausible explanation, and may mark another change hereafter in the division of the building seasons. Of course, if houses are being built now and equipped with heating apparatus, there will naturally be a less demand for furnaces later in the season, when heretofore they have been in great request. Such a change in the building season must also have its effect upon other lines of materials, and give a fall and winter activity to trades that are then usually dull. Anything that has a tendency to distribute business evenly throughout the year and relieve the excessive rush and activity of short seasons should be welcomed by the industrial world.

THE MAN WHO BUILDS AND WANTS WHEREWITH TO PAY PROVIDES A HOME FROM WHICH TO RUN AWAY.—*Young.*

The Labor Laws of Massachusetts.

The labor laws of Massachusetts have been collected and published by the Bureau of Labor Statistics. We get an instructive view from this compilation of how old theories about the relation of the State to industry have been modified in the last 20 or 30 years, and step by step the State has come to interfere in behalf of the laborer The employment of women and minors is now regulated and bounded by certain hours and conditions, child labor is forbidden, minors under 18 cannot be legally employed over 60 hours a week, imprisonment for debt is abolished, the workingman is given a lien on his employer for wages, necessary tools of a mechanic are exempted from attachment, the trustee process is curtailed, co-operative banks, building societies and associations are authorized, and inspection of factories and regulations for the protection of life and health of the operatives established. Besides, educational facilities have been extended and free text books provided, and, while not the subject of specific legislation, ten hours has come to be the maximum day's work in most industries, and the tendency is still toward a shorter work-day.

PLATES.

One of the plates accompanying this issue presents a general view of a house erected in Detroit, Mich., from plans prepared by A. C. Varney & Co., architects, of that city. A detailed description, as well as plans and elevations, will be found in another part of the paper.

Other plates show a general view of the Casino, New York, together with three interiors. This building, it will be remembered, was the scene of the immense theater party given on Wednesday evening, February 11, by the Mechanics' and Traders' Exchange of New York City in honor of the National Association of Builders of the United States, an account of which will be found as a part of the convention report.

The Casino, which was completed in 1882, has a frontage of 104 feet on Broadway and 139 feet on Thirty-ninth street. It is constructed in the Moorish style of architecture, of rough red brick, stone and polished terra cotta. It combines a theater, summer garden, balcony terrace and restaurant. It has eight exits, a seating capacity of 1200 and standing room for about 800, bringing the total capacity up to 2000 people. The principle feature of interest is the treatment of the interior. The walls and dome are covered with what is termed "fibrous plaster," pressed into numerous artistic designs. The plaster is made by combining layers of burlap and a composition resembling ordinary plaster. This is said to have been the first extensive introduction of ornamental plaster work in walls, domes and ceilings. The general tint or color of the decorations is buff, relieved by the free use of silver, copper, brass and gold, in three shades. The boxes, which are graceful in form, the pillars and the front of the balcony are finished in old gold. The front of the balcony is composed of a series of small colonnades connected by arches and liberally decorated in gold, silver and copper.

The flooring of the vestibule at the entrance on Thirty-ninth street is of broken tile in various colors. From the lower vestibule a staircase of marble 10 feet in width and broken into a number of landings leads to the grand vestibule on the second floor, where the theater is situated. The vestibule is octagonal in form, with vaulted ceiling, and surrounded by a series of arches, which form entrances to the auditorium, the foyer and the staircase leading to the balcony. The upper part of the house above the theater gallery is a concert room with promenade. The room is said to have an area of about 15,000 square feet, and is laid out as a summer garden. The architect under whose supervision the Casino was erected is Francis H. Kimball, with office at 40 Broadway, New York.

NEW PUBLICATIONS.

HOUSE DRAINAGE AND SANITARY PLUMBING. By William Paul Gerhard. The Van Nostrand Company, 1890. 50 cents.

This valuable little treatise in the Van Nostrand Science Series by the well-known sanitary engineer, Mr. Gerhard, has, we are pleased to see, reached its fourth edition. The first edition came out in 1882, and was an essay originally prepared for the annual report of the State Board of Health of Rhode Island. It has been re-edited since then in the different editions and much additional matter has been inserted. In the preface to this edition the author states that he has deemed it best to make as few changes as possible, adding that the general principles of house drainage have not been materially altered or modified since the earlier editions of the work. The difficulty attending the publication of any sanitary work in that part of it which relates to plumbing fixtures has been well met by Mr. Gerhard, for in discussing the various types of closets he has omitted mention of the closets of the more prominent makes, because, as he says, the many well-illustrated catalogues of dealers and manufacturers in plumbers' supplies give full information in this matter; and also there being so many closets on the market it would be impossible to mention them all. This small publication has grown to 230 pages and illustrating it are several engraved plates. One of the plates shows 16 different forms of traps for fixtures, while another illustrates six types of water closet. Sectional illustrations also show the construction of flushing tanks, while a final large cut illustrates a sectional view of a house, showing a system of drainage. The mere mention of these illustrations will show the practical value of the book, the text of which has been reviewed favorably in these columns heretofore.

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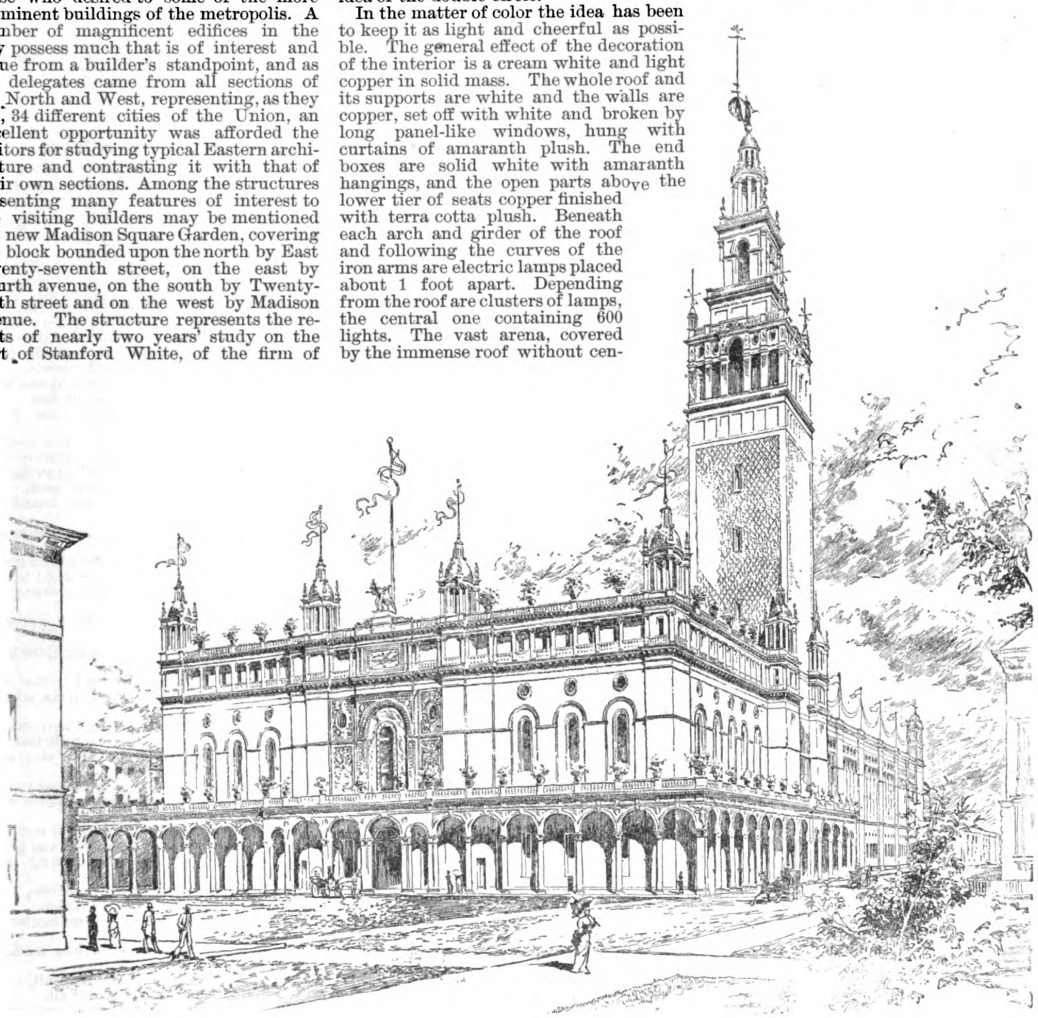
THE MADISON SQUARE GARDEN.

ONE OF THE FEATURES laid down in the elaborate programme prepared for the entertainment of the delegates to the Fifth Annual Convention of the National Association of Builders of the United States, held in New York City during the week ending February 14, was a visit by those who desired to some of the more prominent buildings of the metropolis. A number of magnificent edifices in the city possess much that is of interest and value from a builder's standpoint, and as the delegates came from all sections of the North and West, representing, as they did, 34 different cities of the Union, an excellent opportunity was afforded the visitors for studying typical Eastern architecture and contrasting it with that of their own sections. Among the structures presenting many features of interest to the visiting builders may be mentioned the new Madison Square Garden, covering the block bounded upon the north by East Twenty-seventh street, on the east by Fourth avenue, on the south by Twenty-sixth street and on the west by Madison avenue. The structure represents the results of nearly two years' study on the part of Stanford White, of the firm of McKim, Mead & White, architects, of No. 57 Broadway, New York City, and combines an immense amphitheater, a restaurant, a ball room, a concert hall, an open-air roof garden and a theater. A good idea of the external appearance of this magnificent structure may be gathered from an inspection of the perspective view shown in the accompanying illustration.



The Madison Square Garden.—McKim, Mead & White, Architects, New York City.

The amphitheater, which was the first part of the building completed, extends nearly the entire length of the block from Madison to Fourth avenue, and in width reaching from Twenty-sixth to Twenty-seventh street. It has permanent seats for 7800 people, with sufficient standing space left to give room for a total of 15,000 persons. The main idea has been to make it look absolutely like an amphitheater—that is, a building with a double curvature, and perhaps the most remarkable thing in connection with it is the system of iron construction and its lightness. The trusses have a rise of only 15 feet, and spring from light phenix columns fully 60 feet from the ground, the span being 186 feet. The arches are rather flat and the roof which they support a very slight slope. There are six full trusses and 16 radial trusses at each end, all emphasizing as much as possible the idea of the double circle.

In the matter of color the idea has been to keep it as light and cheerful as possible. The general effect of the decoration of the interior is a cream white and light copper in solid mass. The whole roof and its supports are white and the walls are copper, set off with white and broken by long panel-like windows, hung with curtains of amaranth plush. The end boxes are solid white with amaranth hangings, and the open parts above the lower tier of seats copper finished with terra cotta plush. Beneath each arch and girder of the roof and following the curves of the iron arms are electric lamps placed about 1 foot apart. Depending from the roof are clusters of lamps, the central one containing 600 lights. The vast arena, covered by the immense roof without central support, is entirely open and free from side to side and from end to end. The only pillars are a row of light steel posts close to each wall, upon which the roof arches are supported. In the arrangement of the seats the garden amphitheater follows the Roman idea except as to size. The amphitheater was opened in June of last year.

The Garden Theater is modeled in the Louis XVIth style, the characteristics of which have been carried all through the ornamentation from the coffered proscenium arch and the dome in relief to the delicate silk upon the walls and the magnificent drop curtain. The front on Madison avenue has four double oaken doors leading to a wide lobby connecting with the theater proper, and separated from it by a 20-inch party wall. In this wall are six openings, each 5 feet in width, providing means of entrance and exit for the audience. Besides these exits there are two from the orchestra floor on Twenty-seventh street and two on the south side of the theater. The seating capacity is about 1200, with standing room for 400, giving a total capacity of 1600 persons.

Probably the finest room in the building is the ballroom or concert hall, the seating capacity of which has been somewha sacrificed for the sake of fine interior effects. Along the sides of the room is a series of deep bays, surmounted by arches covered with delicate *papier mache* ornaments. The idea has been to make the room look like a great chamber, such as might be found in a king's palace, instead of like an ordinary concert hall. There are boxes in the gallery, with dressing rooms and retiring rooms adjoining, and a supper room for use when the hall is given up for dancing. The capacity of the hall is about 1500.

The restaurant is on the Twenty-sixth street corner of the building, and is intended for the service of the patrons of the amphitheater, although it may be used by others as well. One of the most popular featurs of the series of attractions centered in this immense structure is the open air garden extending over the roof along the Madison avenue front. It is

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reached by elevators and ample staircases, and will hold from 3000 to 5000 people. On it, when fully completed, will be a mass of electric lights producing a brilliant effect. The roof garden has a colonnade around it, while the general style of architecture is the Italian Renaissance.

As shown in the illustration, the building is surmounted by an immense tower rising 300 feet above the street. At present this portion of the building is not completed, but when finished elevators will carry visitors to a spacious observatory gallery higher than any structure in the vicinity, and 40 feet higher, it is said, than the steeple of Trinity Church. An interesting feature of this tower will be a powerful electric light placed at the very top. It will light the open-air garden with great brilliancy, and it is said that it will be so powerful that in the space within its illumination the moon will cast no shadows. In addition to the great electric light on the top of the tower and the lamps on the roof garden, there will be a series of outside electric lights.

NATIONAL BRICK MANUFACTURERS' ASSOCIATION.

THE fifth annual convention of the National Brick Manufacturers' Association began in the Board of Trade Hall, Indianapolis, Ind., on Tuesday, January 20. The attendance was large and great interest was evinced in the proceedings. A pleasing feature was the presence of a large number of charter members, who had been conspicuous in the organization of the association at Cincinnati five years ago. President T. B. MacAvoy of Philadelphia occupied the chair and delivered an interesting address, in the course of which he expressed the belief that the time is not far distant when brick will be made almost wholly by machinery. In other industrial interests where new inventions and machinery have come into use, he said that decided benefits have followed to all concerned, from the laborer to the proprietor, and that the same results would undoubtedly obtain in brickmaking. The prime object of the National Brick Manufacturers' Association was to bring about more improved methods of work. The president's address was greeted with much favor, and after the applause had subsided the election of officers was taken up. Justus C. Adams of Indianapolis was elected president, and was escorted to the chair by a committee of three appointed for the purpose. The new president addressed the convention, thanking the members for the honor conferred upon him. He referred briefly to the fact that the successful operation of those engaged in the manufacture of brick imposed upon those who follow it a watchful supervision of details, careful attention to small matters and a complete knowledge of methods, as well as a close acquaintance with the market of the various localities. He stated that the year just passed had been fairly prosperous, and that while in some localities prices were low and trade depressed, yet, on the whole, there were many reasons for thankfulness for the past and bright expectations for the future. The business of electing vice-presidents was then taken up, and a number of gentlemen were nominated. Richard Smith of Omaha received the highest number of votes and was made first vice-president; S. P. Crafts of New Haven, Conn., was elected second vice-president, and George S. Oldfield of Norfolk, Va., was made third vice-president. C. P. Merwin of Berlin, Conn., was elected recording secretary, and Theodore A. Randell of Indianapolis corresponding secretary. Frank B. MacAvoy was elected treasurer.

The next order of business was the presentation of papers, of which there were several of an interesting character. The first was by S. K. Fletcher of Indianapolis, Ind., and was entitled "Nomenclature or Vernacular in Brickmaking." Following this paper, the discussion of which was postponed until the following day, was the presentation of the report of the treasurer, showing that the total receipts were $864.04 and the expenditures $698.50, leaving a balance in the treasury of $165.54.

The evening was devoted to the "Third Annual Pow-Wow," which T. A. Randell, master of ceremonies, defined as an occasion when "the brethren should come together from all parts of the country, and by social intercourse rub off the rough corners of restraint and be the more willing and ready to take part off-hand in the discussion and deliberations of the association." An address of welcome was delivered by Mayor Sullivan of Indianapolis, and the evening was taken up with music, song and speechmaking.

On Wednesday, after the convention had been called to order, Thaddeus S. Smith of St. Louis, read an essay on "The Elements of Dry Kiln Brickmaking," which provoked some interesting discussion. This was followed by a paper touching the same subject prepared by John W. Sibley of Coaldale, Ala., and was entitled "Brickmaking in Alabama." After the discussion of this paper had been concluded a Committee on Resolutions was appointed. D. V. Purington of Chicago presented some interesting remarks on "Labor Troubles—How to Avoid Them,' which brought out some valuable and interesting discussion relative to the question of strikes, especially in the brickmaking industry. The next thing in order was an address by W. D. Gates of Terra Cotta, Ill., entitled "What, How and Why." Following this was a paper on "The Pallet System—Its Advantages and Disadvantages," by Frank Stiles, North Haven, Conn., after which was an essay on "Drying Brick" by Frank D. MacAvoy of Philadelphia, which was well received by the members and provoked no little discussion. Before adjourning for the day the members of the convention accepted an invitation extended by the Commercial Club to take a trip around the Belt Railroad.

The morning session of Thursday was taken up with an address by A. O. Jones of Zanesville, Ohio, on the paving brick interests and a somewhat extended discussion on the subject, in which many members participated. After the morning session the assembly made an excursion around the Belt Railroad, a special train having been provided for the purpose by the directors of the Commercial Club. In the afternoon the discussion of the paving brick interests was continued at some length, and when concluded William Roberts of Trenton, N. J., presented an essay entitled "Pressed Brick—Their Manufacture and Use," which was well received. Ellis Lovejoy of Union Furnace, Ohio, made an address on "The Guthrie Kiln." Another essay was that by E. M. Pike, Chenoa, Ill., on "Drain Tile—Its Manufacture and Use." Other papers read at this session included one by W. H. Duffet, Beatrice, Neb., on "Continuous Kilns," and another by W. Waplington of Philadelphia, Pa., on "Manufactured Gas for Burning Brick." These brought out some discussion, and were followed by a consideration of the subject of vitrified brick.

Reports of committees were next in order, the first being that of the Committee on Nomenclature of Brick. This was a lengthy document, but one full of interest and value, not only to those engaged in the manufacture of brick, but also to all connected with building operations. The next report was that of the Committee on Resolutions, of which B. W. Blair was chairman. The following gentlemen were appointed on the Committee on an International Exhibit of Clay-Working Machinery in connection with the World's Fair at Chicago in 1893: B. W. Blair, Cincinnati; Albert Gleason, Washington, D. C.; C. W. Raymond, Dayton, Ohio; Thaddeus Smith, St. Louis; and C. D. B. Howell, Chicago, Ill. After a few remarks by President Adams, the convention adjourned, subject to the call of the Executive Committee.

A "Brick" of a Poem.

At the Fifth Annual Convention of the National Brick Manufacturers' Asssociation, D. O. Loy read the following poem, which was enthusiastically received:

In a beautiful garden on Eden's fair plain
Our old Mother Eve began to raise Cain.
Now, if we believe what historians say,
Cain was much harder than vitrified clay.
A patent brick clamp advertise if you will,
But Cain was the man that invented the kill.
For brick kilns in Eden there was no demand,
So Cain was advised to seek other lands.
In that olden time when the world was new
They never used brick for cellar or flue.
No well brick were used at the time Adam fell,
For long ages since Jacob dug the first well.
No cisterns were made in that garden so new
For Adam and Eve had no washing to do.
The first brick made at Babel were used,
Where brickmakers' language was mixed and confused.
Though the tower was a failure, the bricks which were made
By those ancient people established our trade.
From that day to this, in each civilized land,
For brick there has been an increasing demand.
When Jacob's grand-children in Egypt were kids
They were moulding the brick for those huge pyramids.
And our minds often wander back to that day,
When those slaves made brick from stubble and clay;
And we fancy we hear old King Pharo ask
Those Hebrew slaves to increase their task;
And we fancy they moistened the clay with their tears,
While moulding brick in those ancient years.
But we know that those slaves whom that king possessed
Have long since gone to that home of rest;
And the king who ruled with pomp and pride,
That king and his children have long since died.
Of his royal palace, his crown or throne,
Not one relic of them to-day is known.
That king and his children are mummies to-day.
Yet the language we read on bricks made of clay,
The Egyptian kingdom, its rise and fall,
Hieroglyphics on bricks has told it all.
Before Moses from Egypt went out on a strike
He invented a kiln claimed by Castle & Pike;
And the Steward brick kiln is laid in the shade,
For the Hebrews burned bricks before they were made.
Near an ancient city, deep under the ground,
A kiln like Eudaly's was recently found.
Editorials on brickmaking in the Journal appear
Which have been composed over three thousand years.
Like those Hebrew slaves, we will soon pass away,
But the bricks we have made will never decay;
Then I'll write on each brick, in the mold that I cast,
A message of love that forever will last;
A poem on brick at once I'll commence,
To be read by brickmakers ten thousand years hence.
Were I choosing a brick from the new or the old,
I would not select a brick made of pure gold;
A brick of pure gold time would surely destroy,
While a brick would last always if made of a Loy.
If you doubt what I say, I'm ready for that,
For I always carry a brick in my hat.

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RESIDENCE OF CHARLES F. BIELMAN, DETROIT, MICH.

A. C. VARNEY & COMPANY, ARCHITECTS.

FOR ELEVATIONS, FLOOR PLANS, ETC., SEE PAGES 53 TO 56.

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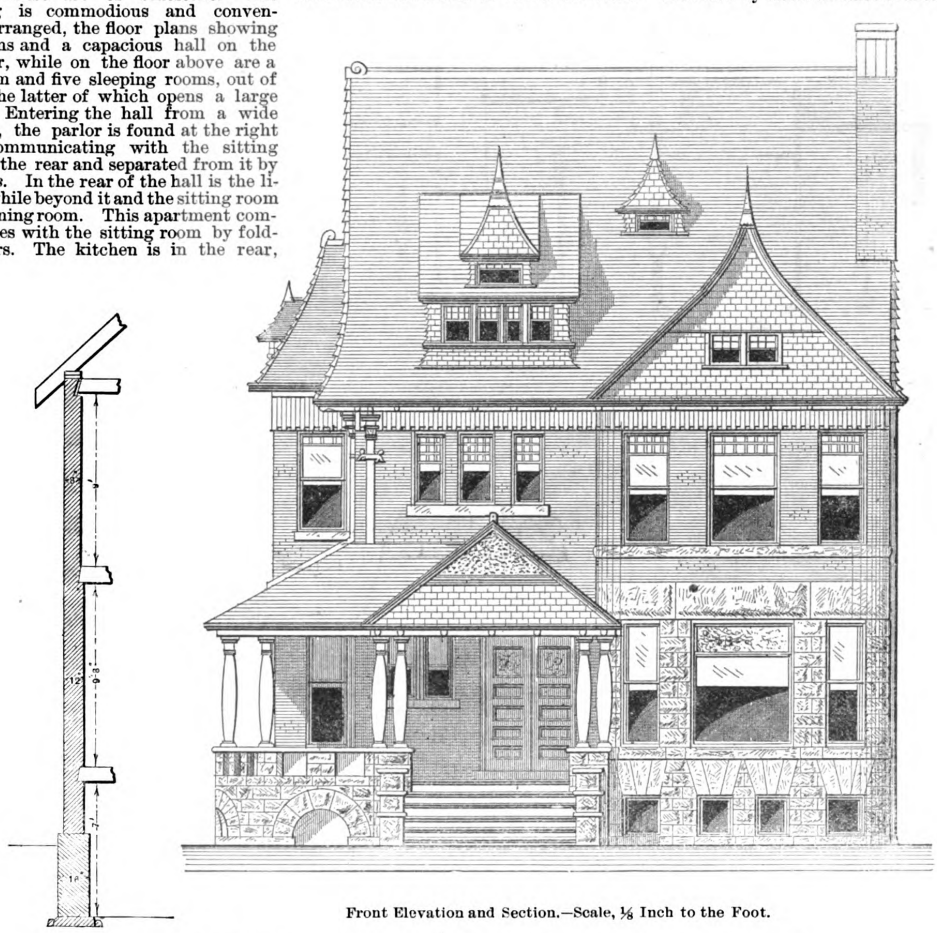
RESIDENCE IN DETROIT.

THE HOUSE which we illustrate upon this and the following pages was erected for Charles F. Bielman, at No. 285 Hancock avenue, West, Detroit, Mich., from designs prepared by A. C. Varney & Co., architects, of that city. It will be seen from an inspection of the perspective view, which appears in one of our supplement plates this month, that the house is constructs of stone, while the roof is covered with slate. The material employed up to the window sills is limestone, while above that point is red sandstone. The steps of the house are of bluestone. The dwelling is commodious and conveniently arranged, the floor plans showing five rooms and a capacious hall on the first floor, while on the floor above are a bathroom and five sleeping rooms, out of one of the latter of which opens a large alcove. Entering the hall from a wide veranda, the parlor is found at the right hand communicating with the sitting room in the rear and separated from it by *portières*. In the rear of the hall is the library, while beyond it and the sitting room is the dining room. This apartment communicates with the sitting room by folding doors. The kitchen is in the rear, and is provided with all the modern conveniences. In the parlor and dining room are open grates. Ascending to the second floor, it is found that the hall runs very nearly the length of the house, extending as it does from the door of the front chamber to the bathroom. The servants' chamber is in the rear, over the kitchen, communication between the two being made by rear stairs. This arrangement does away with the necessity of the servants passing through the main rooms on the first floor in order to reach the second story. It will be observed from inspection of the floor plans that the bathroom is so placed that the plumbing fixtures are in line with those on the first floor. The house is heated by steam, and with the exception of the kitchen all the rooms on the first and second floors are finished in hardwood. The floor of the hall is of oak, while in the library and dining room the border is of oak. The hall, dining room and bathroom are finished with paneled wainscoting. The house is complete in every particular and cost $6800.



Front Elevation and Section.—Scale, ⅛ Inch to the Foot.

Residence of Charles F. Bielman.—A. C. Varney & Co., Architects, Detroit, Mich.

Home Building in the South.

If there is anything within the scope of our trade journalism that has lagged behind in the general march of progress, says a writer in the Chattanooga *Tradesman*, it is in the matter of homes for the people. By homes is not meant in this connection the moral or social surroundings, but the houses—the residences of the people. Of the five primal orders of architecture, followed more or less closely in all civilized countries in the construction of public buildings, the writer is not prepared to say whether climate had anything to do with the differential details of finish of the various orders, but he is quite convinced that our homes—houses to live in, and in which to rear families—ought certainly to be constructed with an eye single to the conditions of the climate. With due deference to the opinions of modern architects it may be claimed that they have not given full appreciation to this feature of their profession in the Southern States. Take any architectural book or periodical, examine the drawings and designs for model houses, and it will be found that the same design and arrangement suitable for the bleak climate of the lake region is equally recommended for the Gulf Coast or the central South. This question is particularly pertinent now when the accumulation of wealth in a rapidly recuperating section is finding investment in permanent homes—when the decaying mansions of the lordly planters of the ante-bellum days must be rebuilt and the humble homes of the cabin dwellers replaced by modern farm houses.

Our Southern ancesters builded very wisely, with an eye single to the requirements of the climate in reference to comfort and health, with little or no regard to prescribed forms or orders of architecture. The homes of the better classes were characterized by an abundance of broad, shady porches, wide halls and commodious rooms, insuring the fullest ventilation by day during the hot season and the best safeguard against the insidious malaria at night. In such houses the minimun mortality occurred in a climate considered very unhealthy by the average actuaries and life insurance experts. The cabins of the poorest classes were built in accordance with their limited means and all provided for unlimited ventilation—but the latter feature was due more, perhaps, to lack of means and improvidence than to any sanitary intention or foresight. At any rate, they answered the purpose and gave to the South a robust and hardy yeomanry, as can be easily proven by comparing the reports of the medical departments of the two armies engaged in the war between the States.

The time is now at hand, or soon will be, when all these old residences must be replaced by new ones, and common sense

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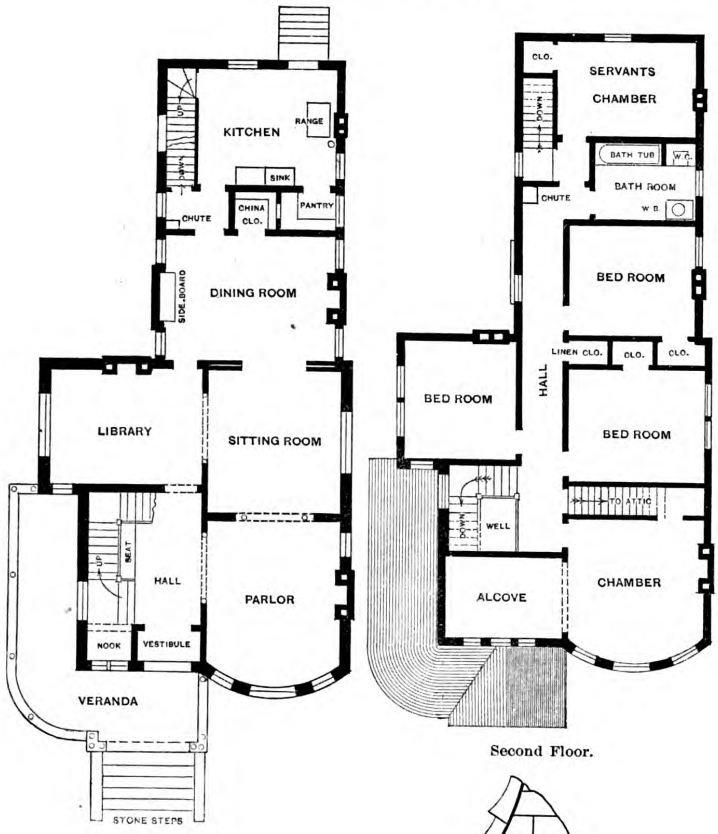
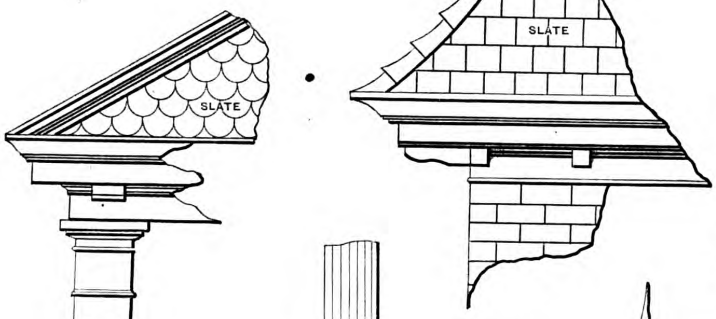
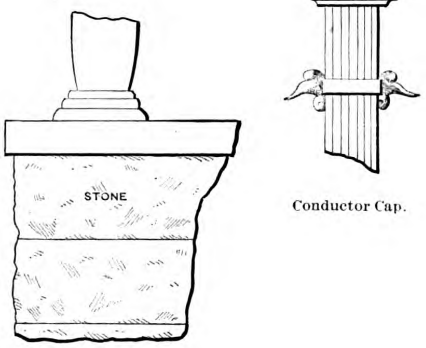


First Floor. Second Floor.



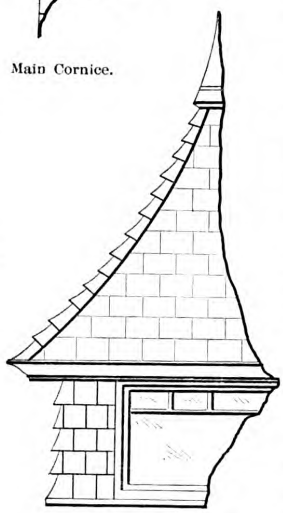
Main Cornice.



Details of Porch.



Conductor Cap.

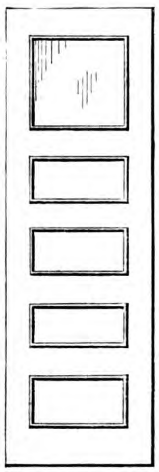


Small Dormer in Roof.

Floor Plans.—Scale, 1-16 Inch to the Foot. Details.—Scale, ¾ Inch to the Foot.

Residence of Charles F. Bielman Detroit.

teaches that the permanent abiding places—the home dwellings of the people—should be built in accordance with the requirements and the conditions of the climate. A residence perfectly adapted to the climate of the extreme northern part of the Union would be entirely unsuited for either comfort or health in the extreme southern portion. And yet we find in all the designs of modern American architects the same general plans for all sections and climates. The only adaptation apparent in them is to simply adjust the plan of the house to the amount of money to be expended in its construction. With an abundance of the cheapest and best building material of all kinds to choose from it is possible for every one intending to build a residence to arrange it in accordance with the climatic requirements and environments. What we need most in this regard is a new school of home architecture—men of original thought, who will break away



Elevation of Front Door.—Scale, ⅝ Inch to the Foot.

from the stereotyed and established designs and give us models for homes in accordance with the conditions that surround us.

IT IS STATED that during the year 1890 the three cities of New York, Brooklyn and Chicago spent over $158,000,000 in new buildings, and in New York and Brooklyn the cost of alterations amounted to $9,000,000. Permits were given in New York for the erection of 3537 buildings, at a total cost of $74,900,812, and plans were approved for alterations in 2417 buildings, at a cost of $7,188,250. In Brooklyn 2577 permits were issued for the erection of 4800 buildings, to cost $24,334,290, and for alterations in 1275 buildings, at a cost of $1,633,290. In Chicago over 50½ miles of frontage of new buildings were erected and $59,000,000 expended. This is said to be the largest amount ever spent on new buildings in one year in that city, and it is expected that preparations for the Fair will keep up the boom. New York and Brooklyn together spent nearly twice as much on new buildings as Chicago, but while the Western city spent more than in 1889, New York spent $5,000,000 less and Brooklyn $2,100,000 less. It will be some years, though, before Chicago spends as much as New York, says a local paper, and many years before she puts into iron, stone and brick as many millions as the cities of the Manhattan district.

IT IS STATED that Omaha, Neb., will soon have an apartment house built according to the Edward Bellamy idea. It will be a brick structure, four stories high, and containing 25 apartments. The plan of living in the building will be co-operative, as all the cooking will be done in one kitchen, each individual sharing his or her expense.

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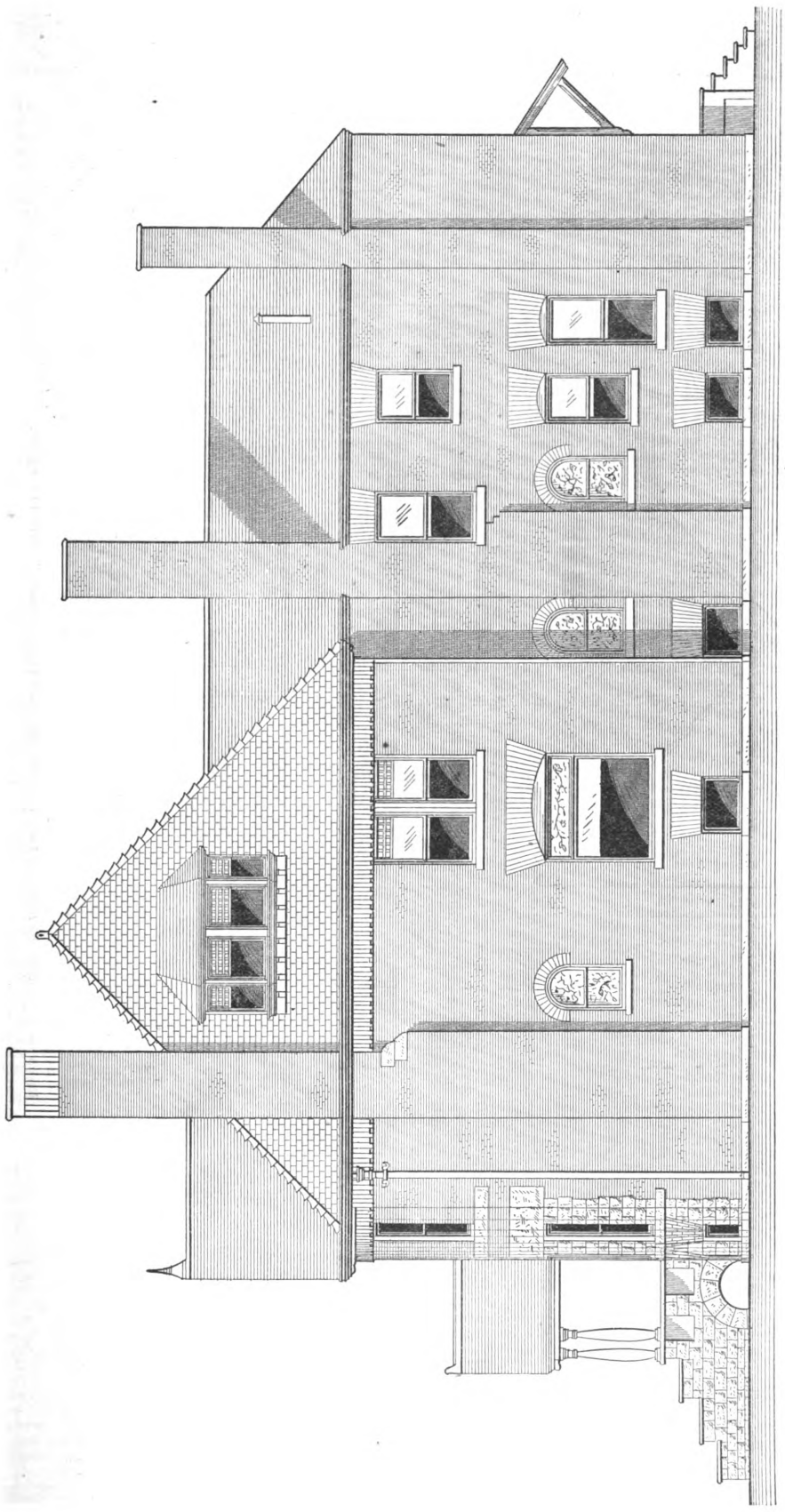

Residence of Charles F. Bielman, Detroit.—Side Elevation (Right).—Scale, ⅛ Inch to the Foot.

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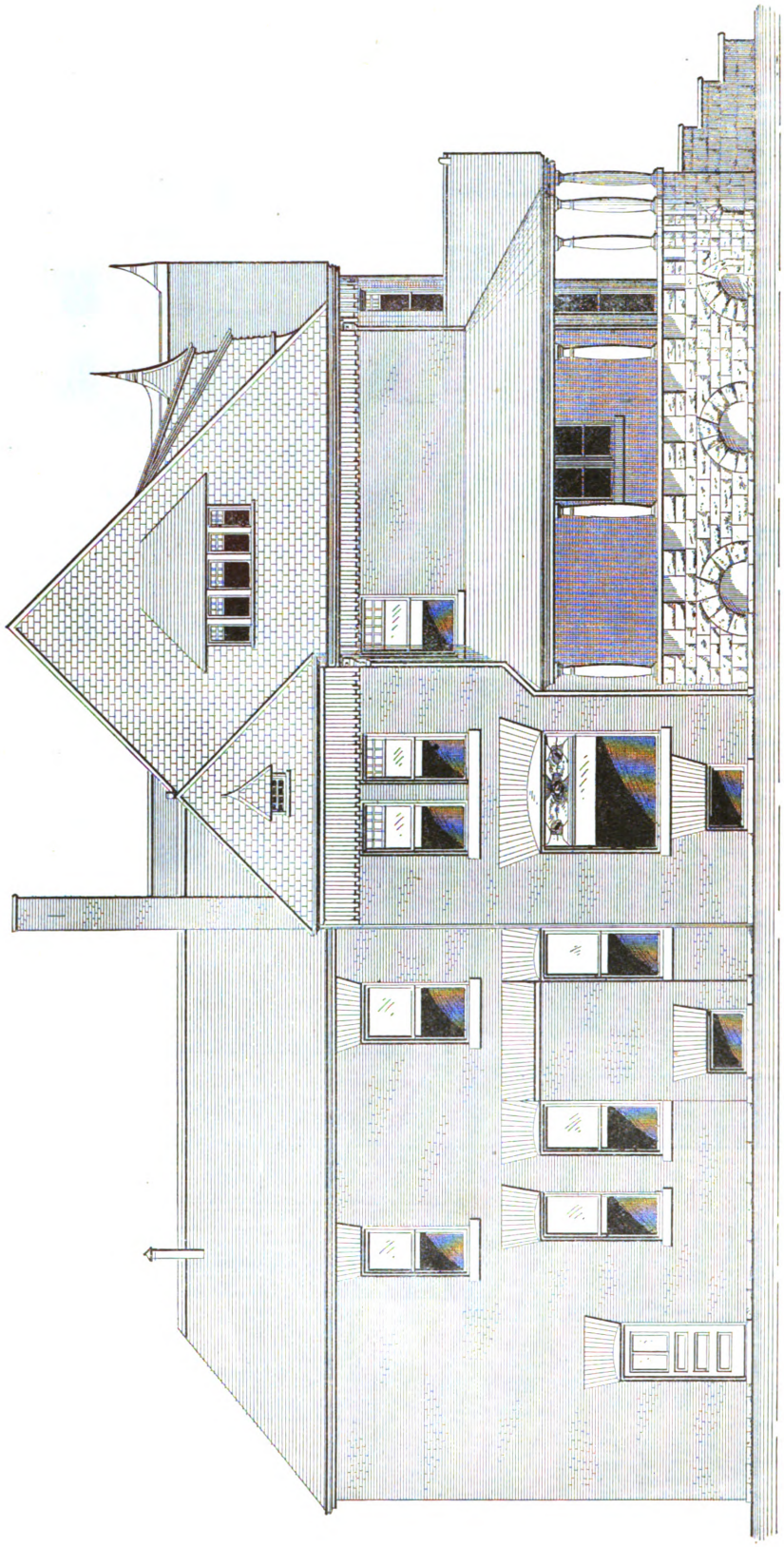

Residence of Charles F. Bielman, Detroit.—Side Elevation (Left).—Scale, ⅛ Inch to the Foot.

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LAW IN THE BUILDING TRADES.*

VARIATION FROM SPECIFICATIONS IN BUILDING CONTRACT.

WHERE A BUILDING CONTRACT specifies that the work shall be done according to the plans and specifications, which are made a part of the contract, and the contract expressly stipulates that there should be no variation from the plans and specifications without the written consent of the owner, it is a breach of the contract to substitute a certain kind and make of columns which is different from the kind called for by the contract, when it appears that the kind called for could have been procured, although it is shown that those which were used were substantially like those called for by the contract, and equally as good, and where the specifications fix the size of the columns the contractor will not be permitted to show that columns of a different size were more in accord with the contract. In a case of this kind, where the contract is in writing and in clear terms, a court should construe the contract and instruct the jury what the rights and duties of the parties are, and leave the question of compliance for the determination of the jury.—Lynch *vs.* Paris Grain and Lumber Company, Superior Court of Texas, 14 S. W. Rep., 701.

CONTRACT SUBJECT TO ACCEPTANCE.

A contractor entered into a contract by the terms of which his work was to be accepted by the architect before payment was to be made. He sublet the contract on the same terms and upon completion the work was rejected. It was then reconstructed by another sub-contractor and accepted. The sub-contractor for the first work was paid and the second was not. No lien having been filed by the second sub-contractor, the contractor is entitled to judgment, and it is no defense to such an action that the second sub-contractor had already recovered judgment against the owner in an action to which the principal contractor was not a party.—Griffith *vs.* Happersberger, Supreme Court of California, 25 Pac. Rep., 137.

CONSIDERATION FOR CONTRACT FOR EXTRA WORK.

Every contract must rest upon and give a sufficient consideration, and a promise by a building contractor to put another coat of oil on the inside of a house, made after he had fully complied with his contract, and without any additional consideration, is a mere gratuity, and his failure to put on the additional coat will not preclude him from recovering the full amount due under contract.—Widiman *vs.* Brown, Supreme Court of Michigan, 47 N. W. Rep., 231.

TIME FOR FILING MECHANICS' LIEN—LIENABLE ARTICLES.

The time limited by law for filing a notice of lien does not commence to run until the liability of the contractor terminates, and where for two weeks after the work itself is actually completed the contractor is engaged in removing materials wrongfully placed upon the land of another, which work was insisted upon by the owner before he would accept the contract as completed, the time for filing lien does not commence to run until the completion of such removal. Where articles are included in the claim for lien for which the law allows no lien, on the trial the lienor will be allowed to segregate the non-lienable articles, and upon proof of the value of the lienable materials, assert a lien for them.—Gordon Hardware Company *vs.* San Francisco & S. Ry. Co., Supreme Court of California, 25 Pac. Rep., 125.

PRIORITY OF MECHANICS' LIEN OVER VENDERS' LIEN.

Where a purchaser of real estate takes possession of it before the delivery of the deed, and with the full knowledge of the sellers causes improvements to be made thereon without objection by the latter, and without notice by the latter to the contractors and material men of their claim of title, the lien of the material men and contractors is superior to the venders' lien for purchase price, and will be enforced as against the sellers as well as the purchaser.—Leonard *vs.* Cook, Court of Chancery of New Jersey, 20 At. Rep., 855.

REQUISITES OF NOTICE FOR MECHANICS' LIEN.

Where the mechanics' lien statute requires the person claiming a lien to state in his claim therefor the name of the person to whom he furnished the materials, one who furnishes the materials to the contractor, and after his assignment to his assignee, need not specify how much was furnished to each, as all that both received were taken under one contract, and the assignee only took what he did as a successor in interest to the contractor. The fact that the notice claims for more lumber than was furnished, or claims more than what was furnished was actually worth, will not defeat recovery for the amount proved, unless it appears that such excess of claim was fraudulent.—Harmon *vs.* San Francisco & S. Ry. Co., Supreme Court of California, 15 Pac. Rep., 124.

CONSTRUCTION OF SPECIFICATIONS.

Where a contract in writing, whereby a contractor agreed with an owner to do certain work on certain houses agreebly to specifications signed by the parties and annexed to the contract, and to provide such good, proper and sufficient materials as shall be proper and sufficient for completing all said work on the buildings mentioned in the specification, was executed, there was annexed thereto a letter signed by the contractor showing the kind and quality of material to be used, and how they were to be applied. Under the circumstances such a letter was a "specification," within the meaning of the contract, and became part of the contract which was to be construed therewith.—McGeragle *vs.* Broemel, Supreme Court of New Jersey, 20 At. Rep., 857.

SUBMISSION OF PLANS BY ARCHITECT FOR COMPETITIVE AWARD.

An association invited architects to submit designs for a building to cost not to exceed $400,000. Of the designs submitted, the seven deemed most meritorious were to be accepted and awarded $500 each, except the one selected as the best of all, the designer of which was to be engaged as architect and superintendent. The directors selected seven from the designs submitted, and invited the architects to explain their plans. Plaintiff offered his bond that his plan would not cost over $400,000. The directors resolved to select the favorite plan by ballot, with "the understanding that the plan shall be so modified or changed as to suit the wishes of this board, and to cost not to exceed $400,000." The vote resulted in the selection of the plaintiff's plans. Plaintiff was selected as architect, to become so in fact when his amended plans and "the contract and bond under which this building is to be erected" were approved by the board. The alterations desired added to the cost of the building, and the plaintiff demanded that the limit be fixed at $425,000. After much negotiation he notified the board that, unless this concession could be made, he declined entering into the proposed contract. The board then employed another architect, who made new plans. The selection of plaintiff's designs was conditional only, and did not entitle him to be employed as architect of the building, and there was evidence that he had waived the right to have a selection made in accordance with the terms on which the competition was invited. The association, having tendered the plaintiff the award of $500, became the owner of his plans, and entitled to use them, and evidence of similarity between the building erected and plaintiff's design is of no value.—Walsh *vs.* St. Louis Exposition and Music Hall Association, Supreme Court of Missouri, 14 S. W. Rep., 722.

MECHANICS' LIEN FOR UNAUTHORIZED IMPROVEMENTS.

The mechanics' lien law makes ample provision for the protection of property from encumbrance by lien for unauthorized improvements, and the establishment of a lien, by a material man, on both the land and building, cannot be barred by the defense that the building was erected by tenants under an agreement that it could be removed by them at the end of the term, unless notice of such agreement was brought home to the lienor before his contract was completed.—West Coast Lumber Company *vs.* Apfield, Supreme Court of California, 24 Pac. Rep., 993.

LIENS IN FAVOR OF CORPORATIONS—ERRONEOUS IN CLAIM

Where the mechanics' lien statute gives a lien to persons but not to corporations, the benefit of its provisions will nevertheless be extended to commercial corporations furnishing materials or labor. Where the statute provides that the statement for lien must show the amount of the demand, less all just credits and offsets, a statement of an amount slightly in excess of the amount proved will not invalidate the lien, if the overcharge appears to have resulted from inadvertence and not through attempt to fraud.—Gaskell *vs.* Beard, Supreme Court of New York, 11 N. Y. Supp., 399.

VERIFICATION OF STATEMENT FOR LIEN.

Where the statute regarding mechanics' liens provides that the statement for lien shall be verified, and that it shall contain a statement of the time at which the materials were furnished and the work was done, a verification which does certifiy that the dates set forth in the statement are the correct dates is not a sufficient verification, and a lien based upon it is defective.—McDonald *vs.* Rosengarten, Supreme Court of Illinois, 25 N. E. Rep., 428.

PREVENTING BREACH OF CONTRACT FOR PERSONAL SERVICES.

Where an employee has not covenanted that he will not enter the employ of a rival business concern, the mere fact that he is familiar with the business and customers of his employer, which familiarity will be of special value to the business competitors of his employer, will not justify a court in issuing an order preventing him from entering the employment of such rival. The breach of a contract for personal services will not be restrained by injunction where the services are of such a nature that any one of ordinary intelligence can perform them, and where if there is any damage from its breach, adequate remedy is provided by an action at law for the recovery of damages.—Wm. Rogers Mfg. Co. *vs.* Rogers, Supreme Court of Errors of Connecticut, 20 At. Rep., 467.

LIEN FOR CONTRACT AMOUNT LESS DAMAGES—PRIORITY.

If a building is not constructed according to contract, the owner is entitled to offset any damages he may have sustained thereby, and the lien attaches for the amount actually due after deducting such damages. Where the purchaser of real estate takes it under a contract of sale

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containing a stipulation that he shall construct a building upon the premises, and erects a building thereon, the laborer or material man is entitled to a lien against the property superior to the lien of the vender.—Millsap *vs.* Ball, Supreme Court of Nebraska, 46 N. W. Rep., 1125.

The Ridiculous in Furniture.

The carvings are most queer and droll
  On modern furniture,
In bird and beast and vine and scroll
  The artist to allure.

We see the arms of Rhoderick Dhu,
  His lance, his axe, and all,
Artistically worked into
  The hat-stand in the hall.

Upon the sideboard, grim and fierce,
  With mighty wings outspread,
A glass-eyed eagle seems to pierce
  The gaslight overhead.

Why won't the dealers try to mark
  Relationships with care,
And carve the albatross or shark
  Upon the steamer chair?

Upon the kitchen things might blend
  The goose and turkey sweet;
The black piano legs might end
  In Richard Wagner's feet.

But if they won't accept the view
  Suggested in these rhymes,
They might display a leaning to
  The things that rule the times.

They might construct the airy stand
  On which we hang our hats,
To look imposing in a grand
  Array of baseball bats.

And then the great, big easy chair,
  That every dreamer loves,
Upon its arm ends e'er should wear
  A pair of boxing gloves.

The racket of lacrosse, the free-
  Kicked football of the green,
The dumb-bell, oar and club should be
  Conspicuously seen.

Instead of dragons, hippogriffs,
  And beasts from foreign lands,
And empty, gilded hieroglyphs
  That no one understands.

Oh, let our furniture, above
  All hollow styles that rage,
Mark the athletic spirit of
  This great athletic age!

—*Exchange.*



A steady carpenter wants a steady job.



IS HANDY

at building anything, from air castles to soap boxes, and in a varied experience of twenty years has made everything—but a competency.



BEGAN LIFE AS A VILLAGE JOINER.

For a period of five years was



ENGAGED ON CONTRACT WORK.

His specialty, however, is



INSIDE WORK.

Address,
"Joist," Whirled Office.

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MASONRY AND STONE CUTTING.*

CUPOLA INTERSECTED BY FOUR ARCHES NARROWER THAN ITS SPAN.

THE ARCHES are here separated by pendentives, as in the former case treated in our twentieth lesson ; but the pendentives are no more terminated below by an acute angle. The pendentives are spherical quadrilaterals projected on plan as in B C Z Y, Fig. 127, and on elevation in B' C' Z' Y', Fig. 128. Such is the shape, among others, of the pendentives which support the cupola of St. Peter's at Rome. The pier below the pendentive may be circular on plan, on it may be a plane stretching from B to C. In the latter case the discrepancy between the circular springing line of the pendentive and the plane of the pier is hidden by an impost molding usually placed at that level.

In determining the jointing of the cupola and the arch, we must in this case take care that the first joint L' of the arch be well below the first bed joint of the cupola. We have added a ring or cross rib to mark and strengthen the connection between the cupola and the barrel vault by which it is penetrated. The ring is made in one piece with the arch stones above, as is seen in Fig. 129, where a perspective view of the springer is given. This springer is so large that it is usually composed of several stones, as shown in plan and elevation, Figs. 127 and 128.

In our drawing we leave the cupola with an opening above and through which the building may receive its light. Sometimes the cupola which springs from the same level as the arches is stopped at the level Y' Z , Fig. 128, of the crown of the arches, and then from that level another cupola, with its center at the level of Y', is produced ; such is the case of St. Sophia at Constantinople. A cornice is then run round at the level of the crown of the arches to separate the surface of the hemspherical cupola from the pendentives.

* Continued from page 44, February issue.

Lastly, the pendentives are made to support a cylindrical tower, which is roofed by a cupola or dome. All these arrangements do not give rise to anything new in the way of setting out the masonry.

We may also notice that the number of pendentives to be placed round a cupola may be greater than four; and also that pendentives may be made to support elliptical domes over elongated rectangles, as may be seen in the arcade under the town hall of Aosta.

We shall now study the construction of pendentives over an octagonal space, in which an entirely new principle of surface formation is introduced, Figs. 130, 131, and we will let the pendentives support a circular tower.

Let A B C D E F G H A be the base of our structure, Fig. 130, in which the lines B C, D E, F G, H A are splayed angles, while A B, C D, E F, G H are open arches. Over these is a circular tower, starting from the circle V X Y Z, Fig. 130, X' Y' Z', Fig. 131. Now we have to fill in the quadrilateral spaces, such as B Y Z C, by a proper surface, which will be limited exactly by this outline, as we wish to avoid all such artifices as the hiding of a defective connection of surfaces by the interposition of a molding.

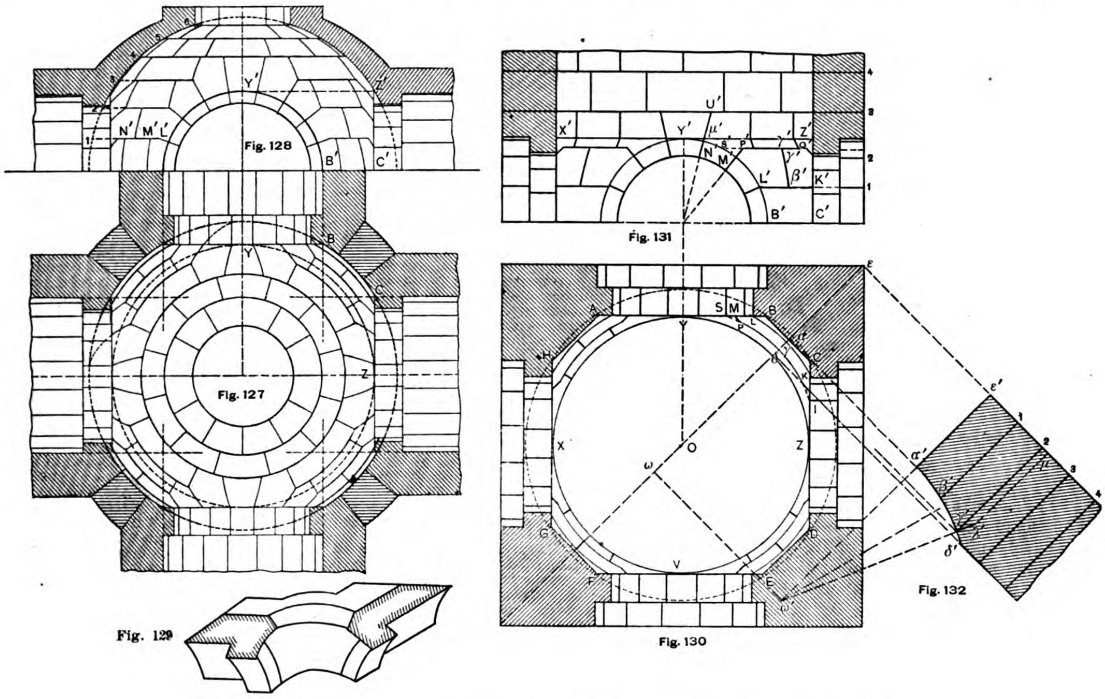
To do this we produce a vertical plane, Oa ε, cutting the center of the pier B C, and we draw the section of the pedentive by that plane in Fig. 132. We first mark the point (δ δ') where the vertical plane cuts the horizontal circle which forms the base of the round tower. Then through a' and δ' we produce an arc of a circle, the center ω' of which is at the level of the springing line of the pendentive. This done, we produce the surface of the pendentive by sliding up and down a variable horizontal circle bound to touch the arc a' δ' and the outlines of the two circular arches. To draw a generator of the surface, we have only to produce a plane 2 S', Fig. 131, or 2 γ', Fig. 132, and mark on the plan the points S γ T where the plane cuts the directing curves of the surface. Through the points S γ T produce an arc of a circle ; it will be the generator required. In the same way we produce the generator L β K, and when the generator is taken at the level of the springing it becomes a straight line, B C.

To simplify the work the lower bed joints are often made horizontal as I K', Fig. 131, and I β', Fig. 132. The second joint of the arch will cut the surface of the pendentive along a curve M P, easily determined by a series of horizontal sections. The third joint will cut the pendentive along the curve N' u', Fig. 131, and then the cylindrical face of the tower along another curve from u' to U'. This last curve is an arc of a very elongated ellipse.

As to the horizontal bed joint P' Q' of the pendentive, it would be a very laborious problem to make it everywhere perfectly normal to the face of the vault. The operations would resemble those given in article relating to the elliptical dome. Masons employ the following practical system, which is sufficiently near, although not perfectly correct. They form the surface of the joint as that of a cone with its apex in ω, the center of the section a' δ', Fig. 132. We have to find the line of intersection of the surface of the conical joint γ' λ', Fig. 132, with the upper plane λ' μ', Fig. 132, of the stone; and guided by this last line and the joint line on the soffit of the vault, we can cut this bed joint exactly in the same way as in any ordinary cupola.

To work the soffit of the stone on the pendentive, three guiding lines at least are required : they will be the edge of the upper bed joint, the edge of the lower bed joint and an intermediate horizontal section. In this kind of work a great deal is left to the correctness of the eye of the workman, as we have already seen, when working the soffit of the St. Anthony vault and the elliptical dome, models of which, executed by the pupils, can be seen at the City and Guilds of London Institute, Exhibition Road, S. W.

(To be continued.)



Masonry and Stone Cutting.—Figs. 127 to 132 Inclusive.—Cupola Intersected by Arches.

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The Builders' Exchange

CONDUCTED BY WM. H. SAYWARD, SECRETARY OF THE NATIONAL ASSOCIATION.

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Wilmington, Del.....A. L. JOHNSON.
Worcester, Mass.....H. W. EDDY.

The Fifth Annual Convention of the National Association of Builders.

The fifth annual convention of the National Association of Builders has been held and is a thing of the past. As a most perfect expression of the increasing importance of association and the ever-increasing appreciation of its utility and possibilities, it is pertinent to state at the outset of this condensed outline of its proceedings that the result has been most highly satisfactory to all who think upon the subjects within its jurisdiction.

Five years only have passed since the inception of this association, and already its influence as a mighty power for good is felt all over the world. Considering in this connection the countless years that have passed whose only record is the accumulation of an endless number of wrong practices, which through neglect upon the part of those most vitally interested have become customs and have prevailed as such, the five years' work of the National Association is truly remarkable for the wonderful progress which it marks.

Builders in all the many branches of the business have apparently awakened to the fact that they have been enduring adverse conditions in the conduct of their affairs which were totally unnecessary, and which are only in existence through lack of concerted action upon their own part, looking toward correction and improvement. The gathering together in annual meeting of the best elements of the various filial exchanges, representing such widely diverse interests as they do, has produced a condition of things which has compelled the builder to recognize the fact that these wrong conditions are capable of elimination, or at least correction, and the purpose of the National Association is clearly demonstrated in the work they are doing.

MONDAY MORNING.

The convention was called to order at 10.30 o'clock on the morning of Monday, February 9, with President Tucker in the chair, and the proceedings were opened with a very eloquent prayer by Rev. Talbot W. Chambers, D.D.

President Tucker expressed his regret that absence from the city prevented an address of welcome by the Mayor, Hugh J. Grant, hence that ceremony was waived, and the president proceeded with his address.

The President's Address.

Gentlemen of the Convention: It affords me great pleasure, on behalf of the Mechanics' and Traders' Exchange of New York, to welcome you on this occasion, the fifth annual convention of the National Association of Builders, and to extend to you the hospitalities of our city.

Although our association is but a youth, I know you all feel as I do, in looking back over its history, that the time has been well spent and we may be proud of the fruit that has been borne.

Five years ago the acquaintanceship and knowledge possessed by the building fraternity of those engaged in like pursuits and what they were doing in our sister cities was very limited, and if nothing more had been done than to bring together these representatives from all parts of this broad land and enable us to form new ties of friendship, a grand work would have been accomplished and well repaid us for our labors.

Our inactivity, or, rather, lack of concerted action, had permitted many abuses to creep into our business methods and affairs. After organization, among the first things to attract attention was the question of "contracts," and how could the interests of all parties to the same be equally protected.

A committee was appointed from our body who met in conference with one from the Institute of Architects, and the result of their deliberation is found in the uniform contract, which, while not perfection, is in every way superior to that which existed previously, and has been very generally adopted throughout the country.

APPRENTICESHIP QUESTION.

The next important question to arouse discussion was that of "apprenticeship," and how to train our young men to become superior mechanics.

The trade school has been the answer, and it will be the pleasant duty of the Entertainment Committee this afternoon to show you what is being accomplished in this city by one of our philanthropic citizens at his own expense, Col. R. T. Auchmuty.

While New York has her Auchmuty, Philadelphia her Williamson, Brooklyn her Pratt, and other cities whole-souled, generous-hearted men who are carefully looking into this subject, the real ones behind the movement should be the exchanges themselves, and I hope and believe that before many years pass by we shall find in every city a thorough and efficient trade school in operation, under the direction and guidance of the exchange of that city.

Philadelphia is the first in the field, and the success of the undertaking has been far greater than the most sanguine looked for. Let us hope that in the coming year others will be added to the list.

We have under discussion other questions of great importance to this body, and what has been accomplished will be told in the reports of the committees in charge of them.

At our last convention it was decided that it would be beneficial to hold a mid-year meeting of the directors, so that the results of the labors could be more fully discussed and presented than seemed possible by correspondence. This meeting was held, and more than met the anticipation of its advocates, and I think you will decide, after hearing how much value was attached to the result obtained, that it should hereafter be a feature in the movements of the association.

Our association is not intended to be anything more than advisory. The real work must be done by the exchanges themselves. Our main object is to bring troublesome questions under consideration and discussion by many instead of a few, and under the light of thorough investigation, through the friction of many minds, evolve that which is beneficial and good, and eradicate all that is injurious and hurtful to our interests as mechanics and men.

For many years the mechanic, as a member of the community, has not received the consideration that he was entitled to, but we are growing in knowledge of ourselves and each other, and with patient forbearance will ultimately reach the position that is rightfully ours.

CORRECTING ABUSES.

I can conceive how we can retard our progress through a blindness to the fact that we have too long neglected our duty in correcting abuses which have become grounded in habit and practice. We must avoid doing and resolving to do things which we are unable to carry out, as failure would only result in ridicule; and also we must be careful not to expect too much until we have so fortified ourselves as to enable us not only to assert our rights, but to maintain them.

In municipal affairs, the knowledge and experience acquired by years of application to our industries should accrue to the advantage of the community and be at their disposal. Has it been so? No! Others incapable, as far as practical knowledge was concerned, have been selected to fill the place that rightfully belonged to the mechanic.

This condition, I am pleased to say, is to some extent changing, and to no small degree it is due to the National Association.

Association or consolidation is the spirit of the hour. We hear of it not only in all parts of our country, but also from abroad. Much can be accomplished by combined, while individual effort would only be wasted. Such an association is ours—and for consolidated action, not for the purpose of forcing a weaker neighbor to the wall, and so absorb all he has, under the principle that might makes right; that sentiment belong to a past age, but an association of brains and interests, where the strong can help his weaker brother, where the timid and struggling may turn for assistance and feel assured of receiving it; where an injury to one would not be tolerated, as it would be a menace to all. That is our association; that spirit in which it had its birth and is its ruling sentiment to-day.

The appreciation of that feeling is evinced by the active interest taken in cities where exchanges have not existed up to this time. The advantages to be derived from such association and organization are too apparent to be longer neglected, and as you will hear from our secretary, the exchange feeling is growing in every direction, not only in the formation of new exchanges, but in the infusion of new life and spirit among the old.

There are many questions of most lively interest to the building trades that require careful consideration and prompt action.

Of the numbers actively engaged in the various branches we have no reliable knowledge, and the monetary value of our productions is in about the same condition.

Some time since a publication in this city made an effort to secure the statistics of the building trades in the various cities of the country, and was compelled to abandon the project, as the facts were not obtainable, the records in most cities being so incomplete that they were worthless.

This is a matter that each exchange should move in at once, and endeavor to have these facts accurately recorded.

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CORPORATION ORDINANCES.

Another matter is that of corporation ordinances, particularly those affecting building interests. Too frequently they are carelessly drawn up, and by parties unfamiliar with the needs and requirements of those they affect, and more than that, after these ordinances are perfected, their enforcement should be placed in the hands of a practical and competent man, and not some political favorite, who, although wishing to be just and equitable to all, from lack of knowledge is incapable of properly protecting the interests as intended.

These matters, however, do not belong to the National Association, they are purely local and the affiliated bodies must act independently; but discussion will more rapidly secure the result we are all so desirous of obtaining.

There is another question that does belong to this national body, and although it may be premature to present it at this time, it is surely coming, and we must meet it.

It is: How can we influence and unite the interests of our vast army of employees with our own as employers?

Shall the means be found in a system of profit sharing? By a system of pensioning when age or disability prevents further labor? Or what?

It is a question that requires great thought and most deliberate action, as it affects not only ourselves, but this great land. And when the time does come that action must be taken, I feel assured that the decision of this association will be such that not only may we be proud of our connection with it, but be able to say that the builders were the first great body to act in this all-important and far-reaching movement.

Never in our history has the future been more bright. The most encouraging reports come in from all directions, and I will say that if we continue in the work as we have done during the past year results will be realized that a short time since were but a dream.

In conclusion let me repeat that the prime object of these conventions is discussion, and in order to have the most thorough and exhaustive knowledge of the subject under debate I would ask that as many as possible of the delegates express their opinions, so that we may arrive at the best conclusions.

The work before us is important, and I know it will receive your thoughtful consideration.

The remainder of the morning was devoted to numerous necessary announcements by the secretary, relating to the presentation of credentials, the visit to Colonel Auchmuty's New York Trade Schools, the distribution of the badges presented by the Mechanics' and Traders' Exchange and other matters of similar nature, including the reading of many cordial invitations from various sources, all looking toward instructing and entertaining the delegates.

MONDAY AFTERNOON.

The first business of the afternoon was the report of the Committee on Credentials, which showed the following representation from cities named: Baltimore, 4; Boston, 7; Buffalo, 3; Chicago, 13; Cincinnati, 4; Cleveland, 4; Denver, 3; Detroit, 3; Grand Rapids, 2; Indianapolis, 3; Kansas City, 5; Louisville, 2; Lowell, 3; Lynn, Mass., 2; Milwaukee, 3; Minneapolis, 3; New York, 8; Omaha, 3; Philadelphia, 7; Portland, 3; Providence, 3; Pittsburgh, 4; Peoria, 2; Pueblo, 1; Rochester, 3; Saginaw, 2; St. Joseph, 3; San Francisco, 1; St. Louis, 7; St. Paul, 4; Sioux City, 2; Syracuse, 3; Washington, 4; Wilmington, 3; Worcester, 3. Total exchanges, 35; total of delegates, 129.

The number of delegates given is exclusive of alternates and visitors, which being included swell the number drawn together by the convention to nearly 450, beside about 50 ladies.

Next in order was the presentation of the badges, which were of silver and bronze, distinguishing the delegates from the alternates and visitors. The design was particularly neat and tasteful. The obverse side of the medal, which was suspended from a bar by a yellow ribbon, showed an arm and hammer surrounded by the words "National Association of Builders." The reverse side held the words "Mechanics' and Traders' Exchange" surrounding the words "New York" in very pretty design. The beauty of the badges was in perfect harmony with the rest of the entertainment offered the convention by its generous host.

The officers of the association were each presented with a beautiful gold medal of similar design, with the name of their office inscribed upon the bar from which the medal was suspended.

The badges being distributed, the convention adjourned to meet the next morning.

New York Trade Schools.

Upon leaving the building the delegates found coaches in waiting, which carried them to the New York Trade Schools, at Sixty-seventh street and First avenue, where they were cordially welcomed by Col. R. T. Auchmuty, the founder of the schools. In addressing the visitors he said:

Gentlemen: It gives me pleasure to welcome you to the New York Trade Schools. Your presence here shows that you are aware of the importance of training our young countrymen so that they can make their labor of value. You have seen to-day how these trade schools are conducted, and the class of young men who come to them. On Friday next the delegates to this convention of master builders will see the trade school of the Philadelphia Builders' Exchange, and I wish then that the delegates who are strangers here could find time to visit the trade school attached to the Pratt Institute in Brooklyn.

So widespread is the desire to learn a trade, and to learn it well, that there are young men now in this building from 23 different States, from Nova Scotia and from Montreal. The total attendance at this school is 589, 176 young men being in the day classes and 413 in the evening classes.

How much can be learned here may be seen in this room, the brickwork, stonework, woodwork and the painting of which were done by youthful hands who, a few months before, did not know how to handle a trowel, a chisel, a saw or a brush. Here are 14 houses, the walls of which were built by the graduates of the bricklaying class. I think any mason builder would say that the work of those young bricklayers is better than the average contract work, and I can say that, like the builders of old described by the poet, those young men wrought with greatest care both the seen and the unseen.

Much of the success of these schools is owing to the trade school committees appointed by some of the associations of master mechanics and to the newspapers. The trade school committees have given time and thought to make the instruction thorough, with no other reward than that which comes from smoothing the path of the young. The trade school committee of the Master Plumbers Association were 14 hours last spring in examining the day plumbing class, and nearly as long in examining the evening class—no small amount of time for busy men to give. The other trade school committees had smaller classes to deal with, but they did their work no less thoroughly.

The newspapers have called attention to the importance of bringing young Americans into the trades, and have commended this and every effort that has been made to do so. The solution of the labor question is in education. The trade school allows a young man to remain at school until 18 years of age, to get a high-school education, and yet not be too old to learn a trade, while the custom heretofore has been to take a lad from school at 16 or even younger, at just the age he should be there, in order that he might spend four or five years at taking up his trade and doing the drudgery of the workshop. I hope to live to see the day when trade schools will be established in every city of the United States [applause], when the mechanic arts, as well as law, medicine, engineering and mining will be taught in our colleges, and when the apprentice rules recommended by this association, in which ability alone is made the test of admission to a trade, will be adopted not only in the building trades, but in all trades.

Gentlemen, I take pleasure in introducing one who has been a warm friend of these schools from the first day they were open. I will introduce Bishop Potter.

BISHOP POTTER'S ADDRESS.

When the applause which followed the remarks of Colonel Auchmuty had subsided, the Rt. Rev. Henry C. Potter, D.D., stepped forward and spoke as follows:

Gentlemen of the Builders' Association: I think that the humor of the situation must be apparent to you as it is to me. The gentlemen of the press on my right have asked me with that fine sarcasm which is characteristic of the modern newspaper whether I am here this afternoon to speak to you because of my technical knowledge; and I am reminded of the man who was picked up in the gutter very drunk one night, to whom somebody said, "I thought you lectured on temperance?" "No," said he, "I am the frightful example." [Laughter]. Certainly, gentlemen, when it comes to a technical knowledge of building, I should be a frightful example of ignorance. And yet, singularly enough, there is a very close analogy between the calling which I follow and yours. The word "clerk," which describes in our American language one whose business is to write or make entries in a book, has a much older meaning. A clerk in the old English usage of the word was an ecclesiastic—a clergyman, and all ecclesiastics were clerks, because in the day when the two terms were interchangeable the ecclesiastics were the only learned people; in other words, to read and to write and to cipher was for a long time the almost exclusive privilege of clergymen. Clergymen, in those days, were the teachers of other men, and the knowledge of letters that men had they had because they got it from the parson.

But a time came when the parson ceased to teach a man to be an all-round man. He could teach him the catechism, he could teach him to read the history of his time, and also he could teach him one or two rudiments of science, and that was all. Then there came to pass, what? Why, because the teaching of the parson or the clerk was so narrow and circumscribed, there came to pass the school, the college, the university, in which men were taught not alone what the parson could teach them, but everything the widening area of knowledge made possible to human enlightenment.

MASTER AND APPRENTICE.

Gentlemen, it seems to me that old situation, out of which we have gotten the better situation of to-day, is precisely analogous to that which has produced this school and the work which is being done within these walls. Once, in other words, there was the master and the apprentice—the master living under the roof with the apprentice, the apprentice sitting at the master's table, and a member in all respects of his family, and usually, when he could do it, marrying his daughter [laughter]. I don't know but that that last feature occurs sometimes now, but certainly in other respects the old relation has entirely ceased to be. Under conditions which I need not describe here, the gentlemen of this association know better than I that any such relation between the master and apprentice has become impossible. The apprentice, so far as he exists at all, is a boy or a youth employed in the first place to be a helper to facilitate the accomplishment or achievement of somebody else, who is principally concerned not to teach the boy or the young man, but to get the best work done within a specified time—the shortest possible time—and to make the best profits he can in disposing of it. Now and then there are undoubtedly conditions where a large-hearted and generous nature makes out of the helper under conditions like that something more than a mere assistant to fetch and carry tools or mortar or brick or something else and allows out of its own fuller knowledge to run into the younger and more ignorant life that which shall educate it for skilled labor; but I think that you will agree with me that the opportunities for such enlightenment as that are very imperfect, that they must be extended over a very large space, and that labor as it exists and as it is organized to-day may be said distinctly not to be existing and organized on the part of those who are skilled laborers for any educational purpose. Isn't that so? [Applause.] Very well; if it is so, what are you going to do with the boy or the young man who wants to learn a trade? How are you going to supply the want but precisely in the way in which our fathers supplied the want when they made first of all the public schools of England and Scotland and Ireland, when they made the universities of the Continent, and when, one by one, they enlarged the area of the influence of those great schools of learning by bringing within their penumbra one and another and

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another of the modern sciences. It is precisely so, it seems to me, that we must deal with the problem of learning and with the question of a skilled hand in the matter of those who are to exercise a trade in this land in view of the present situation; and verily, gentlemen, there could be no nobler opportunity than exists in our America to-day.

THE BUILDING PERIOD.

There comes in the history of a new country a period when it builds, as our fathers—yours and mine—in the East and in the West builded, for the moment; when it builds a log house or a wooden house, a clapboard house or something of that temporary sort, which is the habitat of a new people, in which those of narrow means begin to live and toil and accumulate. But then there comes a day, which has come here in our New York, in Philadelphia, in the great seaboard cities, in the great and magnificent cities of the West, which, when I saw them last winter, some of them, like Denver, for the first time, made me say when I came back to New York here, and somebody said to me: "Well, what do you think of the West?" "This," I said, "I have made up my mind to make the best terms with the West that I can." [Laughter and applause.] That wonderful newer America, in splendors of architecture, in Denver and in Chicago and in other great cities, is illustrating to us that genius, especially of domestic architecture, which has already won recognition on the other side of the Atlantic, and which, as I profoundly believe, is to be followed by illustrations of the genius of scientific and of commercial architecture which are to dot this broad land with the noblest achievements in the way of construction which the world has yet beheld. [Applause.] Ah, my brothers, you are the builders whose great privilege is that which, you remember, Adam Garth commemorates in "Middlemarch" when his master has sent to him his commission as steward of a great estate, and when Adam, reading it over, says: "I would rather have it than a fortune." You have the privilege of getting a bit of land into good fettle, as they say. You have the privilege of being able to build on this great estate homes of men, so that they who come after shall be the better for the integrity and the permanence with which we have built. "Ah," says Adam, "what a calling it is." That, gentlemen, is your calling.

Now, then, in the achievement of what you are called upon to do, how shall you give the best chance to the younger men who to-day here in New York, everywhere, are trying to find something to do? You know what young men are doomed to do in most of our great cities. We find them going into counting rooms, we find them standing behind counters, where I confess I believe most always I should rather see and enjoy the courtesy of a woman; we find them doing a great many tasks to which I believe feminine talent and aptitude are far better adapted. Why? Because under the present condition of things as it exists in America the avenues which open to them in the direction of the employment of the human hand are so largely closed. How many apprentices shall be engaged in this or that or the other trade depends purely upon the arbitrary association of those who are organized for purposes of self-protection, in which, unfortunately, the element of personal interest obscures the larger interest of the whole.

Let me not be misunderstood, and I won't be, gentlemen. I have no word to say against the right and the righteousness of the organization of labor. My only regret is that there isn't something answering to it among preachers [laughter and applause] to protect the parson from the salary of a country minister. But I deny anybody's right to deny to me the privilege to take this God-giving instrument [holding up his hand] and do with it the finest possible work in any direction of construction which my taste or my genius, if I have it, happened to draw me [applause]; and I believe profoundly that this America of ours would be a happier and a better land in a multitude of ways if its native talent were employed, as it is to-day so little, far more largely in what I might call constructive work.

MANUAL TRAINING.

But what is the history of all the finer work in carpentering, in wrought iron, in wrought brass, in what may be called the higher grades of the mechanic arts to-day? Why, it is that they are simply the result either of imported labor or of imported laborers. It is not our own work; and admirable and beautiful as a great deal of it is, the glory of it belongs to others. Well, let us go a step further. How does it come to pass that work as good as this is done to-day by these gentlemen who come to us from beyond the sea? Ah, gentlemen, the answer to that question is to be found in those great schools which dot Germany and France to-day, and in which those elder nations have recognized the wisdom of training both the brain, the eye and the hand of the young men who are educated there. Until we meet them with equal training, until we make our system of manual education as good as our glorious common school system, until something more than merely individual enterprise repeats the noble result which you have seen here to-day, believe me, gentlemen, American enterprise will languish and drag in the rear. You and I believe that, with our native gifts, it is entitled to walk in the front [applause]. Forgive me if I say with the utmost frankness that whether it shall or not depends largely upon the decision of the men who are within these four walls this afternoon [applause] If you determine resolutely to commit yourselves to the cause of educated handicrafts, if you determine that the apprentice trained within these walls, or others like them, shall, against all odds, have a right to his own footing in the great works which you control, believe me, sooner or later he will do so [great applause]. That is the whole of it.

And then, gentlemen, for I have detained you too long, in addition to that, when you go home to those great cities and towns of which I have spoken, and from which you have come here, carry with you something of that fine enthusiasm which I am persuaded has been kindled in your hearts to-day as you have gone about through these buildings. Surely, when we are so ready to accuse one another of selfishness and self-seeking, in our generation, there has been no more beautiful illustration of large-hearted citizenship than my dear friend who has wrought and builded here with such rare modesty, with such undaunted courage, and now, as you have seen, with such splendid success, has illustrated what a power a man is with a high purpose and the courage to illustrate it. God bless Colonel Auchmuty for what he has done to teach rich men in New York how to use wealth. I believe that the example which he has set here is an example surcharged with fecundity; it will reproduce itself. See to it, my friends and brothers, builders of America, that when you go back to the communities in which you live you strive to kindle something of a kindred enthusiasm in the hearts of your fellow citizens, and by your own liberality, by the associated endeavors of your fellow citizens, multiply these centers for the higher culture and the better training of the human hand and brain. A builder. What do we call him who has created and whose is the gift of every faculty we possess? We call him the Great Architect of the Universe, and the dignity of God's work in the world is at once its thoroughness, its fidelity and its permanence.

Mr. Ruskin has told us, you remember, how when you climb up to the summit of some pinnacle at Milan or Rouen, or some of those old cathedrals in the elder world, away out of sight, where no human eye below can trace it, you may see the evidence of a work as fine, as faithful and as perfect as though it had been wrought for the inspection of every human eye in the very center of the great building below. This, it seems to me, is the nobility of the builder's art, to make it strong, to make it fine, to make it thorough. Yes, that surely; but in the doing of it to give our young brothers a chance to make character strong and fine and thorough by the culture which we place within their reach and by the chance which we give them to do an honest day's work, for an honest day's wages. [Applause.]

I thank you with all my heart for the great privilege of looking into your faces and speaking these few words to-day. I shall remember this meeting as one of the most grateful recollections of my life, and I pray God that His divine blessing may go with you gentlemen, in your homes and in your work and give you grace and wisdom to recognize the large responsibilities and noble opportunities which belong to you. [Great applause.]

As Bishop Potter concluded his remarks, Student Frank Thompson of Detroit, on behalf of the plumbing class, stepped forward and presented him with a beautiful bouquet of flowers. Bishop Potter then said:

When I was in Boston, I remember very well that I reported to a gentleman of Mr. Thompson's vocation a slight domestic misfortune, and I said to him, "What will it cost, do you think, to repair the plumbing in the bathroom?" "Well," said he, "I don't know, sir; but I think I will make you the usual answer. I will take the house in part payment." I think you will agree with me, gentlemen, that that day has passed, and I venture to believe that in the noble spirit of the work which Mr. Ruskin describes, you may see in the fruit of the handiwork of Mr. Thompson and his associates something that is just as good behind as before.

SECRETARY SAYWARD'S REMARKS.

In response to repeated calls, Mr. Sayward finally stepped forward and spoke as follows:

Gentlemen: It is hardly appropriate for me, I am sure, to utter a word after what has been so eloquently spoken to you. I can but simply say that my heart is filled with satisfaction by the exhibition which has been placed within our reach to-day. Through all these years that I have been working in behalf of the National Association, I have looked forward to the time when I could bring a representative gathering of the builders of the country to the schools of our great philanthropist, [Applause], and to-day from Portland in Maine to San Francisco upon the Pacific Coast we have representatives of the builders of the country here [Applause], and they have seen here to-day what I have told them upon many an occasion was a work being done by one man out of his large heart, which is a thousand times wider and deeper and richer than his purse. [Applause.] Colonel Auchmuty, gentlemen, has been doing what it is your duty to do, and if there is any lesson in this exhibition which you will take back with you, I hope it will be the one which will enable you to do the thing which we are preaching in the National Association—namely, that builders' exchanges themselves should be the ones to teach the trades in trade schools of their own. [Applause.]

After further inspection of the departments, the delegates then took their departure, some visiting the Central Turn Verein Building, in Sixty-seventh street, near Third avenue.

In the evening the visitors scattered in all directions, one party attending the Fourteenth Street Theater to witness "Blue Jeans," another going to Proctor's Twenty-third Street Theater to see "Men and Women," while still others of the members went to the Bijou to witness the inimitable Goodwin in the "Nominee." Another party was entertained at the Manhattan Club, while numbers of others passed the evening in social intercourse at the Building Trades' Club, the privileges of its rooms having been extended to all attending the convention.

TUESDAY MORNING.

On Tuesday morning various resolutions were presented, and the Committee on Time and Place of Next Convention and for the Nomination of Officers for ensuing year was appointed, after which followed the secretary's report. The report is too long to give in full in these columns, and as it will be printed in full in the "Official Report," all who desire to receive a copy of the same will be supplied by addressing the national secretary.

Report of Secretary Sayward.

After touching upon the welcome news that encouraging correspondence is now being held with exchanges in Zanesville, Ohio; Nashville, Tenn.; Chattanooga, Tenn.; Atlanta, Ga.; Watertown, N. Y.; Youngstown, Ohio, and New Haven, Conn., with a view to their affiliation with the national body, he gave the convention some small idea of the amount of value that the National Association is to exchanges not yet affiliated, scattered all over the country, by being able to supply them with literature relating to ways and means for establishing and conducting successfully an association of builders. Mention was also made of the relationship between the local bodies and the National Association.

"The National Association," he said, "does not for itself need the affiliation from every city nearly as much as the builders of every city need live organizations for their own benefit and advancement, and it is a

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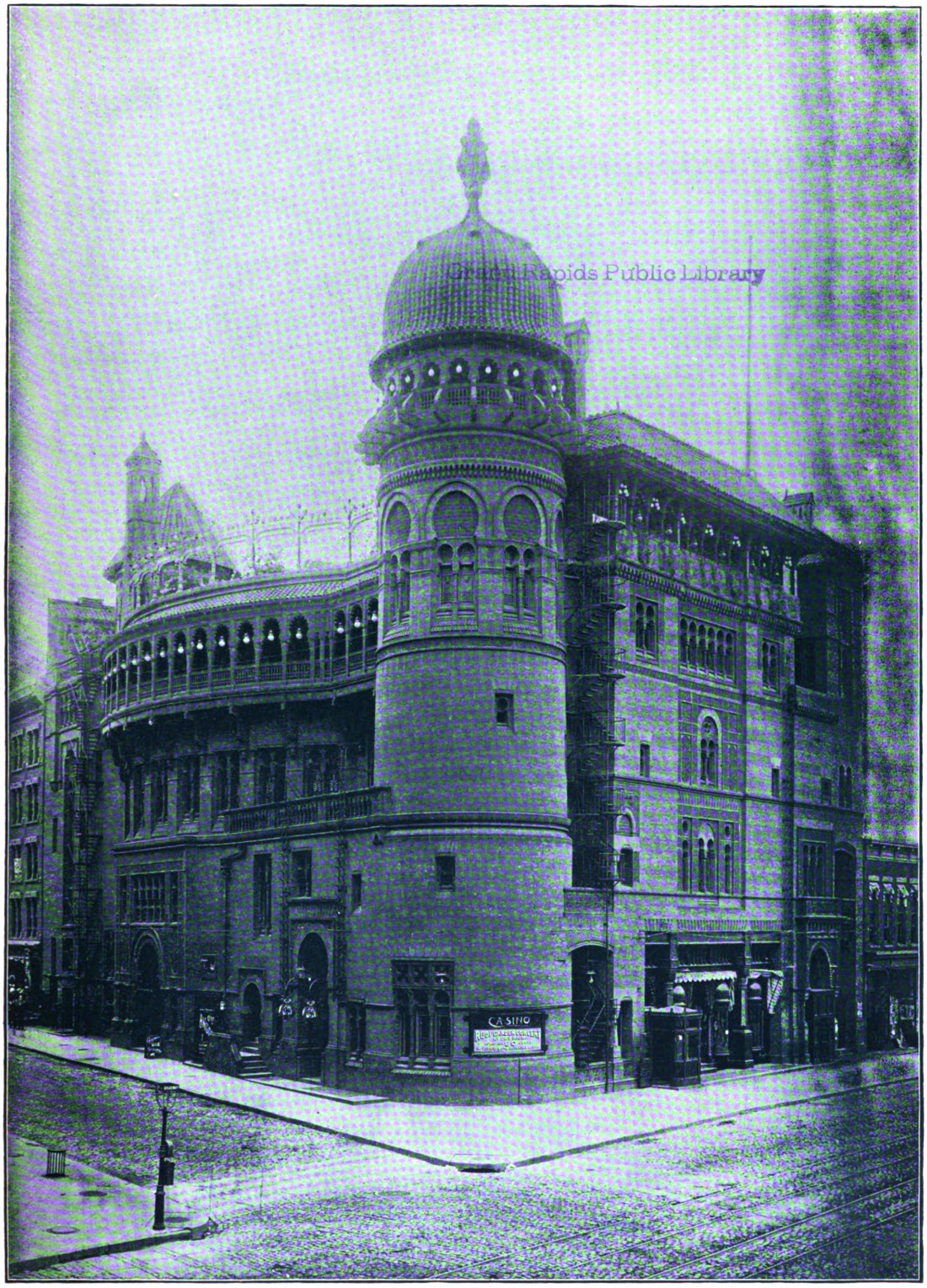

THE CASINO.- BROADWAY AND THIRTY-NINTH STREET, NEW YORK.

FRANCIS H. KIMBALL, ARCHITECT.

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part of the work of the National Association to encourage the establishment of such bodies. The national body could, no doubt, exist by the allegiance and support of not more than six of the important cities of the country, and could do vast good for all, no doubt, but it can do much more by the active co-operation of many cities, all cities, in fact, and all cities would receive much more if they would put themselves in condition to receive. The larger the circle of the National Association the wider will be its usefulness and the more comprehensive its action, through the ideas and experience gained from many quarters, and made valuable and available for all through the medium of the central body, but if there be no live local organization it matters little how good the thought, how valuable the experience which others have in store, and if there are no live local organizations there can be no central organization to act, first as digester of the experience of many, and then as a disseminator of the wisdom gained. If live local organizations be but few, their concrete influence must be to a certain extent limited and many must go without who are entitled to benefit."

ADVANTAGES OF THE ASSOCIATION.

In speaking of the advantages of the National Association, the secretary endeavored to impress the fact upon the delegates that the older bodies frequently stand in need of knowledge gained from experimenting, and the newer associations especially need the help and advice which can be secured only from those who have been long in existence. The National Association thus affords to new and to old bodies the largest aggregate of experience and the most reliable advice upon all such matters as shall most surely advance the interest of the builder, and affiliation is urged as the surest means to gain such advancement. Our influence as a repretive body, said the secretary, has been acknowledged again and again during the past year from places much beyond our jurisdiction. Our correspondents abroad have manifested their recognition of the value of our work in many ways. The *Engineering and Building Journal* of Melbourne, Australia, has printed in full many of our documents and reports, and has succeeded in starting a national movement in that country similar to our own. While our country has found enough that was admirable in Australian methods of voting to copy here, and is now considering the adoption of the Australian plan of land transfer titles, it is exceedingly gratifying that the builders in America have placed themselves far enough in advance to create a desire among the Australian builders to, in time, imitate us. From other foreign countries regular and valuable information is obtained, some of which was placed in printed form in the hands of delegates at the convention and others interested. In many particulars it is noticeable that the builders in Great Britain are co-operating with their workmen in the establishment of "working rules" and the settlement of other matters of mutual concern. This custom has apparently been of long duration, though there is occasional friction, such as for instance the refusal of the journeyman plumbers of Worcester, England, to refer certain matters to arbitration although they had signed trade rules fixing arbitration.

FOREIGN ASSOCIATIONS.

It is most satisfactory to note that the National Master Builders' Association of Great Britain frequently refers to the policy and action of this body, and always with commendation of our enterprise and the progressive nature of our work. One of the noticeable features of the work of Great Britain's National Association, and one which it might be well to imitate, is the issuance of periodical statements of the condition of the building trades in the various cities affiliated. This information covers general conditions, prices for labor of all kind, reports of strikes and lockouts, with their cause and nature, as well as other matters of general interest to builders. Much, however, as may be suggestive in the methods for information, the adjustment of wages, hours, &c., adopted by the builders in older countries, it is conceded by all that we are in a general way much more advanced and are steadily advancing, and if we will carefully examine the methods of older bodies, and graft such as may seem to be good on to our younger, more vigorous, more enterprising stock, we may look for the best of results.

During the year, pursuant to resolutions passed at the last convention, Congress has been petitioned to authorize the Secretary of the Treasury to furnish builders' exchanges in the various cities with plans and specifications of all public work, but up to the present time no action has been taken by that body.

CHANGE IN METHOD OF REACHING FILIAL BODIES.

Allusion was made to the change in the method of reaching the filial bodies through some regularly established periodical or some clearly defined channel, and the secretary called attention to the fact that the National Association was to be congratulated upon the incorporation of *The Builders' Exchange* into "the well-known and admirable publication called *Carpentry and Building*."

The publisher of the amalgamated journalis anxious to forward the best interests of the builder, and stands ready to devote space to matter that will benefit the trade.

It should be understood, continued the secretary, that abundant space is given to the special editorial and other matter prepared by the secretary in behalf of the National Association, and this matter is kept entirely distinct from the rest of the paper, under the heading and title "The Builders' Exchange."

OPPORTUNITIES FOR AN INTERCHANGE OF VIEWS.

Before leaving this branch of his report the secretary desires to call attention to the fact that although he has repeatedly besought the many members of the National Association to take advantage of the opportunity offered to present their views on any and all subjects of common interest to builders, to a wide field of readers through this medium, he has not, up to the present writing, received one line from any member directly intended for publication in the columns of our official paper. In view of the fact that builders everywhere are constantly claiming that this or that practice is wrong, and this or that abuse should be ventilated, it seems strange that so excellent an opportunity should not be taken advantage of, for surely there is no better way to get at the truth of things—no surer method of developing a way out of difficulties—than by plainly stating the facts, with some proposed remedy, in the columns of a paper that will be read by persons in similar pursuits, and then by them be criticised in the same columns, thus keeping the subject before the eyes of those interested, instead of consigning the whole matter to the oblivion of forgetfulness until some new development causes another spasmodic outcry. The only way to secure reformers in any direction is to keep "constantly hammering," and certainly no better chance can be had for such effort than that offered by the columns of a paper like ours. Members should appreciate and use the opportunity constantly.

TRADE SCHOOLS.

Every effort that was possible for the secretary to make during the year, in the way of impressing the necessity for the establishment of trade schools, has been made, and it is somewhat of a disappointment that only one of the many filial bodies of builders has succeeded in establishing an institution of this character. In all attempts to supplant an old regime with something more comprehensive and progressive, similar difficulties and disappointments are met to those which afflict us in securing the permanent establishment of trade schools under the patronage and direction of Builders' Association, but the one brilliant example of what is possible to do in this direction, furnished by the trade schools of the Builders' Exchange of Philadelphia, is really wonderfully encouraging—for it is an immense step in the right direction, and the debt which all other filial bodies of the National Association owe to their Philadelphia brethren cannot be overestimated for thus demonstrating the practicability and value of such undertakings, carried out on the precise lines recommended by the National body. After the visit which is to be paid to these schools of the Philadelphia Exchange I am satisfied that every delegate and every visitor will be convinced that this is work which the builders must undertake for their own protection and for the salvation of the building trades of this country. No other means for preserving and improving the crafts can be so effective, and for those whose whole interest as business men is involved in the building trades to remain inattentive or apathetic is indefensible. It should be one of the leading motives of every builder's life to do his part toward putting trade schools on a sure footing, thus transmitting to the future a sure means whereby the building crafts may be maintained in the utmost integrity and preserved beyond possibility of deterioration. To assist in perpetuating a method of training, instead of allowing the future youth of the country to depend upon chance education in the

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details of the crafts, is a most laudable ambition, and if the National Association accomplished no more than this one thing it will have done enough to warrant its existence. The missionary work of the secretary during the last year was principally confined to one extensive tour during the fall, extending as far west as Denver and as far south as Louisville. Other work of this character has also been done in short trips to nearer points. The result of the long tour has already been given in detail in these columns.

FILIAL ASSOCIATIONS.

A detailed statement of the apparent needs of each association visited would require much more time and space than can be devoted thereto in this issue, but it is well to mention that every convention lessens the necessity for criticism. In some cases advance is very notable, and conspicuous examples are those of Kansas City and Washington, D. C. The former Exchange has moved during the year from its old leased quarters into a magnificent building of its own, which is devoted exclusively to the interest of the builders of Kansas City. Washington has under way one of the finest buildings for office purposes in that city, and like the completed one in Kansas City, will be owned and occupied by the Exchange and devoted to the interests of the fraternity.

Especial mention is made of these cases, as showing how much can actually be accomplished in so short a time, and also to call the attention of every Exchange in the country to the result and urge them to emulate the emample set and secure property of their own.

The interest by Exchanges in owning property is in itself a most significant evidence of growth, and is most encouraging to the secretary, who has done his very utmost to show all filial bodies that the ownership of a building—a building which shall be the home of the Exchange—with every attention paid, first to providing conveniences and accommodations for its members, and next to the development of other related interests, lies the surest means of holding the membership firmly together, and of creating and maintaining interest in combined effort for the good of the building crafts. The secretary is sanguine enough to believe that within ten years nearly every Exchange now connected with this association will occupy a building of its own and be on the high road to financial success, as well as success from an association point of view. The many suggestions which he has made in the course of his missionary work, in relation to the ownership of a building and the possibilities it offers, may not all prove sound, but he feels sure that more will be found feasible than even his fertile imagination has depicted.

GROUND FOR DISCOURAGEMENT.

The secretary frankly expressed the opinion that the chief ground for the discouragement which exists in some of the exchanges is the apathy of individual members; their inattention to subjects of common interest and concern, their unwillingness to investigate, to examine, to study into the cause and effect in any of the directions where they are jointly interested with others, or to devote any time to perfecting plans in advance to guard against difficulties when they do arise, and, worse than all, their grudging payment of money to support the action of persons who are willing to devote time, money, thought and energy to the furtherance of the common cause.

The secretary touched upon the principal needs that were apparent in exchanges as discovered by the last missionary tour, upon the value and work of the mid-year meeting, and the advisability of its being made a fixture in the affairs of the association. Brief allusions were made to some of the most prominent suggestions developed by the correspondence of the past year and the great necessity of earnest work upon the part of the individual to insure the success of the whole.

SECRETARYSHIP OF LOCAL BODIES.

In closing his report, the secretary emphasized an item of advice regarding the secretaryship of local bodies. The office should be a permanent one, and should be held by some practical builder, who is willing to devote his time and energy to the welfare of his association, receiving therefor, of course, suitable salary. A permanent secretary should be a man of affairs, well versed in the customs and practices of men and of business, a man who is progressive and, to a certain extent, aggressive, and ready to fight for justice in the cause of the builder. The result is plainly manifest in such exchanges as have permanent paid secretaries.

The report of the secretary was followed by that of the treasurer, which showed that after the expenses of the convention were paid there would be about $2000 in the treasury, which is a much better showing than has been made at the end of any of the previous fiscal years.

The various standing committees next made their reports, which were received and laid over for discussion at an appointed time during the convention, with the exception of the Committee on Builders' Surety Company, which reported that, after careful consideration during the past two years, it was deemed inexpedient for the National Association or its filial bodies to be connected with such an organization. The latter report was adopted and the committee discharged from further duty, and the morning session closed with announcements by the secretary regarding plans for facilitating the work of the entertainers.

TUESDAY AFTERNOON.

The first business of the afternoon was the adoption of a set of resolutions offered by Mr. Kelly of St. Louis, expressing the earnest thanks of the convention to Col. R. T. Auchmuty for the opportunity to visit the New York Trade Schools and to Bishop Potter for his most excellent address; also it was resolved to extend to Colonel Auchmuty an honorary membership in the National Association of Builders.

The next business was the appointing of a committee of seven, including the president and secretary, to meet in New York City, April 2, 1891, with committees of like number from the National Association of Building Inspectors, the National Association of Fire Engineers and the American Institute of Architects, for the purpose of framing a universal building law.

A subject which excited much discussion pro and con was the proposed amendment to the constitution, that "any person having served a term as president of this association shall by virtue of that service become a permanent director, in addition to the directors otherwise provided for."

There was a decided opposition to the adoption, and much argument was indulged in. Those opposed to the amendment seemed possessed of the impression that the object of the measure was simply to show due deference to and appreciation of the services rendered the association by the ex-presidents, and also it seemed that some were of the opinion that at some future time there would be a sufficient majority of permanent members to control all action of the directory.

The actual object of the amendment was to secure to the association the voice and energy of these men, who have worked and studied to perfect and carry out the purposes of the organization. The real deference is to the National Association by the retention of the active services of men who have proved their ability and their spirit.

The secretary, in reply to a question—Is there any danger in the councils of the presidents who have gone before?—said "No. I tell you it will be a sad day when the National Association loses the opportunity of reaping the great benefit it would receive from their continued active service."

After various substitutes and amendments had been offered to the amendment, the original was lost, by a vote of 68 for and 54 against, it requiring a two-thirds vote to amend the constitution.

LEGAL ASPECT OF STRIKES AND BOYCOTTS.

One of the interesting features of the convention came next, being John L. Wilke's address on the "Legal Aspects of Boycotts and Strikes." It was received with marked deference and attention. Mr. Wilke spoke as follows:

In submitting to your attention some of the legal propositions that courts and legislators have laid down as defining and governing the relations existing between those who are affected by strikes and boycotts, it is expedient at the outset, in addressing this convention of builders, to limit our subject to the building trades; a vast field of the law, interesting and instructive in the highest degree, covering the peculiar relations that exist between such semi-public bodies as railroad and steamboat companies and other carriers, telegraph companies, and certain other lines of industry, and the community, have been entirely passed over in the preparation of this paper, except in so far as the principles applied in their cases have been applicable generally to others. And it would, further, be well to state that in this, as, more or less, in every paper which treats of a legal subject, much if not all the thought, as well as considerable of the language employed, will be the gathering from other minds and pens.

Considering that our subject, then, will be the legal aspect of strikes and boycotts in the building trades, a brief historical review of the relations that have existed between employers and employees will be helpful in enabling us better to understand the comparatively great development in recent years of what their advocates admit are "war measures."

Whether in this review it would repay us to go back to those shadowy times in the building trades to which Miss Amelia B. Edwards referred in her lectures last year on temples and tombs in ancient Egypt before the General Society is doubtful. Certain it is, however, that even then co-operation in labor "was recognized as beneficial to production, although a

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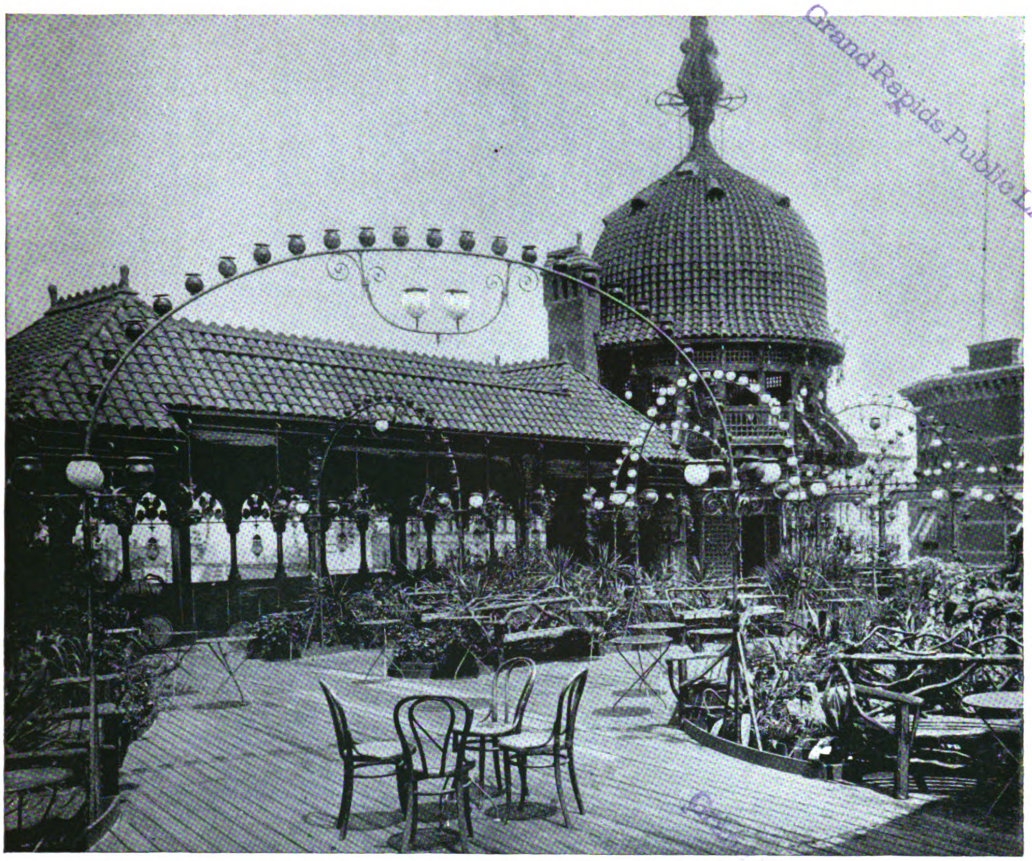

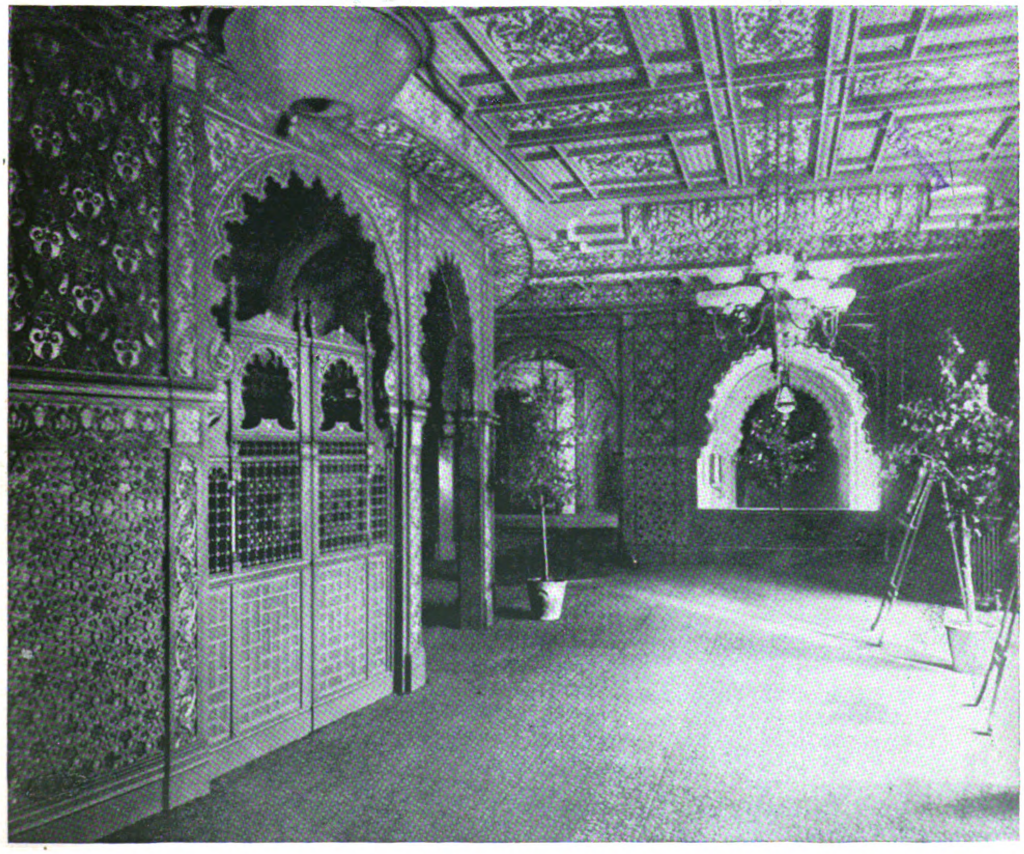

THE CASINO, NEW YORK.—VIEWS OF ROOF GARDEN AND FOYER, ORCHESTRA FLOOR.

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like co-operation among the laborers for the purpose of bettering their condition was observed only to be suppressed." In England this suppression was never wholy effectual, and occasional outbreaks among the laboring classes are noted all along the pages of its history. This suppression, about the fourteenth century, took the form of harsh and tyrannical statutes, which aimed to uphold the class distinctions then existing. Workingmen born so were always to remain so, and any attempt by them, especially if several joined in it, to better their condition was almost sure to bring the individuals under the ban of the law. From time to time, commencing almost with this century, and down even to the present day, this legislation has been liberalized, and with the gradual doing away of aristocratic caste feeling workingmen have been more and more placad on the same plane of equality before the law with all other professions or callings.

In this country we find very little trace of this class distinction among our laws; although a statute in Massachusetts prohibiting combinations among laborers was not repealed until some time after independence had been secured. The spirit of our institutions in this free country is to regard every one as equal before the law, and to interfere as little as possible with the rights of the individual; and these fundamental principles it is well for us to remember when we come to consider methods and acts, necessary maybe as "war measures" where conditions are different, but as utterly alien and foreign to our American life as are the individuals among us who urge and adopt them.

THE CIVIL ASPECT.

The most convenient mode of examining into our subject, it would seem, would be to regard first the civil aspect of boycots and strikes, and second the criminal aspect.

By the former, I mean those rights and duties which affect individuals in their relations with each other solely, and by the latter such violations of these rights or duties as affect the interest of the public and the welfare of the State, and in the adjustment of which the State is a party.

From the comparatively small number of reported cases in which suits have been brought to recover damages for, or to enjoin, actions which have periled or destroyed a man's property or his trade or business by labor difficulties, it would seem that this right of civil action was very little regarded or its results not looked upon as of practical utility. Noticing, too, the large sums which certain of the labor commissioners in the various States have noted as being collected and held as strike defense funds, and viewing the increasing tendency of labor interests, despite some recent set backs, to consolidate, this phase of the question has seemed to point to a surely developing field of legal inquiry in the future. To a lawyer this matter is one of immediate interest, because, as we have already noted in distinguishing the two phases of our question, the criminal law is based upon the idea that certain violations of individual rights and duties are of sufficiently grave importance to the public to call for the intervention of the State, and without a careful definition of these rights by the courts how can we look for wise criminal legislation?

The ground upon which a civil action would lie for injury caused by a labor disturbance has been variously suggested, but the most logical seems to be that a man's trade or business is as much his property and estate in the sense of the law as any other property or right that he may have, and that to arbitrarily attack this right is to deprive him of his property, for which the courts when called upon will lend him their protection. This was declared to be the law very early in England, and has come to us by way of inheritance, receiving the express sanction and approval of unnumbered judges, who have declared it one of the great principles of the common law. And just here it becomes necessary to state a definition of the term common law, which we shall have to use again, and we may for our purposes state it thus: That the common law consists of those principles originating from the intercourse of people in their business, in reference to conducting it, which, applied by them only in the special cases arising, gradually grow into rules of wider application, which finally reach a statement by judges or legislators. Thus in England in the course of centuries a great body of law came to be stated, and, on the independence of the United States, this whole body of law was adopted as part of the law of each of the States, except where it happened to be in conflict with some already enunciated contrary principles.

The principle which we have noted as stated by Lord C. J. Holt, that "he that hinders another in his trade or livelihood is liable for an action for so doing," being the law in the case, the question comes as to its application in specified instances

So far as strikes are concerned these acts consist chiefly in the abandonment of their employment by working men, either because of a matter of wages, or of working hours, or of the adoption of shop rules which are offensive, or of the failure to follow the trades union rules in reference to the employment of none but union hands or union apprentices, or any of a great number of causes, and such an abandonment of employment where the employee is simply a day laborer and is not breaking any contract made with his employer gives the latter no right to action against him. Often the courts have said that every man may carry on his trade as he pleases, may do what he will with his own so long as he does nothing unlawful, and acts so as not to injure his neighbor, and this applies as well to discharges by the employer as to retirement from employment by the employee.

INTERFERENCE WITH THE RIGHTS OF EMPLOYERS.

The most serious aspect of strikes is the interference of the strikers with the rights of their employers and their attempts to prevent and obstruct the employment of workmen to take the vacated places. Of course where actual physical violence is used, the law fastens upon the guilty individuals a liability to its full extent; but the question becomes more difficult of answer where the means used are the intimidation of employers or prospective workmen by threats of bodily harm, or of annoyances, or by any method of intimidation that works upon the mind rather than upon the body, and really causes the non-striking workman to forego or to be discharged from his employment. It is obvious that in cases of this kind practical success can only be attained by organization; and to this can be attributed in large part the modern development of trades unions. That there were unjust and tyrannical employers, and that their men single handed were powerless to achieve any results in betterment of their condition, is undisputed. But having formed their unions, placing the members, so far as combination can effect that purpose, upon a footing of equality with employers, and having tasted of the power thus acquired, its use has been at times directed in the furtherance of the matter we have just been considering. Now, it is not in any way intended to animadvert here upon trades unions. In this era of combination their place and office among workmen seems assured, and their existence has been recognized as proper and lawful by courts and by statute. It is only in so far as unions have become the means of coercion and intimidation that we discuss them here.

The question briefly stated seems to be "Does a cause of action exist when the influence exerted upon either employer or employee amounts to coercion?" Now, this coercion may be and has been manifested in a great many ways; direct threats of injury, the circulation of hand bills, the gathering in groups and the denouncing of non-strikers; even, as an English judge has said, pickets by black looks sufficient to have a deterring effect upon the minds of ordinary persons; all these acts have been held by the courts to be unlawful and actionable. Men acting as private individuals, or as members of a union or guild, or as Knights of Labor, may go out on strike if they will, they may seek to persuade others from taking the places they have vacated, so long as their persuasion be unaccompanied by threats, but further than that they must not go. Allowed perfect freedom of speech and action themselves, they must grant to others the same rights, and the moment they seek to curtail these rights their action becomes unlawful, and the courts will hold them so accountable.

About ten years ago a new "weapon," so called in this "labor warfare," gave rise to the question "Is coercion, when the only act threatened is lawful, actionable?" and to give you only the results of this discussion, we would state that such coercion has been held not actionable. The reason of the rule is this, that the only safe course in laying down legal principles is to make them of universal application. That though the threat to do in a lawful way an act lawful in itself, or the actual doing of such an act, may result in injury, and may even be immoral, impolitic and hurtful to the industrial interests of the State, yet to hold such acts unlawful would make it impossible under the general principle for workmen, for instance, to refuse to work with a drunkard, or for an employers' guild to make it a rule not to employ individuals who were addicted to gambling or other immoral habits. The dangers of such a rule must be evident, and in a country where individual liberty is so greatly prized we may confidently look for slight infringements upon the rights of others in the way we have described.

THE BOYCOTT.

The subject that brought this matter so much into prominence was the boycott, so called, and as that word is still a developing term, meaning one thing in Ireland, where it originated, and different things differing from each other upon both the Atlantic and Pacific coasts of our own country, a brief glance at its origin and development—of its fall, too, we might also say—will not be out of the way. Most of you will remember something of the origin of the term, how that one Captain Boycott, a land agent, having rendered himself obnoxious by the energy he displayed in collecting his owner's rents, was placed under the ban, no one would harvest his crops, nor sell him goods, nor buy from him, nor, in fact, hold any intercourse whatever with him, and, further, whoever would do any of these things was placed under a similar ban. This treatment making it necessary for laborers to be imported from a great distance to perform the necessary duties upon the farm, and necessitating, too, in that initial boycott, as in almost every succeeding one, the intervention of the constabulary to prevent violence, was a great success in the embarrassment of its victim, and among labor agitators a pæan of joy went up that at last the weapon had been forged which would make capital bow a servile knee to labor. It is of interest to note that in a description of this "new discovery" Mr. Justin McCarthy spoke of it in his work entitled "England under Gladstone," as a species of excommunication, and whoever looks into the matter will be struck with the logical similarity between the two. Excommunination was applied to offenders from the very beginning of recorded history; used by the church in the middle ages, it was recognized by almost every code in Europe. It was the duty of the State to strip the excommunicate of his citizenship, and to declare him an outlaw, to be slain by any one; no one could give him food or shelter, and left to perish in wretchedness, he was denied the right of burial, and his body was left to rot in the air. This condition of things, which a moment's reflection will show you would be the necessary consequence of the boycott, a condition so shameful and degrading that it sneaked into oblivion long ago, regarded as of too low a nature for any modern man to use, was sought to be resuscitated in this last quarter of this nineteenth century, as a new weapon of labor. Having been dragged from its closet, we are obliged to examine its bearings according to legal principles. And it is to the honor of our jurisprudence that as a result of legal decisions the boycott is rapidly disappearing to the shade from whence it came, we trust never again to come to light.

The subject matter of the offense is the same in this case as in the illegal methods of strikers—namely, the interference with the property rights of others—and the reasoning of the law is precisely the same as that already considered in reference to coercion and intimidation. The exception that we noted, that coercion by threats of a lawful act was not actionable, applies as well here, but, as a practical question, this can never be of moment to Americans, for, without unlawful coercion, no man, unless a criminal and an outcast from society, can be so shut out from his ordinary trade or occupation by common consent as to be deprived of his means of livelihood. The courts have applied these principles to cover the following cases:

In Massachusetts in 1888, where strikers paraded up and down in front of their employer's shop, bearing banners notifying other workmen to keep away.

In Vermont in a strike in one of the granite quarries in 1887, where the quarry was posted as a "scab shop" and the non-striking employees were advertised as "scabs" in the strikers' journal.

In Connecticut, in the same year, where the strikers issued a circular as follows:

> A word to the wise is sufficient;
> Boycott the *Journal and Courier*.

In New York, New Jersey, Virginia, Pennsylvania and Illinois similar acts have been held illegal and as giving a right of action to the party injured.

Of course this rule applies equally as well to employers as employees, and combinations of the former to unlawfully coerce workingmen would be held just as illegal as these acts of the latter that we have noticed, and though the cases are few in which the court have had this question before them, yet the decisions are clear to that effect.

THE CIVIL REMEDY.

Having glanced at what the rights of employers and laborers are in reference to their trades, we come now to the question, What are the civil remedies given them for a violation? And first we would say an action for money damages; we have already suggested that this remedy has been infrequently invoked. It exists, however, and suits have been brought. In this State, as in some others, such an action brought for injury to property entitles the plaintiff to obtain an order for the arrest of the defendant, and every new illegal act giving a new cause of action, repeated arrests

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may prove deterrents to persistent wrong-doers.

Another and more effective remedy in some cases is to obtain an injunction against the doers of the illegal acts. The law is not yet settled sufficiently to enable one to say in just what cases an injunction will be granted. The mere fact that a crime is being committed or is threatened is not enough. Where the act, however, is unlawful, is continuous, injures the complainant's business, and is one for which, by reason of the defendant's being pecuniarily irresponsible, or for any other reason, the action for damages will not be a full, complete remedy, the better opinion seems to be that an injunction will be granted. It has been successfully invoked in Massachusetts against boycotters; in Chicago against a furniture makers' union, which picketed a factory and by personal violence and insult kept non-strikers from working, and in several cases in England under the common law. It has been suggested in New York, but refused in one case outright, and in the case of Theo. Thomas against the Musical Union, where the facts were exceptional, the court held there was no ground shown for the exercise of such jurisdiction. In the United States Circuit Court for the Ohio district an injunction was granted against strikers, and the Court of Common Pleas of Cleveland did the same thing against strikers who had practically stopped a railroad.

We have given such extended consideration to this first division of our subject because upon it, in large measure, depends the second division, viz.: the Criminal Aspect.

THE CRIMINAL ASPECT.

We have seen that the law regards certain interferences with a man's business as actionable injuries for which he may sue and recover damages, and we are now to consider briefly at what point the law says that such acts are so grave and menacing to the welfare of the State that they are not only actionable injuries to individuals, but crimes against the people, for which an indictment will lie. Aside from actual violence or destruction of property, which is rather incidental to than the thing itself, the legal heading under which crimes arising from strikes would fall is that of criminal conspiracy—a heading of almost boundless limit, and including every crime entered into or contemplated in concert.

In considering the application of this doctrine in the United States we find that the States are about equally divided in number into two classes—those governed by the common law of conspiracy and those in which the subject is regulated by statute, and of the latter, including Maine, Vermont, Pennsylvania, New Jersey, California, Illinois, Texas and others, the statute of New York seems to have been more or less the guide, and I quote from it here. It is contained in the Penal Code, Chapter 8, Section 168, and is as follows: "If two or more persons conspire together." . .

Page 5, "To prevent another from exercising a lawful trade or calling or doing any other lawful act by force, threats, intimidation, or by interfering or threatening to interfere with tools, implements or property belonging to or used by another, or with the use or employment thereof, or"

Page 6, "To commit any act injurious . . to trade or commerce . . . each of them is guilty of a misdemeanor."

And, too, Section 170, which holds "that the orderly and peaceable assembly or co-operation of persons employed in any calling, trade or handicraft for the purpose of obtaining an advance in wages or to maintain wages is not a conspiracy."

Under this and the similar statutes it has been held to be a conspiracy to attempt by threats and fines to compel others to join in a strike; to prevent an employer from taking into his employ other persons who were objectionable; to picket a factory for the purpose of deterring others from hiring; by intimidation or by the threat of numbers; to congregate around the door of an establishment and distribute printed circulars warning against the proprietor, in sufficient numbers to make the jury believe that the attitude was one of intimidation.

In what are popularly known as the Theiss case decided in New York in 1886, and the Landgraf Bakery case, in the same year, the boycott cases, Judge Barrett said: "A number of men may combine together to obtain larger wages for themselves in any employment. They may stop working . . . they may do their utmost by speech, writing and in every other lawful way to persuade others not to fill their places. But the very moment that other men . . . find it to their interest to fill the vacant places they cannot be stopped by violence, threats or intimidation. As soon as any of these are attempted the combination becomes criminal;" and to a similar effect is the opinion of Judge Brown of the United States District Court in the case of the Old Dominion Steamship Company *vs.* McKenna.

A PECULIAR CASE.

In the case of the People *vs.* Walsh, known as the Hartt Conspiracy case, in which a conviction was upheld by the Court of Appeals in June, 1888, a foreman who had incurred the ill favor of the unions was not only driven out of one shop by the refusal of men to work under him, but getting employment in another, was driven out of that by the men there going on strike, because of his employment, and unable to obtain further work in this great city of New York, going to Baltimore, where, after working one day, on a notice sent from the union here to the union there he was again forced out of his job, and returning to this city, invoked the law to protect him from the deliberate purpose to impoverish and crush him. Now, here we have no attempt by the rich and powerful to crush the poor, no unjust law interfering with the rights of the citizen, but a large body of workingmen attempting to utterly ruin and destroy one of their own number, and why? Not because he had been arrogant and tyrannical, but because he had found one of the employees cheating on his work checks, and had discharged him.

Not only does the act cover a conspiracy against an employer or by one workman against another, but it covers cases of conspiracy by employers against their men; and lockouts by agreement among employers, blacklisting of employees, or the combination of certain employers against one or more others, are within the view of the statute and are equally punishable.

The States which have no statutory enactments covering this question find the common law broad enough to amply protect their citizens. In the Vermont granite quarry case before referred to, in Massachusetts in 1886, in Connecticut in 1887, where a printer's union boycotted a paper and the printing office for employing non-union men, and in another late case in the same State, where one railroad company, in furtherance of an agreement, notified a second company to discharge an employee who was perfectly satisfactory to it, who had practically been blacklisted by the first; in an old case in Pennsylvania, in Virginia, where a boycott was instituted against Baughmann Bros., who were printers; in all these cases combinations such as we have noticed have been held to be criminal conspiracies at common law.

EXTORTION OF MONEY IN CONSPIRACY CASES.

There is one other incident of these conspiracies that we may notice, and that is the demand and often the collection of a fine or of a sum of money for the "expenses" of the strike or boycott, as the case may be. And this state of things has been more common than would be supposed. Within the last five years three instances of fines averaging $250, which have not only been demanded, but which have been paid by builders in this city, have come under my own observation. In a case in Massachusetts in 1867 the stone mason who had the contract for building the Catholic Cathedral in Boston, finding it impossible to get out all his work there, sent to New York to have some of it done. The journeyman's association fined him $500 for doing this, and threatened to strike all his work unless he paid it. He refused, and they did strike, until, finally, to complete his contracts, he paid it. Afterward he brought suit for damages for this extortion, and the court held: "We have no doubt that a conspiracy against a mechanic who is under the necessity of employing workmen in order to carry on his business, to obtain money from him which he is under no legal liability to pay, by inducing his workmen to leave him, and by deterring others from entering his employment, or by so threatening, is an illegal conspiracy . . . and the money so paid may be recovered back, and, in addition, if the parties succeed in injuring his business they are liable to pay all the injury thus done him."

And in the Theiss case, in this city, where the employer was fined $1000 for keeping his old employees and refusing to let the union tell him whom he should employ, the court said: "Let me say right here to the so-called walking delegate that hereafter he enters peoples' offices, be they mercantile, manufacturing or shipping, with the danger before him of the extreme penalty of the law, should he venture to extract one unlawful penny from his victims."

To sum up, we find as a result of the cases that workmen may combine in unions or societies for their advancement, for the purpose of raising wages or for fixing the hours they will work. Whenever they seek to secure these objects by threats, by violence or by intimidation, or where, as in the Hartt case, they seek to destroy and impoverish an individual, or when they seek to enforce their rules upon others, or to extort money, they commit criminal offenses for which they are subject to indictment.

There is one other matter incidental to this subject to which, at the request of one of your delegates, I will refer, and that is what defense a strike or boycott would be for failure to complete a building contract within the required time. This time clause in a contract rests so lightly upon the average builder that, as an architect said in my hearing, a builder would contract to build the great Pyramid in three months and rely on being excused for failure to perform because of changes in the plans or interference from other contractors. But if there should be a contract not open to this excuse for delay, in which the builder had agreed to perform within a fixed time, the law will hold him to strict performance within the time. If there are contingencies which may prevent performance, they must be provided against in the contract. Of course this rule would be modified if the prevailing labor disturbance reached such a magnitude as to amount to an insurrection; but the only safe course is to insert in the contract a stipulation excusing performance where the work is interrupted, and such a provision will be upheld and approved by the law.

STATISTICS OF STRIKES.

In this necessarily sketchy view of some of the relations existing between employers and workingmen, we have seen how the law regards certain acts, approving some, condemning others, but through all it must have been evident that the one great underlying principle declared as the policy of all the States was freedom—freedom of individuals, whether employers or employed, and freedom of trade from unreasonable obstruction. Because of this very freedom partly there have been, there will be in the future, industrial disturbances from these free agents working out the forces within them. Addressing, as I am, representatives of one of the greatest industries of this country, an industry which numbers among those dependent upon it a vast number of our citizens, to whom a strike, with its attendant loss of employment, means so much morally, I feel justified in closing this paper by urging upon you the necessity of a nearer and kindlier relation between employer and workingman for the solution of these questions. At present the latter's most trusted counsellor is more often than not some hired labor agitator whose advice is from the purely selfish standpoint of justifying his position by doing something, and that something a sure means of magnifying his own importance, no matter at what cost. Will such a one make use, for instance, of Labor Commissioner Wright's careful and trustworthy statistics showing the small percentage of successful strikes, the amount of loss of wages, and the moneys paid by labor for carrying on strikes, or will he state Mr. Wright's conclusion drawn from a study of strikes in Massachusetts for 50 years down to 1881, that "Strikes generally prove powerless to benefit the condition of the wage classes; that they lead to improvidence and are demoralizing in their effect upon the working man.

In the one month of May, 1890 about 250 strikes, involved 70,000 workmen; the actual loss to these men while on strike, was not made up by them from the actual results gained. I do not mean estimated gain for the balance of the year, based upon a temporary victory, but an actual gain for the following six months, and meanwhile other causes had started new complications.

These are but few of the truths of this relationship, and it is a good thing that so early in this convention you have visited Col. Auchmuty's trade schools, that you are to-day to visit the splendid library and school rooms of the General Society. These suggest means to a better understanding, such as should exist between an employer, whose business and what he has invested in it are worthless unless he can put it to use through employing workmen, and to the latter, whose plight is even more hapless unless he can get work. It is not by adding laws to the statute books, making this act and the other crimes; the law sufficiently and adequately, and no more, gives that protection now. It is not even by providing that outsiders shall be called in to make your bargains for you whether they be called Labor Commissioners or Commissioners of Arbitration. It is only by this more friendly footing being the fact with all its attendant consequences, that the legal aspects of strikes and boycotts will wane in public consideration.

The paper was ably written, and will be incorporated in the annual report.

WEDNESDAY MORNING.

The consideration of the report of the Committee on Form of Arbitration was the first business of the morning.

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THE CASINO, NEW YORK.—VIEW AT HEAD OF MARBLE STAIRWAY.

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Report of Committee on Form of Arbitration.

I. The committee appointed at the last convention of the National Association of Builders to prepare a form of arbitration, offer to the delegates assembled at the Fifth Annual Convention the result of their deliberations.

II. The committee call attention to the fact that one of the fundamental points of the Declaration of the Principles of the National Association recites that "employers in the building trades should recognize that there are great opportunities for good in associations of workmen, and while opposing and condemning improper methods and action upon the part of such associations, they should still be ready to aid and assist them in all just and honorable purposes."

III. Your committee believe it to be possible and desirable for employers and their workmen to unite in establishing a method by which the interests of workmen and the interests of employers may each receive just consideration, and through which the relations of each to the other may be harmoniously adjusted.

IV. They believe that to secure the establishment of such a method it is absolutely necessary that there be associations of employers and associations of workmen, to serve as representative bodies in the premises, in order that the action taken may comprehend, as fairly as possible, the collective interests of the individuals on both sides, and in order that the practices recommended may, through them, be more generally adopted.

V. They believe that no association desiring recognition as a representative body should, either in its form of organization or through its by-laws, rules or practices, attempt to independently or arbitrarily control or influence the action of others; but, recognizing the rights of others, should adopt measures that will lead to joint consideration and joint action in all matters of mutual concern.

VI. They believe that associations established on the principles above expressed should be heartily encouraged, all persons eligible thereto should be urged to join, and every legitimate effort made to convince them that it is their duty to unite with their fellows in all honorable methods for the establishment and maintenance of just and proper practices among themselves and in their relations to others.

VII. In harmony with these views, and believing it is the manifest duty of the National Association to recommend to its filial bodies a definite and universally applicable method of arbitration in place of objectionable methods, or lack of method, heretofore existing, and which shall fully recognize the rights of both employers and workmen.

VIII. Your committee offer the following draft of a form of organization of a joint committee, and certain other action deemed essential, which they believe to be applicable for the use of any and all of the various branches of the building trade, and offer it as an honorable plan, which filial bodies may safely recommend to employers and workmen in the building trades, for the peaceful settlement of all matters of mutual concern.

IX. Your committee recommend that all filial bodies be urged to present this simple plan to the various trades represented in their bodies, requesting their various special trades to organize, if not already organized, and then offer this plan to the organizations of workmen in their trades as the basis for a mutual agreement and understanding which shall prevent all further disputes.

FORM OF AGREEMENT TO SECURE THE ESTABLISHMENT OF ARBITRATION COMMITTEES, WITH PLAN OF ORGANIZATION OF THE SAME, FOR THE USE OF ASSOCIATIONS OF EMPLOYERS AND ASSOCIATIONS OF WORKMEN IN ALL BRANCHES OF THE BUILDING TRADE.

Agreement.

For the purpose of establishing a method of peacefully settling all questions of mutual concern,..... (Name of organization of employers) and.....(Name of organization of employees), severally and jointly agree that no such question shall be conclusively acted upon by either body independently, but shall be referred for settlement to a joint committee, which committee shall consist of an equal number of representatives from each association; *and also agree that all such questions shall be settled by our own trade, without intervention of any other trade whatsoever.*

The parties hereto agree to abide by the findings of this committee on all matters of mutual concern referred to it by either party. It is understood and agreed by both parties that in no event shall strikes and lockouts be permitted, but all differences shall be submitted to the joint committee, and work shall proceed without stoppage or embarrassment.

The parties hereto also agree that they will incorporate with their respective constitutions and by-laws such clauses as will make recognition of this joint agreement a part of the organic law of their respective associations. The joint committee above referred to is hereby created and established, and the following rules adopted for its guidance:

Organization of Joint Committee and Rules for its Government.

1. This committee shall consist of not less than six members, equally divided between the associations represented, and an umpire, to be chosen by the committee at their annual meeting, and as the first item of their business after organization. This umpire must be neither a journeyman craftsman nor an employer of journeymen. He shall preside at meetings of the committee, when necessary.

2. The members of this committee shall be elected annually by their respective associations at their regular meetings for the election of officers.

3. The duty of this committee shall be to consider such matters of mutual interest and concern to the employers and the workmen as may be regularly referred to it by either of the parties to this agreement, transmitting its conclusions thereon to each association for its government.

4. A regular annual meeting of the committee shall be held during the month of January, at which meeting the special business shall be the establishment of "Working Rules" for the ensuing year, these rules to guide and govern employers and workmen, and to comprehend such particulars as rate of wages per hour, number of hours to be worked, payment for overtime, payment for Sunday work, government of apprentices and similar questions of joint concern.

5. Special meetings shall be held when either of the parties hereto desire to submit any question to the committee for settlement.

6. For the proper conduct of business a chairman shall be chosen at each meeting, but he shall preside only for the meeting at which he is chosen. The duty of the chairman shall be that usually incumbent on a presiding officer.

7. A clerk shall be chosen at the annual meeting to serve during the year. His duty shall be to call all regular meetings, and to call special meetings when officially requested so to do by either body party hereto. He shall keep true and accurate record of the meetings, transmit all findings to the associations interested, and attend to the usual duties of the office.

8. A majority vote shall decide all questions. In case of the absence of any member, the president of the association by which he was appointed shall have the right to vote for him. The umpire shall have casting vote in case of tie.

Clauses to be Incorporated with By-Laws of Parties to Joint Agreement.

A. All members of this association do by virtue of their membership recognize and assent to the establishment of a Joint Committee of Arbitration (under a regular form of agreement and governing rules), by and between this body and the..... ..... for the peaceful settlement of all matters of mutual concern to the two bodies and the members thereof.

B. This organization shall elect at its annual meeting.....delegates to the said Joint Committee, of which the president of this association shall be one, officially notifying within three days thereafter the said .....of the said action and of the names of the delegates elected.

C. The duty of the delegates thus elected shall be to attend all meetings of the said Joint Committee, and they must be governed in this action by the rules jointly adopted by this association and the said.....

D. No amendments shall be made to these special clauses, A, B, C and D, of these by-laws except by concurrent vote of this association with the said..... ....and only after six months' notice of proposal to so amend.

J. MILTON BLAIR,
ANTHONY ITTNER,
GEORGE C. PRUSSING,
MARC EIDLITZ,
DAVID A. WOELPPER.

Discussion of the Report.

It was voted that the report be considered *seriatim*, and each paragraph received full and free discussion. One of the strongest points brought out by the discussion was the value and importance of proper organization on the part of the workmen. A proper organization on the part of the employers and on the part of the employees should bring them into such condition as shall make the adoption of joint rules for their mutual benefit and welfare imperative.

The severe experience of many of the employers in the convention led to the expression of the opinion that it would be best to allow every Exchange the full power to adjust its own affairs to suit existing conditions.

The very intent and purpose of the report is to supply to every builders' or other association in the land the groundwork of a plan whereby every question between organizations of employers and of employees may receive full consideration. It has seemed, from action taken by some of the unions, as though all subjects which concerned both classes of organization were not open to arbitration, but the truth is that in many cases both employers and workmen have assumed more than their position warranted, and the latter especially, from the fact that their older organization and lack of opposition has allowed them to fall into unjust demands and untenable premises, which it is the primal object of arbitration to correct.

The arguments that were unfavorable to the adoption of the report were based upon the ground that local conditions between associations of employers and unions of workmen are such as to prevent the adoption of a general form of arbitration, or even to prevent the mediation of arbitration in difficulties between the two without humiliating concessions on the part of the employers.

DEMANDS OF THE WORKMEN.

The excesssive demands of the workmen in many localities have compelled the employers to take an attitude of antagonism to unions, because of the lack of some well-defined and carefully formed plan for meeting them on their own ground. In the daily transaction of business the builder has had little time to do more than accede to the demands of workmen, for the sake of harmony, or rather the prevention of strikes; and this condition of affairs has gone on for so long that many of the employers, desperate at last, have refused utterly to arbitrate with their men, overlooking the fact that the adoption and application of arbitration in the first case of difference would have prevented the complications which have followed the short-sighted policy of yielding for the sake of temporary peace.

One gentleman stated that he was a little uncertain as to the application of the plan of arbitration as proposed, for the reason that he was not aware of any unions in his vicinity that were properly formed, and that he knew of no such organization of workmen in existence as was contemplated in the report.

It was his opinion that associations of employers must deal with things as they are to-day, and asked what was to be done with such men as had abandoned the improperly conducted trades unions at the instance of their employers. The report recommends the urgency of proper organization on both sides, and the gentleman asked the question: "If he should return to his home and ask his men to rejoin the Union?" While the gentleman believed firmly in the principle of arbitration, it did not appear applicable to him, for the

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reason that there seemed to be certain subjects, fundamental principles, which were not arbitrable; and if such subjects were ignored, the whole plan of the committee would be inoperative, and it appeared that the first subjects that would come up for arbitration would be the topics which have been decided as not arbitrable.

The proposition seemed to him to be a blow at the individual rights of men, and the questions as to what were subjects of mutual concern would at once create antagonism. Dealings with trades unions, in the experience of the speaker, had developed the fact that the unions sought to obtain the larger concession from the employers, and arbitration has done nothing to fix a just basis of equal benefit.

CONDUCT OF UNIONS.

It appeared from various discussions that the fact that there are so few unions properly conducted should not deter the association from recommending a general form of arbitration, for the reason that the longer improper conditions are allowed to exist the greater the complications which at some future time must be untangled.

To every set or association of employers the evidence was given that in cases where good workmen had left the unions because of intolerant conditions, the greatest mutual benefit that could be conferred, would be the establishment of a new union of workmen, upon lines suggested as comprehending the joint rules between associations of employers and associations of workmen, which are attached to the report of the Arbitration Committee.

The fundamental principles which underlie the relationship between employers and workmen are not arbitrable, but the misapplication of these principles or the unjust arrogation to themselves of these principles, by either employees or workmen, is subject for arbitration. It is only by working together with the express intention of fixing the province of each separate interest, and of fixing the interterests which are common, that subjects to be disposed of by the employers and those to be within the disposition of the workmen, and those that require joint action of the two, can be ascertained. Such meetings are called arbitration. By bringing organizations of workmen into a condition where joint rules with the employers shall govern, a new era will appear in the relationship between the two, and it is the purpose of arbitration to bring about these conditions.

WANT OF DEFINITE METHOD.

It was stated in the convention that a certain arbitration committee met in a certain city for the purpose of settling a strike, and at the beginning of the session each side was armed against the other, and the deliberations of those committees began in distinct antagonism, but when arbitration had accomplished its work the committees parted with the utmost harmony and with the knowledge that each side was right and each side was wrong, and that arbitration had established the right and eliminated the wrong.

It would not be out of place to quote the substance of a portion of the remarks made by a delegate on the subject.

"Our workmen," he said, "as we have come into the way of speaking of them, have formed organizations in the past which have drifted into a method of opposition to us which we have learned—some of us by bitter experience—is exceedingly dangerous, and hampers and handicaps us, and which we resent as an interference with the individual liberty of the men.

"This thought was introduced at the first convention at Chicago, has been reiterated over and over, and is now comprehended in the report submitted by the Committee on Arbitration. A definite method must be supplied; some distinct plan of arbitration must be defined, and although many are at variance as to the detail and are more or less apart, which is natural, considering the various conditions in existence, the necessity for correcting the wrong demands action. All members of the National Association have recognized from the beginning that they together simply composed a congress of builders with large experience, and the object of meeting together is for counsel and to recommend back to the filial bodies represented and to all associations of builders, feasible methods for the accomplishment of things that are proper to be done.

"Fairness is due to both sides, and it is a fact that organizations of employers need improvement, for they are often too arbitrary, often claim too much, go a step too far, and arrogate too much to themselves. What the National Association is endeavoring to accomplish is to show how these two great interests, which are bound to exist no matter what happens—the interests of employers and the interests of workmen—can be harmonized so that justice will prevail."

After a very thorough discussion, which was participated in by a large number of delegates, and many cases cited for and against the subject, the report was amended so that the sixth paragraph read: "They believe that associations established on the principles above expressed should be heartily encouraged in all honorable methods for the establishment and maintenance of just and proper practices among themselves and in their relations to others," and with this change the report was unanimously adopted, together with the detailed form of arbitration attached.

WEDNESDAY AFTERNOON.

The allotted business of the afternoon was the consideration of the report of the Committee on Reform in Methods of Sub-Contracting. As was the case during the consideration of the report of the Committee on Form of Arbitration, the discussion was full and earnest, and the sense of the convention on the subject is manifest in the adoption of the following amended report of the committee as the recommendation of the National Association to its filial bodies.

Report of Committee on Reforms in Sub-Contracting.

NEW YORK, February 11, 1891.

To the President and Directors of the National Association of Builders:

GENTLEMEN.—Your committee, appointed at the annual convention at St. Paul, under the following resolutions:

Whereas, Many evils and wrong practices have become prevalent through the present methods of sub-bidding and sub-contracting; and

Whereas, It is for the best interests of both direct contractor and sub-contractor to have a more complete understanding of the rights and practices which should prevail to constitute and comprehend honorable dealing; therefore, be it

Resolved, That a standing committee of five be appointed by the chair to take this subject into consideration, make thorough investigation, and report at the next convention;

desire to present as the result of their deliberations the following:

1. A principal contractor having been awarded a contract involving sub-contracts, his estimate having bee based upon sub-estimates, should award the said sub-contracts to the lowest solicited bidders whose bids were received by him prior to his having made out his own bid, and should notify the sub-bidders that their estimates have been accepted or rejected, as soon as the contract has been awarded to him; and should without unnecessary delay execute with the lowest solicited bidders such contracts as may be mutually satisfactory; promptness upon the part of the contractor in notifying the sub-bidders of the acceptance of their bids and the executing of these contracts being essential to the proper compliance of this rule. Should a principal contractor receive a sub-bid unsolicited, he should not be considered under obligation to use the said bid, even if it be the lowest; but he must not reveal the bid, nor use it in any way to influence any other party.

2. Any sub-bid knowingly opened by a principal contractor should be for the purpose of this article considered as having been solicited. A sub-bid should always be treated by the general contractor as a confidential communication, and should not be disclosed by the general contractor at any time without the consent of the sub-bidder; but contractors knowingly receiving or obtaining knowledge from whatever source of the bids of sub-bidders must treat them as solicited bids.

3. Sub-contractors should avoid leaving their estimates in architects' offices, when they are received there simply as an accommodation to, and for the information of, principal contractors

4 When bids are submitted to the architect or to the owner for portions of building work, they should be considered as direct estimates only.

5. Contractors should decline to give architects or owners estimates in the aggregate when the said architects or owners are soliciting estimates in detail, nor should estimates be furnished in detail when estimates are solicited in the aggregate.

6. Payments should be made by the contractor to the sub-contractors on account, as the work progresses, final payment to be made when the sub-contractor's work is completed, and should not be delayed until the entire building is completed.

7. Any one detected in trading on any of the sub-bids, whether they be solicited or unsolicited, or however knowledge of them may have come into his possession, should be liable to forfeiture of membership, censure or suspension, as the Board of Directors, or General Exchange of which he is a member, may direct.

8. A contractor having obtained work upon bids received from sub-contractors, has received from those sub-contractors valuable considerations for which proper remuneration should be given; the proper remuneration being the awarding to said sub-contractors of their repective sub-contracts; and the damage to the sub-contractors for failure of the contractor to make such awards should be estimated at the liquidated damages of not less than 10 per cent. of the amount of their respective bids; the payment of these damages by the contractor not necessarily to relieve him from being disciplined by his exchange for dishonorable conduct.

9. To bring this code at once to the attention of those interested, and to prevent it from being forgotten, or its rules overlooked, each exchange should prepare copies of this code of practice, printed in large type, and posted conspicuously upon the walls of the exchange, where they can be readily referred to by all members.

10. This association recommend to all affiliated bodies that they adopt this code and pass proper rules for its enforcement, and to enable them to discipline their members for violation of this code in their dealings with members of affiliated bodies, as well as with members of their own exchange.

11. Any member having work to let should, as far as consistent with business principles, deal only with members of his own or an affiliated exchange, and should do all in his power to forward their interests

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12. To properly enforce this code, each exchange should have a rule about as follows—viz.:

Any member of this Exchange who shall be guilty of unfair, dishonest or unbusiness-like conduct in the transaction of any business, either in competition for work or material, or refusal to comply with a contract, according to the terms thereof, or by declining to enter into a contract after the same has been awarded to him, shall be deemed guilty of a violation of the rules of this Exchange, and if after a fair trial he shall be so adjudged, he shall be liable to suspension or expulsion.

Respectfully submitted,

JAMES A. MILLER, Chairman.
W. A. KELLY,
STACY REEVES,
ABRAHAM RASNER,
SAMUEL FARQUHAR.
} Committee on Sub-Contracting.

After the report had been received the meeting adjourned until 10 o'clock, Thursday.

WEDNESDAY EVENING.

THE THEATER PARTY.

The lavish generosity of the entertainment tendered the delegates and visitors to the convention by the Mechanics and Traders' Exchange and by the Building Trades Club, and the warm and hearty friendship extended by all to every visitor, was of such a nature that an attempt at expression of appreciation would be entirely inadequate to the occasion.

Great as the city of New York is it found time to open the doors of every thing of interest to the visiting builders, and a need or desire unsupplied was an unknown quantity. The rooms of the Building Trades Club were tastefully decorated, and an especial exhibit of large photographs of prominent buildings located throughout the country was exposed in one of the apartments. A bounteous lunch was continually spread, and messengers, stenographers, typewriters, telegraph facilities, postage stamps, carriages, &c, were always at the service of the visitors, without charge of any kind.

The principal features in the entertainment line, not to mention an endless number of other things, were the theater party and the banquet. On Wednesday night all delegates and visitors, and as many of the members of the Builders and Traders' Exchange as could gain admission, were invited to attend a colossal theater party at the Casino, which is one of the prettiest theaters in the city. The seating capacity of the theater was exhausted, and every one thoroughly pleased with what was probably the most delightful gathering of builders that ever occurred in the United States.

The social aspect of the affair was most enjoyable, and the absence of strangers, for none were admitted who were not connected with the National Association, increased the sensation of friendship and regard that seemed to pervade the atmosphere.

The performance, "Poor Jonathan," the latest New York success in light opera, was very favorably received, and the liveliest expressions of satisfaction were heard all over the house at the pronounced success of the undertaking.

The company seemed imbued with the spirit of the occasion, and did, as the New York builders had done throughout, even better than the best.

THURSDAY MORNING.

Before the regular business of the morning was taken up the secretary read the following letter from the secretary of the New York Chapter of the American Institute of Architects, which was unanimously received and ordered placed on file in the records of the convention:

NEW YORK, February 11, 1891.

W. H. Sayward, Secretary National Association of Builders:

DEAR SIR.—At a regular meeting of this chapter, held this afternoon, the following action occurred, moved by the secretary and seconded by N. Le Brun, and unanimously carried:

Resolved, That the New York Chapter of the American Institute of Architects sends it greetings to the National Association of Builders, now in session in this city, and desires to express its sympathy with any action on their part calculated to harmonize the relations between the different branches of industry in connection with building operations.

Yours, very respectfully,

A. J. BLOOR, Secretary.

It was suggested by the secretary that, previous to the consideration of the report of the Committee on Uniform Contracts, it might be well to hear from the representatives of some of the exchanges regarding the use of the standard form in their various cities.

It was stated from Baltimore that, although the use of the contract had been introduced only about six months before, it was being almost universally used in the city and vicinity.

Mr. Hamilton of Pittsburgh stated that the contract was in universal use in that city and for all classes of work, and has afforded general satisfaction. The only suggestion that might be offered was that the document was a trifle lengthy.

Henry George of Detroit made a similar statement regarding its use in his city, and it is manifest that the contract is rapidly coming into more general use every day.

DISCUSSION OF UNIFORM CONTRACT.

The regular business of the morning was begun by the reading of the report of the Committee on Uniform Contract.

The report was favorably received, and Mr. Terrill of San Francisco pointed out one or two clauses wherein the contract did not cover the needs of the California builder because of the laws of that State. The builders of California have framed and are using a form of contract much the same as the standard form in wording and intent. The differences mentioned by Mr. Terrill were on the subjects of architects being compelled to give the builder a certificate for work done, and in relation to the delay by the owner in making payment at stages of the work specified for the purpose in the contract; a decision having been given in the California courts that failure to pay on the part of the owner did not release the contractor from the completion of the work.

The following is the report of the committee, together with an amendment passed thereupon.

Report of the Committee on Uniform Contract.

To the President and Delegates to National Association of Builders in convention assembled in New York, February, 1891.

GENTLEMEN: Your committee finds an acknowledgement of the value of a uniform contract in the volume of correspondence had on the subject, and is flattered with the expressions of approval bestowed upon its work, and believes that the longer the instrument as it now stands is tried by time the more universal will be its use—the larger the number to acknowledge that even-handed justice to both owner and the builder is conserved.

The publishers report the sales during the last year as largely in excess of the year previous. And still there are cities and districts in which this contract is hardly known and seldom used. The propriety of enumerating all the reasons for this tardiness to substitute the better contract in this place by us might be questioned, but one, and we believe the principal one, of them we will mention, and trust to being pardoned for so doing.

The fault lies with the builder and his neglect of business of the most vital importance to him.

In cases where both parties to the contract are fair-minded men, and no unusual conditions occur during the prosecution of the work, a simple memorandum, giving the names of the contracting parties, the work to be performed, the time it is to be completed, and the sum to be paid therefor, may suffice. But experience has shown that under the various circumstances apt to arise a different document is necessary. Some fault has been found with the form prepared as being too long, and still no clause therein has been proved superfluous during the three years of trial and experience now had. Nor has a material improvement been suggested by either architect or builder or lawyer which necessitates amendment to the original document as yet.

The Joint Committee representing the American Institute of Architects and the National Association of Builders has therefore not been called together during 1890.

In conclusion, your committee desires to urge upon you all, gentlemen, and upon the builders of the country represented by you, the fact that you are in each case one of the parties to the contract, and as such have a right to choice of form to be employed, and that in the judgment of your committee your interests will be better served at all times by insisting on the use of the uniform contract.

Respectfully submitted,

GEO. C. PRUSSING,
ARTHUR MCALLISTER,
MARC EIDLITZ.

After the discussion had ceased, Mr. McGilvray of Denver offered the following:

Resolved, that the report of the commitee be adopted, and the use of the uniform contract recommended to exchanges wherever its use is practicable under the laws of the State in which such exchange is situated.

The next subject brought up was the report of the Legislative Committee, who reported that one or two subjects had been handed them since the opening of the convention, and that owing to insufficient time for the consideration of the same, the request was made that the subjects be referred to the incoming committee.

THURSDAY AFTERNOON.

The afternoon session opened with the report of the Committee on Resolutions. The committee recommended the adoption of a resolution offered by Richard Smith of Omaha, fixing the product of convict labor at market prices when brought into competition with other labor. The resolution was adopted.

The next resolution adopted was one offered by John D. McGilvray, recommending that every exchange should devise means for the creation of a more efficient apprenticeship system, and that each exchange use every means in its power to promote the cause of manual and technical education.

ELECTION OF OFFICERS.

Next in order came the report of the Committee on Time and Place of Next Convention and on Nomination of Officers. The report was adopted and read, time of next convention, January 18, 1892; place, Cleveland, Ohio. Officers for ensuing year: President, Arthur McAllister; first vice-president, Anthony Ittner of St. Louis; second vice-president, Ira G. Hersey of Boston; secretary, William H. Sayward of Boston; treasurer, George Tapper of Chicago. The naming of officers was received amid much enthusiasm, and each made a pleasant response in accepting the nomination.

Mr. McAllister and Mr. Ittner each made a few happy remarks upon the prosperity of the association and the clearer demonstration that comes with each year of the wisdom of the creation of the association.

The second vice-president, Mr. Ira G. Hersey of Boston, took occasion to pay an exceedingly high compliment to his fellow worker, the secretary, by stating that

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while he accepted the office of second vice-president, he did it for the purpose of bringing the National Association home again to Boston in the near future, and inasmuch as the secretary had been called the father of the association, he accepted the honor of the office for the express and only purpose of giving to the National Association the honor of being presided over in the visit home by its "father" and originator.

Considering the fact that precedent virtually gives Mr. Hersey the high honor of being the association's president in three years, his purpose to resign that office just previous to the convention over which he would have presided, in favor of W. H. Sayward, which will prevent the association from losing him as secretary up to the time for the presiding officer to take his seat, is a most generous and high spirited action. Mr. Hersey's action was warmly welcomed by the convention.

Mr. Tapper responded in his usual quiet and pleasant manner, and Mr. Gillingham of Philadelphia cast one ballot, electing the officers in the order named.

Following the election of officers came the election of directors for 1891, whose names appear in another column of this issue.

The pro rata assessment was fixed at $3 per capita, which is the same as prevailed during 1890.

Just previous to the end of that portion of the business of the convention which was to be transacted in the Masonic Hall, Mr. Geo. C. Prussing of Chicago offered the following resolution, which was adopted:

Resolved, That a committee of five (5) be appointed by the President to take into consideration the advisability of taking action on the subject of Lien Laws by this body, and to report the form of such action at the next convention.

A letter was read by the Secretary from Col. Auchmuty thanking the National Association for electing him an honorary member of that body, which he regarded as an expression of approval for the work he is doing in the New York Trade Schools.

There were fitting resolutions of the warmest thanks of the convention tendered to the retiring President, to which Mr. Tucker made brief answer. An effort was also made to give some expression of appreciation of the wonderful hospitality of the Mechanics' and Traders' Exchange and the Building Trades' Club of New York City, but all seemed impressed with the idea that words were absolutely useless in return for such magnificent entertainment, and the convention adjourned to meet the next day at the Master Builders' Exchange of Philadelphia, Pa.

THE BANQUET.

Only those who had the privilege, the very great privilege, of attending the banquet at Lenox Lyceum, at Fifty-ninth street and Madison avenue, on the night of February 12, will be able to comprehend the full significance of any words that can be used in a description of that event.

The Lyceum, which is perhaps the best building for the purpose in the United States, was resplendent with beautiful and unique decoration and the beauty of the scene impressed itself indelibly upon every beholder.

The mammoth room, circular in form, was brilliantly lighted with an extra supply of electric lights which were added for the occasion, and the two tiers of boxes which encircle the room were obscured by great banks of greens and flowers. The upper tier was filled with large green palm leaves, which made a most perfect and beautiful contrast to the light back ground of the walls. The fronts of the lower boxes were filled with a most artistic arrangement of plants, clusters of flowers and concealed electric lights, and the brilliancy of the whole scene was almost incomprehensible from the delicate handling of every auxiliary to the general effect.

The front of the platform, upon which was spread the table at which sat the guests of honor, was completely obscured by the work of the florist, and its beauty but accentuated the appearance of that portion of the enchanting circle which surrounded the banqueters.

Directly opposite to the platform and in an elevated position was placed the famous Thomas' Orchestra, which rendered during the evening an excellent selection in its usual perfect style.

The tables at which the banqueters were seated were placed at right angles to that of the speakers and bore a precious and fragrant burden of flowers and service. At frequent intervals down the entire length of the long tables were placed huge bouquets of rare flowers whose delicate perfume gave added zest to enjoyment of the banquet.

The appearance of the scene as viewed from among the palms in the upper boxes was magnificent in the extreme, and it would be difficult for any one who had not been present to comprehend the elaborateness of the display or the skill and judgment with which the whole had been accomplished.

The *menu* was a further exemplification of the fact that the builders of New York are keenly alive to what constitute the "good things of life," and the serving was done in a manner so devoid of confusion and complication that each of the 900 guests received more than his portion of that which made him dream that the Banquet Committee were the masters of the earth.

The *menu* itself was a beautiful novelty, being composed of terra cotta with the names of the various "good things" in relief, bordered by fluted pillars and surmounted by an arch which bore the legend "Mechanics and Traders' Exchange of New York." It was fully up to the mark that had been so high in everything and will prove a fitting souvenir to all who were in attendance.

The last course was served at about 10 o'clock, and the toasts of the evening, after an agreeable opening by toastmaster Wm. C. Smith, were responded to in the following order:

"Our Country," ex-President Grover Cleveland.

"The State and City of New York," acting Mayor, J. H. V. Arnold.

"Our Guests," Arthur McAllister, the newly elected president of the National Association; "Education, Professional and Industrial, or the Builder of the Future," by Gen. Alex. S. Webb, President of the College of the City of New York; "Arbitration," by the Rev. James M. King, D.D.; "Architecture," by Montgomery Schuyler; and "Our Sister Exchanges," by John S. Stevens, delegate from Philadelphia.

After Mr. Stevens had finished there were repeated calls for "Sayward," and although the secretary had especially requested that he be not called upon to speak, he made a few brief remarks touching upon the magnificent hospitality of the hosts of the National Association, and pointing to the success of the convention as an indication of the future of the association.

The speeches in response to the various toasts were received with close attention and full appreciation of the excellent material of which they were composed. Mr. Cleveland's response to "Our Country" was received with much enthusiasm. Each of the other speakers were greeted with full measure of attention, and when the last word was said and the last song sung all were imbued with a new knowledge of the ability of his fellows to provide for the entertainment of the mind and body of his kind.

FRIDAY AFTERNOON.

THE PHILADELPHIA EXCURSION.

Friday afternoon the delegates and their friends to the number of about 500 went by special train to Philadelphia to inspect the Builders' Exchange in that city, its building material exhibit and its trade schools. Reaching the city at 3.30 o'clock the visitors formed in line and marched to St. George's Hall, where they were served with an elaborate lunch, provided by the Builders' Exchange. When the lunch had been fully considered the visitors repaired to the Exchange Building, where they were welcomed by President George Watson, who in a few brief remarks told what could be accomplished by hard, earnest work.

HISTORY OF THE EXCHANGE.

A history of the Exchange was read by Charles Gillingham, chairman of the Exhibition Committee, showing the growth of the institution, its workings, and the methods adopted in putting up the building. The three special departments of the Exchange were taken up and considered somewhat in detail. In the departments were offices for members or those in any business allied to the building trades, an exhibition department and a trades school. The report showed that such a building can be run at comparatively small cost. It was shown that the total possible revenue from the offices was $10,000. In the exhibition department the total available space was 3134 square feet on the floor and 392 square feet on the wall, yielding a total possible rent of $16,000. The report showed the revenue for one year to be $12,000, and the expenses for salaries, advertising, incidentals and a proportionate share of the general expenses of the corporation to be $10,150, leaving a net profit to the department of $1850.

THE TRADE SCHOOLS.

The explanation of the workings of the trades school came next in the report, and attracted the undivided attention of the delegates. Before concluding arrangements for opening this school the committee having it in charge paid a visit to Colonel Auchmuty's school in New York for an official inspection. The school was finally organized and opened last September, after nearly a year's committee work. The applications for admittance to the classes came in so fast that many branches were soon full to overflowing, and a division became necessary even before the opening of the school. One class comes on Monday and Thursday evenings and the other on Tuesday and Friday evenings, Wednesday evening being devoted to lecturing on mechanical theories. The cost of a year's tuition in the school is $18.

The school is not run for profit excepting that which accrues from an advancement of the apprentice. The report showed a slight deficit in this department.

When the report was finished George C. Prussing of Chicago offered a resolution indorsing the action of the Executive Committee for planning the trip, and extending the thanks of the National Association to the Builders' Exchange for the demonstration given of what an Exchange can accomplish—"an object lesson to all filial bodies here represented." The resolution also included a clause to the effect that the address of Mr. Gillingham be a part of the recordof the convention and be printed in the official report. This resolution was unanimously adopted.

BUILDERS' EXCHANGES AND TRADE SCHOOLS.

John S. Stevens, ex-president of the Philadelphia Exchange, made a few remarks touching the value of trade schools for teaching boys a method of learning to care for themselves, after which Mr. John T. Tucker, the retiring president of the

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National Association of Builders, spoke upon the subject of builders' exchanges. Among other things he said that mechanics are as much entitled to a building of the kind occupied by the Philadelphia body as are the brokers. A committee has been appointed by the New York Exchange, said he, to inquire into the cost of such an establishment, which, to my mind, should be at least 100 feet square, 10 stories high and fire proof. I have estimated the cost to be $1,000,000.

Secretary Sayward presented a few remarks, in which he criticized the New York and Chicago organizations for not having a building similar to that of the Philadelphia Association. George W. Hunt, president of the New York Board of Education, paid a high tribute to the builders of the country, and said:

"In New York there are 29 manual training schools, and another is proposed, but these only teach elementary principles. I am heartily with you in this undertaking. The bone and sinew of the country depend on the middle class, which is represented by those you will make mechanics. The civilization of a country can be determined by the character of its buildings, and the elements of civilization group themselves together in cities. You represent the civilization of the country. The monuments you have reared to-day are monuments of immortality and your trades school boys will be your successors, and with the foundation you give them, will make first-class citizens."

The delegates then adjourned to the school room, and expressed themselves as highly pleased with the extent to which the work had been carried. After an inspection of the exhibition department, in which the delegates apparently were deeply interested, the visitors left for New York.

The members of the Committee on Arrangements, who worked so diligently for the welfare of the guests, were William H. Albertson, chairman; George W. Roberts, Albert A. Reeves, Charles P. Hart, W. P. Fogg, F. A. Ballinger, F. F. Black, John Atkinson, James MacAvoy, W. W. Stevens, S. R. Riley, Almond Rimby, H. R. Coulomb, Joseph Brown, H. C. Webster, Frank Williamson, Charles Fowler, F. M. Harris, Jr., and Charles Linton.

SATURDAY MORNING.

After the visit to Philadelphia, the convention met on Saturday morning at the rooms of the Building Trades' Club, in New York, and after listening to an interesting address by Mr. Tucker and transacting the closing business, the convention formally adjourned to meet in Cleveland on January 18, 1892.

NOTES.

Among the many pleasant impressions left upon the minds of each delegate and visitor to the convention none are stronger than those imparted by the kindness, the watchfulness after the needs of the visitors, and the unflagging courtesy of every person connected with the entertainment of the convention, and more particularly by the tireless efforts of the members of the various committees appointed for the purpose from the Building Trades Club and from the Mechanics' and Traders' Exchange.

It is impossible, from lack of space, to name each individual member of the committees that contributed their services so generously, and then, too, some of the many builders whose names do not appear in any of the committees, but who also added the warmth of their welcome and assistance, might be unnamed among the number who devoted their entire time and attention to the visiting builders.

To the chairmen of the various committees, Messrs. Cowan, Eidlitz, Warren A. and Frank E. Conover, are due the most heartfelt thanks of every builder in the National Association, as well as the greatest credit, for the perfect performance of every thing that ingenious hospitality could suggest.

The labor of the general secretary of all the committees, Stephen M. Wright, which has extended over a period of nearly one year, was so thoroughly comprehended and carried out that it was impossible for the delegates to understand the vast amount of thought, time and energy that had been expended in perfecting every detail, so that the whole affair passed off without a hitch or complication of any kind whatever.

Nothing could exceed the uniform courtesy with which Mr. Wright greeted every one of the inquiries for information of every description, and all who had occasion to test his knowledge have carried with them to their homes a warm spot in their hearts for the general secretary of the entertainment committees from two such hospitable bodies as the Mechanics' and Traders' Exchange and the Building Trades Club.

Annual Meeting of the Philadelphia Exchange.

The fourth annual meeting of the Master Builders' Exchange of Philadelphia was held on the afternoon of January 27, President Stacy Reeves in the chair. After the reading of the minutes of the previous meeting it was decided to proceed at once with the business of electing seven directors for three years and one for two years, the latter to fill the unexpired term of William S. McGinley, deceased.

The voting was done under the cumulative system, which allows each voter to cast one ballot for each of the seven different candidates or cast seven ballots for any one of the nominees. After all had voted the tellers retired to make a count and the other business of the meeting was proceded with.

The secretary read the annual report of the Board of Directors. It congratulated the members on the prosperity of the Exchange and of the constantly improving condition of its finances, which were stated to be as follows: Assets: Cost of the building, $148,908.34; value of furniture, fixtures, &c., $6485.83; total, $155,394.17. Liabilities: Bonds outstanding, $100,000; floating debt, $13,704; 132 certificates of corporate membership, $36,960; total, $150,664; surplus to be charged to the contingent fund, $4730.17.

The net earnings of the different departments were as follows: Taxes, water rents, &c., $5193.27; Exchange proper, $5144.25, less the donation of $2500 to the Trade School, which left $2644.35; the exhibit room, $751.29. Total, $8519.61.

The Legislative Committee reported to the board that it had assisted in the prepation of a bill to revise the building laws. It has also in course of preparation a new lien law for the better protection of subcontractors.

CONFERENCE SUGGESTED.

The Committee on Labor recommended that there be a conference between employers and employees in the building trades at the beginning of each year to fix the rate of wages for the building season and to make other suggestions of mutual benefit. The Historical Committee has secured the services of a competent gentleman, who is now engaged in writing a history of the Exchange to date.

The Committee on the Mechanical Trade Schools reported success in their undertaking and are much encouraged. Their total receipts were $8719.52; expenditures, $5779.25, leaving a balance on hand of $2940.27. There have been 130 pupils admitted to the school up to January 1. The Membership Committee reported that at the beginning of 1890 there were 123 corporate and 166 non-corporate members; admitted during the year, 21 corporate and 25 non-corporate; total, 335. The loss by resignation, non-payment of dues and death amounted to 39, leaving the present membership 296, a net gain of seven during the year. The average daily attendance during the year was 67¾ per cent.

RESULT OF THE ELECTION.

The tellers then came in and announced the result of the election. F. A. Ballinger, who was on the ticket, having withdrawn, left 12 candidates, seven to be elected. The candidates were divided up among the different trades as follows: Bricklaying, stone masonry and cellar digging, John Atkinson, George W. Roydhouse and Louis Deitrich; carpentry and stair building, George Watson, Jacob R. Garber, Charles G. Wetter and Thomas H. Marshall; wrought and cast iron work, David S. Creswell; plastering and artificial stone pavement, William H. Albertson and A. G. Buvinger; roofing and galvanized iron work, J. S. Thorn; stone cutting and tilework, F. F. Myhlertz, and for the two-year term Joseph E. Brown, of the roofing and galvanized iron work trade.

Those elected, with their vote, were as follows: George Watson, 128; George W. Roydhouse, 119; John Atkinson, 95; J. S. Thorn, 87; F. F. Myhlertz, 84; William H. Albertson, 79, and Charles G. Wetter, 78. Joseph E. Brown, who had no opposition for the two-year term, received 114 votes.

A Siberian Forest.

A Russian traveler gives an interesting account of the Siberian forest called the Taiga. He says it is so vast that not even the peasants who were born in it, and have lived there all their lives, know how far it extends. The peasants declare that in the winter strangers from the north come on reindeer to sell bread. What people they are, or whence they come, the peasants cannot say. They only know that they are not the same race as themselves, and do not speak the same language. This mysterious people, it would appear, have never been seen by any one but the inhabitants of the forest, who are themselves almost uncivilized, living upon what they shoot. The trees, which are pine, are wonderfully thick and high, and a dead stillness prevails in the summer, an attribute common to all Russian forests. This silence has a peculiar effect on the traveler after he has been journeying for many hours, especially if he is alone. At the end of his first day the traveler states he ascended a hillock, and as far as the eye could reach stretched an endless sea of trees; at the end of the second day only the same scene was to be observed, although he knew that Irkutsk and open land lay beyond. The forest of Taiga opens up a vast territory for exploration to those who are tired of the beaten track, as in many parts of it no human being has ever planted his foot.

IT IS STATED that although the year 1890 was a bad one in Kansas City, Mo., for building operations, permits were issued for work involving an expenditure of $8,000,000. Two hundred and six brick business buildings, 414 brick residences and over 900 frame business blocks and residences were erected, including many very handsome residences. It is true that dwellings in Kansas City are not being built as rapidly as some years ago, when 2000 people were living there in tents, not from poverty, but from lack of houses. The business men and property owners, however, have erected houses that are largely in demand, as they are comfortably built, with all modern conveniences.

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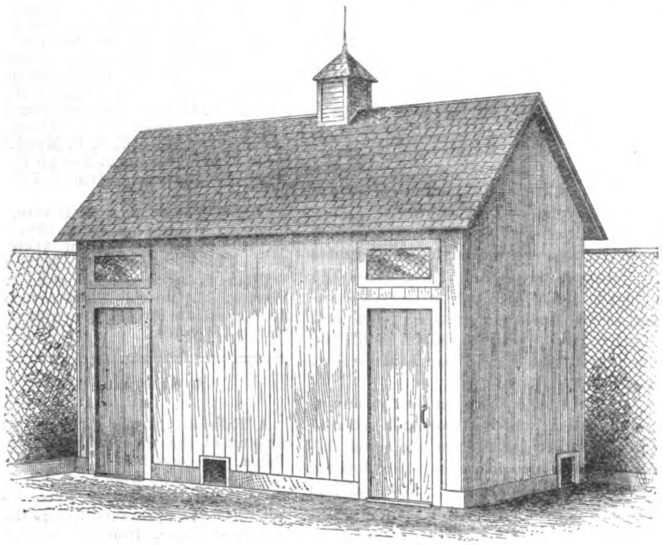
CORRESPONDENCE.

Design for Hen House.

From W. B., *Washington, D. C.*—A correspondent in the December number of *Carpentry and Building* asked for a plan of an improved hen house, and in reply thereto I send sketches of a house built on a Mr. Burdette's farm in Maryland. The house shown is of sufficient capacity to accommodate from 75 to 125 hens. While it is a cheap house, I consider the arrangement convenient, not only for the fowls, but also for the farmer. A general view of the structure is indicated in Fig.



Design for Hen House.—Fig. 1.—*General View of House.*

1 of the sketches. It is 16 feet long by 8 feet deep and is 9 feet to the eaves. The space inclosed is separated by a tight partition, making rooms 8 x 8 feet in size. From an inspection of the engraving it will be seen that there are two doors, each measuring 2½ feet wide by 6 feet high. One of the compartments into which the house is divided is known as the "laying room," while the other is the "roosting room." Fitted around the laying room on the sill is a 12-inch board, so disposed as to support 24 boxes 12 inches square by 6 inches deep. The boxes are not nailed, and can be moved at pleasure. Four feet from these boxes is another row similar to those described, resting on 12-inch boards. The bottom boxes are intended for setting hens in the spring. The house can be arranged with a hole in the partition be-

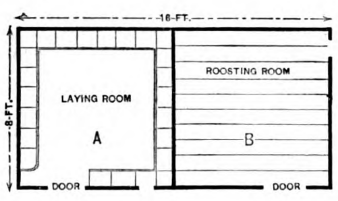


Fig. 2.—*Plan of House.*

tween the walls if desired. In the roosting room four uprights are placed from the sill to the plate over the door, and across these uprights are put cedar or pine poles about 1½ inches in diameter, as indicated in the plan shown in Fig. 2 of the sketches. The poles are placed from 12 to 14 inches apart, while the uprights are in a slanting position. The small opening into the laying room is 10 inches square and is designed for the admission of fowls, while the small opening into room B is 12 inches square and leads to the roosting room. This opening has a door which is locked or fastened on the inside. It is also well to keep the roosting room door locked. There are transoms, or heavy sash, with glass over the doors shown in Fig. 1, which are covered on the inside with wire screen. The object of this is to prevent the fowls from breaking the glass. On the top of the building, the roof of which is covered with shingles, is a ventilator 18 inches square and 18 inches high. The sides and ends of the building are made of weather board, running up and down.

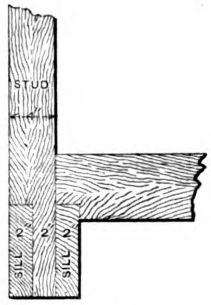
Convenient Door Holder.

From S. F. B., *Wellington, Ohio.*—I have taken quite an interest in the door-holder question, recently discussed in the columns of *Carpentry and Building*, and think the holder shown in the January number, if hit hard enough at A, would be more stationary than the trestle with the boot-jack on the end. I used "N. P. W.'s" way of putting a board with a notch in it across the jambs. It does not scar the jambs if put in right, but I have a wide board laid on trestles on the opposite side of the door on which to lay tools and hardware for fitting the door. I always use a bench when I can, and have one 6 feet long and 2 feet wide, with a vise, also two light trestles, on which to do sawing, and a light step-ladder with a shelf on the top, on which to place tools when putting in the top butt. I always saw off the stiles first, then fit the butt edge, then the lock edge, then reset the door by a scribe top and bottom. I then put the door in the frame up to the top and mark off the butts on both the frame and the door. Next, I place the door in the base and put in the butts, then the other half in the frame, and hang on the door, swinging it part way open, and driving a wedge or chisel under the door, so that I can bore for the lock and knob. For this purpose I use a $\frac{7}{8}$-inch bit and a $\frac{3}{8}$-inch for the key-hole. Our Western friend tells us they have to hustle, but that he "gets there" with the best of them. I built a house last summer, with four doors, all fitted with rim locks. I used "N. P. W.'s" method with entire satisfaction. There were outside doors having mortise locks, four with mortise latches and one pair of folding doors, with edge bolts and mortise latch. I fitted and trimmed the entire number in eight and one-half hours. I used a bench on the first floor.

From C. E. J., *Bryan, Tex.*—The trestle suggested by "W. K. H.," Chase City, Va., in his letter, which appeared in the November issue of *Carpentry and Building*, will work all right provided one end rests against a wall. If he tries to fit a door without one end of the trestle being against the wall or some other stationary object, the trestle will move about while he is planing the door and prove very annoying.

Framing Sills.

From A. B. H., *Winter Haven, Fla.*—I have been a reader of *Carpentry and Building* for four years, and during that period have never seen the method of framing sill which I have been in the habit of employing. I have used it on buildings of all kinds from 10 x 10 to 50 x 90, barns,

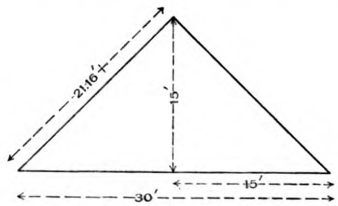


Method of Framing Sills, Employed by "A. B. H."

houses, &c., and it has given entire satisfaction. In light cottages I do not always double the end sill. Some of the advantages are that it is made of joist, is easily spliced, and is not as liable to decay as a solid piece. It also requires less labor and material. The method which I employ is clearly indicated in the accompanying sketch.

Pitch of Roofs.

From S. W. R., *Boonville, Mo.*—I am much pleased with the manner in which my questions on estimating the cubic contents of buildings were presented in the



Sketch Submitted by "S. W. R."

December number of *Carpentry and Building*. I have calculated the cubic contents of a number of buildings which have been constructed at a certain cost, and find, like the writer who replied to

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my questions, that the cost per cubic feet is "very variable," owing probably to the difference in cost of work and material in different sections of the country in which the buildings are constructed. I notice also a discussion of the pitch of roofs going on in the September and December numbers of the paper. Allow me a word on this subject. Certainly what the pitch of a roof means should be the same whether it be in this or a foreign country. Among civil engineers there is no question what the slope of earth in railroad construction or the bevel of stone in masonry means, and so it should be with the pitch of a roof. If the slope of earth is referred to as "one to one," it is understood at once that the embankment slopes 1 foot horizontal to 1 foot vertical, and so "one and one-half to one" means that the slope is 1½ feet horizontal and 1 foot vertical. If in masonry the expression is used "one to one," it is understood at once that the bevel is 1 inch horizontal to 1 foot vertical. There is never any question about it, and so it should be with the pitch of a roof. "Half pitch" should be understood at once to mean that over a 30-foot span the hight at the center or ridge of the roof should be 15 feet. What I mean can be readily understood from an inspection of the diagram which I herewith submit. The length of the rafter, then, is readily calculated by the rule for finding the hypothenuse of any triangle. If the various societies would take action on this apparently simple question it would settle it for the young and uninitiated in the trade. What is often so simple to the expert that explanation seems folly is frequently a stumbling block to the beginner. As in the case of "W. S." of Paterson, N. J., it should not have been necessary for him to ask the question.

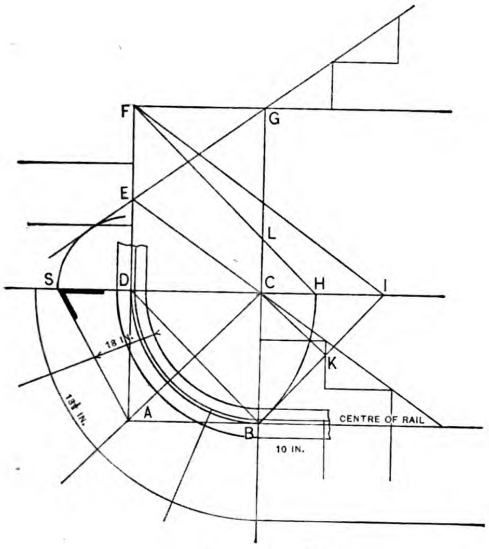

Fig. 1.—Plan View.

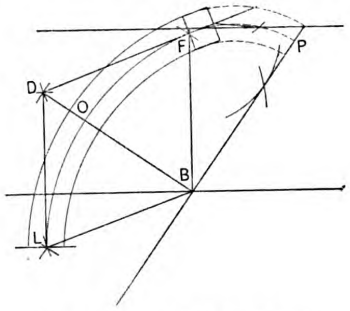

Fig. 2.—Method of Drawing the Mold.

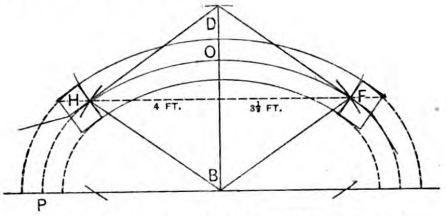

Fig. 3.—Another Method of Obtaining Mold.

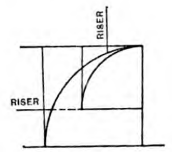

Fig. 4.—Enlarged View of Cylinder.

A Question in Handrailing.—Sketches Submitted by "A. D."

A Question in Handrailing.

From A. D., *Beloit, Wis.*—I saw what I considered a very faulty construction of a handrail by "F. P. C.," Lincoln, Neb., in the March number of *Carpentry and Building* for 1890, which impels me to attempt to set him right and at the same time answer the inquiry of "J. C.," Cedar Rapids, Iowa, whose letter appeared in the December number of *Carpentry and Building* for 1889. Referring to Fig. 1 of the accompanying illustrations, let A B C D inclose the quadrant of the cylinder, which is obtained in the following manner: The risers are 7 inches and the tread 10 inches; set up from D to E and from E to F the hight of two risers. Draw the pitch from E to C, which makes the quadrant 30 inches and determines the radius of the cylinder to the center of rail. This is imperative and cannot be departed from. Draw the segment B H and the line H F. Draw F I parallel to E C; draw L B and C K. The bevel is shown at S. Referring now to Fig. 2 of the illustrations, in order to draw the mold, set up from B to F the distance E C or E G of Fig. 1, and from F take the distance F L, and from F as a center draw the arc at L, as shown. From B intersect the arc at L, with the distance E C of Fig. 1, and draw the line L D with the same distance from F to L. Draw the arc at D, and with the diagonal B D draw the arc at D. Set up from B to O the radius C D of Fig. 1. With the distance F L draw arcs on the major axis, which will give the place for the pins, and with a string or trammel draw the ellipse, which will pass through the three points. Set off from P 1 inch more than half the width of the rail each way, and it will give sufficient wood at the joints to square the rail. Fig. 3 is the same thing as Fig. 2, only obtained in a different way. Set up from B to O the radius C D of Fig. 1 and the diagonal B D of the same figure. From B and D with the distance C E draw arcs at H and F. Draw D H and D F, which will be tangent to the ellipse, and the ellipse will pass through the three points. One mold will answer for the upper wreath if there are eight winders in the half cylinder. One bevel answers for all the joints. If there are but two winders in the quadrant, or four in the half cylinder, the radius of the cylinder will be one tread or two circles on a platform, the radius of which will be 5 inches. In consequence of the smallness of the cylinder it is best to enlarge it and place the risers in the cylinder as shown in Fig. 4 of the sketches. This, it will be observed, is drawn to the larger scale. The falling mold is a straight piece cut out of thick paper the width of the thickness of the rail and bent on both sides. After the sides are worked off "F. P. C." will perceive that a slab will be cut off the sides as well as the top and bottom, and is impracticable. The bevel could not be applied to the face of the plank, or in any other way, and is contrary to all known rules of geometry. I trust that the correspondent may be able to derive some benefit from the answer to the problem which I have endeavored to present.

Estimating Work in Framing Barns.

From A. S., *Lancaster, Ill.*—I desire to ask the readers of *Carpentry and Building* for a concise and easy method of estimating work in connection with barn framing. I also think it would be of interest as well as a benefit to the readers of the paper if a little more attention was given to the architecture of farm buildings, such as farm houses, barns, &c.

Question in Door Making.

From L. P., *Manayunk, Philadelphia, Pa.*—In reply to "A. W. W.," Sudbury, Ont., I desire to state that in my estimation his method of constructing doors, as mentioned in a recent issue, was perfectly proper. In all my 17 years' experience I have never seen front doors molded on the inside with a 2½ inch mold. We either make a bead and butt panel which comes flush with the inside, or insert a 1½-inch mold, or else make the panel plain raise without mold. I should judge that the person who criticised the method employed by "A. W. W.," lacked experience. If, however, he was an experienced person, I should like to have him prove his position. I should also like to see more questions asked in regard to the construction of mill work.

From M. D. D., *Scranton, Pa.*—In reply to 'A. W. W.,' Sudbury, Ont., I would say that I am a door maker, and have made doors by the hundreds in the largest cities of Germany and France, but have never worked in a door factory in this country. I will endeavor to answer the question proposed in the February number of *Carpentry and Building* by saying to "A. W. W." that he made the front door as it should be. The molding on one side of the door has nothing to do with the other side. It is proper, however, to have the inside of the door like the rest of the inside doors.

Kennet's Shingling Bracket.

From F. K., *Gridley, Ill.*—I would like to ask, through the columns of *Carpentry and Building*, who manufactures the Kennet Shingling Bracket? At one time it was made by Hetzel & Williams of Syracuse, N. Y., but I am unable to find any address

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of the firm now putting it upon the market. It is a roofing bracket which I hold in high regard, and I would like to obtain one or more of them.

Framing a Bank Barn.

From C. S., *Brunswick, Ohio.*—I notice in the December number of *Carpentry and Building* an inquiry from "H. J. C.," Volanti, Pa., to the effect that he desires to know how to frame a bank barn in which the barn floors are dropped a few feet and the center piece of the middle beams cut out? In reply to his letter of inquiry I send herewith some sketches which I think will prove of interest to him. Fig. 1 represents the front side of the barn framing, Fig. 2 the rear side, while Fig. 3 represents the end bent. Fig. 4 of the sketches represents the middle bent, while the dotted lines indicate the bents on each side of barn floors. This is planned for two summer sills 12 x 14 inches, running the entire length of the barn. Fig. 5 of the sketches is an elevation of one of the summer sills. With regard to the question of purlins, I think straight ones are much better than sloped. I will warrant a barn constructed in the manner outlined by the sketches not to spread, and to prove substantial in every way. The long braces running from the beam to the top of the purlin posts, as shown in Fig. 4, are dovetailed at both ends, one on each side 1½ x 8 inches, so that they cannot pull out. Considered as a whole, this makes a very good barn.

Effects of Mortar on Timber.

From DRY ROT, *Rutherford, N. J.*—In the December number of *Carpentry and Building* I notice a communication from "S. S.," Ithaca, N. Y., on the effects of mortar on timber, which interests me. The correspondent describes the matter in about the same way as I have already found it. Something like two years since I was called upon to build an extension to a house which at the time I thought to be in good condition. The stone work had been run up to the flooring between the floor timbers on the inside of the sill. Everything looked all right in the cellar, but when I tore out the siding, lo and behold! the water table actually dropped off. There was hardly any sill left, only here and there a piece. The rest had been consumed by the dry rot, which was caused by running the wall up to the floor and providing no means of ventilation for the sill. Some architects call for filling in over the sill between beams with grouting. For my part, I think it is a great piece of nonsense to choke up the timber in that manner. If I want to stop all draft between timbers I do it with lumber, not with mortar. If one will cut short pieces between the floor timbers it will exclude drafts, rats and mice, to the same extent that mortar will do it, and there will be no dry rot in the sills either. I shall be glad to hear from other readers of the paper touching upon these points.

High Cost Houses.

From W. H. G., *Rochester, N. Y.:* I am a subscriber to *Carpentry and Building*, and have looked with much interest at the elevation and plans which appear in the monthly issues. Would it not be of interest to the readers to publish plans of a better class of houses, such as would cost from $10,000 to $20,000, built of frame, brick or cut stone, and located on a city lot of 50 to 75 feet front, in such cities as Rochester, and those west of Boston as far as St. Paul. I would suggest five rooms on the second story, which would give the proprietor a room, with one for his wife, bath and dining rooms being attached. A general bath for the rest of the family could be on the second story, and servants' room in third story, or attic. There should also be a small parlor, good-size dining and sitting rooms, library, toilet, a good light hall, and a kitchen of good size, this room on the average being too small—in fact a model

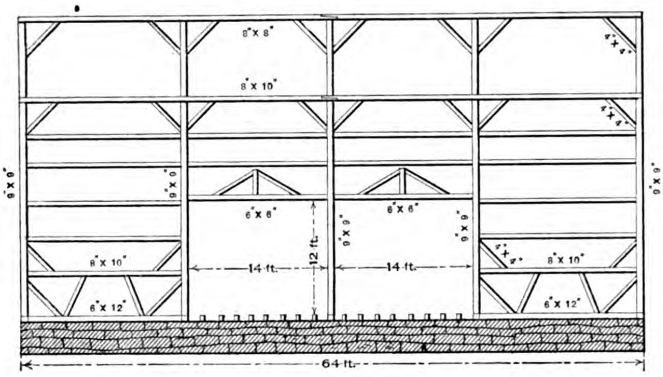

Fig. 1.—The Front Side of the Barn.

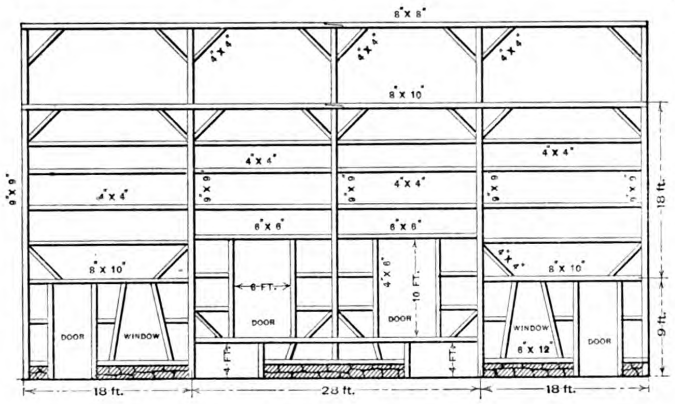

Fig. 2.—The Rear Side.

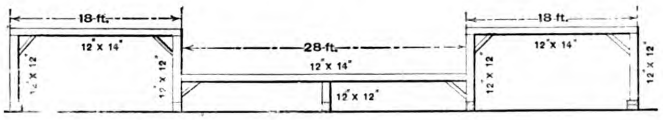

Fig. 5.—Elevation of Summer Sill.

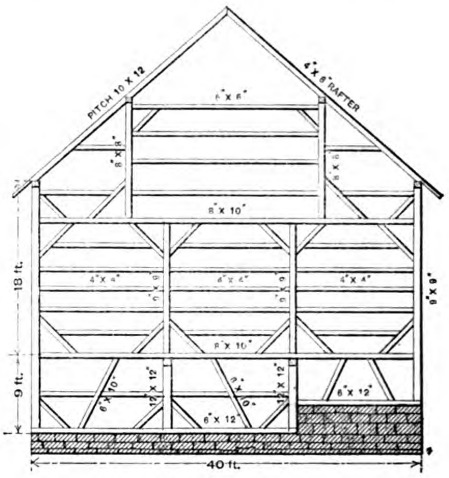

Fig. 3.—End Bent.

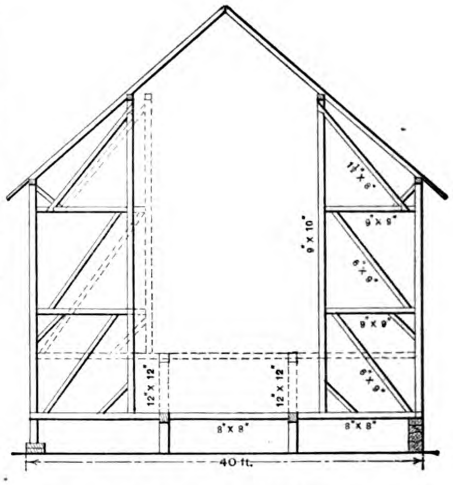

Fig. 4.—Middle Bent, with Dotted Lines Indicating Bent on Each Side of the Floors.

Framing a Bank Barn.—Sketches Accompanying Letter Submitted by "C. S."

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house for the times, and for those in comfortable circumstances.

Note.—During the past year the pages of *Carpentry and Building* have contained several designs of city houses, ranging in cost from $5,000 to $25,000, which would appear to be in the line suggested by our correspondent. The subject is a broad one, however, and cannot be exhausted in a single year's issues. The future will probably witness the presentation in our columns of other studies suited for city lots, but in the meantime we shall be pleased to receive contributions and suggestions from those who are interested.

A System of Framing Roofs.

From D. H. MELOY, *Waterbury, Conn.*—I notice in the February number of *Carpentry and Building* a criticism on my system for laying outside bevels for two pitch roof by "J. W." of Paterson, N. J. In reply permit me to say that I have examined Fig. 13 and find it correct in every respect. The rule given will apply to any pitch from 1° to 90°, and the side bevels will fit all exactly. If "J. W." will say wherein any part of it is not clear to his mind I will most cheerfully endeavor to throw more light upon it for his benefit.

From L. W. H., *Duryea, Pa.*—I would like to ask D. H. Meloy, whose article on roof framing is being published in *Carpentry and Building*, to examine Fig. 9 which appeared in the January number, and tell me why the point at A is the length of the hip rafter when the corner of the building is where the lines B J, B J cross?

Choice Excerpts.

From F. S. Y., *Lock Seventeen, Ohio.*—I am greatly pleased with the feature of quotations recently incorporated in *Carpentry and Building*, and will give one or two which may be of interest:

"'I'll try' conquers the world;
'I can't' conquers nothing"
A. LARANTZ.

"He who makes no mistakes makes few discoveries."

From B. F. S., *Feastewille, Pa.*—In reading over the choice excerpts found in the January issue of *Carpentry and Building*, I was reminded of one by Gail Hamilton, found in S. S. Wood's *Household Magazine* for December, 1871. It occurs in "Our Household Discoveries:"

> "The cathedrals and palaces of the Old World are pictures and poems in stone."

The truth of this can scarcely be doubted, when we stop to consider the true meaning of the author.

Drawings for a Bake Oven.

From W. S. C., *Corpus Christi, Texas.* Will some of the practical readers of *Carpentry and Building* kindly send to the editor, for publication, drawings of a bake oven on a small scale? This is a matter in which I am particularly interested, and I have no doubt other readers of the paper would find it equally so.

Finishing Wood Patterns.

From H. E., *Greenfield, Ohio.*—Will you or some of your readers give me information as to the preparation which is used in coating wood patterns? I am no practical pattern maker, but where I am employed I make all the patterns, and have used a preparation of varnish and beeswax, but do not like it. Probably I did not have it mixed correctly. I would also like the receipt for a black finish.

Note.—Patterns usually are first covered with shellac dissolved in alcohol, after which they are rubbed down and finished with white varnish. The black finish referred to by our correspondent is shellac and alcohol, to which lamp black is added as desired to make a dark or light color. This is also rubbed down and a coat of white varnish applied to it to give it a smooth finish. These receipts are in use by some pattern makers, but we do not know how generally they are employed. We would be very glad if some of the practical readers of the paper would describe their method of finishing patterns for the benefit of this particular correspondent as well as many other readers who, we do not doubt, are equally interested in the matter.

"French" Houses.

From F. L. F., *Oxford, N. Y.*—Will some one kindly explain through the columns of *Carpentry and Building* the construction of what are called "French" houses? I think they are built in "half stories." I no not understand the meaning of the term used in this way, but I am told there are a few houses of this kind in New York City and possibly in some of the other larger places.

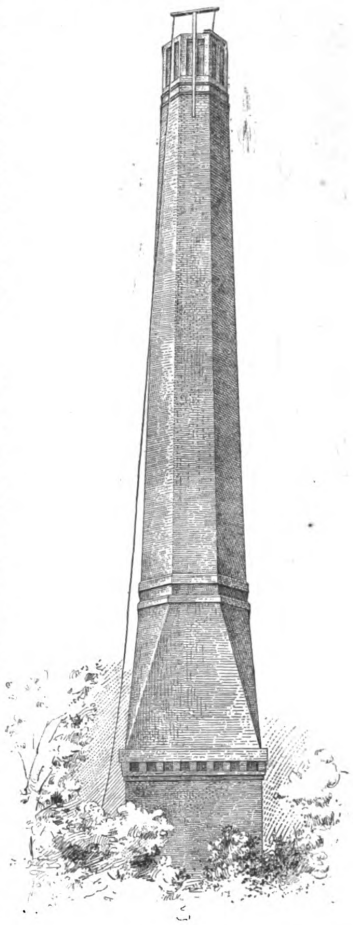
Note.—With regard to the question of our correspondent above, we are under the impression he refers to what are commonly called French flats, or apartment houses, now very common in the larger cities. As our readers know, all the rooms occupied by a family are on the same floor, thus avoiding the necessity of going up and down stairs, in order to pass from one room to another. Just what our correspondent means in this connection by "half stories" we are unable to say, but think it may be a term peculiar to certain sections. We submit the question to our readers in the hope that it may bring out an interesting discussion.

Building a Factory Chimney.

From BUILDER, *Chicago, Ill.*—Many visitors who have wandered about Lincoln Park during the past summer have been interested watching the progress upward of the large chimney that is to furnish the lung power for the engines and boilers connected with the new propagating houses. This chimney has appeared to rise out of the ground. There have been workmen at the top, and a slender rope extending from the ground upward, and that was about all there was to be seen, excepting a very energetic engine covered with a common board shanty that appeared to give motion to the rope. There were more mysteries connected with this chimney than is contained in the ordinary novel that can be bought for a dime. While the engine and rope conveyed the nscessary material to the workmen above, it was a great mystery to many how the workmen managed to secure their elevated position, and when once secured, how they managed to reach the earth again in time for their meals.

Before describing the manner in which the workmen made this change, it may be well to give the dimensions of the chimney, a plan elevation and vertical section of which are presented in Fig. 2, while a general view is shown in Fig. 1. The hight of the chimney is about 108 feet. The foundation, which is composed of concrete, is 15 feet 8 inches by 15 feet 8 inches. Above this is the base, made from Bedford limestone, and measuring 11 feet 8 inches by 11 feet 8 inches. Above this base the chimney tapers to a diameter of 10 feet 8 inches, with a transition from square to octagon. The portions shown in Fig. 2 indicate the use of ornamental stone work, but this was left out, and brick used instead. From here to a point below the ornamental top the chimney tapers to a diameter of 7 feet 3 inches. The architect's drawings call for a cast-iron lining from the upper part of the ornamental stone work to the top. In place of this lining brick was used. The chimney walls are 3 feet 3 inches thick at the base, and 1 foot 8 inches thick below the ornamental top. In the construction of the chimney Indiana limestone was used for the base, Indiana pressed brick for the exterior, and common brick for the interior, excepting the part shown in the sectional drawing, where fire brick was used. The elevation of material was done by means of an upright engine and boiler combination, located conveniently near.

In Fig. 3 is shown a side and sectional elevation of the chimney, in which the hoisting apparatus is also shown. In this engraving P Q S R represents the chimney in elevation and T U W V the chimney in section. For the construction of the elevating apparatus, A B in elevation is a piece of round pine, 8 inches in diameter. Above this is placed C D, which can be about 6 x 8 inches. A B has a pin, *c d*, upon which C D turns. Referring to the sectional drawing, M L and N O are two pieces of iron, about ¾ x 2 inches, and of sufficient length to pass through the wall of the chimney. As the brick work progresses it is easy to leave holes in the chimney for the irons to be slipped through. These holes can



Building a Factory Chimney.—Fig. 1.—General View.

be closed as may be found convenient after the irons have been removed.

Referring to the section in Fig. 3, the irons N O and M L are slipped through the spaces left in the wall, and then it is easy to place the derrick H G in position. These irons are secured in the inside by the pins *a* and *b*, and when the wall is built as far as the distance from M L to N O, a slot (*f e*) is left; then the derrick H G is removed, the iron M L taken out and placed at *f e*, then the derrick is placed with its base at N O, when the bent iron *h* will enter at *f e*. At H J the iron can be bent and fastened as shown, or in any convenient manner. At *h* the L iron can have a long thread with a nut on each side of the pole. It is not considered necessary to explain every detail of construction, as any practical mechanic will have little difficulty in constructing such

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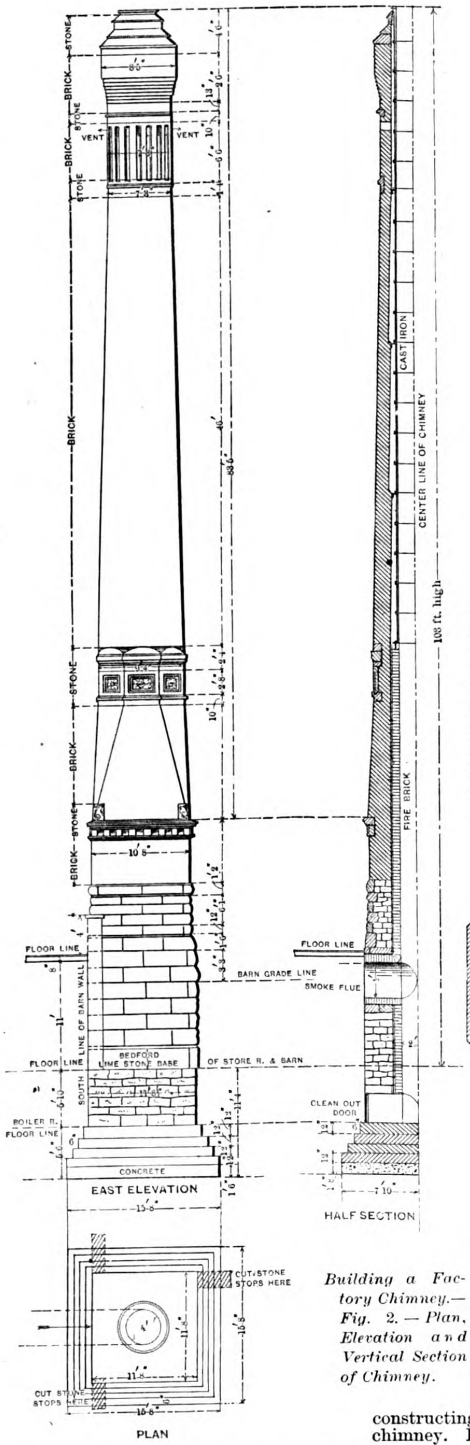
an apparatus from the drawings. The size of materials will depend upon the nature of the work. The reader will see how easy it is to elevate the derrick as the work progresses and how easy it is to close the small holes left for the irons if he is a practical mechanic.



Building a Factory Chimney.—Fig. 2.—Plan, Elevation and Vertical Section of Chimney.

Regarding the method used for elevating the material, it will be noticed that in Fig. 2 there is a clean out door in the base of the chimney. The workmen enter this door and climb the iron ladder to the top. The rope D Z in Fig. 3 extends to the bottom of the chimney, where there is a pulley, and from this point the rope extends to the hoisting engine. The rope D Z passes over the two wheels F and E, and is of sufficient length to reach the ground, as indicated by C X. It was only necessary to attach a bucket of mortar or brick to the end of rope X, when the signal was given to the engineer, who set the machine in motion, which wound up the rope X and brought the boat attached to the rope at Z to the top of the chimney. As C D of the derrick moved on the pivot *c d*, it was easy to swing the load so it could be unloaded on to the staging. The burning out of the cross pieces left in the openings in the brick would make it an easy matter to erect a similar staging to the one used in connection with this construction, and by rigging up a similar derrick, take the chimney to pieces.

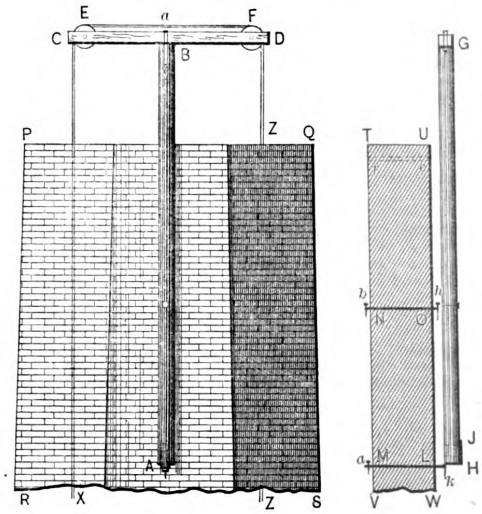


Fig. 3.—Sectional Elevation, Showing Hoisting Device.

While the sea wall was being constructed there was a great quantity of the irons left from the old breakwater, and Superintendent Pettigrew utilized these in constructing a ladder inside of the chimney. In Fig. 4 is shown a plan of the chimney, where A B represents one of the irons placed in the brick work to form the ladder as the chimney progressed upward. Opposite to these irons were placed pieces of 2 x 4 or 2 x 6, as shown, upon which it was easy to place cross pieces to form the staging for the workmen to stand upon as indicated in Fig. 5. After the brick work reached a proper hight other irons and pieces of wood were placed in position, when it was easy to raise the staging another "notch," as it were. In this manner the staging was built inside of the chimney, and when at last the work was finished the removal of the pieces of wood was effected by building a rousing fire at the base of the chimney, when they were all reduced to ashes and smoke. At the present moment the irons placed in the flue remain, and in case any repairs are required at any time the ladder can be used for the purpose of reaching different points.

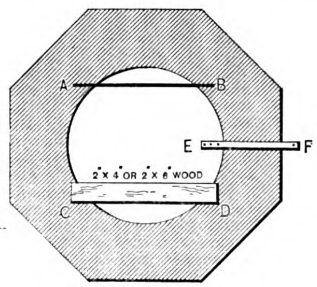


Fig. 4.—Plan of Chimney, Showing Iron Ladder and Wooden Support for Staging.

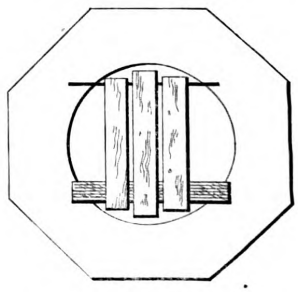


Fig 5.—Position of the Boards Forming the Staging.

Position of Corner Blocks.

From L. P., *Manayunk, Philadelphia, Pa.*—I would like to ask "I. T. S.," of Huntsville, Ala., if it would not be more mechanical, in putting up corner blocks, to hide the end wood? If good, seasoned lumber is used in the blocks, I think they will not have much tendency to dry rot.

From C. E. J., *Bryan, Texas.*—In the November issue of *Carpentry and Building* for last year, I notice the inquiry from "R. R. S.," Pittsburgh, Pa., relative to setting corner blocks. Here in Texas, we put the corner blocks on in such a way that the grain of the wood runs perpendicularly. If the trimmings are to be painted it does not make much difference how the grain runs, but if oil finish is employed the appearance is greatly improved by having the grain of the wood run in the direction indicated.

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A SYSTEM OF FRAMING ROOFS.*

BY DAVID H. MELOY.

TO FRAME CURVED ROOFS.

THE PLAN, Fig. 22, represents the corner portion of a roof with curved rafters. The lines A B and A C represent the outside face of the main wall plates, and the lines D E and D F represent the outside face of the deck plates, which is 10 feet above the main plate and is 4 feet back from the face of main plate, as shown in Fig. 23. This figure represents the common rafter and so on. Then make the curved line from A to B as desired, which in this case is 15 feet radius or 1 foot curve. The layout of the common rafter pattern is now complete, but before cutting it we must lay out the hip rafter, because it is necessary to use the lines and figures in the common rafter for the layout of the hip rafter.

TO LAY OUT CURVED HIPS.

Take another board, about 18 inches wide and 12 feet long, and make the edge straight. Lay out the rise and run of the hip rafter on the straight edge of the board, the same as for a straight hip rafter, but remember to use 17 inches for the run in the hip rafter for each foot of run in the common rafter, so that the run of the hip will be four times 17 inches, which will be 5 feet 8 inches, as shown in Fig. 24. The line A B of this figure is the pitch and length of the hip rafter. Divide the distance from A to B, Fig. 24, into the same number of equal parts as the line A B, Fig. 23, and draw level lines from each point across the face of the board, 1, 2, 3, and so on, as shown in Fig. 24. We must now use what I call the miter rule, shown in Fig. 25, and which is described further on. Make all the distances on the hip rafter 1 1, 2 2, 3 3, and so on, of Fig. 24, equal to the distances on the common rafter, Fig. 23, measuring the common rafter with the common rule, but lay out the hip rafter, Fig. 24, with the miter rule. Mark the curved line through all the points 1, 2, 3, and so on. The back bevel is found by measuring back on all the level lines half the thickness of the hip rafter, and bevel from center, or by moving the pattern back half the thickness and marking the bevel line on both sides and beveling to the center.

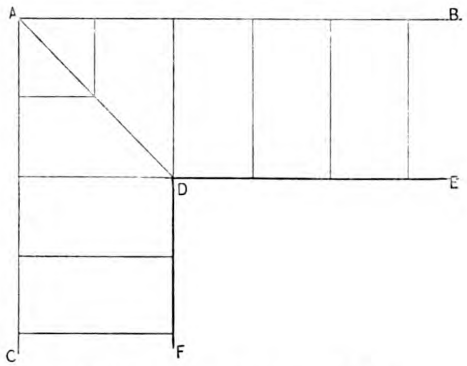


Fig. 22.—Plan of Corner of Roof, with Curved Rafters.

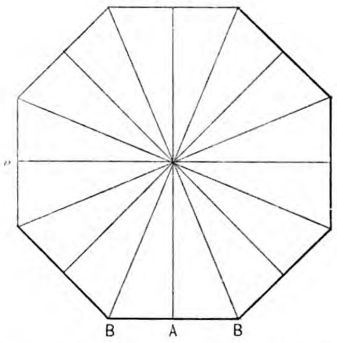
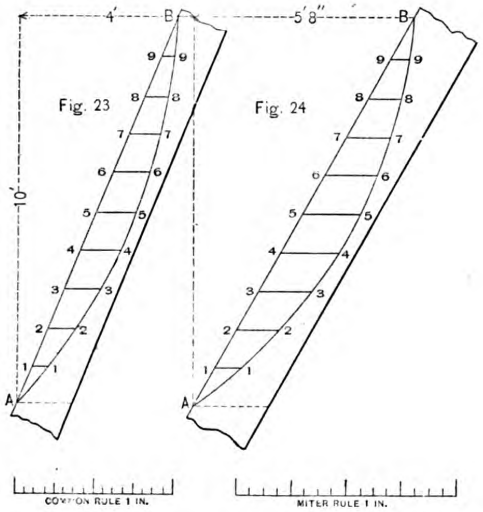


Fig. 26.—Plan of Octagon Roof, with Double Curved Rafters.



Figs. 23 and 24.—Laying Out Curved Rafters.

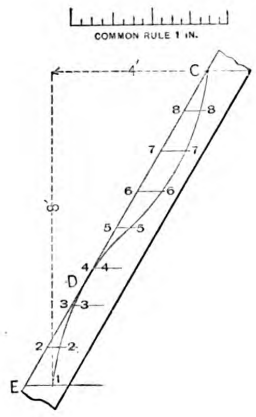


Fig. 27.—Profile of Common Rafter.

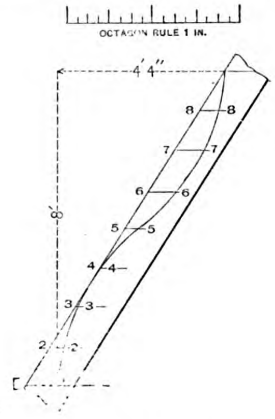


Fig. 28.—Profile of Hip Rafter.

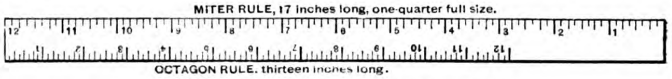


Fig. 25.—Miter and Octagon Rule.

A System of Framing Roofs.

the curve of the roof, which is 1 foot and the radius 15 feet, but the curve may be made more or less as desired. To make the pattern for the common rafter in this roof, take a board about 15 inches wide and 12 feet long; make one edge straight and lay it out on the straight edge of the board the same as for a common rafter in a straight roof, with 10 feet rise and 4 feet run, as shown in Fig. 23, the line A B representing the edge of the board and the pitch of the roof. Divide the length of the rafter into any number of equal parts, as shown and numbered 1, 2, 3, and so on. Mark level lines across the face of the board from all the points, 1, 2, 3, and

TO MAKE THE MITER AND OCTAGON RULE.

Take a strip of straight grained wood about ¼ inch thick and ½ inch wide and 17 inches long. Divide the distance, 17 inches, into 12 equal parts, as shown in Fig. 25, then divide each of these 12 parts into 8 equal parts the same as on the common rule. The whole length, 17 inches, represents 1 foot on the miter line. Each of 12 parts represents 1 inch on the miter line and each of the eight parts represents ⅛ of 1 inch on the miter line. The length of any brace having an equal run each way

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can be obtained with this miter rule. If the run of a brace be 2 feet 3 inches each way, the length of the brace will be 2 feet 3 inches, measuring with the miter rule. The octagon rule is made the same as the miter rule. Lay off on the opposite side of the miter rule 13 inches, which represents 1 foot on the run of an octagon hip Divide the 13 inches into 12 equal parts and the 12 parts into 8 equal parts. This rule will lay out hip rafters for octagon roofs, the same as you lay out hip rafters for a square roof with the miter rule.

TO FRAME OCTAGON CURVED ROOFS.

Fig. 26 represents the base or wall plates of an octagon roof with double curved rafters, the lower half being convex in form and the upper half concave, as shown in Fig. 27. This figure represents the common rafter and is in the middle of each of the eight straight sides from A to the center, as shown in Fig 26. In Fig. 27 is represented the hip rafters which are to stand on the eight angles from B to the center, as shown in Fig 26. To make the pattern for the common rafter, take a board of sufficient size and make one edge straight, mark the form of the curves as desired, but always have two points somewhere in the form come to the straight edge of the pattern board so as to govern the pitch or level lines for forming the hip rafter. Having made the pattern for the common rafter as above, or as desired, divide the entire length from C to E into any number of equal parts and mark level lines across the board from all the points, as shown in Fig. 27, and numbered E, 2, 3 and so on. Take another board for the hip rafter pattern, lay it out to the proper length and pitch, divide it into the same number of equal parts as the common rafter and mark the level lines, as shown and numbered E, 2, 3, as in Fig. 28. Transfer all the distance in the common rafter pattern E 1, 2 2, 3 3, and so on to the hip rafter pattern ; measure the common rafter with the common rule but measure the hip rafter with the octagon rule.

Wages in the Building Trades.

The Wisconsin Bureau of Labor Statistics recently sent to the secretaries of builders' exchanges located in different cities throughout the country a request for information touching the rate of wages prevailing in various branches of the building trades. In reply to this appeal statistics were received from 38 cities, and bring to light some exceedingly interesting facts. The trades selected were masonry, carpentry, plumbing, roofing, painting and common labor required in the construction of a building. From these statistics it appears that New York, Brooklyn, Chicago, St. Louis, Galveston and San Francisco pay the highest wages, although no one city pays them in more than one trade. It is found that St. Louis pays the highest wages for masonry, New York for carpentry, San Francisco for painting, Chicago for plumbing, Santa Fé for roofing and Galveston for common labor. Santa Fé pays more than any other city for roofing, says the *Engineering and Building Record*, but it ranks below Brooklyn in all other trades.

The lowest wages are paid in the southern cities—Atlanta, New Orleans, Lexington, Va., Vicksburg and Norfolk, Va. Some of the smaller cities of the North pay but little more than those of the South. Wages in the North seem to depend more on the size of the city than on its location. The explanation is that in the larger cities the trades are better organized. For the same reason two adjoining cities seldom pay exactly the same wages. New York pays more than Brooklyn for painting, carpentry and plumbing. Brooklyn pays more than New York for masonry, roofing and for common labor. There is the same difference in wages paid in the nearby cities of Minneapolis and St Paul and Cincinnati and Cleveland. Philadelphia and Boston rank below the five leading cities. Atlanta pays the lowest wages for roofing, masonry and common labor, but comparatively good wages for painting and plumbing.

The difference in the wages rates paid in each trade is as great as their geographical distribution. Atlanta will pay 21 cents an hour for masonry, but St. Louis is willing to give 49 cents for the same work. New York and Baltimore pay 40 cents an hour, and Brooklyn, Galveston, Washington, San Francisco and Chicago from 41 to 45 cents an hour. For carpentry New York pays 39 cents an hour, and Lexington, Va., 18 cents. In eight cities, from Minneapolis to Providence, the prevailing rate is 25 cents an hour. New Orleans and Vicksburg are willing to pay 25 and 26 cents, but most of the smaller Western cities will give less than 25 cents for carpentry. For plumbing Chicago pays 40 cents an hour and Vicksburg 22½ cents. New York and San Francisco pay 39 cents.

The other 33 cities follow in no particular order, some of those in the West paying less than Southern cities. The rates for painting show the greatest difference, San Francisco paying 53 cents an hour and New Orleans 22½ cents. New York pays 52 cents and Kansas City 51 cents. Indianapolis, Baltimore and Providence are willing to pay 42 cents, and Santa Fé 40 cents an hour. Roofing is paid for at the lowest rate of all the trades—19 cents in Alanta. New York pays 34, Brooklyn 37 and Santa Fé 38 cents an hour. For common labor Atlanta pays 7½ cents. New York, according to statistics, pays 16 cents an hour less than do Philadelphia, Boston and Brooklyn. Galveston gives 20 cents an hour, or $2 a day, the highest rate of all. The rate in San Francisco is not shown, but from another source it is known that $2 is also paid for common labor there.

The Legend of the Steeple of St. Menoux.

The Priory of St. Menoux is a Roman church of the tenth century, says A. Dumas, which began to fall into ruins toward the end of the fifteenth. Although it was the third daughter of the Abbey of Cluny, it was so poor that Don Cholet, its minister, did not know how to meet the repairs which decay rendered necessary. He was very much embarrassed then, when a sudden inspiration seized him—he would go to the Pope, who still resided at Avignon, and obtain some indulgences. This favor, which only cost a signature, was easily obtained. Four copies, stamped with the Papal seal, were put into the hands of four monks, the most vigorous that could be found. They went away the same day, at the same hour, from the same place, walking in the direction of the four cardinal points of France. A year afterward they returned, bringing back 400,000 francs. Then the monks commenced the work of repair; Gothic flourished as if it were grafted on the Roman architecture, and soon spread its ornaments around the natural stem. As was the custom at this period of instinctive and Christian art, each sculptor undertook a niche, a pillar or a chapel ; and a young architect named Diaire, the only one whose name has been preserved, took for his task the steeple, which was to lift its head from the midst of the 10 spires with which the roof of the church was to be decorated. He had commenced his work with the faith of a Christian and the ardor of an artist, when he was chosen by Duke Gilbert de Montpensier, who was accompanying King Charles VIII to the conquest of Naples, to form part of his retinue. This was unfortunate, for the architect had as much dislike for war as he had attachment to his own art ; accordingly, at the fourth halt he disappeared from his company. The captain reported the circumstance to the Duke Gilbert, who wrote to his domains, ordering that if the refractory person should be caught he was to be hanged without mercy, whatever excuse he might make for his desertion. This direction having been given, he continued his route and arrived at Pouzzoles, where he died loyally and was buried. In the meanwhile the deserter had returned to his family, and was living concealed with one of his brothers. During this time, also, the architects, his companions, had finished their spires. Diaire's steeple alone, which, nevertheless, ought to have been the loftiest and the most handsome, showed, shamefully enough, only one layer of stone, the sculpture of which scarcely showed the mark of the chisel. This was a singular disgrace to the church; so that, after a deliberation on the subject, it was decided that the completion of the work should be entrusted to whichever of the other architects should offer the plan most in harmony with the part already done. The day after this decision was made known, it was observed with astonishment that the steeple appeared to have increased in hight during the night by an entire course of stone. However, not much attention was paid to it, when, during the following night, the miracle was repeated in so evident a manner that there could no longer be any doubt upon the subject. An invisible hand was employed in this nocturnal work, and from the superior boldness with which it was executed, and the fineness of the sculpture, people began to think that some superhuman workman had undertaken the work, and that the fairies who had built the church of Sauvigny wished to form a pendant to it by completing in so miraculous a manner that of St. Menoux. This opinion acquired additional credence from its being remarked that it was only during dark nights that the mysterious architect devoted himself to his task ; as long as the moonlight lasted, on the other hand, the work ceased, only to be resumed when the revealing orb had completely disappeared from the heavens. In the meanwhile one of the architects, whose faith was less firm than that of his brethren, resolved to elucidate the fact. He ascended his particular steeple in the evening, concealed himself there like a sentinel in his box, and was not long before, in spite of the dark, he could distingush a being decidedly material, who lifted up certain stones ready cut and sculptured on to the church, which he afterward arranged in their proper places. He thus beheld the work of this man until the day was about to break, when the nocturnal workman disappeared, leaving his steeple increased in height by another row of stones. The following night each spire had its man; so that directly the mysterious workman made his appearance he was surrounded and seized. A dark lantern was held to his face, and the deserter Diaire was recognized. The artist had not been able to keep away from his steeple ; when near it he had not the courage to let another person finish it, and had continued his work at the risk of his life. Diaire's sentence had been already pronounced. His trial, therefore, did not occupy much time, and he only demanded a respite of one month to finish his steeple, which was accorded to him. The day after the steeple was finished Diaire was hanged.

BOSTON'S BUILDING BOOM is at present in an ambitious stage. The great Court House on Pemberton square, it is said, will cost, when completed, from $4,000,000 to $5,000,000, and the cost of the State House extension will be $3,000,000. The new Public Library has already cost $1,000,000, and $850,000 more is wanted. The Exchange Building, nearly finished, will cost a round $1,000,000, while the Chamber of Commerce Building will exceed that sum and the Bell Telephone Company Building will add another $500,000 to the city's valuation.

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LAYING PREPARED ROOFING.

IT HAS COME to be regarded as an established custom of the leading manufacturers of roofing material to present in their catalogues full directions for properly placing the material upon the roof and accompanying these directions with illustrations clearly showing the manner in which the work should be executed. This policy on their part has been shown to be eminently desirable, as it gives the roofer who may be called upon to perform work, in which it is expected to make use of a special kind or style of roofing material, just the information concerning it that is necessary to insure satisfaction to all concerned. In a catalogue lately issued by the S. E. Barrett Mfg. Company, of Chicago, Ill., are presented directions for laying the prepared roofing which they manufacture, in connection with which several illustrations are given. As indicating the manner in which gutters and the space about chimneys are to be finished when their Black Diamond Prepared Roofing is employed, we select from the catalogue in question several engravings. Fig. 1 shows the

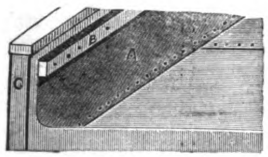

Fig. 1.—Finishing at the Wall.

manner of finishing against a wall, the roofing being allowed to run to the angle and finished with a separate strip 6 or 8 inches wide, lapping one-half on the roof and the other on the wall. The upper edge of the material is fastened with a wooden strip marked B in the engraving, the finish of the top of the strip being roof coated in order to make a tight joint. Fig. 2 of the illustrations shows the manner of finishing around a chimney, the engraving so clearly showing how the work is done as to render a detailed description unnecessary. Fig. 3 indicates another way of finishing around a chimney. In this case the roofing is fitted closely around it and then fastened with a three-sided cleat, all the joints being filled with cement and then thoroughly coated. In the case of gutters the company recommend the use of a separate strip in the bend as indicated in Fig. 4 of the illustrations. Cement is placed between the edges of the laps, after which they are nailed and an extra coating applied. At all tin and other sheet metal connections, such as leaders, it is said the roofing should be carefully cemented and nailed.

Chicago Architecture.

A symposium of opinions of prominent Chicago business men, relative to the advances made in the past year, and published in a Chicago daily, contains the following contribution from the eminent Architect Daniel H. Burnham.

The least enthusiastic must admit that 1890 has been a phenomenal year of building, unprecedented in the history of Chicago or any other city. The character of the structures erected demonstrates one notable fact—that is, that for the first time architects have risen to the plane of the highest constructive knowledge in structures. It has been held with growing conviction that in extremely tall buildings it was not only necessary to use enough material, of the size and shape required for proper strength and stability, but, further, to use only that material exclusively which could stand the necessary tests made at the time of construc-

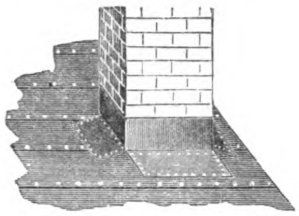

Fig. 2.—Fin shing Around Chimney.

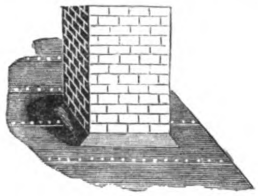

Fig. 3.—Another Method of Finishing Around Chimney

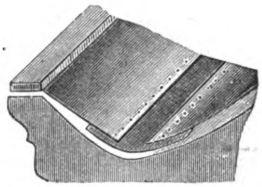

Fig. 4.—Method of Lining Gutters.

Laying Prepared Roofing.

tion, so as to leave not the slightest doubt whatever regarding its strength down to the very last cubic inch. This truth has long been recognized and the facts have been more or less clear, yet the architects have not, strictly speaking, carried out their work on this basis until the present time—that is, during the last year.

In the work of the last year, however, all uncertainties were cast aside, and the notable buildings constructed during the last 12 months are all built on the rigid basis of material perfect theoretically and tested scientifically to its known limit. In the offices of the leading architects, for instance, the stand has been taken that no column can be erected except it has been previously ascertained by specialists to be composed in every particular of material which has been chemically and physically examined by experts to its most minute part. It is not enough to use a material guaranteed by the maker, but Chicago's architects themselves now employ engineers for the special purpose of examining and testing each and every piece and passing their individual opinion upon it in a written report, and only such as is accepted by these engineers is used in the buildings. So essential and necessary is this department of architectural engineering considered that specialists are sent to the mills which furnish the iron and steel structural shapes and beams for buildings, and the metal is not only tested in the ingot but the strength of resistance is ascertained for every finished beam. The result of all this gives to Chicago buildings which are not only theoretically safe but known to absolute certainty to be safe down to the last cubic foot of masonry and the last cubic inch of steel.

In this respect Chicago is unique, and it is a common remark in Eastern and foreign cities among those actively engaged in building that Chicago to-day erects the best built structures ever known, and with the notable distinction that she does it with the closest economy in material and time. That is to say, that it is a fact that in Chicago buildings the quality is better, the distribution of material is more skillful and the buildings are naturally more reliable.

Chicago architects not only consider the elements of strength usual in all architectural calculations past and present, but they actually add increments for windage, which was never before done in buildings of like character. It is singular that with their knowledge of all these important features they have always failed to come out squarely on the broad basis which characterizes their work of the last year. This hesitancy was observable in the average limit of hight which they put to their buildings. Ten stories was considered high enough, but now 14 to 20 stories are building and on paper, and a 20-storied building is commenced with as much confidence regarding ultimate strength and stability as an ordinary residence, for last year all questionable methods and uncertainties were thrown aside and architecture assumed its proper position as an exact science.

The buildings have all been constructed fire-prof to a degree surpassing those erected under old methods. Not only are steel and iron used for supports for girders and for joists, but they are covered with fire-clay, which is so disposed that air chambers are left next to the iron or steel in every case, making it impossible for the metal to be overheated even by the hottest fires. The buildings erected and in process of erection during the year are significant of a decided change in the esthetical phase of architecture. Originality of design and invention of new forms are giving way to a higher appreciation of pure types, and the consequence is that a higher tone characterizes the structures built last year. From present indications, as shown by inquiries and other means, this coming year will prove a very busy one for the architects, and the building operations of Chicago will reach a magnitude which will be simply unparalleled.

IN OUR DESCRIPTION of the scaffolding employed in connection with the Margaret Apartment House, published in the February issue of *Carpentry and Building*, we omitted reference to the firm who erected the scaffolding. This work was done by Brown & Davidson of 185 Third avenue, Brooklyn, N. Y. The firm furnished all the poles and ropes and both erected and took down the scaffolding when the building was so far advanced as to permit it. The poles, we learn, were previously used in the erection of a scaffolding on Trinity steeple, in that city, which was 275 feet high. The same firm recently put up about an old chimney a scaffold which was built 20 feet square at the base and ran up about 175 feet in hight. When the scaffolding was completed the chimney was taken down and the scaffolding left standing until the new chimney was erected.

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Building Papers and Roofing Felts.

The handling of Building Papers and Roofing Felts has become so prominent a feature in the building trades that the following list of leading manufacturers and their products may be of interest to our readers:

THE STANDARD PAINT COMPANY, 59 Maiden lane, New York: P. & B. Building Paper, Giant P. & B. Building and Insulating Paper and the Universal Building Paper. The point is made that these Building Papers are coated with the P. & B. compound, containing no tar or oil, rendering them water, acid, alkali and gas proof.

F. W. BIRD & SON, East Walpole, Mass.: Neponset Water Proof Papers, No. 1 Neponset Red Rope Roofing Fabric, Black Neponset Building Paper and Neponset Insulating Paper. It is stated that Neponset Papers are not coated, but are water proof all through.

AMERICAN STRAW BOARD COMPANY, Chicago: Plain Board, American Sheathing, Standard Sheathing, Plain and Corrugated Moth Proof Carpet Felt, Deadening Felt, Roofing Felt, Tarred Board, Amazon Water Proof Sheathing, Water Proof Sheathing, Inodorous Board and Tarred Roofing Felt.

THE BIRD PAPER MFG. COMPANY, 149–151 Church street, New York: Bird's Sheathing. It is claimed this is water proof, odorless, vermin proof and air tight. It is intended for sheathing buildings, lining ice houses and refrigerators between floors or under shingle, slate or metal roofs. It is stated that it will not absorb moisture, that it will not shrink nor swell, and that it is a non-conductor of heat and cold.

NEWTON PAPER COMPANY, Holyoke, Mass.: Corrugated Carpet Lining, No. 1 Gray Rosin-Sized Sheathing and Rosin-Sized Sheathing Paper.

S. E. BARRETT MFG. COMPANY, Chicago: Inodorous Board, Plain Straw Board, Peerless Niagara and Diamonds brands of Rosin-Sized Sheathing, Neponset Rope Insulated Paper, No. 2 Neponset Rope Sheathing, Excelsior Building Paper, Cedar Moth Proof Carpet Lining, XX Blue Corrugated Carpet Lining, Eureka Deafening Felt, Noiseless Deafening Felt, Tarred Felt, Tarred Board, Two and Three Ply Felt, Asbestos Sheathing, &c.

THE NELSON-SPENCER PAPER COMPANY, Minneapolis, Minn.: Plain Board, Tar Felt, Tar Board and Moth Proof Carpet Lining.

EHRET-WARREN MFG. COMPANY, St. Louis, Mo.: Offer Plain and Tarred Straw Board, Diamond Brand Rosin-Sized Sheathing, Peerless Brand Sheathing, Excelsior Parchment Sheathing, Neponset Insulating Papers, E. & W. Tarred Felt, &c.

H. F. WATSON, Erie, Pa.: Asbestos, Sheathing, Building Felts, Mill Boards, Building, Manilla, Carpet, Asbestos and Pulp Lined Papers; also, Tarred Roofing Felt, Asbestos Roofing, Asbestos Roof Coating, White Asbestos Coating, Asbestos Roof Cement, &c.

TRADE NOTES.

WE HAVE RECEIVED from the Powerville Felt Roofing Company, Limited, with works located at Powerville, N. J., and New York office at 100 Maiden Lane, a copy of their annual catalogue, which is a volume of 24 pages of letterpress bound in paper covers. Owing to the large demand for their product they have doubled the output of their works, and are now in a position to greatly increase their already extensive trade and to promptly fill orders. The catalogue gives attention to Patent Carbonized Roofing Felt, which is sold by measure instead of weight; the Powerville Carbonized Ready-Made Roofings, which are made in several varieties; also building papers of various descriptions. The work is illustrated with engravings showing the company's paper mills covered with Carbonized Stringed Three-Ply Ready Roofing, and also an interior view showing one of the machines used in the manufacture of Patent Carbonized Stringed Felts. Prices are given, as well as a number of testimonials, which will be found of general interest in this connection. The proprietors of the company are William H. Eberts and John M. Eberts of the well-known firm of Eberts Bros., Detroit, Mich.

"PECORA MORTAR STAINS" is the title of a very handsome publication recently issued by S Bowen's Sons, North Penn Junction, Philadelphia, Pa. It is a souvenir issued for the purpose of calling the attention of architects, contractors and others interested in building to the growing favor with which this style of staining or coloring mortar is received. The volume measures 12 x 15½ inches and presents handsome photo reproductions of 11 buildings in different sections of the country in connection with which Pecora Mortar Stains have been employed. Printed upon thin paper and serving as a guard to the illustrations are letters from the architects of the different buildings presented, referring to the fact that the mortar stains made by S. Bowen's Sons were used as mentioned above. This work is handsomely gotten up and tends to show in a very striking manner the merits of the goods of the company issuing it.

THE RUSSELL & ERWIN MFG. COMPANY, with factory at New Britain, Conn., and warerooms at 43–47 Chambers street, New York, have just issued a pamphlet illustrating the development of a new and important departure in the manufacture of their door locks from wrought steel. It is a little volume of nearly 30 pages of letterpress, profusely illustrated, and containing a great deal of information of interest to dealers, architects and builders relative to wrought-steel locks. The manufacturers refer to the strikes for the rim locks, the improvement in which is said to be the added security of a flange extending over the door casing. Through this flange a screw is fastened at right angles with the usual screws, thus preventing the possibility of its being forced or taken off when the door is locked. These goods are said to possess the qualities of lightness and strength, beauty of design and novelty of finish. They are uniform in size and exact in measurement.

THE ADAMANT MFG. COMPANY of Syracuse, N. Y., have just issued a pamphlet relating to Adamant Wall Plaster, which they are prepared to furnish. This material is designed to produce a hard and practically indestructible interior wall and ceiling, and is meeting with a rapidly growing demand. Among its advantages to which the manufacturers refer may be mentioned the economy of time and labor, both in preparing and applying the Adamant; its cleanliness, the ease with which it may be worked, and that where used it is not necessary to saturate the timbers with water, thus avoiding consequent swelling and shrinking. The publication which they have issued shows illustrations of a number of houses where Adamant wall plaster has been employed, and presents a long list of testimonials showing the favor with which the material has been received at the hands of the building trades.

THE GAGE TOOL COMPANY, Vineland, N. J., are pushing, with a great deal of enterprise, the sale of their new Self-setting Bench Plane, which is made in a variety of sizes in order to meet different requirements. The company are offering to send a sample of this plane, or a set of planes, on receipt of price, to carpenters in any town in the United States where dealers do not handle them, and will pay all charges of transportation. If the carpenter is not satisfied with the plane, or for any reason does not desire to keep it, he can return it to the company within 30 days, and they will refund the money. The company feel satisfied, however, that after a carpenter has once used their Self-Setting Plane he will dislike exceedingly to part with it.

THE CANTON STEEL ROOFING COMPANY of Canton, Ohio, have just issued a catalogue known as No. 16, relating to long eaves trough, conductor pipe, cornices, eave-trough hangers, &c. It is a tastefully arranged volume of nearly 50 pages, profusely illustrated and bound in colored paper covers of neat design. The side title upon the front cover is typographical in character, while the fourth page of the cover presents a view of the company's works. The Wock Patent Slip-Joint Eaves Trough, recently introduced to the trade, is fully described and illustrated, as well as Belding's Patent Lock Slip-Joint Eaves Trough, made in lengths of 10 feet 2 inches without seams. Price lists of the various goods illustrated and described are presented, together with an enumeration of the various sizes which are made. Numerous testimonials, showing the estimation in which these goods are held by those who have practically demonstrated their merits, occupy the closing pages of the catalogue. The company state that catalogue No. 15, relating to H. W. Smith's Patent Folded Lock-Seam Steel Roofing, corrugated-iron roofing, siding, ceiling, roofing paper, weather boarding, &c., will be sent to any address on application.

WE ARE INDEBTED to Fr. Beck & Co., whose place of business is at Seventh avenue and Twenty-ninth street, New York, for a copy of their catalogue of designs in lincrusta-walton. This material is, without doubt, one of the most satisfactory, as well as one of the most widely used, relief decorations now before the public. The company have expended a very large amount of money in its improvement and quality, as well as in producing designs which may be manufactured in it. We understand that they have recently reduced the price in order to give it still wider scope and to adapt it to the requirements of people in moderate circumstances. The catalogue before us has been prepared at great expense, and is given only a limited circulation. The company very wisely restrict its use to those who are likely to be benefited by it or to those who are about to select decorative material. They decline to send it where it would be used against their interests or where it would only gratify curiosity.

THE DETROIT HEATING AND LIGHTING Company have opened a branch at 114 Liberty street, New York, where they have secured a fine store for stock and show rooms. This branch will be managed by George H. Raymond, formerly president of the Raymond Furnace Company of Norwalk and New York. He will look after the trade in Western Massachusetts and Connecticut, Southeastern New York and Northern New Jersey. The specialty of the company is the Bolton Hot-Water Heater, the production of which for 1890 was largely in excess of that for 1889.

IN ANOTHER PART OF THIS ISSUE the O. and C. Company, 703-707 Phenix Building, Chicago, Ill., state that they are supplying the trade with the Richmond Perfection Door Bottom, which is claimed to be one of the best weather strips made. The construction of the door bottom is such that there are no springs to break, no triggers to get out of order, and the action is always automatic and reliable.

THE INDIANA MACHINE WORKS, Fort Wayne, Ind., call attention in another part of this issue to their Improved Tenoning Machine No. 2, and also to an improved mortiser which they have lately added to their line of woodworking machinery. These goods are carefully constructed and are of such a character as to give satisfaction.

THOMAS MORTON, 65 Elizabeth street, New York, presents elsewhere in this journal several illustrations of Morton's Cable Chains and attachments, designed for doors and sash. These goods have met with great favor at the hands of the trade, and have been subjected to severe tests with very satisfactory results. A handsome sample board of Champion chains and a diamond-shaped sample card of Cable chains will be forwarded by Mr. Morton to any architect upon application. Builders and contractors will find them at the different hardware stores throughout the country.

E. T. COPELAND & CO., 106 Liberty street, New York City, announce in another part of this issue that they have completed business arrangements with a number of well-known manufacturing concerns, under which they are enabled to place on the market at factory prices full lines of steam engines, boilers, turbine water wheels, and various incidentals requisite for the equipment of steam or water power plants.

THE STANLEY RULE AND LEVEL COMPANY, 29 Chambers street, New York, have recently issued a circular addressed to hardware dealers, in which they say that the sale of their patent Duplex levels during the first year of their introduction was 900 dozens, a fact which, in their minds, is conclusive evidence that mechanics have found in them a convenient tool for all varieties of work required of a level. The circular also states that the company have already sold 1500 roofing brackets, and that the demand is constantly increasing.

THE CHAMPION IRON COMPANY, Kenton, Ohio, are directing the attention of the building trades to their specialties, which include iron fences, malleable iron cresting, and plain and ornamental iron work for architectural or structural purposes of all kinds. The company have brought out a catalogue consisting of 166 pages, a copy of which will be forwarded to any address upon application.

THE CAMPBELL FURNITURE COMPANY of Ironton, Ohio, are supplying an interesting variety of wood mantels and mantel tops for tile or iron fronts, as may be desired. The goods are finished in a variety of styles, and can be obtained, the manufacturers state, at low prices. The announcement which they present elsewhere in this issue will be found of general interest.

THE U. S. GUTTA PERCHA PAINT COMPANY, with office and factory at No. 131 Mathewson street, Providence, R. I., have recently completed a number of important improvements, which gives them much larger facilities than they have enjoyed in the past. The works have been completely overhauled and a large and commodious office added. The company state that the changes have been such as to enable them to promptly meet the demands of the trade, and they look forward to a heavy expansion of their business.

THE MURRAY & PORTER LEVEL COMPANY, Pittsburg, Kan., report that the Pendulum Level which they are furnishing is meeting with a gratifying reception, and that it is giving satisfaction wherever used. The company state that this level is now on sale with the leading wholesale hardware merchants throughout the country.

JAMES B SCOTT & CO., Pittsburgh, Pa., present in another part of this issue an announcement which will be found of interest to the building trade, more especially to those doing roofing work. The announcement relates to Scott's Extra Coated Roofing Tin.

LYLE & MILLS of New York City direct attention in another part of this issue to the fact that they are offering the trade an interesting line of metal ceilings of attractive design. The firm are turning out work which is meeting with favorable mention wherever used, and are in a position to supply varying requirements, as regards designs, &c.

(*Continued on page* xxviii.)

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CARPENTRY AND BUILDING.

A MONTHLY JOURNAL FOR THE BUILDING TRADES.

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APRIL, 1891

Fire "Proof" Construction.

The terribly destructive fires which visited New York City on the night of March 17, and swept away structures valued at hundreds of thousands of dollars, has given renewed interest to the question of fireproof construction in buildings for whatever purpose employed. Some of the buildings burned were regarded as possessing fireproof qualities, but the ease and rapidity with which they melted away before the flames indicates that many of the alleged fireproof buildings of the present day are such only in name. The idea that a building mainly constructed of iron and granite is proof against fire has been exploded, for under intense heat iron warps, twists and melts, while the granite crumbles and is reduced to dust. It was shown by experts after the great fire in Boston in 1872, that up to a certain temperature granite possesses considerable fire-resisting qualities, but when the heat has passed that point the material becomes dangerous and contributes to the spread of the flames, rather than serving as a check to them.

A MAXIM IS THE EXACT AND NOBLE EXPRESSION OF AN IMPORTANT AND UNQUESTIONABLE TRUTH. GOOD MAXIMS ARE THE GERMS OF ALL EXCELLENCE. WHEN FIRMLY FIXED ON THE MEMORY, THEY NOURISH THE WILL.—*Joubert.*

Brick Construction.

In marked contrast to the effect of the flames upon iron and granite structures in the fires referred to, may be mentioned that upon a rather plain but substantial building constructed within and without of brick, cement and tiling, which stood adjacent to one of the structures destroyed. This easily withstood the intense heat of the flames and was comparatively little damaged, so far as the building itself was concerned. That brick structures possess valuable fire-resisting qualities has been proven by the results of numerous conflagrations. It is well known that when the burned district of Boston was rebuilt, after the fire of 1872, some of the insurance companies made it a condition that at least the outer walls of the structures should be of brick. Many, if not a majority, of the mammoth edifices recently put up in New York City, or are in process of erection, are built largely of brick, with interior partitions and floorings of fireproof tiling and cement, and it has become to be pretty well understood by architects and builders, both of whom have learned to handle brick in such a way that it no longer gives a building a monotonous or commonplace appearance, that this material is destined to play an important part in the erection of all buildings of any considerable size, especially if they are designed to possess fire-resisting qualities.

MAXIMS ARE OFTEN QUOTED BY THOSE WHO STAND IN MORE NEED OF THEIR APPLICATION.—*James Ellis.*

The Chicago Building Outlook.

An extremely active building season is promised in Chicago this spring. The number of permits now being issued is unusually large. The city building department issued 274 permits in January and 670 in February, making a total of 944 in these two months, against 726 in the corresponding months of last year. This is a large increase, but it is expected to be kept up in succeeding months. Most of the permits taken out are for flats and cottages, but there are on the list a number of large office buildings, extensive hotels and not a few manufacturing establishments of great extent. Real estate authorities impute the increase in building permits to the unusual sale of lots, which was a feature of the past year and which has maintained a steady volume, despite the monetary stringency and the customary dullness of the winter months. The influence of building associations is shown by the large number of permits taken out by people of slender means, who would not attempt to build if they were not assisted in this way. There appears to be a steadily growing feeling among the working class of the citizens of Chicago in favor of owning their own homes. The easy terms upon which building lots are now sold offer tempting inducements to found a home even to those who have very moderate incomes. At the present rate of building in Chicago, it will not be many years until that city rivals Philadelphia in its proud distinction as "the city of homes."

COLLECT AS PRECIOUS PEARLS THE WORDS OF THE WISE AND VIRTUOUS.—*Abd-el-Kader.*

Combustible Architecture.

A very interesting address was recently delivered before the Architectural Club of Boston by Edward Atkinson, who discussed in an entertaining style the subject of combustible architecture. After alluding to Old World architecture as a development rather than as an invention, and complimenting the old Colonial architecture of New England as honest, solid and firmly set, he referred in a light vein to the Queen Anne style of the present day, with its florid ornamentation and undue elaboration of useless parts. The true principle in the construction of a building, according to Mr. Atkinson, is first to understand what purpose is desired in the structure proposed, and then to build to that purpose. His idea is to reverse the ordinary method of building, and to plan the roof first. The purpose of the roof is not merely to keep out the rain, but also to keep out weather changes and keep off fire. The ordinary roof, he says, does not appear to meet these requirements. The modern roof is a structure of light wood and felt covered with slate, while the very best roofs to be found are those covering some of the oldest factories, made with solid frames, matched boards, and covered with lime mortar, upon which shingles are laid. Mr. Atkinson's ideal roof is one nearly flat, and which is as strong as the floors of the building which it covers. He would have no hollow cornices to invite destruction by fire, and the roof of industrial buildings should pitch toward the center with a fall of ½ inch to a foot. This plan allows the water to be carried away through a channel not exposed to frost, while giving better facilities for light in the upper story. In speaking of windows, which are for light and air, he stated that the top should be flush with the ceiling and the bottom well set up from the floor. A building 150 feet deep, he said, can be lighted from such windows if the rooms are 13 feet high. Pointed or round-arched windows he considered ordinarily out of place. He disapproves of the ordinary floor of sawed joists mortised into the timbers in such a way as to impair the strength, but commends the vulcanizing of timber, which tends to prevent decay while increasing its strength. He considers solid floors essential to economy and safety, and in cases where plaster is necessary under a floor to resist sound he pointed out that care should be taken that no connections are made with the vertical spaces in the walls and partitions. The effort to make the rooms pleasant by sheathing and varnish is an invitation to fire, as are also wooden dadoes, architraves and moldings in what otherwise might be wisely constructed buildings. He considers that while the old Colonial style of building was wise and desirable, modern architects and builders have a wealth and variety of appropriate material of which they should make good use of which the builders of earlier generations had no conception.

A MAXIM IS LIKE THE SEED OF A PLANT, WHICH THE SOUL IT IS THROWN INTO MUST EXPAND INTO LEAVES AND FLOWERS AND FRUIT.—*Mme. de Sartory.*

The Philadelphia Trade School.

The trade school organized by and carried on under the auspices of the Master Builders' Exchange of Philadelphia is having a most successful season. The applications in some departments are far in excess of the capacity for students, and it is already evident that the present quarters of the school are quite inadequate for the needs of this excellent enterprise. At present the students number 126, and are divided as follows among the several classes: Plumbing, 60; bricklaying, 30; carpentry, 21; plastering, 3; stone-cutting, 3; blacksmithing, 6; painting, 3. The most popular class, as shown by these figures, is the one in plumbing, and the limit of capacity is reached, as there was

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room for but 60 students in the class, although there were over 100 applications for admission. The bricklaying class is likewise full, and so is the carpentry class; but in the remaining departments it was intended that more students should be included, provision having been made for 20 in plastering, 20 in stone-cutting, 16 in blacksmithing and 20 in painting. The prejudice of the local unions, or whatever other cause may have given rise to opposition to the instruction of boys in the last-mentioned trades, will probably disappear with time, and the school, when it gets started with abundant room and facilities, will be equally prosperous in all its departments.

AXIOMS ARE DELIGHTFUL IN THEORY, BUT IMPOSSIBLE IN PRACTICE.—*Rivarol.*

The Class in Plumbing.

As yet only evening classes have been organized, instruction being given every weekday evening except Saturday. Each pupil practices his trade two evenings in the week, while all the students are taught drawing Wednesday evening, the classes adjourning across the street to the Franklin Institute where instruction is given. W. A. H. Allen, superintendent of the schools, has done much excellent work in systematizing the instruction in the several departments and is yet busily engaged in making up diagrams and laying out plans for the future. So far as possible the students are made to work by drawings and diagrams, which not only develops their own resources, but also familiarizes them with the methods of working from scale and from blue prints, which are conditions met with in actual practice. Of course these are supplemented by the direct assistance of instructors, and we understand that the plumbing class is in the hands of very competent practical men. A schedule of instruction divided under the heads: 1, Tools and Materials; 2, Joints, Seams, Bends, &c.; 3, Miscellaneous; 4, Instruction, is printed on a large poster and kept in the school for reference. Under the first heading is included the explanation of the various materials and appliances used by the student plumber; the second section includes the practical work involved in all the ordinary labor of the plumber, this covering 20 operations, such as the wiping of joints in all positions, making seams, bending pipe, soldering, tank lining, &c. Miscellaneous is devoted to special work, while under instruction are included nine sections, such as trapping and ventilating, fixtures, pumps, tanks, supply pipes, &c. The whole is arranged with excellent system, and is undoubtedly of much assistance in the work of instruction.

METHOD IS THE ARITHMETIC OF SUCCESS. —*H. W. Shaw.*

Use of the Question Book.

An excellent feature introduced into this department is the question books, of which there are nine, corresponding to the divisions of the schedule referred to and covering all the different departments of plumbers' work. These are neat pamphlets, arranged with questions on one side and blank pages opposite for the purpose of recording the answers. The instructor writes the questions and answers on a blackboard, the pupils taking notes and entering the answers opposite the question in the book. In this way they get a practical text book, including information on the most important topics of their trade. At the end of the term the examination held is based partly upon these questions, so that the student has to study up his note-book to be prepared to pass. The system followed is an excellent one, for the pupil not only has to follow the lecturer and take notes, which impresses the matter on his memory, but he must write out the answers, carefully in his book, and finally, must prepare himself on them for the closing examination. Considering the short time this school has been open, it is remarkable what progress has been made in reducing the work to a system and in providing facilities for practical instruction in the use of metals and building materials.

METHOD IS LIKE PACKING THINGS IN A BOX; A GOOD PACKER WILL GET IN HALF AS MUCH AGAIN AS A BAD ONE.—*Cecil.*

Possible Labor Troubles.

Although the indications are pointing so strongly to a season of great activity in building, there is a cloud in the horizon which is ominous and threatening. The journeymen carpenters and their employers, says our Chicago correspondent, are sparring over differences bequeathed from last summer, and an absolute fight may be precipitated on April 1. If this should occur and the carpenters' union then orders all journeymen carpenters to abstain from work until matters are adjusted in their favor, the building trades will experience a long season of dullness, instead of the prosperous period to which they are all now looking. The employing carpenters and builders seem to be determined to have matters settled their way. Arbitration has been proposed and rejected, and if a fight is precipitated on April 1 it will be stubbornly contested by both sides. It is to be hoped in the interest of everybody having aught to do with the erection of buildings that moderate counsels will prevail, and that the issue will not be forced on the lines now laid down by the contending parties. Much inconvenience was caused by the strike last year, and it is most discouraging to the business men of Chicago to look forward to another blighted season this year. It would be an excellent thing for Chicago if some legal measures could be devised and acted upon that would put an end to these profitless disputes. It has been demonstrated sufficiently in that city that labor troubles settled by a fight to a finish do not stay settled, and the time has now come to try something else.

BUILDING WAYS AND MEANS.

AT THE PRESENT DAY roofs of buildings are used for more than the single purpose of sheltering those beneath them. They are not only employed as places for promenade open-air concerts, but are, in one instance at least, utilized as a skating rink. The house occupied by the Manhattan Athletic Club of New York City has a roof area of 5000 square feet, and during the cold snap in December ice formed upon this roof of sufficient thickness to permit the members of the club to enjoy real ice skating. On the Madison avenue side of the building there is a stretch of skating surface 120 feet long by 30 feet wide and on an L extending along the Forty-fifth street side there is a space 35 feet square. The rink was illuminated by electric lights and covered by a substantial roof. In the summer time the roof is transformed into a summer garden.

IT MAY NOT, perhaps, be generally known that at the time the City Hall in New York City was erected the front and sides were constructed of marble, while brownstone was employed in the rear wall. The city was then confined largely below the spot where the City Hall now stands, and it is related by the local historian that the municipal authorities did not suppose the city would ever extend sufficiently far northward to permit the rear of the building named to be often seen, and so, for the sake of economy, they employed brownstone instead of marble for that portion of the building. Thus it stood for nearly a century an object of curiosity to all visitors interested in building operations. A few weeks ago, however, the rear wall was subjected to a course of treatment which has left it, to all appearances, like the remaining portions of the exterior of the building. The change was wrought by cutting away the surfaces of the brownstone where the action of the elements had rendered them porous and broken, and then restoring the exterior by means of a specially-prepared cement of a color closely approximating the other walls. After this had been done the surface was covered with a coating of shellac, and then painted in such a way as to give the wall the appearance of marble. As the City Hall stands to-day, the four walls look exactly alike.

IT WAS NOT VERY LONG AGO that any building constructed of iron was considered fire proof, but the firemen soon discovered that an iron structure was one of the most dangerous buildings that could be put up in a large city. They emphasized this discovery by refusing to go into iron buildings to fight fire when once the conflagration was started. Iron, however, was too valuable a material for building purposes to be neglected. Then arose the question how to protect iron so as to make it beneficial for building purposes, and yet avoid the objection which the firemen had found and enforced. Looking over the large structures which have recently been built in New York and other cities, including some that are now in progress, the observer is impressed with the idea that all these constructions are, in effect, double buildings. A conspicuous example of the feature of construction to which we refer is the *World* building in New York City. This is a double building from foundation to capstone. If all the brick were taken away, it is asserted that the building would still stand, and in turn, if the iron work could be removed the brick would sustain the building. In putting up this building iron and brick progressed together, the first a little in advance of the second. All the iron upon which the building depends for stability and strength is incased in brick to such an extent that the largest fire that could be started in the building, by any contents that it might hold, would affect the iron only a few degrees in temperature. The columns are built around by brick and then are finished in plaster. The floor beams have hollow brick arches between them, and the lower flange is incased in terra cotta, and then the entire surface plastered. The floors above the beams in turn are covered with cement, in which tiles are imbedded. In the main walls of the building iron columns are carried up story after story and firmly bolted together, and the whole imbedded in brick.

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A HOUSE IN DENVER, COLORADO.

FRANK J. GRODAVENT, ARCHITECT.

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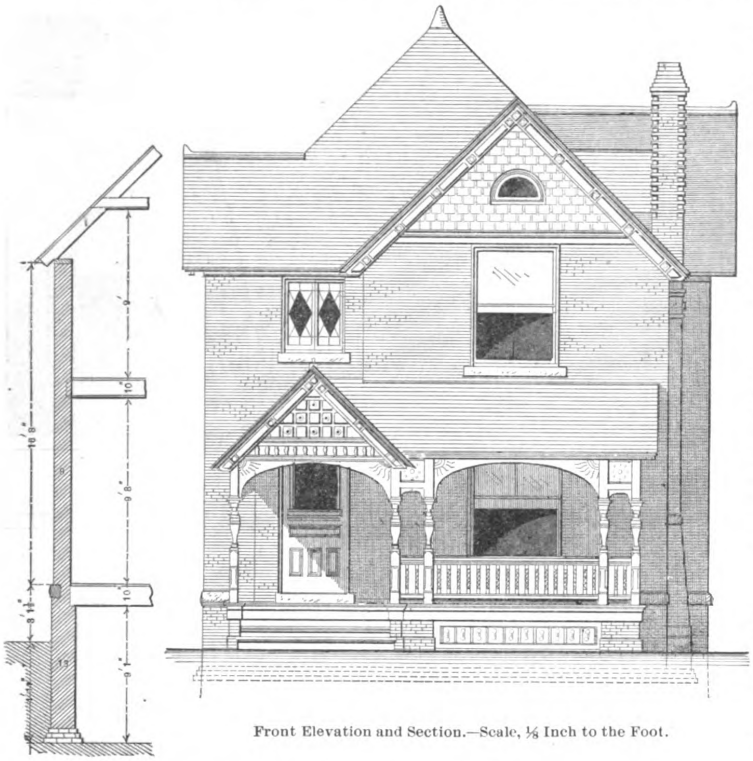
A HOUSE IN DENVER.

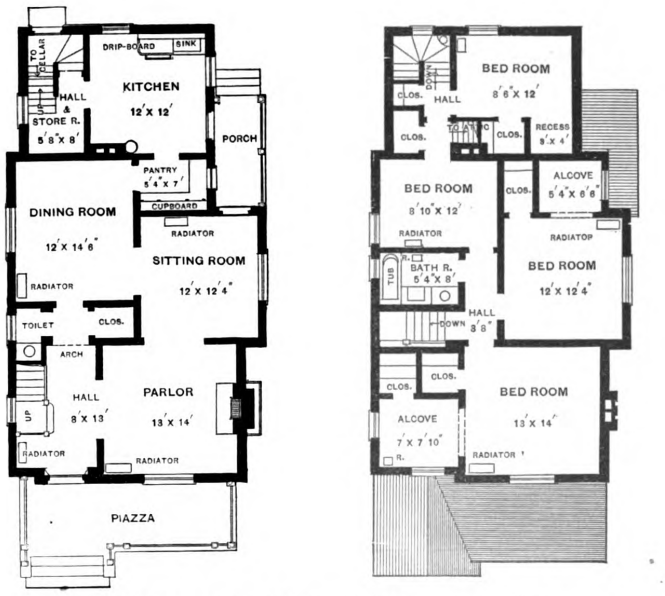
THE conveniently arranged brick dwelling which we present by means of elevations, floor plans and details upon this and the following pages was designed by Frank J. Grodavent, No. 36 Railroad Building, Denver, Col. It will be noticed from an inspection of the plans that there



Front Elevation and Section.—Scale, ⅛ Inch to the Foot.

are four rooms upon the first floor, consisting of parlor, sitting room, dining room and kitchen, besides a commodious hall, which is entered directly from the piazza. The only room opening directly from the main hall is the parlor, measuring 13 x 14 feet, and provided with an open fire place. Beyond the parlor is the sitting room, 12 feet by 12 feet 4 inches, which is lighted by a wide window at the side and a smaller window looking out upon the rear porch. The dining room, which is at the left of the sitting room, communicates with the latter by means of a broad opening, and with the hall through an arch and a doorway, the passage between the two opening into a closet on the one side and a lavatory on the other. Communication between the dining room and the kitchen is established by a conveniently arranged pantry. Opening from the kitchen is a rear hall and store room. From the rear hall the second floor of the house may be reached and also the cellar.

On the second floor of the house are four sleeping rooms, in connection with two of which are good-sized alcoves. The bathroom is located about midway from front to rear of the house, and is easily accessible from the sleeping rooms. The servants' room is in the rear of the house, and by means of the back stairs can be reached directly from the kitchen. Ample closet room is provided in connection with each of the sleeping rooms, this being a feature which cannot fail to be appreciated by house owners generally. The details which are presented with this study are of sufficient variety to clearly indicate the principal features of exterior and interior finish. The house is heated by hot-water circulation



First Floor. Scale, 1-16 Inch to the Foot. Second Floor.

A House in Denver.—Frank J. Grodavent, Architect.

A Very Large House.

Every American, European and Oriental country has its scores of public and private mansions, yet Vienna, Austria, has the giant of them all. The Freihaus (free house), situated in Wieden, a suburb of the city just mentioned, is the most spacious building on the globe. Within its walls, says an exchange, a whole city of human beings live and work, sleep and eat. It contains in all between 1200 and 1500 rooms, divided into upward of 400 dwelling apartments of from four to six rooms each. This immense house has 13 courtyards—five open and eight covered—and a large garden within its walls. A visitor to the building relates that he spent two hours in looking for a man known to reside in the house.

Scarcely a trade, handiwork or profession can be named which is not represented in this enormous building. Gold and silver workers, makers of fancy articles, lodging-house keepers, bookbinders, agents, turners, hatters, officers, locksmiths, joiners, tutors, scientific men, Government clerks, three bakers, 18 tailors, 29 shoemakers and many other tradesmen live in it.

The house has 31 staircases, and fronts on three streets and one square. In one day the postman's delivery has amounted to as many as 1000 pieces to this single but Titanic house. To address a letter to the house and to the person it is intended for does not assure the sender that the person to whom it is addressed will ever receive it.

In order "to make assurance doubly sure," all letters addressed to the "Freihaus" must be provided with both the given and the surname of the person for whom intended, the number of the court, the number of the staircase and the number of the apartment; otherwise it is apt to go astray, as though addressed to a city unprovided with directions as to street and number.

At the present time 2112 persons live in this immense building, and pay an annual rental of over 100,000 florins.

DURING THE YEAR RECENTLY CLOSED building operations were brisk in Louisville, Ky. Ray McDonald, the inspector of buildings, reports 1717 constructed at a cost of $2,942,970. Of these 1546 were residences, 108 stores, 45 mills or factories, 10 church edifices and 2 each of schools, banks, hotels and opera houses. In addition large sums were expended in restoring the buildings damaged by the terrific tornado that visited that city in March of last year.

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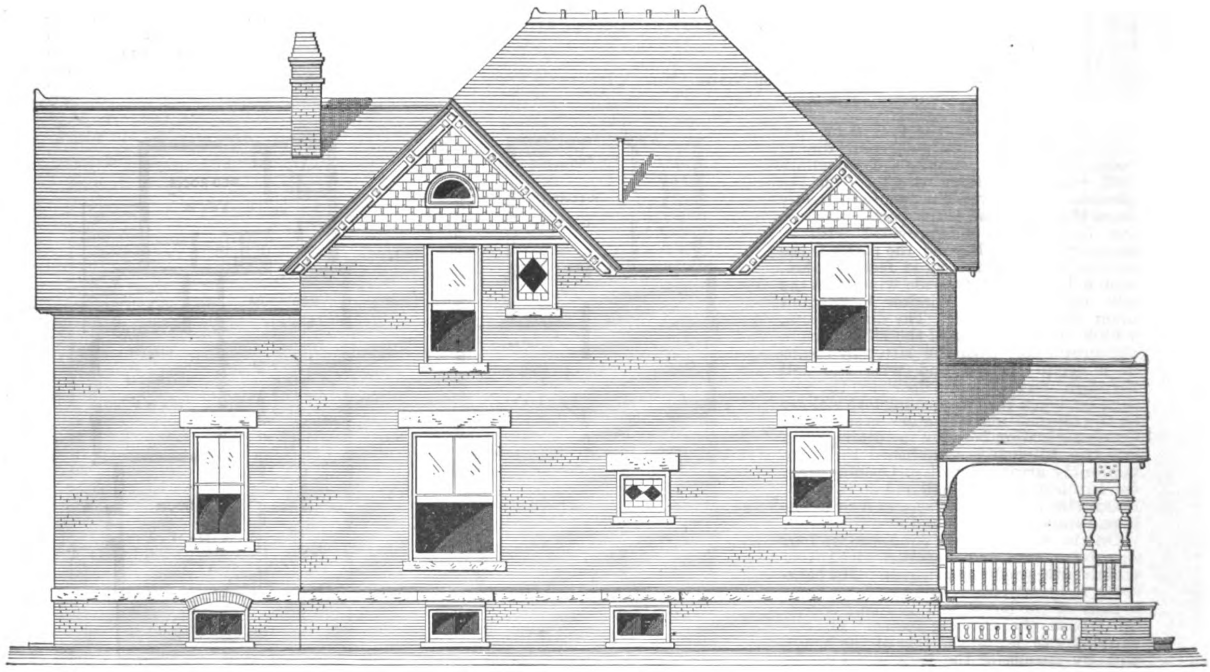
Side (Right) Elevation.



Side (Left) Elevation.

A House in Denver.—Elevations.—Scale, ⅛ Inch to the Foot.

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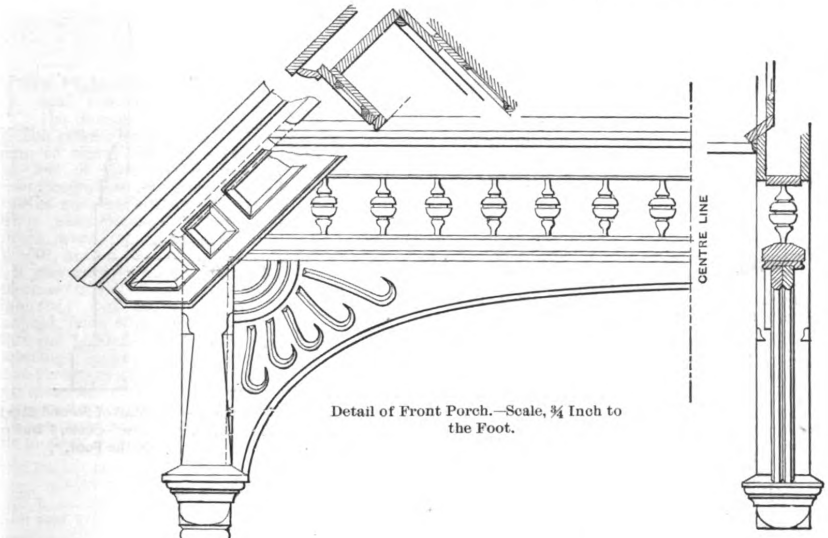
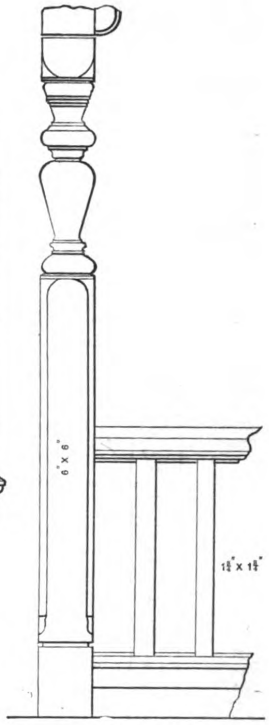
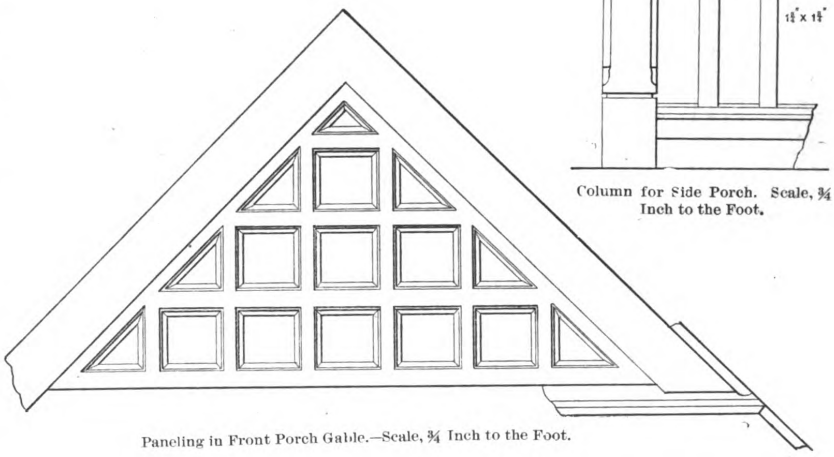


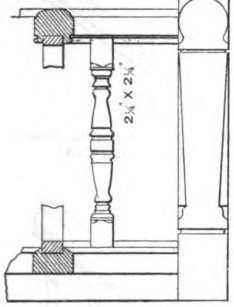
Detail of Front Porch.—Scale, ¾ Inch to the Foot.

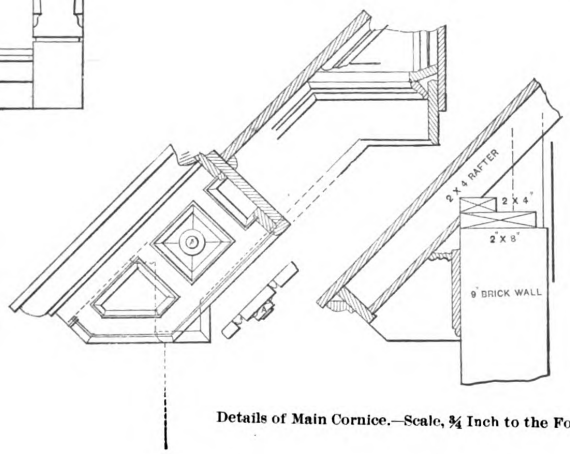


Column for Side Porch. Scale, ¾ Inch to the Foot.

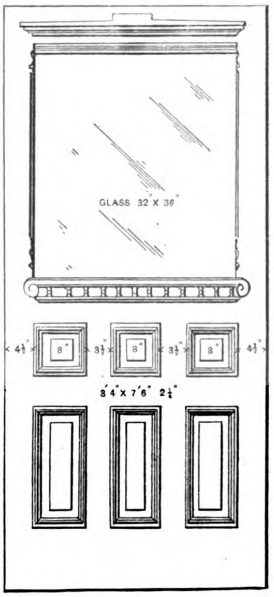


Paneling in Front Porch Gable.—Scale, ¾ Inch to the Foot.

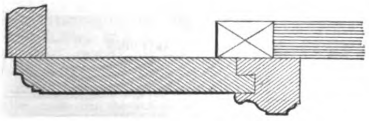




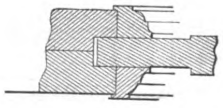
Details of Main Cornice.—Scale, ¾ Inch to the Foot.



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



Detail of Side Casing of both Stories.—Scale, 3 Inches to the Foot.



Section of Front Door.—Scale, 3 Inches to the Foot.

A House in Denver.—Miscellaneous Details.

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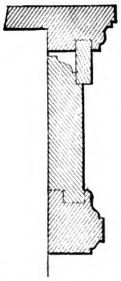
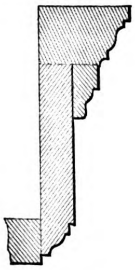
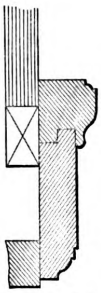


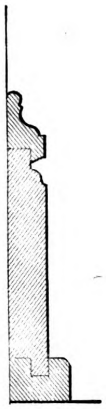
Stool Finish.—Scale, 3 Inches to the Foot.



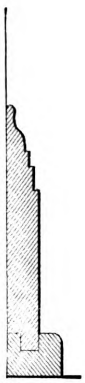
Head Casing of First Story.—Scale, 3 Inches to the Foot.



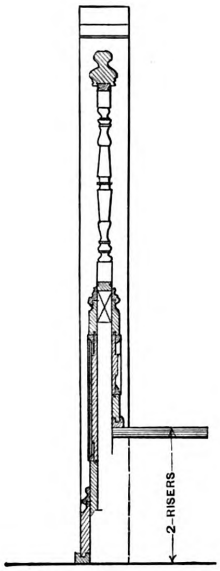
Head Casing of Second Story —Scale, 3 Inches to the Foot.

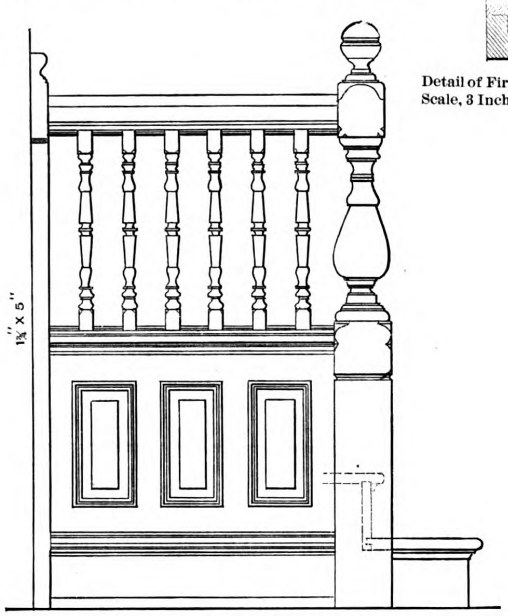


Detail of First Story Base.—Scale, 3 Inches to the Foot.

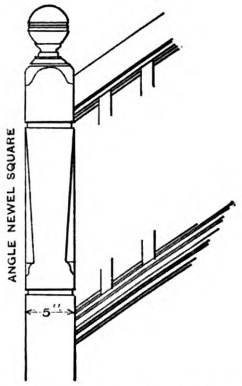


Detail of Second Story Base.—Scale, 3 Inches to the Foot.

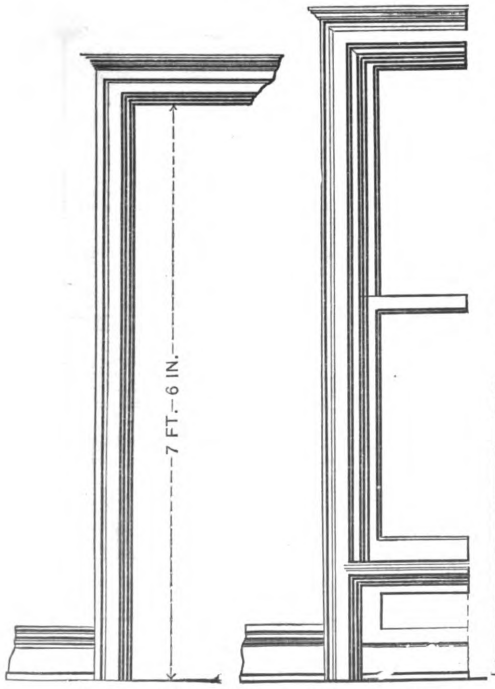




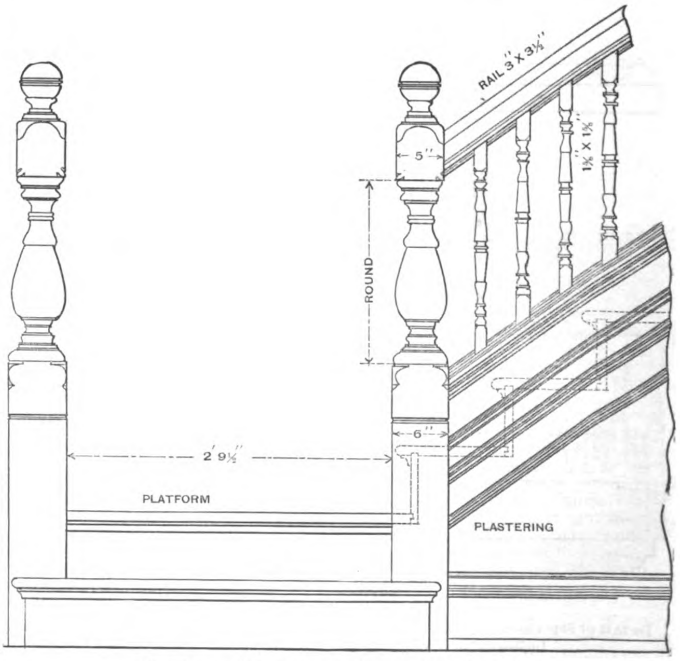
Section and Elevation of End of Stairway.—Scale, ¾ Inch to the Foot.



Newel Post at Landing.—Scale, ¾ Inch to the Foot.



First Story Interior Finish.—Scale, ½ Inch to the Foot.



Elevation of Main Stairs.—Scale, ¾ Inch to the Foot.

A House in Denver.—Miscellaneous Details.

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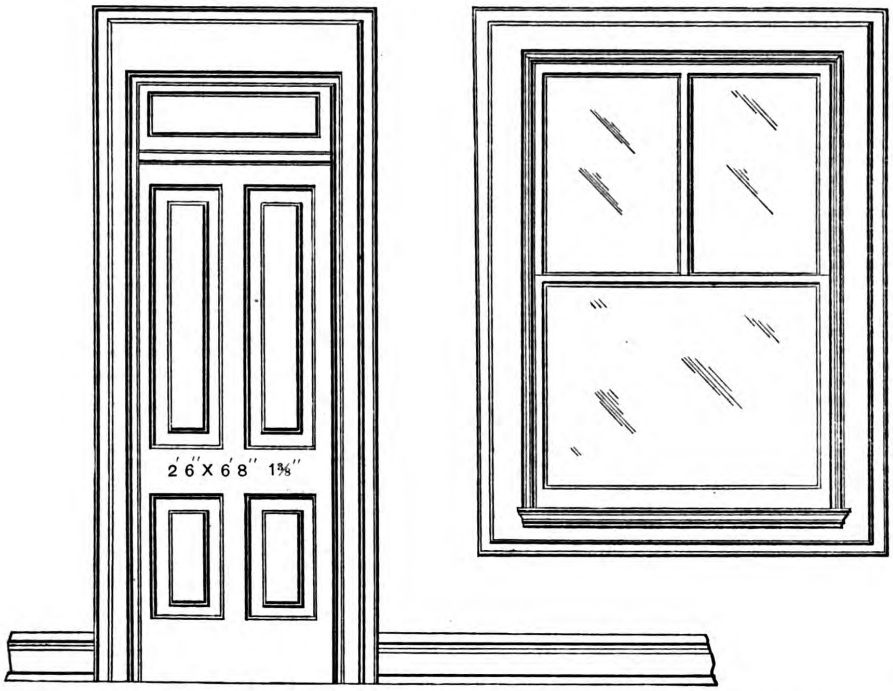
THE BUILDING HANDICRAFTS.—III.*

THE PLASTERER is one of the old and venerated handicrafts. Like the mason, he had a great deal of the artistic part of the architect's design to carry out, and like him also, he has of late years suffered from the introduction of various kinds of wall linings and embellishments in materials other than plaster. The London plasterers were incorporated into a guild in 1501, and in 1603, in the reign of James I, it was enacted that no plasterer should exercise the art of a painter in the city or suburbs; but an apprentice was exempted, from which we infer that at that date the plasterer often undertook to do painting. Later, in 1694, it was enacted that those practising the art without being members of the guild could be fined. From various accounts it is certain that the old plasterer was more of the artist than his modern descendant, and his work consisted chiefly in the decorative work of walls and ceilings. Especially in the ceilings of the Tudor and Stuart periods does the art of the ancient plasterer become an important element in the internal architecture. The modern plasterer's work is of a purely mechanical nature—he is not instructed in the art by the Italian masters and hand-workers in stucco, like his forefathers were, who were engaged by Gibbs, Chambers, Adam Brothers and other eminent architects. Few who pass the Strand know what a masterly example of the art of the plasterer of the eighteenth century is to be seen in the interior of Gibbs' fine church, now being "restored;" the apsidal semi-dome, and the flat elliptical vault in one span, exhibit some excellent foliage in the redundant style of Le Pautre, all worked entirely by hand. We can show little modern decorative plaster work like it. The cause of the decline in this art, as in that of the carpenter, carver and mason, is the introduction of mechanical appliances. No sooner was the art of casting in plaster introduced than a change began, and the fine school of ornamental modelling quickly died out. The Plasterers' Company, by their yearly prizes for designs and models, are doing a good work; but plastering of the ornamental kind is now intrusted to a few well known firms of repute, who employ artists of their own, and who work in fibrous plaster or cartonpierre, and turn out decorative plaster work of a superior kind, wanting, however, in some of the qualities which give the old plasterers' work its undisputed charm. It is the handwork and individuality of character which strike us in the old Elizabethan or Jacobean ceiling, an art which would not pay in modern buildings in which cheapness of production is the only aim. Decorative plastering is almost a defunct art among the trade. The mechanical process of plastering walls and ceilings has little to raise the operative to the rank of artist. Recent substitutes, in the form of "Lincrusta Walton wall decoration," faïence "appliqué," and several kinds of wall hangings have no doubt transferred much to other hands. There is one branch, that of rough casting, as seen in the old houses in Kent, and employed decoratively on half timbered houses, that has been lately developed, and the "wattle and plaster" business has made a new start. A field for art might be made by ornamental plaster surfaces, such as are common in Spain. The decoration of the Moors consisted in fine plaster carved into traceries and diapers of elaborate design. In this class of work would be found certainly an opportunity for the artist in plaster.

Some time ago there was a scarcity of plasterers, and the Builders' Association issued a circular to master plasterers urging them to take on apprentices. The abolition of "hawk boys" has been the gain of the London plasterer, though his position is not what it might be. Efficient men are not numerous; but the cause will be found to be the prevalence of the system of "labor only," or task work. The builder finds this system the cheapest; the work is let to the lowest bidder. How can good work be turned out under this system? The London plasterers are scarcely alive to the danger of work done under these conditions, which ought to be left only to the few who care to do work under them; but task work has been injuring other trades in the same manner. There is yet a hope of improvement in spite of the changes that have taken place. When every plasterer has been taught to model we may have a class of men worthy of those artists in plaster whose works grace the interiors of the sixteenth and eighteenth centuries.

Two other classes of operatives have contributed more to modern architecture—we mean the engineer and the plumber. The engineer has done something to develop the resources of the art by developing the intractable material, iron, though we must wait patiently before the results are seen. Up to the present time iron construction has been rather the stumbling block than the aid of the artist. There is much yet to be done before the architect can use it freely and artistically, and except in artistic wrought metal work no school has pre-existed; still, there is hope and a great future for iron in architecture, of which stage we have scarcely reached the threshold. Not till the engineer is educated in art and the architect in iron construction will progress be made. Lord Hartington's address the other day to members of the Iron and Steel Institute at Chatsworth is worth bearing in mind—we must not only develop our resources, but boldly deal with modern inventions. The plumber has made rapid strides in education, and the registration of the plumbing craft is already a significant sign of a new order of things. Of all the old crafts, his is the only one which has advanced from the sheer pressure of circumstances.

Under the generic term of "decoration" we may include various handicrafts like those of the painter ceramist, glass



A House in Denver.—Details of Second Story Interior Finish.—Scale, ½ Inch to the Foot.

* Continued from page 226, October issue.

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painter, mosaicist and carver, whose separate existence as professional contracting artists was unknown in the old days. Are these contributing their quota to modern architecture, or are they simply earning livelihoods as professional artists or "sub-contractors?" On the whole, the building operative is no longer in the position to influence style as he did once when he was a master of material, and could design as well as work in it. With the revolution created in many trades by the introduction of machinery, the operatives have lost interest in art labor, and have become mere mechanical experts. They work away from the building, not in it, through the intepretation of a superior, not independently. What a few idealists wish to see is a return to the old plan by which every working artist had his share in the construction and design. We may not hope for that; indeed, it seems impossible under the changed order —the reconstitution of the trades; but we may look forward to a time when for the present disorganized condition of the trades will be substituted a body of skilled operatives to whose hands can be intrusted the general design and directions of the architect. Comparing modern with the ancient organization of operatives, we note an important difference.

At the beginning of the thirteenth century we find the free masons were an important body, and were exercising a potent influence on the change of architecture that took place. Other trades were then organized; each had its master, past-master, and other officers, and was recruited from apprentices who had served their time in the trade. These crafts were competent to make improvements as time went on. If in one church they found any feature defective or wanting in dimensions and details, it was noted, and when the next church was built the fault was rectified. New forms of arrangement of piers, of arches and vaulting, of tracery, were developed by this process of improving on what had been done before. The bishop or ecclesiastical functionaries would discover any errors in plan, the master masons any details of construction, and as the works proceeded these alterations and modifications could be introduced with little or no trouble; each craft had its share in the improvements. Drawings to small scale would not be required to instruct the workman about matters which could be pointed out, and if such were needed they would be sketched on the works to a full size. These gradual modifications and improvements, carried on through generations, and by different minds and classes, developed the art in a much more natural manner than if one individual was engaged to design a new church *de novo*, without previous experience, and by the lights which only traditional types could furnish him. In short, improvements were not due to one or two eminent professional artists, but to a succession of artists working each in his own materials through a number of years uniting in great works of architecture.

These ideas of progressive art, though not new, may appear revolutionary to the conventional architect's notion of treating design and execution as distinct and separable functions. We will not allude to the words of eminent laymen, such as Mr. Ruskin or of Mr. Morris, both of whom have labored to show the working artist's true share; but we may, in conclusion, quote the following very pregnant sentence from a recent paper by a well known architect this year: "Old architecture was craftsmanship, or it was nothing. The thews and sinews of old designs were in the trades. Old architecture was not like modern architecture, the creation of the architect's office—it was the creation of the workshop; the workshop was its home, the tradesman's bench was its cradle, tradition was its foster mother." So says one of our rising architects, who points out also that the vast majority of our parish churches were both designed and built by schools of workmen.

If workmen in England were encouraged as they are in France we should have to relate more rapid progress. As all know who are acquainted with building operations in France, the various trades are carried on by specialists, or specialist contractors, who are also operatives. Each workman under this system can lend great aid to the architect in carrying out his design; he can point out how and where a particular material can be economized; he takes an individual interest in his labor, for his desire is to please the architect who appoints him; he has no inducement to run up the cost, for he can execute the work at a less profit than the general contractor. The architect in this manner gets round him a number of artist operatives who work with him; he can select his own hands, those who understand his style and work and who take a personal interest in it. For many years these operatives may work for one or two architects. The system of working is, therefore, quite different to that in this country. There is another feature that ought to be mentioned in connection with workmanship abroad. Prizes are given for executed work. The *Société Centrale des Architectes* award prices to all workmen who have executed work of merit, and with this object a committee of inquiry is appointed to ask all architects to send in the names of all workmen who are deserving of reward. Architects and manufacturers also are recipients of prizes and medals for executed work. The English operative has not this interest taken in him, perhaps partly owing to his own indifference and want of action. Contrasting the cost of English and foreign labor, we know perfectly well why it is English contractors obtain foreign labor. Builders, masons, carpenters who take large works tell us that the rate of wages per hour is considerably more for an English workman than a foreigner; in one case we know of a well known mason and carver in the West of England who some time ago paid 1s. 6d. per hour, besides lodgings and other extras, to an artist, for work which afterwards he obtained a Prussian workman to do for him at just half that rate. During the progress of the Law Courts, the employment of foreign masons was, we believe, a necessity, and few large contractors will hesitate to employ foreign labor. America, Germany, France, Holland, Belgium, and other countries have now extensive factories competing with our own in the cost of production, and in the future the country that can produce the cheapest and best will be the leading one. We have here a problem for the political economist to solve: How is machinery likely to benefit the working artist? We see him outstripped in the race by foregn machine turned out goods.

The tendency is still to reduce the cost of labor in producing, the effect of which is to underrate the labor of men who work with their brains as well as hands, though the case is different with those who are art specialists and contractors. The higher kinds of artistic production are put into their hands, and no machine has ever been able or is likely to accomplish purely intellectual or artistic work. But we are now speaking of a large class of operatives and art workmen, including modellers, carvers, art metal workers and designers and painters on glass, and engaged in the production of art faïence. Other countries are taking away, or, let us rather say, contracting our staple industries. If, as some assert, the goods manufactured in this country are diminishing, the outlook is indeed a sorry one, for we have the other fact before us that the population of the country is increasing. If, too, the demand for labor is on the decrease, we are compelled to the conclusion of a still further cheapening process to avoid the miseries which a large surplus of unemployed labor is sure to create. There are a number of pessimists who augur ill for the future of industry in this country, who say that we shall have to pass through a commercial crisis of still greater severity than we have yet done. There is only one hope for the mechanical laborer and operative artist, and that is to make himself an expert at this work, for after all the best must qualify the condition of cheapness, and thereby force cheap inferiority on one side. There are, too, unworked fields for labor which may be thought of. Here is another opening. The substitution of mechanical for human labor is what most concerns the workman of to-day. How is he to keep his position, and raise his work to the level of an art? The more he can do this, the greater chance he has in the struggle.

Seating Capacity of Churches.

One of the journals published in this country in the interests of the brick making industry has prepared some figures showing the seating capacity of the more important churches in European countries and directing attention to the striking contrast between these edifices and the largest churches to be found in America. The statement is made that in this country there are few houses of worship having a seating capacity of over 1500 persons, while the important cathedrals of foreign countries can seat many thousands. The following table is given as showing the seating capacity of some of the principal churches of Europe, and is interesting in this connection:

	SEATS.
St. Peter's Church, Rome	54,900
Milan Cathedral	37,000
St. Paul's, Rome	32,000
St. Paul's, London	35,600
St. Petrionio, Bologna	24,400
Florence Cathedral	24,300
Antwerp Cathedral	24 000
St. Sophia's, Constantinople	23,000
St. John's, Lateran	12,900
Notre Dame, Paris	21,000
Pisa Cathedral	13,000
St. Stephen's, Vienna	12,400
St. Dominie's, Bologna	12 000
St. Peter's, Bologna	11,400
Cathedral of Vienna	11,000
St. Mark's, Venice	7,000
Spurgeon's Tabernacle, London	7,000

Sugar in Mortar.

Some time ago a statement that the mixture of a small quantity of sugar with mortar greatly improved the latter exercised the risible faculty of the building fraternity, says a recent issue of a foreign exchange. The notion was regarded as too ridiculous for serious consideration. There is, however, reason to believe that the addition of saccharine matter to mortar is an extremely valuable discovery. In the first place, it enables bricklaying to be carried on in the frosty weather. About two pounds of coarse brown sugar to a bushel of lime and two bushels of good sand will supply the proportions for a mortar that will resist frost admirably. It is claimed, however, that in addition to this advantage, mortar with sugar mixed in it is vastly superior to mortar without it. It sets as hard as cement very soon, makes the brickwork extremely strong and quite effective when used with dry bricks. For indoor plastering also, saccharated mortar sets hard quickly. When portions of the same wall had been covered in one part with sugared and in another with unsugared mortar, the latter has ripped up directly when a nail was run over it months afterward; the other had become as hard as stone. Much interest is taken in the matter by Mr. Crampton of Cranleigh Guildford, and he reports some interesting experiments. He points out that if sugar be added to mortar that is already made it will render it too thin. Strong sugared water dissolves lime in the same way that water dissolves sugar. It is therefore necessary to dissolve the sugar in water first, and then add the sugared water to the lime slowly and cautiously. The mortar should be as stiff as it can be used. For lime washing 1 pound of sugar to 16 gallons of water will make it adhere splendidly. Drops of whitewash made with water so mixed, if they fall on the floor or window, or any iron plate, cannot be washed off. They stick like enamel, and have to be scraped off.

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MEASUREMENT OF ROOFS.*

BY TRIANGLE.

THE GABLES IN MAIN ROOF.

IT HAS BEEN SHOWN that the two gables are alike in size, and on this account it will be only necessary to obtain the area of one, or of one side, as the sides are alike. Before obtaining the area of the gables,

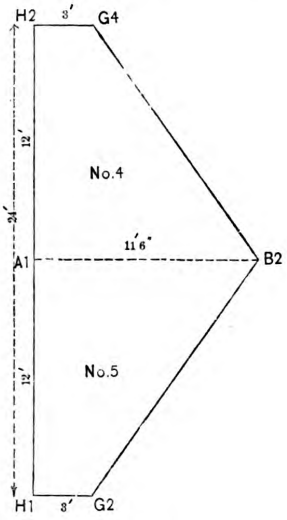

Fig. 100.—Shape of Gable Roof.

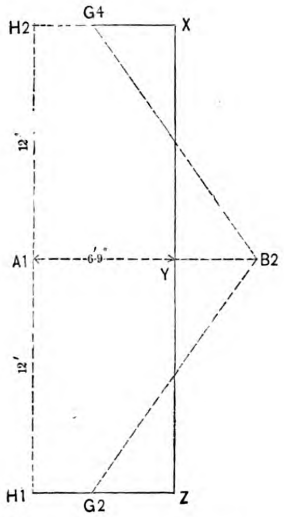

Fig. 101.—Area of Gable Roof.

we will construct the diagram in Fig. 99, showing the length of either of the valleys. We draw G2 B2, in length equal to either of the valley lines, as shown in plan, and erect the perpendicular B2 A1, equal in length to A1 A2, the hight of gable, in Fig. 93. By connecting G2 A1 we have the length of valley, which according to the scale is 14 feet 8 inches. In Fig. 100 is shown the shape of one gable roof, but we will obtain the shape of No. 4 on plan first, as No. 5 is a duplicate of No. 4, as the two are duplicates of Nos. 6 and 7. We can obtain the length of eaves and ridge of No. 4 from the roof plan in Fig. 91, where H3 G4 is $\frac{3}{8}$ inch, or 3 feet; and A1 B2 is 1 inch, $\frac{3}{8}$ inch and $\frac{1}{16}$ inch, which shows the gable ridge measures 11 feet 6 inches. These measures are placed on the diagram in Fig. 100, as shown. From the side elevation in Fig. 90 we see that the slant of the

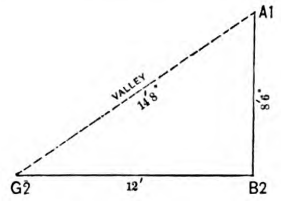

Fig. 99.—Diagram Showing Length of Valleys Between Gables and Main Roof.

roof at H2 A1 is $1\frac{1}{2}$ inches, or 12 feet. The area of No. 4 is obtained in the same manner as was No. 2 in Fig. 96. We multiply the altitude by half the sum of parallel side. The operation is shown in Fig. 101, where A1, H2, X Y is the area of A1, H2, G4, B2. The area of the two is shown by H1, H2, X Z, which is a figure 24 feet long by 6 feet 9 inches wide.

THE MAIN ROOF.

In Fig. 102 is shown the shape of the main roof, which is also drawn to the scale of $\frac{1}{8}$ inch to the foot. To one not accustomed to estimating roof surfaces, this would appear to be a difficult figure to estimate, but that such is not the case we will proceed to demstrate. The lengths of eaves and of ridges are obtained from the roof plan, Fig. 91. The lengths of gables are obtained from the front elevation, Fig. 89, and as the intention has been to use the same letters on the diagram as were used on the plan or elevation from which they were derived, the reader will have little difficulty in understanding the diagram. We will remark, however, that the distance N4 N5 is derived from the plan, that X B2 is the distance in Fig. 89 from N to J, and that N M, M4 J, J R and R K*k* are also derived from the same figure. We will proceed to obtain the area of No. 8 of main roof. To do this, we will extend J M4, cutting off N*n* M4 M N, and estimate the figure as a rectangle, then deduct the space left by the gable. Having this method in mind it is easy to determine what measurements it is necessary to make from the plan and

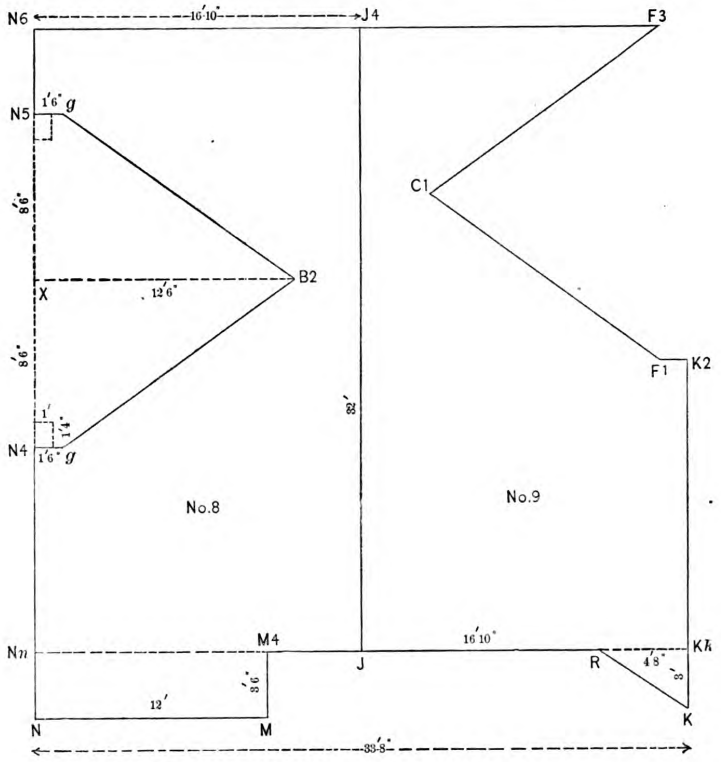

Fig. 102.—Shape of Main Roof.—Scale, ⅛ Inch to the Foot.

Measurement of Roofs.

elevations. By placing the rule on the plan we see that the line of ridge measures 4 inches, or 32 feet, which measurement is placed on the ridge line in diagram. We also measure N J in the front elevation, and find it to be 16 feet and 10 inches. It has been previously explained that the distance from N4 to N5 can be obtained from the plan, and the distance X B2 from the front elevation, as also the distance N4 *g* or N5 *g*. At these points is also shown the shape of parts of roof under eaves

* Continued from page 9, January issue.

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of gable, each of which measures 1 foot by 1 foot 4 inches. Then to obtain the area of No. 8 we will multiply the distance N6 J4, which is 16 feet 10 inches, by the length of ridge J J4, which is 32 feet, and from this amount deduct the space left by the gable. We would also add the area of parts of roof under the gable, and the part cut off by the dotted line N*n* M4, which part measures 3 feet 6 inches by 12 feet. The method by which the area of space left by the gable would be obtained is shown in Fig. 101. The area of No. 9 would be obtained in a similar manner to No. 8, first cutting off the triangle R K K*k*, estimating its surface and adding it to the surface of the large part. Another way would be to extend M4 R, as shown, cutting off N*n* M4 M N and the triangle R K K*k*. We would then consider the parts 8 and 9 as a rectangle, the length of which we see by the figures on the ridge to be 32 feet, and by measuring N J K of front elevation in Fig. 89 we would find distance N3 N2, which is $1\frac{1}{8}$ inches, or 15 feet. In Fig. 89, H *g*, which is the distance from the edge of gable roof to vertical line of side, gives the projection, which is 3 feet. To the width would be added the flashing and material required for turning over the edge of cornice. It is a general custom when estimating the surfaces of roofs for the roofer to consider the space occupied by the chimneys as taken up by the flashings and extra labor required. The size of chimneys can be determined from the front and side elevations, so the reader is at liberty to dispose of this part of the subject as is thought best.

In Fig. 106 is shown a diagram giving the length of valley and hip in Nos. 10 and 11. The diagram is constructed in a similar manner to those previously shown, by making the distance in base equal to the lengths of lines in plan and erecting the perpendiculars equal to the altitudes as derived from the front elevation, the Fig. 107, to draw which it has been found necessary to take the measurements from the plan and elevations, so it would be to scale. After it has been so drawn the reader can the better determine in his own mind how he would proceed to estimate the area of the figure. When making a

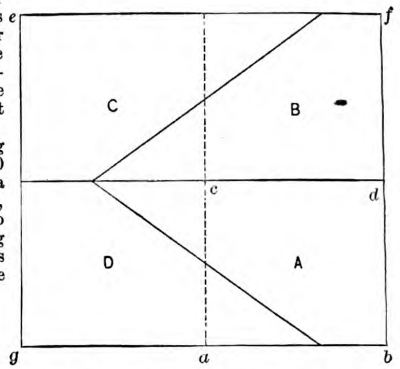

Fig. 104.—Shapes A, B, C and D Combined.

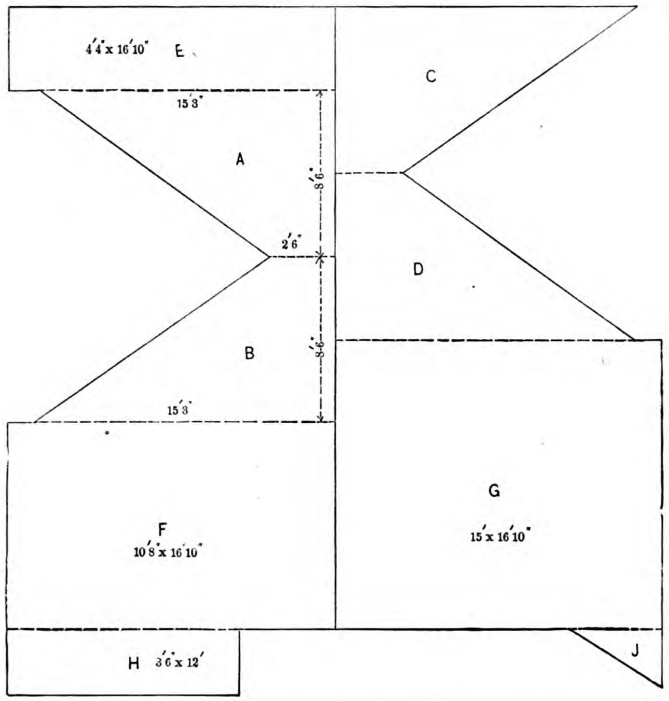

Fig. 103.—Main Roof Divided into Shapes Convenient to Estimate.

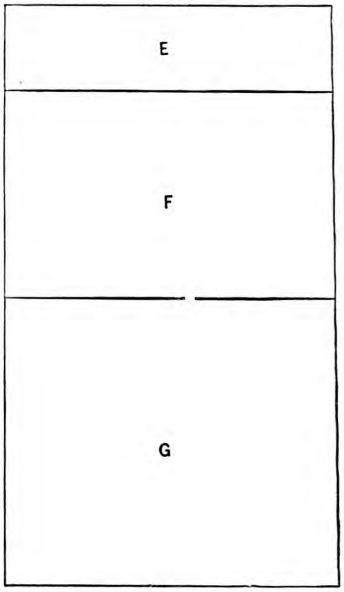

Fig. 105.—Shapes E, F and G Combined.

Measurement of Roofs.

this to be 38 feet 8 inches. After multiplying the two numbers the four parts similar to the projection under eaves at M4 would be added, also the area of rectangle and triangle cut off by N*n* K*k*. We would then deduct the spaces occupied by the two gables.

In Fig. 103 is drawn a duplicate of the previous figure, which is divided into a number of figures, each of which can be estimated with little trouble. Our previous knowledge of the roof shape is such that we know A, B, C and D are of the same shape, so we can obtain the area of one of the shapes, and take this amount four times for the area of the whole. This operation is shown in Fig. 104, where *a b c d* is the area of A, and *g e f b* is the area of the four figures. The result of obtaining the areas of E, F and G, and adding the amounts, is shown in Fig. 105. Part of the gable shown in side elevation is sunk, so the cornice would have to be covered. The length of this covering can be obtained in Fig. 90 by measuring the hypothenuses showing the length of valley and ridge.

We will now obtain the necessary measurements for estimating the area of No. 10, the shape of which is shown in Fig. 107. By placing the scale on the front elevation in Fig. 89 we see that the distance M L is $1\frac{1}{2}$ inches, or 12 feet. From the plan in Fig. 91, or side elevation in Fig. 90, we can obtain the length of ridge and the distance the roof runs back to the dotted line representing the front. On the plan we measure M3 M4 and find it to be 3 feet and 3 inches, which is placed at M M4 in Fig. 107. From the front elevation we measure M I and find it to be 1 foot, which is placed to the right of M4 in Fig. 107. In the plan we can measure from M4 to the dotted line, which is 1 foot and 6 inches, the distance the roof extends under the large gable. From the front elevation we determine the length of L L4 of diagram, which is 6 inches. By drawing O L4, which is the length of valley, we complete the diagram in diagram freehand, which is to guide the operator in placing the figures of distances, it is best to form a plan by which the particular part of roof is to be estimated, and put down such figures as are necessary, as shown in Fig. 108, which is derived from the previous one. The diagram would appear to indicate that the length was 12 feet and the width 4 feet 9 inches. That a triangle whose base was 4 feet 3 inches and altitude 6 feet was to be taken out or deducted, as was also a rectangle 1 foot by 1 foot 6 inches. Referring again to Fig. 107, some would consider it unnecessary to deduct the corner at M4 1 for the cornice, as about as much material would be required to work the roof about the cornice as to cover the roof if there was no cornice there, or that the material saved would no more than pay for the extra time required to make the connection. Unless the flashings were estimated separately an allowance would be required at I O for this purpose.

For the shape of No. 11 of roof plan,

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which is shown in Fig. 109, most of the dimensions can be obtained from the front elevation, Fig. 89. As all parts of the main roof have the same pitch, we can take L O of the front elevation as the slant hight of the roof and L K as the length at the eaves. Accordingly we draw L K in Fig. 109 in length equal to L K of front elevation, and at right angles draw L O, equal in length to L O of front, which gives the slant hight. At this point we have secured the necessary measurements from which the area of the figure can be calculated, (excepting the deduction to be made for the cornice), as we will show. We will consider the diagram in question to be a rhomboid, which is an oblique-angled parallelogram, the area of which is found by multiplying its base by the altitude. As L K is the base and L O′ the altitude, when the two are multiplied the result is as shown in the diagram below, where the rhomboid has been changed to a rectangle. When the base L K is multiplied by the altitude L O′, the practical result of the operation is to cut off L O′ O, and place it on the other side with O L on D K. Referring to the lower figure, L′ O″ D′ K′ is a duplicate of L O′ D K above, and K′ D′ S shows the position occupied by L O O′ when its position is changed by the operation of the rule. As the rhomboid is a figure that occurs quite frequently in roofs, we have taken this method of showing how its area is to be calculated.

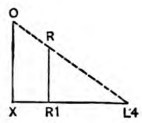

Fig 106.—Diagram Showing Lengths of Valley and Hip in Front of Roof Plan.

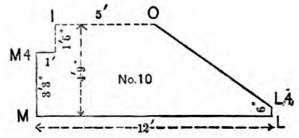

Fig. 107.—Shape of No. 10 in Roof Plan.

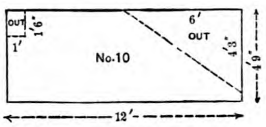

Fig. 108.—Method of Obtaining Area of No. 10.

Referring again to No. 11 in Fig. 109, the distances on O D are obtained by measuring each way on front elevation from the point on O P where the dotted line drawn from L intersects O P, supposing the line to be extended to the line of gable J K. By connecting the points O L and D K in the diagram of No. 11, we have the shape of the roof as it would be if not cut by the line of cornice, P Q, in the front elevation. In Fig. 106 L4 R gives the length of hip shown on roof plan by K1 R1. So by setting off the distance L4 R of Fig. 106 from K on K D in Fig. 109, as shown by K R, we have the point corresponding to R in the front elevation. As O P in Fig. 109 corresponds with O P in the front elevation, we can draw Q R parallel with P D, and P Q parallel with D R, which shows the shape cut out of roof by the cornice, as derived from our tracing of front elevation in Fig. 89. That is, P Q R of Fig. 109 corresponds with P Q R of Fig. 89. As our tracing does not show the moldings in the cornice, the diagram in Fig. 109 is not as accurate as it should be at P Q R. After the reader has decided what allowance to make for P Q R, the amount or area decided upon can be deducted from the area of the whole figure.

THE PORCH ROOF.

The length of valley in porch roof is shown by the diagram Fig. 110. V2 U2 is the length of valley line in plan, and U2 T the hight of roof as shown by T S in front elevation. By connecting V2 T we have the length of the valley. There are no shapes in the porch roof that have not been encountered in other parts of the main or rear roof, so there can be no difficulty in estimating the surfaces. In Fig. 111 the line of outside wall on plan is duplicated in T1 *a b* U, and for convenience in estimating the area it would be well to continue the line T1 *a*, cutting off the small part and estimating its surface separately. By laying our rule on the outer wall line in plan and measuring from the point T1 to the valley line, we find the distance to be 16 feet 4 inches. From *b* to *a* is 6 inches, and from *b* to U is 3 feet. By referring to the side elevation, Fig 90, the slant hight of the roof, or from T1 to S1, is 7 feet 9 inches. From the plan or front elevation can be obtained the length of No. 12 at the eaves, which is 12 feet, which measurements are placed on the diagram in Fig. 111. The area of this part of the roof would be obtained in the same manner as shown in Fig. 101, or we can cut off the triangle at the right by drawing a line at right angles to S1 V, leaving a rectangle 7 feet 9 inches by 12 feet and an inverted triangle whose base can be considered as 4 feet 4 inches and its altitude 7 feet 9 inches, as 16 feet 4 inches minus 12 feet equals 4 feet 4 inches. Before leaving No. 12 we must consider the allowance to be made for flashing against the main building and for the finish of the edge and eaves.

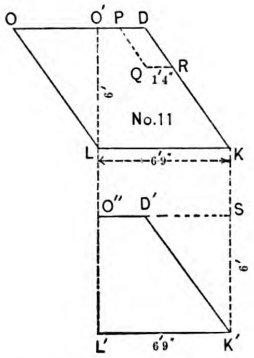

Fig. 109.—Shape and Area of No. 11 in Roof Plan.

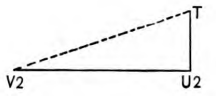

Fig. 110.—Diagram Showing Length of Valley in Front Porch.

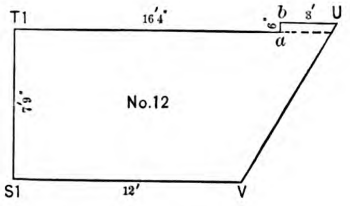

Fig. 111.—Shape of No. 12 in Roof Plan.

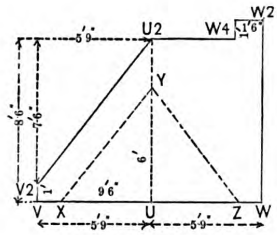

Fig. 112.—Shape of Nos. 13 and 14 in Roof Plan.

The shapes of Nos. 13 and 14 are shown in Fig. 112. The lengths of gable front can be obtained from the front elevation in Fig. 89, where V U or U W are found to be 5 feet 9 inches. From the plan we find that the projection V2 V3 is 1 foot, and that the length of ridge is 8 feet 6 inches, all of which figures are placed in the diagram, as shown. We could consider No. 12 to be a rectangle, and multiply V U by U U2, then deduct the area of the triangle, the base of which can be considered as 7 feet 6 inches and the altitude as 5 feet 9 inches. Or we can consider the shape of No. 13 as a trapezoid, and to find the area of a trapezoid, multiply the altitude (V U) by half the sum of its parallel side. For No. 14 we have obtained the distances U W and U U2. An inspection of the plan shows that this part of the roof is a rectangle, to which can be added the return, shown on plan at W4 W2, which extends back about 1 foot, and the slant hight of which is shown by W2 W in the front elevation, and is 1 foot 6 inches. Then the shape of No. 14 is a rectangle, 5 feet 9 inches by 8 feet 6 inches, to which is to be added the return, 1 foot by 1 foot 6 inches. The same allowance is to be made for flashings and edges as in the previous example. For the shape of roof under gable, as indicated by X Y Z in the front elevation, Fig. 89, we have set off the distance Y X of front, as shown by U X in Fig. 112, and drawn X Y parallel with V2 U2. Then U X Y shows one-half of the shape, which is a triangle, with a base of 4 feet 6 inches and an altitude of 6 feet. The other half of roof is shown by U Y Z.

Measurement of Roofs.

THE USE OF IRON in the construction of the walls of dwelling houses has hitherto been unknown in Berlin, Germany, small structures, such as kiosks, built up of corrugated sheets or temporary buildings of iron and glass being the only purposes to which the metal has yet been applied in this connection. A new departure is, however, being made by a Berlin builder, who is constructing five residences of three stories each, the walls of which are formed of iron plates and the floors of iron girders. The plates are lined inside with wood, but in other respects the usual building materials are dispensed with. It is claimed for this style of building that greater security against fire is obtained, with unusual resistance to the destructive influences of the weather.

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MASONRY AND STONE CUTTING.*

PENDENTIVES BETWEEN POINTED ARCHES.

IT WAS the ambition of the late Sir Gilbert Scott to use the cupola in connection with Gothic architecture, for it is the grandest feature we possess, and Gothic architecture is an incomplete style without it. Sir Gilbert introduced the cupola on pendentives over pointed arches both

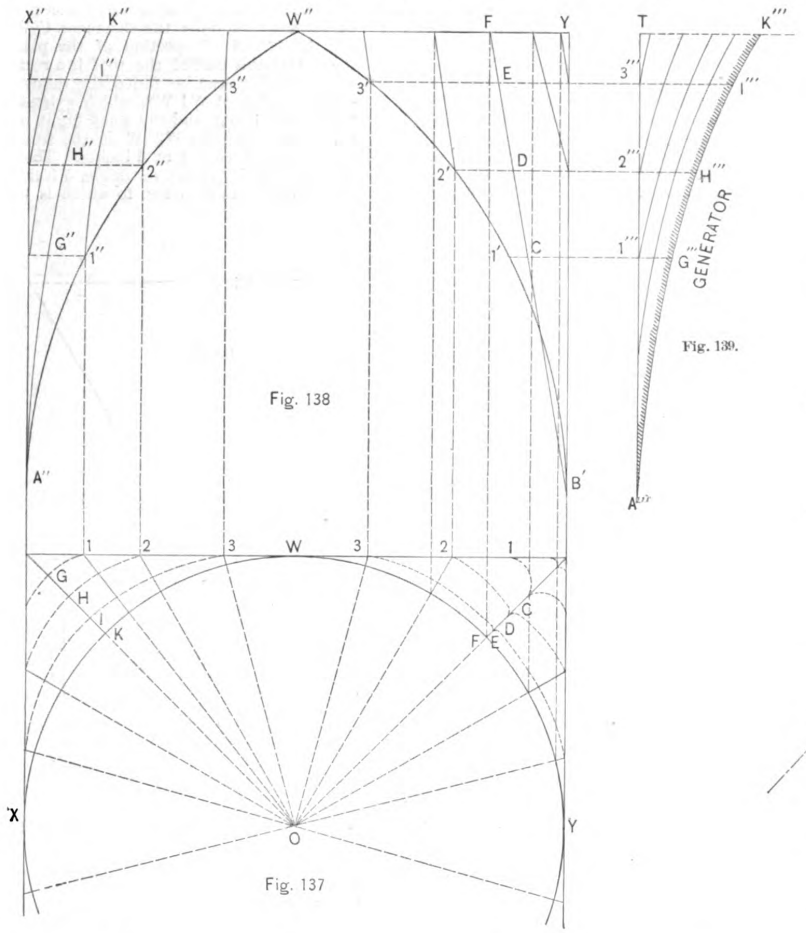

Fig. 138

Fig. 139.

Fig. 137

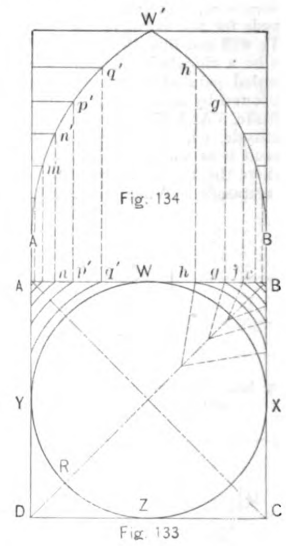

Fig. 134

Fig. 133

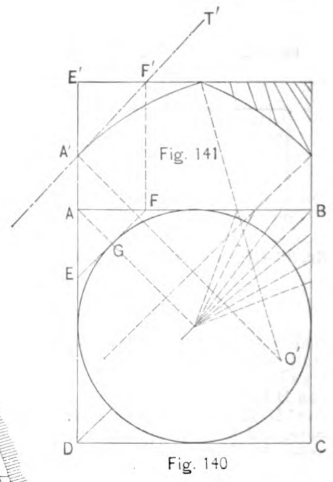

Fig. 141

Fig. 140

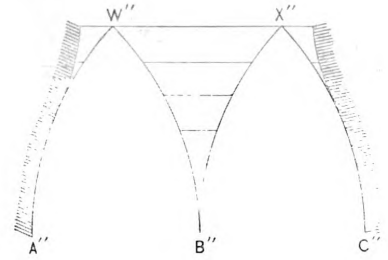

Fig. 135.

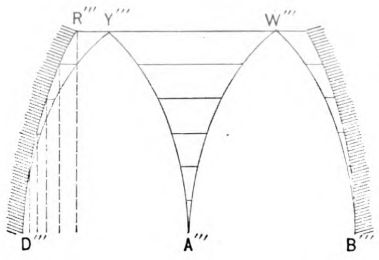

Fig. 136.

Masonry and Stone Cutting.—Figs. 133 *to* 141 *Inclusive.*

section, Fig. 135, of the pendentive from A—C will have an ogee outline, a form of vault which Sir Gilbert declares to be unacceptable. Pendentives between pointed arches are not unknown to architecture; they can be seen in the South of France in the church of St. Front, Périgueux, but they were not formed as surfaces of revolution such as Sir Gilbert Scott discarded. The construction which I gave in Fig. 130 is practically a modification of the construction used in the pendentives of St. Front.

in his design for the Berlin Houses of Parliament and for the London Law Courts. Now, in doing this he made an extraordinary discovery. If the pendentives be drawn as portions of a surface of revolution of which the pointed arches are sections—that is, if, Figs. 133 and 134, from the points *m n p q* on the arch we draw horizontal circles, and let these be the surface of the pendentive, then the main

On the diagonal section D B, Fig. 133, D''' B''', Fig. 136, we draw an arc of a circle, the center of which is on the level of the springing line D''' B''' of the pendentive, and which starts from the angle D, Fig. 133, and rises to touch the upper horizontal circle of the pendentive in the point R. This is in Fig. 136 the arc D''' R'''. Now, at as many levels as we like we draw horizontal circles, shown on the right-hand side of Fig. 133, which are made to touch the arc D''' R''', previously drawn, and the sides of the pointed arches. It will be seen that each of these horizontal circles has a different center. If we take our sections close to one another, these series of arcs will form the pendentive used in the church of St. Front. The soffit of the arch stones might be worked as in the former case, Fig. 130, by working on the stone two or three of these horizontal sections and then finishing the intervals, trusting to the eye of the stone cutter only, but I believe I have found a much safer and easier process. Two years ago, at the congress of the R. I. B. A., an American architect

* Continued from page 59, March issue.

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stated that this pendentive could be formed quite regularly as a conoid. I tried it. On the right-hand side of Fig. 137, Fig. 138, I have drawn the pendentive as formed by the motion of a straight line bound to touch the center line over O of the cupola, the horizontal circle X, W, Y, and the sides of the pointed arches. It is, in fact, a surface identical to that used in the angles of the Marseilles backvaulting, referred to in a previous article. Here one-half of the surface is guided by the curve of the pointed arch from W—B, and the other half by the curve from Y—B. We know that these surfaces will be continuous if in three points of the common generator F B they have the same planes tangent to both. This is so. Where the generator F B meets the center line they both have for tangent plane the one which contains the generator and the vertical center line over O; in the point F they both have for tangent plane the one which contains the generator and the tangent to the circle F; lastly, in the angle B, both pointed arches are tangent to the same vertical line over B, and, therefore, both surfaces have the same tangent plane which contains that vertical tangent and the generator F B. The surfaces are, therefore, continuous. I then made a series of horizontal sections, and I found that my section lines, instead of flowing on, as might have been expected, according to the theoretical reasoning quoted above, met at sharp angles on the generator F B, showing that this generator would form a sharp arris between the two surfaces. The conoid construction of the American is, therefore, wrong. The fact is that the surfaces are continuous in different directions. If the pointed arches were continued below their springing, so as to form the curious arch known as the "vesica piscis," then, forming the surfaces as above, the upper surface of the one vault would be continuous with the lower surface of the other vault.

This failure made me try another construction, in which I replaced the straight generators by a curved generator, Fig. 139. The generator is the profile adopted in Fig. 136. The curved generator is made to move round so as to touch the pointed arch, the horizontal circle and the vertical axis of the cupola, and it is during this progress always held in a vertical plane. According to its position the curved generator is more or less inclined, the inclination of the generators starting from the points 1″, 2″, 3″ is shown in Fig. 139. To see if the surface of the pendentive be continuous, I made several horizontal sections of same, and I found, to my surprise and satisfaction, that they gave me exactly the same arcs of circles which are produced in the first construction, Fig. 136, at the corner B, Fig. 133. Now this discovery simplifies very much the operation of stone cutting. We need only by the first method draw on the stone the arrises of the upper and lower bed joints; then, by means of a templet cut to the curve D‴ R‴, Fig. 136, we can work the surface of the soffit as easily as in any ordinary spherical cupola. To find the points of intersection of the curved generators by the horizontal planes, I measured, Fig. 139, their distances to the vertical line A‴ I, and carried these distances on the plan from A, T, 2, 3 respectively, according to the generator considered.

As to the bed joints, they will be formed exactly as those of Fig. 130. In Figs. 140, 141 I have shown a particular pointed arch, between four of which it would be possible to form pendentives with straight generators only. Let E F be the side of an octagon circumscribed to the circle; if, Fig. 141, we draw a line A′F′, and strike the side of a pointed arch from a center O′ taken on a line A′ O′, perpendicular to A′ F′, we shall, in using such pointed arches, be able to form the pendentives with straight generators. As the tangents A F, A E to the pointed arches meet the extremities of the line E F, the lines A F, A E and the generator A G are in a plane; this plane is tangent to both surfaces, both in points A and G, therefore the surfaces are continuous. In fact, since along the generator A G the surface is that of a cone; everywhere else it is conoid.

(To be continued.)

LAW IN THE BUILDING TRADES.*

ABANDONMENT OF MECHANIC'S LIEN.

WHERE A PERSON who would otherwise be entitled to a mechanic's lien for materials furnished and used in the construction of a building takes the notes of the owner secured by a chattel mortgage, he waives his lien, and his mortgage is subject to the mechanics' liens filed to secure debts arising out of the construction of the building.—Kendall Mfg. Company *vs.* Rundel, Supreme Court of Wisconsin, 47 N. W. Rep., 364.

STATEMENT FOR LIEN—SUBSTANTIAL COMPLIANCE WITH CONTRACT.

Where the statute requires a notice for mechanic's lien to state "whether all the work for which the claim is made has been actually performed or furnished, and, if not, how much of it," a claim "for labor and services performed" is sufficient, if the contract has been substantially performed, and where the proof shows a contract for $1665, of which all but $75 has been completed, and that is shown to have been caused by failure to get materials which should have been furnished by the owner, this is a substantial compliance, and a lien will be sustained.—Mechan *vs.* Baker, City Court of Brooklyn, 11 N. Y. Supp., 781.

USAGE OF TRADE IN CONSTRUING CONTRACTS.

Usage may be used as evidence to interpret a contract, but not to vary or contradict it. Its purpose is to ascertain the intention of the parties where it cannot be ascertained by the terms of the contract. In all contracts as to the subject matter of which known usages prevail, the parties proceed on the tacit assumption of such usages, but commonly reduce into writing the particulars of their agreement, but omit to specify those known usages which are included, as of course, by mutual understanding. Where in a contract to ascertain the net profits of a firm, it was provided, among other things, that "from the outstanding accounts 5 per cent. be deducted to cover losses and bad accounts," it was proper to prove usage of the trade to show in such cases that "outstanding accounts" meant those from which the bad accounts had been segregated and charged to profit and loss.—McCulsky *vs.* Llostermann, Supreme Court of Oregon, 25 Pac. Rep., 366.

VALIDITY OF WRITTEN CONTRACT FRAUDULENTLY SECURED.

When one of two contracting parties is fraudulently induced to execute a written instrument upon the false representation that it expresses the agreement which they had made, the party defrauded may defend against the enforcement of the fraudulent instrument by the other party, even though he may be chargeable with want of prudence in relying upon the false representations. This defense may also be made when a third party, for whose benefit the contract was made, seeks to enforce it.—Maxfield *vs.* Schwartz, Supreme Court of Minnesota, 47 N. W. Rep., 448.

FLOWAGE FROM WATER SPOUTS.

It constitutes a trespass to so construct a building that the system of water spouts for carrying away the water which falls on the roof is arranged in such a manner that the water collected thereby is discharged upon the land of another.—Conner *vs.* Woodfill, Supreme Court of Indiana, 25 N. E. Rep., 876.

MECHANIC'S LIEN—AGREEMENT AS TO PAYMENT.

By a written contract defendant R. purchased of defendant N. certain land with the building thereon, and went into immediate possession. Plaintiff sold to R. machinery, which he used in constructing a mill on the land, and which became a part of the freehold. Thereafter R. and N. made a settlement by which the agreement was canceled, and N. went into possession. At the time of such settlement N. knew of the improvements that had been made by R. Though the machinery was sold to R. on this agreement to pay therefor with stock, still, he having failed to make such payment, plaintiff, who had complied with the provisions of the statute in regard to filing, was entitled to a lien on the building and the interest in the land owned by R. at the time the machinery was bought.—Kerrick *vs.* Ruggles, Supreme Court of Wisconsin, 47 N. W. Rep, 486.

MECHANIC'S LIEN IN MICHIGAN.

Under the statutes of Michigan which require that a copy of the notice of claim of a mechanic's lien shall be served on the owner of the property, proof that a copy thereof was delivered to him personally is a compliance with the statute. Under the statute which provides that the filing of a lien shall not bind the premises for a greater sum than is due from the owner at the time it is filed, or that may become due thereafter, the lien is good as against money assigned by the contractor to a third party, but which, at the time of filing the lien, has not been paid over under the assignment.—Bourget *vs.* Donaldson, Supreme Court of Michigan, 47 N. W. Rep., 326.

LIEN UNDER SEPARATE CONTRACTS AGAINST SAME OWNER.

The owner of two lots entered into two separate contracts with a builder for the erection of a house upon each. The builder entered into an entire contract with a material man to furnish material for both. The sub-contractor filed a lien for the whole amount against both houses. Such a statement is invalid as a basis for lien against either lot, as it should have shown the specified facts necessary to give jurisdiction with reference to each lot separately.—Knauft *vs.* Miller, Supreme Court of Minnesota, 47 N. W. Rep., 313.

BUILDING OPERATIONS in New York City and vicinity just at the present time are showing a very slack condition, for which many reasons are assigned. The severe weather which has been experienced during the winter months has undoubtedly delayed operations to a very great extent, and in addition to this capitalists do not appear to be in any haste just now about commencing the erection of new buildings, owing to the number of dwellings which remain vacant. It is said that the present situation in the building trades has not been equaled for a number of years past.

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THE "G. & B." SYSTEM OF FIRE-PROOFING.

THIS SYSTEM of fire-proofing which is being introduced by the Gilbert & Bennett Mfg. Company, with offices at 148 Lake street, Chicago, and 42 and 44 Cliff street, New York City, is based on the fact that wood timbers can be protected against damage by fire by the use of mortar properly applied, and it is well known that wood is desirable for framework on account of its light weight, small cost and readiness with which other material may be secured to it. The important feature of holding the mortar in such a manner as will protect the timbers is claimed to be met by the use of wire lathing employed in connection with Hammond's Metal Furring. The lathing holds the mortar in place, while the furring sets it away from the wood in such a manner as to maintain the air space between the two. By means of the accompanying illustrations we show the manner in which the lathing is attached to wood and brickwork, and also some of the uses to which it is applicable. The Standard "G. & B." Wire Lathing is made by weaving wires in such a way as to form square openings measuring about $\frac{5}{16}$ inch and commonly called "$2\frac{1}{2}$ mesh." It is usually woven $36\frac{1}{2}$ inches wide and put up in rolls 50 yards long. In its manufacture No. 20 steel wire is employed, capaple of sustaining, it is claimed, over 80 pounds, so that every foot in width of the lathing has a strength of about 2500 pounds. The amount of metal in the strands of wire is said to be so small that the action of intense heat will not sufficiently affect it to disengage the mortar. Another point to which the manufacturers refer is that the surface will not crack in case the building should settle, or if poorly-seasoned timber is employed. Hammond's Metal Furring, used in connection with this system of fire-proofing, is a combination of sheet metal bearings or bridges with steel stiffening rods, fastened to the timbers by means of staples. In Fig. 1 of the illustrations is shown a $\frac{1}{2}$-inch metal bearing, clearly indicating the manner of fastening the rods to the timber and of holding the lathing in place. This arrangement is such that it keeps the lathing and plaster away from the woodwork, forming an air space between the timbers and the plaster. Another function of Hammond's Metal Furring is that it admits the mortar to form an unbroken plastered surface on the back, the rod and bearings being so small as to become imbedded in the mortar. It also acts, the manufacturers state, as a stiffener and support for the lathing, and where used wood furrings are unnecessary. It is stated that by the use of Hammond's furring the mortar can be applied with the least difficulty and also of a uniform thickness, thus saving both time and material. As each section of the furring is put up it can be spaced to accommodate the timbers. If they are laid far apart the rods come close together, while if the timbers are separated by only a short distance the reverse is the case. If the timbers are placed irregularly the rods may also be irregularly spaced. The bearings are made of flat sheet metal in such a manner that the ends rest against the timbers. They are made with a slot running transversely to the face for the reception of the staples through which the rods are passed. Two sizes of bearings are made—namely, 1 inch and $\frac{1}{2}$ inch, the former, however, being more extensively employed, for the reason that it sets the plaster sufficiently far away to give an ample air space. In cases where only a small air space is required the $\frac{1}{2}$-inch bearings can be employed. The stiffening rods are made of No. 9 bright steel wire, and are furnished 8, 10 and 12 feet long. The staples are made $1\frac{1}{2}$ inches long, with $\frac{1}{2}$-inch bearings, and 2 inches long, with 1-inch bearings. These extend into the wood 1 inch.

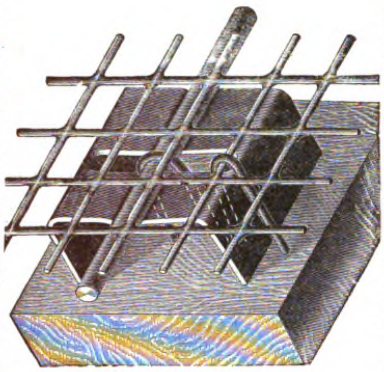

Fig. 1.—Half-Inch Metal Bearing, Showing Manner of Fastening Rods and Lathing.

The "G. & B." system of fire proofing is adapted for interior walls and ceilings of frame buildings, brick or stone structures, including residences, office and public buildings, theaters, &c., as well as for use around elevator shafts, stairways, areas and hot-air flues. In cases where it is applied to wooden studding for partitions, as shown in Fig. 2 of the engravings, the studs are put up in the usual manner and at the base 6 inches of grouting, consisting of brick and mortar, is filled in, as indicated in the cut, in order to prevent fire from below burning up through, and also to prevent rats and mice from passing from one story to another. Timbers around doorways may be protected by lathing covered with a good body of mortar, as may also the timbers around window frames. In Fig. 3 is represented the manner of applying the lathing to brick walls. Between every five or six courses of brick a wood lath is laid in order to receive the staples carrying the stiffening rods and lathing. It is stated that entire buildings have been constructed under Gilbert's patent, employing wire lathing with cement for the outer covering of wood framework and wire lathing with plaster for the inner. It is stated that the lathing and furring is so compact that the bulk of the wall is made up of a thick body of mortar, which becomes hard and as firm as a slab of marble.

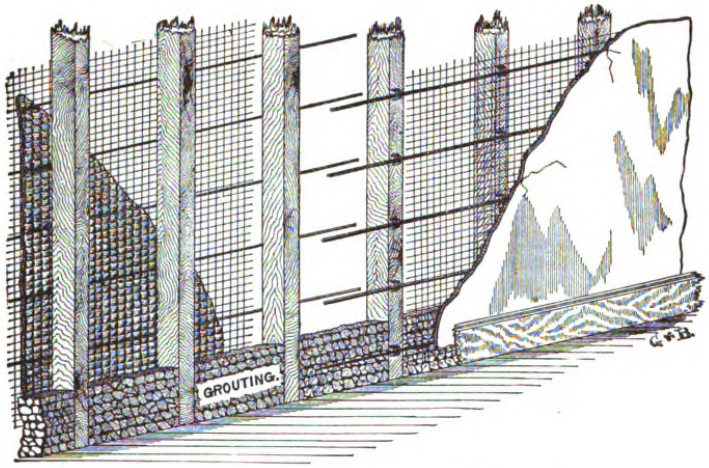

Fig. 2.—Method of Applying the "G. & B." System to Partitions.

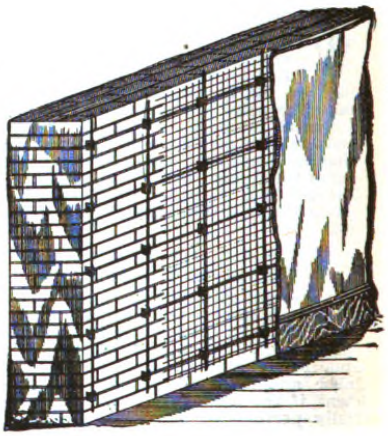

Fig. 3.—Lathing as Applied to Brick Walls.

The "G. & B." System of Fire-Proofing, as Applied to Wooden Studding and Brick Walls.

THERE IS AN ENORMOUS tree in the Ocmulgee River Swamp, Abbeville, Ga., that is said to rival the famous giants of the California forest. The tree is one of tupelo gum variety, and towers above the surrounding forests of immense oaks. It is evidently of great age, and doubtless was inhabited by the Indians in the prehistoric age of this country. The tree is hollow at the base, with an aperture large enough to admit a tall man. The hollow extends upward for a distance of 15 feet, affording space enough for two stories. The hollow at the base is 12 feet in diameter.

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The Builders' Exchange

CONDUCTED BY WM. H. SAYWARD, SECRETARY OF THE NATIONAL ASSOCIATION.

Officers for 1891.

President, ARTHUR MCALLISTER, 20 Newton street, Cleveland, Ohio.
1st Vice-President, ANTHONY ITTNER, 9 North Seventh street, St. Louis, Mo.
2d Vice-President, IRA G. HERSEY, 164 Devonshire street, Boston, Mass.
Secretary, WILLIAM H. SAYWARD, 164 Devonshire street, Boston, Mass.
Treasurer, GEORGE TAPPER, 159 La Salle street, Chicago. Ill.

DIRECTORS.

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Boston, Mass..... JAMES I. WINGATE.
Buffalo, N. Y..... W. D. COLLINGWOOD.
Chicago, Ill..... GEORGE C. PRUSSING.
Cincinnati, Ohio..... J. MILTON BLAIR.
Cleveland, Ohio..... C. C. DEWSTOE.
Denver, Col..... R. C. GREENLEE.
Detroit, Mich..... WARREN G. VINTON.
Grand Rapids, Mich.. H. M. REYNOLDS.
Indianapolis, Ind..... J. E. TWINE.
Kansas City, Mo. .... W. A. KELLY.
Louisville, Ky..... J. N. STROCK.
Lowell, Mass..... CHAS. B. CONANT.
Lynn, Mass ..... P. S. CURRY.
Milwaukee, Wis..... CHAS. F. KINDT.
Minneapolis, Minn.... GEORGE W. LIBBY.
New York, N. Y ... MARC EIDLITZ.
Omaha, Neb..... N. B. HUSSEY.
Peoria, Ill..... FRED. F. MEINTZ.
Philadelphia, Pa..... STACY REEVES.
Portland, Maine..... R. W. JACKSON.
Pittsburgh, Pa..... THOMAS J. HAMILTON.
Providence, R. I..... FRED C. MARKHAM.
Pueblo, Col..... E. P. FISH.
Rochester, N. Y.... H H. EDGARTON.
Saginaw, Mich..... GEORGE C. ZWERK.
San Francisco, Cal... WM. N. MILLER.
St. Joseph, Mo..... JOHN DE CLUE.
St. Louis, Mo..... WM. M. ANDERSON.
St. Paul, Minn..... EDWARD E. SCRIBNER.
Sioux City, Iowa..... FRANK CLARK.
Syracuse, N. Y..... HENRY F. CRAWFORD.
Washington, D. C.... B. H. WARNER.
Wilmington, Del..... A. L. JOHNSON.
Worcester, Mass,..... H. W. EDDY.

New Associations.

Among the many cities from which builders have made inquiry of the secretary concerning the National Association, the best plan for forming local exchanges, their functions, &c., there are a number which seem to promise the early formation of builders associations and affiliation with the national body.

J. I. Foreman, of Butte City, Mont., writes that after a thorough canvas of the builders of his city they were found to be unanimously in favor of establishing a builders' exchange and connecting themselves with the National Association.

The labor organizations in Butte City and vicinity are strongly organized and include a large majority of the workmen in their membership. The desire of the contractors is to form an exchange for the purpose of being able to secure the joint action of the employers upon subjects of common concern. No desire was expressed to antagonize the unions, but rather to establish a harmonious relationship that shall produce the best conditions, the most advantageous relationship between the two interests.

A letter from the ex-director of the National Association from Indianapolis, James E. Shover, contains information regarding the recent formation of a Builders' Exchange in Terre Haute.

The new exchange has about 50 members and starts out with every indication of success. Mr. Shover states that the Terre Haute builders have been in communication with him for some time and that he has endeavored to start them along in the lines designated by the National Association.

Exchange affairs in Indianapolis are in good condition, although for the past month there has been in force a strike that has caused considerable disturbance in the building business. The strike has effected carpenters, planing-mill men, painters, plasterers, tinners, plumbers and coopers, and up to April 1, there seemed to be no immediate prospect of a settlement.

The contractors and builders of Ogden, Utah, have formed an exchange and are at present engaged in perfecting the lines upon which it shall be conducted.

The old Brick Manufacturers' and Brick Contractors' Exchange has been reorganized and the name changed to the Builders' and Traders' Exchange. The new organization is to be more of the nature of a builder's exchange, as advocated by the National Association, than the old one, and the secretary is now in correspondence with the secretary of the National body regarding methods and practices that prevail in filial associations.

The builders of Galveston hope to have an exchange in running order in the near future. Communications have been received from several different contractors of that city asking for information relating to exchanges and the National Association. An exchange has been organized with about 50 members, and letters seem to indicate full appreciation of starting out on lines that have been proved successful in other localities.

Other cities having new organizations and in correspondence with the National Association include Davenport, Iowa; Chattanooga, Tenn.; Wilkes-Barre, Pa.; Youngstown, Ohio; Helena, Mont., besides many others that will be mentioned as they develop.

Australian Builders.

A very interesting letter has lately been received by the national secretary from Edmund A. Hunt, of the *Building and Engineering Journal*, of Melbourne, announcing the successful formation of a national organization of builders, under the name of the Federated Builders' and Contractors' Association of Australasia.

The association is founded on lines very similar to those of our own national association, and is composed of a membership of associations located in the various principal cities of the country.

The following resolution was offered in the meeting, at which the organization was formed, by A. Midson of Brisbane: "Some acknowledgment should be made to our American brethren for their kindness in forwarding copies of their constitution. The committee has borrowed pretty freely from this, and the constitution is very much on the lines of the American association." R. C. Brown of the Melbourne association had much pleasure in supporting the motion, and endorsed Mr. Midson's remarks with reference to the assistance afforded by the American reports.

A very cordial invitation was extended to the secretary, or to any representative of the National Association, to visit Australia at the time of their next convention, which will be in October. A hearty welcome and a right royal entertainment will be given to any one representing the National Association of Builders.

The building business has not been very active for some time past owing to the great shipping strike which for a time paralysed all industries throughout the Colonies, and although the building business was not directly affected, nearly all building operations were brought to a standstill owing to the stoppage of the coal supply and the consequent impossibility of obtaining brick. The employers combined and stood together in a most satisfactory manner, and the strike after lasting about two months ended in the complete discomfiture of the strikers. The prospects for the coming season are very promising in Melbourne particularly where a considerable number of large contracts are to be commenced.

"The National Association."

The following is the response to the toast, "The National Association," by its president, Arthur McAllister of Cleveland, Ohio, delivered at the banquet celebrating the thirteenth anniversary of the Builders' Exchange at Cincinnati:

As representing the National Association of Builders, I beg to thank you for the kind cordiality with which I have been received at this, the thirteenth anniversary of the organization of your Exchange, and trust that when 13 years more shall have come and gone you may find the National Association as strong and as influential as the interests which it seeks to foster are important. The organization of these interests and the establishment of proper business methods in them is the task which has been imposed upon the National Association, and upon the successful performance of this task depend matters of vital importance to all men who are now engaged in any of the avocations which enter into the building of the homes and places of business of the people of this country. The character of the product of a man's mind or hand, or both combined, determines the grade of the man, fixes his position among men, and enables his fellows to place a proper value upon him. Tested by this rule, our fraternity has nothing to fear. On all sides is visible the result of our handiwork, and the evidence of progress in the United States is nowhere more distinctly seen than in the character of its buildings, public and private. The importance of the builder's

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art has not, in the recent past been fairly appreciated, but the structures which the people see rising on the streets of all our larger cities have raised the question, 'Do not the men who construct these towering buildings require an equipment which only careful study and preparation, combined with a high order of intelligence, can give?' The preparation necessary to acquire the knowledge and skill on the part of the master builder, to enable him to construct properly and safely the great modern commercial building, is just as exacting and demand as high an order of intelligence and as virile a brain as does that which qualifies the lawyer for the successful discharge of the duties of his profession, and for the attainment of high rank therein, and there is no just reason why the builder, if he is true to himself, should not take rank with the best. He gives of his skill and knowledge thus acquired, and he should have a fair and reasonable remunecation therefor, and this, I regret to say, in very many cases he does not now receive. To illustrate the principle of remuneration which obtains in some quarters, let me tell a story. We have, within a few days, had a case tried before the Court of Common Pleas, in Cuyahoga County, in which an attorney claimed a a pretty large fee for defending a client, and had sued for the amount. A large number of attorneys appeared as witnesses, and they all thought the charge was not excessive, and on the gentleman being asked what the rule was for charging in such cases, replied that the rule varied with the ability of the client to pay, and that the custom was to take about all the money the client had. Bear in mind that this was in Cuyahoga County; no such custom, I am confident, obtains in Hamilton County. Now, gentlemen of the Cincinnati Exchange, I do not expect that in the matter of charging for services you will ever rise to the magificent proportions which have been reached by our legal friends of Cuyahoga County; but I do not believe that the methods of builders in this respect are susceptible of very great improvement and to the advantage of the builders, and I hope that the influence of the National Association will be felt in this direction as it has already been felt in the improvement of other business methods, and in the kindly social relations which have grown up between builders from all parts of our country, and let us hope that its beneficient effects will continue until all the disabilities under which we have labored shall have been removed.

A Model Building Ordinance.

On April 2 there will be held in New York City an important meeting of committees from the American Institute of Architects, the National Association of Building Inspectors, the National Board of Underwriters, the National Association of Fire Engineers and the National Association of Builders, for the purpose of conjointly framing a model building ordinance.

The preliminary work has been carried on under the direction of the Executive Committee of the National Association of Fire Engineers, by the secretary Henry A. Hills of Cincinnati, Ohio. The preparations have been very complete and a copy of "Preliminary Suggestions" has been placed in the hands of the members of the committees from the various bodies mentioned. These suggestions comprise a pamphlet of over 50 pages and are and represent a very large amount of labor in the compilation.

The following announcement is placed at the beginning of the "Suggestions" and explains itself:

The National Association of Fire Engineers, respectfully submit this excerpt of a building ordinance for your inspection, correction and approval. For the purpose of making the objects to be attained clearly understood, we offer the following explanation:

1. To frame an ordinance that takes in all cities and the whole city without regard to fire limits. This we seek to accomplish by requiring all frame buildings to be built with space between them, as in Section 3, holding that the loss of 4 to 8 feet frontage in a business section of a city will prevent the erection of wooden buildings; while such a rule, if observed in the residence portion, is no hardship.

2. The present practice is: to allow anything to be built outside of the fire limit until this part is thickly settled, after which it is included in the fire limit, but after all the damage has been done. This we have attempted to correct.

3. To prevent loss of life in manufactories, by requiring adequate stairways in proportion to the hight and number of people, and making the law applicable in a country town as well as a large city.

4. To prevent loss of life in theaters, they have been graded according to the number accommodated.

5. To prevent loss of life in hotels, &c., especial attention is given to proper exits.

6. Our object has been to frame a general law that will apply everywhere—that gives to the owner permission to follow his own ideas as to detail, but the general plan being such as will permit his own building to be destroyed without damage to those adjacent.

7. Clauses which do not harmonize with the present method of government can be altered to suit each case.

8. A reduction of the fire loss is just so many dollars saved to the public.

9. One single life saved by better methods of building will be ample pay for our efforts.

Respectfully,
HENRY A. HILLS, Secretary
For the Executive Committee National Association Fire Engineers.

Resolution Passed in the Fifth Convention on the Torrey Bankrupt Bill.

The following is a copy of the resolutions passed in the convention relating to the passage of what is commonly known as the Torrey Bankrupt Bill, which, it will be observed, has already been presented in the Senate.

The original resolution was presented by Mr. Anthony Ittner, first vice-president, and was by him carried in person to Washington:

IN THE SENATE OF THE UNITED STATES.

FEBRUARY 18, 1891.—Presented; ordered to lie on the table and be printed.

The Vice-President presented the following address and resolutions of the National Association of Builders, formulated and passed at the fifth annual meeting at New York, February 12, 1891, praying the immediate passage of the Torrey Bankrupt Bill.

NEW YORK, February 12, 1891.

The Honorable the Senate and House of Representatives in Congress assembled:

The National Association of Builders, composed of citizens of the several States of the Union, respectfully submits for your consideration an address and resolutions as follows:

THE ADDRESS.

The builders of the country pursue a calling founded upon mathematical calculations, the strength of materials used, and the laws of nature. They are willing, therefore, to conduct the business of their calling upon the basis of the integrity of commercial transactions, according to the rules of equity, and with due regard to the rights of their competitors in business and the men with whom they deal both as debtors and creditors.

The size, style or expense of buildings is not varied in the several States because of the difference in their general laws, but the builders often find to their detriment that their rights are modified and their responsibilities changed by such laws as they go from State to State in the pursuit of their calling, and that there is thereby levied upon them useless expense which otherwise would be saved to them and their patrons. They, therefore, are interested in the enactment of a uniform, equitable, national law, under which their rights shall at all times and in all places be easily understood and readily enforced.

"To give and take by the same rule" has always been their practice, and they are therefore interested in an absolute equality between the volunteer parties to transactions on credit, and, for themselves and on behalf of those with whom they deal, announce the necessity for a comprehensive law, embodying provisions for both voluntary and involuntary bankruptcy.

Attention is hereby called to the universal laws for the administration of the estates of deceased persons and the determination of the rights of creditors as between themselves and against such estates, and the necessity urged for a national law to govern the relationship and determine the rights of the creditors and the bankrupt in the event of commercial death.

The United States is the only nation of the first class upon the earth which has not in force a bankrupt law for the determination of the property rights of creditors, the prevention of bankruptcies, and the discharge of honest but unfortunate debtors, although the founders of Government foresaw the necessity for such a law and made ample provisions therefor in the Constitution.

THE RESOLUTIONS.

Resolved, That the integrity of commercial transactions must be maintained according to the rules of equity for the maintenance and the perpetuation of the commerce of the world.

Resolved further, That the variance of the State laws relating to insolvency is such as to discourage the extension of business transactions, create distrust between men in different parts of the country and increase the cost of buildings.

Resolved further, That legislation which deals with the rights incident to voluntary transactions on credit should not favor either party thereto at the expense of the other, and that a law embodying provisions for voluntary to the exclusion of involuntary bankruptcy, or the reverse, would be hurtful to the best business interests of the country, and should therefore not be countenanced in any form or for any purpose by our national legislators.

Resolved further, That since the Constitution of the United States reserves to Congress the sole power to enact a uniform law upon the subject of bankruptcies, and forbids the impairing of the obligation of contracts by the States, it is the duty of Congress to provide a national law pursuant to which the rights and responsibilities of bankrupts and their creditors will be as readily understood and as easily enforced as the probate laws of the various States.

Resolved further, That the United States should have as a part of its permanent laws a bankruptcy code, to the end that it may be abreast of the times and in accord with the position of the other first-class nations of the earth upon that subject.

Resolved further, That the ends recited above will be attained by the immediate passage of the Torrey bankrupt bill, now upon the calendar of the Senate awaiting consideration.

Resolved further, That a copy hereof be authenticated by our officers and forwarded to the Vice-President of the United States for presentation to the Senate, and to the Speaker for presentation to the House of Representatives.

The foregoing address and resolutions were, on the day indicated, submitted, considered and unanimously adopted for the purpose therein expressed.

JOHN J. TUCKER, President.

Attest:
WM. H. SAYWARD, Secretary.

Exchange News.

Among the many communications which have been received by the secretary during the past month none have been so satisfactory or so convincing of the actual, practical value of the work of the National Association as have letters from the exchanges in Milwaukee and Buffalo.

Each of these cities has, since the return of their delegates to the Fifth Convention, selected and purchased a site upon which they propose erecting buildings of their own to be occupied by the Exchange and devoted to the interests of the builders in each locality.

Milwaukee.

On March 6 the Builders' and Traders' Exchange of Milwaukee completed their negotiations for one of the most desirable building sites in the city and made the first payment thereon.

During the year 1889 the project of securing or erecting a building to be owned and occupied by the Exchange was agitated and very seriously considered, but owing to the inability of the members to determine which side of the river would be the most desirable for the location of a permanent Exchange, and for lack of good available property, the plan failed to carry and was temporarily dropped.

The opportunity given the delegates to the recent convention in New York to visit a prop

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erly conducted trade school and to thoroughly inspect a building owned and occupied by a Builders' Exchange, with a trade school under its own supervision and control, and a permanent exhibit of building material, also in connection with the Exchange second to none in the world, resulted in the project being again taken up and carried to an exceedingly gratifying stage which promises everything for the future.

The effect of being in actual contact with an Exchange that has carried out the recommendations of the National Association by establishing such conditions as shall be most conducive to the present and future welfare of the building business in so thoroughly successful a manner, and the perfect success of the trade schools in connection therewith (in which were found two Milwaukee boys), as well as the exhibit of building material, demonstrated to the delegates, beyond any question, the value and importance of such an institution.

Upon the return and report of the delegates it was quickly determined that such an exchange could be maintained in Milwaukee with equal success, and the association at once set about the consideration of a site.

Many locations were suggested, but only three were seriously entertained. The method adopted for determining which of the three should be fixed upon was by ascertaining which site would procure the largest subscription. The largest subscription was for the location at the corner of Grand avenue and Fifth street, which at once decided the matter.

On March 6 the bargain for the property was closed by the owner accepting a small payment as earnest money and the Exchange agreeing to pay $16,000, half the amount of cost, which was $32,000, within 30 days.

The location being on a corner gives a 50-foot front on Grand avenue and a 100-foot front on Fifth street.

In order to simplify the conduct of the business relating to the building it was decided to organize and incorporate a company with this object in view.

The capital stock is $60,000, of which over half is already secured, and no difficulty is anticipated in securing the rest.

The building is expected to cost not less than $100,000, and is to be in every way adapted to the purpose for which it is to be built.

Buffalo, N. Y.

The experience of the Builders' Exchange of Buffalo in this direction has been very similar to that of Milwaukee, except that circumstances favored the selection of the site.

Several months ago a committee was appointed for the purpose of securing a building or a location upon which to build, and up to the date of the convention had not reported favorably on any site.

The effect of the convention upon the Buffalo delegates was much the same as that of the Milwaukee delegation, and the result is most decidedly encouraging.

On March 10th what was known as the Burt property, situated on the northwest corner of Court and Pearl streets, was destroyed by fire, and on the morning of the 11th a special meeting of the directors was called for the purpose of considering the advisability of buying the property. Short time was occupied in the consideration of the subject, and before night the Builders' Exchange was in possession of one of the best corners for an exchange in the city.

The Exchange has been at work for some time past investigating the plans that have been adopted by the other associations that own their own buildings for creating a building fund, and with the thorough consideration which the subject has received, the prospect is exceedingly promising. It is the intention of the Exchange to put up a building that will be in every way adequate to the demands of the builders in all the various phases of the business and one that will be a source of pride to Buffalo as well as to the association.

The value of example set by these two exchanges and by the others so often alluded to in these columns, who have provided a home for themselves, cannot be overestimated, and should be followed by every filial association of the national body.

These exchanges are to be congratulated, not only upon what they have done for themselves, but upon what they have done for every exchange in the national body, by showing to such associations as have not taken advantage of the possibilities that are within themselves what may be accomplished in this direction.

The importance of the step has been clearly proven, as in the cases of Philadelphia, Kansas City, Washington and Boston, and nothing that could be accomplished by an exchange so surely assists in the attainment of every desired end as the possession of a proper building exclusively under the control of the association.

Nothing else so quickly appeals to the pride of the members or so surely brings about a close and harmonious relationship. With the increased interest in the affairs of the exchange thus engendered, the members are brought together oftener and the very essence of the function of the exchange is thus secured, which is the daily meeting at the 'change hour. The constant daily meeting at a given hour *for the transaction of business* gradually but surely impresses the members with a sense of the importance of the association, the strength that it posesses, and the influence that such a body of business men must wield in any community soon makes itself apparent. Such exchanges as only meet together at stated intervals for the consideration of some special topic cannot, in the nature of affairs, be in touch with the thousand and one little things which, taken together, make up so important a whole, and because of the fact that the exchange is a name only or at most a place where some few of the members may drop in when they have a leisure hour, the influence of the body is small and the interest of the members only kept alive at all by the exertions of the few who comprehend the possibilities of such an organization properly conducted.

Builders might as well recognize the fact first as last, that the importance of their business entitles them to, and demands, just as many facilities for its transaction as does that of the broker or merchant, and that such is the fact and such facilities are exceedingly beneficial is forever settled by the experience of builders who have existed under both conditions.

Where an "exchange hour" has been established and contractors and dealers have been in the habit of finding each other, for business, daily at a certain hour, builders would be completely lost if compelled to drop back into the old methods of carrying on their affairs.

On March 1 there went into active operation, at least on the part of the members of the Buffalo Exchange, the code, intended to govern the business relations between builders and architects, which was adopted by the Exchange a short time ago. That the members of the Exchange mean business in this matter is evinced by the wording of their manifesto, it being declared that after the above date they "absolutely refuse to submit bids for work unless the code is used and adopted." Printed copies of the code were submitted to the architects as a body, and since then no decisive action appears to have been taken on it by the Buffalo Chapter of the American Institute of Architects.

Edward L. Cook, the secretary and a leading member of the Exchange, states that in response to a request from the Architects' Association, a committee of four had been appointed by the Exchange to consult with a committee to be appointed by the architects on the matter. Undoubtedly several modifications of the code will result from the deliberations of these committees. Although the code was adopted by the Exchange, the opinions of some of the members are not in full accordance with one or two provisions, at least not as they are at present worded. For instance, under the subhead 'compensation for estimating' it is stipulated that should all solicited bids be refused, the lowest bidder shall be entitled to a certain compensation, $25 for a $5000 estimate, and so on. This plan may be all right for builders who bid for a very extensive job, but with plumbers and others it is extremely seldom that a contract runs up as high as $5000. The majority of contracts are based upon about $200, $300 or $400. Usually it takes only about an hour or so to figure out an estimate on such an amount, and all, of course, agree with the architects that such compensation would be exorbitant. On this and several other points no doubt some modification will be made.

Mr. Cook thinks that the code will ultimately be regarded in a favorable light by the architects, and will in all probability be accepted by them in the same spirit as offered by the Exchange. The builders want to make firmer friends of the architects, and do not wish to take any action which would antagonize the two bodies. Mr. Cook thinks building will be lively this spring, and consequently a good deal of work will be contracted for.

Louisville, Ky.

The Builders' and Traders' Exchange has been at work considering plans for the establishment of a trade school in conjunction with the Exchange ever since the report of the delegates to the fifth convention The subject is being thoroughly considered and the members are earnestly working to establish a school such as is recommended by the National Association and which shall embrace instruction in all branches of the trade.

There is an industrial school in Louisville maintained under the direction of the Public School Board and in connection with the public school system, but like most of the manual training schools in this country, it is conducted on lines entirely distinct from those which govern the trade school advocated by the national association and exemplified in the New York Trade Schools, which were visited by the convention.

Present indications point to the successful establishment of a school in the near future that shall be entirely under the control of the Exchange.

The last regular meeting was very fully attended and considerable business of importance was transacted.

At this meeting a resolution was unanimously adopted seeking to bring into practice a uniform custom of issuing orders by architects.

The sense of the resolution was that the contractor should make his report of work done and amount of money due thereon to the architect before Friday night of each week, and the architect to issue orders therefor on the owner before 10 o'clock on Saturday morning of each week.

The resolution was very favorably received by the architects and the result seems to be highly satisfactory.

The subject of the removal of the Exchange to more commodious quarters was very fully considered and a special committee was appointed to solicit stock in the interest of a building fund, and to negotiate for the purchase of a building. The fact that the Exchange has for some time contemplated buying a property for its own use has placed several desirable locations in the market, and the special committee was empowered to conduct negotiations for the purchase of a building.

Louisville builders do not anticipate that building operations will be quite as extensive as they were last year, owing perhaps to the fact that most of the buildings destroyed by the cyclone have been rebuilt, but a boom is expected in the erection of small dwelling houses.

The Exchange is in a healthy and prosperous condition, and the present year promises to be one of progress.

St. Paul, Minn.

Letters from the secretary of the Builders' Exchange contain the information that affairs in the building line are moving along about as usual, with a fair business prospect for the coming season. A number of large structures are to be built, including a Catholic university, an academy and a large private hotel, besides many projected buildings in the business and residence portion of the city.

Worcester, Mass.

The Builders' Exchange has recently signed a lease for "the finest, best lighted and most desirable rooms in the city," into which they propose to move as soon as possible.

The building in which rooms have been taken is in a central location, situated on a corner and extends from the street back to the alley, thus giving light to the new Exchange rooms on three sides.

It is intended to establish an exhibit of building material, under the supervision and control of the Exchange, which shall comprehend all materials and appliances used in the building business.

The members have profited by the object lesson taught at the convention, and have recognized the fact that an exchange may be of the greatest value as an aid to the transaction of their business. The change into larger quarters will greatly benefit the association.

Cincinnati, Ohio.

At the annual meeting of the Builders' Exchange, which occurred March 2, a change in the officers for the ensuing year was made; the first vice-president advanced to the president's seat and a new second vice-president elected in the person of Mr. S. H. Strunk. Mr. Lawrence Mendenhall was elected secretary by a small majority over Mr. Pugh, Mr. Archibald Coulter retiring from the presidency after serving the Exchange in an honorable and satisfactory manner.

Mr. D. W. C. Bellville, the newly elected president, writes that the Exchange is engaged in perfecting a plan for securing a building, and thinks that a stock company will ultimately be formed for the purpose of buying or erecting a building for the use of the Exchange.

The time for this move is now ripe, as the lease of the present quarters expires at the close of the year, with no possibility of its renewal.

The prospect in the building business for the coming year is equal to the average, and nothing, at present, seems to indicate any change in the present favorable condition of the labor market.

The annual meeting above referred to was the thirteenth, and was celebrated in a most thoroughly enjoyable manner.

A delightful banquet was spread in the

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Knight Templar Asylum of the Scottish Rite Cathedral, which was beautifully decorated for the occasion. About 100 covers were laid, and the affair was thoroughly enjoyed by every person present.

The president of the National Association, Mr. Arthur McAllister, was present on the occasion and was one of the number who assisted at the festivities.

The last course was served about 9 o'clock, and the toastmaster, Mr. W. A. Megrue, opened the post-prandial exercises With a very warm-hearted address of welcome, in which he referred to the organization of the Builders' Exchange, the good works it had accomplished and the much better results it hoped for the future. He announced as the first toast "Our State." He said that Governor Campbell had accepted an invitation to reply to this sentiment, and he could offer no excuse for his absence.

Mayor Mosby was then introduced, and delivered a characteristically business-like address upon the very remarkable growth of the city, closing with the remark that Horace Greeley's advice about Western trips did not refer to Cincinnati, as it was quite the best place to reside in.

A telegram from M. E. Ingalls, from New York, announced his sorrow at being unable to answer to the toast "Cincinnati's Future."

Burr W. Blair gave a most enthusiastic reresponse to the "Builders' Exchange," and his remarks were most heartily applauded. Mr. Blair detailed the earliest history of the Builders' Exchange, and gave much interesting information about the good it did. Mr. Blair's speech was indeed a surprise on account of the most excellent recommendations it contained. In closing he suggested heartily the construction of a home for the exchange.

Hon. A. McAllister of Cleveland spoke briefly but delightfully upon the work that the national body was doing for builders all over the country. Dr. T. W. Graydon used a very admirable regular series of talks with a fitting address upon "Our Builders," and he handled the topic most happily. C. C. Asbury, C. J. Ehrgott, J. F. Lampe and W. Danziger, the College Male Quartet, interspersed several most excellent songs. The incoming president, Dr. W. C. Bellville, made a few pertinent remarks. The Banquet Committee was composed of Wm. A. Megrue, L. B. Hancock, J. Milton Blair, Charles E. Witt, Samuel D. Tippett, John W. Robinson, J. H. Finnigan, W. J. Tanner, O. S. Tuttle, Lawrence Grace, D. W. C. Bellville, Robert Carlisle, Dennis Flaherty, John H. Dorman, H. E. Holtzinger and L. Mendenhall.

Philadelphia, Pa.

The Master Builders' Exchange has apparently achieved not only a national reputation as a complete institution, but also an international one. The late annual convention of the National Association of Builders devoted an entire day to the inspection of this exchange, and 600 delegates were brought over from New York at the expense of the association, as the Executive Committee deemed the inspection invaluable as a part of the business of the convention. This action spoke well for the national reputation of the exchange.

The president of the exchange recently received a communication from Dr. Charles E. Sajous, the Belgian Consul, stating that his Government has requested full particulars regarding the exhibition department, &c. An answer has been forwarded to the Consul stating that all information possible will be given him. The Belgian Government being desirous of securing information as to the methods employed in managing a well equipped builders' exchange, have sent an official communication to Consul C. E. Sajous, asking that information be obtained from the president of the Master Builders' Exchange of Philadelphia.

The letter received by President Watson read:

My Government is very desirous of being informed about your interesting exhibition. I should, therefore, be much indebted to you if you would kindly put at my disposal one of your circulars. Yours,

C. E. SAJOUS,
Consul of Belgium.

The long-contemplated addition to the Exchange Building has assumed definite shape, as plans are being prepared by Wilson Brothers & Co. for a new story, where a restaurant will be opened.

A letter from Secretary William Harkness states that since the visit of the convention to the Philadelphia Exchange he has received numerous requests for information regarding the methods adopted for establishing the trade schools, and building material exhibit, from all over the country. The visit of the convention to the Philadelphia Exchange has been productive of much good by bringing an exchange established under the recommendations of the National Association before the public in so favorable a light.

Baltimore, Md.

The Builders' Exchange has been more active than usual in the consideration of topics of interest to itself and builders generally for the past six months and have a well developed plan for securing a building now in operation, a description of which will appear in the next issue of this journal.

At the last regular meeting the subject of some uniform practice to control the submitting of bids was taken up and after thorough consideration the following rules were drawn up and submitted to the architects who heartily approved their adoption. On March 3 the regulations were unanimously adopted by by the Exchange and are now in force.

Regulations Governing Proposals and the Awarding of Contracts, as Adopted by the Builders' Exchange and Approved by the Architects of Baltimore City, March 3, 1891.

PART I.

Article 1. All bidders on general contract shall be invited by the architect or owner, whose invitation shall state the place and time at which proposals will be received and opened.

Art. 2. All general contractors shall be entitled to a complete set of drawings, for a reasonable time, to make up his or their proposals.

Art. 3. All proposals of general contractors shall be opened in their presence, if so desired, and the bids made known to them. The contract shall be awarded to the lowest invited bidder.

Art. 4. All changes which may be necessary or desirable shall be made by the owner and his architect by agreement with the lowest invited bidder, and in case of a disagreement as to the cost of the alterations, the disagreement shall be adjusted by an arbitration committee; said committee to consist of one arbiter to be selected by the architect, one by the builder, and these two to select a third, if necessary. The cost of this arbitration to be borne by the builder and owner equally.

Art. 5. Architects or owners desiring particular sub-contractors shall specify them to each and every general contractor whom he may invite to bid at the time of his invitation.

Art. 6. All plans shall be at a scale of not less than ¼ inch to 1 foot, and details shall be furnished with the plans, when necessary to make clear what is proposed for contract.

Art. 7. All contractors shall have the names of their competitors furnished them at the time of the invitation to bid, and no invited bidder shall submit a bid where proposals are received from other than the invited bidders.

PART II.

Art. 1. All general contractors shall use only bids from sub-contractors whom they invite to bid with them, and shall award the sub-contracts to the various lowest bidders for their respective classes of work.

Art. 2. Each invited sub-contractor shall have the right to know whose bid for any particular contract is the lowest. If he so desires, he has the right to send a third person (who shall be a member of the Builders' Exchange, and must not be connected with his own trade), to the general contractor, who must show this third person all the bids he has received for that class of work. This person so examining the bids must pledge his word not to reveal the amounts of any of the bids to anyone.

Kansas City, Mo.

The value of a building owned and controlled by an exchange and adapted to the use of the builders has been again demonstrated in Kansas City by distinctly identifying the interests of the business with a recognized locality in the city. The magnificent building owned by the Builders' and Traders' Exchange has been used recently for convention purposes by the Missouri Valley Cut Stone Contractors' and Quarrymen's Association and for the birth place of the National Association of Cut Stone Contractors.

It is impossible to too highly commend the energy and ability with which the Kansas City Exchange has established itself among the permanent and influential bodies of the country, and it is this spirit that fosters and promotes every undertaking for the benefit of the trade.

It is such places of meeting as this Exchange where men of a common calling are constantly thrown into personal contact with each other, that assist at the formation of plans for the welfare of the whole, or of any particular branch of the trade. The necessity for some form of organization among the cut stone and quarrymen was doubtless recognized by the members of that branch of the building business, and would probably have been ultimately effected without the aid of the Builders' Exchange; but how much more difficult it would have been if the one or two men who were prime movers in the beginning had been without a suitable place wherein to meet and confer with other men engaged in similar pursuits and without the inspiration of the atmosphere of success that pervades the Kansas City Exchange to encourage them, and the ever present example in the exchange itself of what energy and persistence will accomplish.

A builders' and traders' exchange that is so conducted as to draw together men of ability and intelligence daily for the purpose of transacting their mutual affairs wields more influence and is of more benefit and importance to the builders than any set of conditions that could be brought about by the same men under less favorable circumstances.

A letter from W. E. Emery, who is one of the most active members of the Exchange, announces the recent organization of the National Association of Cut Stone Contractors with the following officers: President, John D. McGilvray of Denver; vice-president, George Mann of Baltimore; secretary, W. E. Emery of Kansas City, and treasurer, M. A. Blatz of Louisville, Ky.

A circular letter from the secretary makes a statement of the object of the association as being: To gather information of all kinds pertaining to the business of stone-cutting and to disseminate the same among the members. To keep members informed as to the state of the supply and the demand of labor in all the different cities and the difference in hours and rates of wages. To meet once a year for the purpose of comparing notes, cultivating and fostering friendly relations among the members and taking concerted action upon questions which may effect the trade generally.

Owing to the fact of the first meeting at which the organization was effected was of a distinctly preparatory nature and only preliminary work was done, the request is made of all stone contractors to address the secretary on the subject, giving expression of opinion and information regarding the needs of the cut stone contractors in various localities of the country.

The next regular meeting of the association will probably be held during the month of January, 1892, in the city of Cleveland, Ohio.

In this connection it is pertinent to touch again upon the assistance that the builders exchanges and the National Association render to such undertakings as this. Previous to the fourth convention of the National Association of Builders a letter was addressed to each of the filial exchanges asking that at least one of the delegates appointed to attend the meeting should be a stone contractor. The result was that the promoters of the interests of that branch of the building business found at St. Paul representatives of the stone business from all over the country, and were thus enabled to lay the foundation of the present National Association referred to above. It is such things as this that bring satisfaction to the workers and demonstrate the value of their labor.

Notes.

The Building Trades' Club were not content with the immense work which they so successfully carried out in connection with the entertainment of the delegates to the convention, but have extended an invitation to the joint committees which are to meet in New York for the purpose of framing a uniform building ordnance, to use the rooms of the club as a place of meeting. A previous invitation from the Board of Underwriters had, however, been accepted.

The very interesting and instructive address on the history of the Philadelphia Exchange, Trade Schools and Building Material Exhibit, that was delivered by Mr. Chas. Gillingham during the visit to Philadelphia which occurred in the course of the convention, will be published in separate pamphlet form as well as in the report of the Fifth Convention, and persons desiring copies of the same will be supplied upon application to William Harkness, secretary of the Philadelphia Exchange, or to W. H. Sayward, 164 Devonshire street, Boston.

The following clipping from a Cincinnati paper will be of interest to the many warm friends that Mr. Blair has made in the National Association of Builders:

"The Board of Trade at its late annual meeting chose J. Milton Blair as president for 1891. Mr. Blair has for years been prominent in Cincinnati as an energetic, enterprising man. He has built up perhaps the most extensive brick-making business in the Western country, and his output is eagerly sought for by contractors all over the land. On the very day that the Board of Trade honored him, additional test of his popularity was given by his excellent majority for treasurer of the Builders' Exchange. Mr. Blair has been a valuable member of the recent Cincinnati Exposition, has been president of the National Association of Builders, is a member of the National Association of Brickmakers, and is in every wise a most worthy citizen.

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CORRESPONDENCE.

Finding Diameter of Circle When Chord and Spring Are Given.

From C. B., *Orangeburg, S. C.*—In reply to "C. E. S.," Tacoma, Wash., whose inquiry appeared in the February number of *Carpentry and Building*, I submit the sketch shown in Fig. 1 of the illustrations. Judging from his query and diagram, he desires to find the center of any circle of which he has an arc, or what is the same, three points in the circumference. Referring to the sketch, Fig. 1, I assume that the distance from A to B is 12 feet, and the hight from C to D 4 feet. Draw the chords connecting A and B and C and D. At the centers of these chords erect indefinite perpendiculars until they meet at E. Their point of intersection is then the radius of the circle of which we have an arc. Apply the scale and we find the radius equal to 6 feet 6 inches, which is the required center.

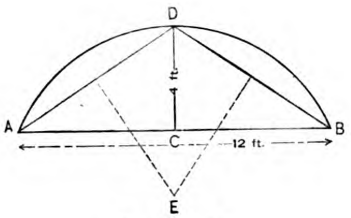

Fig. 1.—"C. B."

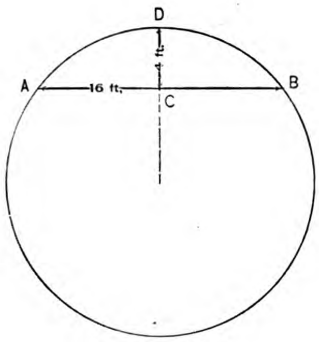

Fig. 2.—"D. H. J."

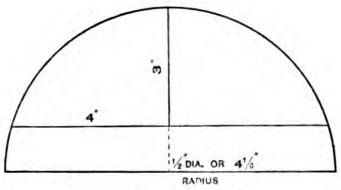

Fig. 3.—"G. D. T."

From D. H. J., *Danielsonville, Conn.*—In answer to "C. E. S.," Tacoma, Wash., I would say that the rules in Hatfield's American House Carpenter is just the one I have used and found satisfactory. It is: "In any circle when a segment is given the radius is equal to the sum of the squares of the half chord and versed sine, divided by twice the versed sine." I reproduce the sketch of "C. E. S.," as shown in Fig. 2, and suppose A B to measure 16 feet and C D 4 feet. One-half the chord, therefore, is 8 feet, which squared is 64 feet. The square of 4 is 16 feet, and now 64 + 16 = 80, which divided by twice the versed sine, 4, which equals 8, gives 10 as the radius or half diameter. The whole diameter, therefore, would be 20 feet. The formula would be as follows:

$$\left(\frac{16}{2}\right) 2 + 4^2 = \text{radius or } 10 \text{ feet.}$$

From G. D. T., *West Philadelphia, Pa.*—I notice in *Carpentry and Building* that "C. E. S." desires to know how to find the center when the rise of arc and length of chord are given. I desire to say that if he will add together the square of half the chord and the square of the rise of the arc, and divide the product by twice the rise of the arc, the result will give the desired half diameter or radius. At least it will be near enough to strike centers for masonry to be built upon. What I mean is shown in Fig. 3 of the sketches.

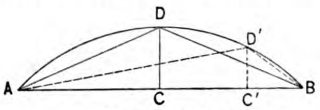

Fig. 4.—"M. R. P."

From M. R. P., *Chicago, Ill.*—In the February number of *Carpentry and Building* "C. E. S.," Tacoma, Wash., submits the following: Referring to the sketch Fig. 4 of the cuts, A D B represents the segments of a circle. When the lengths of A B and C D are known, how is the diameter of the circle of which A D B is an arc found? I offer this solution: Draw A D and D B and find their respective lengths. Multiply A D by D B and divide the product by C D. The result will give the diameter. For example, let A B equal 16 feet and C D 6 feet. Then will A D and D B each equal 10 feet. We have, therefore, $10 \times 10 \div 6 = 6\frac{2}{3} = 16$ feet 8 inches. The result will be the same if the perpendicular distance from A B to the circumference is given from any point on A B, as, for example, C' D' drawn nearer either end of A B. In this instance A D' multiplied by D' B and the product divided by C' D' will give the diameter.

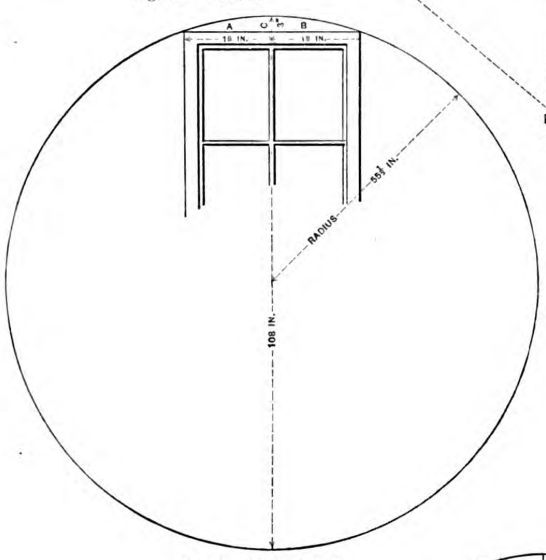

Fig. 6.—"C. A. & Co."

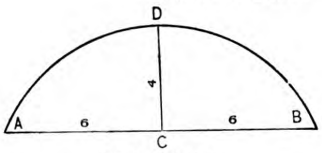

Fig. 7.—"P. L."

From J. H. G., *Rochester, N. Y.*—In answer to "C. E. S.," Tacoma, Wash., I submit the following: As the square of the hypothenuse of a right-angle triangle is equal to the sum of the squares of the other two sides we have in the accompanying sketch, Fig. 5, $(E B)^2 = (C E)^2 + (C B)^2$. Now, E B and E D are both radii of the circle through A D B. If we for convenience call the half chord C B equals C and C D = V and E B + E D = R, then we have by substituting these values in the above equation:

$$R^2 = (R - V)^2 + C^2$$
$$R^2 = R^2 - 2RV + V^2 + C^2$$
$$2RV = V^2 + C^2$$
$$R = \frac{V^2 + C^2}{2V}$$

From the above we have the simple rule to find the radius of any circle when we know the chord or span A B and the hight or rise C D: "Square half the chord, add to it the square of the hight, and divide the same by twice the hight." The result will be the radius or half the diameter of the circle required.

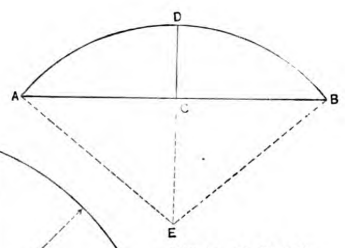

Fig. 5.—"J. H. G."

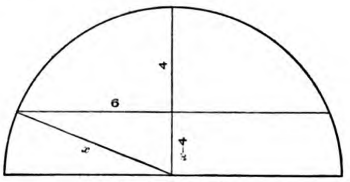

Fig. 8.—"P. L."

Finding Diameter of Circle When Chord and Spring are Given.

From C. A. & Co., *Louisville, Ky.*—On page 41 of *Carpentry and Building* "C. E. S.," Tacoma, Wash., wishes to know a method for obtaining the radius of a center for an arch when the rise and

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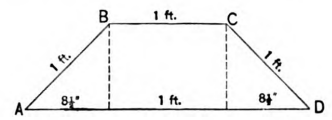
span or width are given. Fig. 6 shows the simplest method for accomplishing this with which we are acquainted. In any circle having two lines crossing each other and touching the sides of the circle, it is well known that if the extremities of each be multiplied, one by the other, the product will be equal. In the sketch which we send is represented the center for a segment head window. A represents 18 inches and B 18 inches. These two multiplied together give 324, which divided by C, the rise, gives 108 inches. Adding to this quotient the rise C gives the diameter as 111; and one half of the diameter is 55½ inches, or the radius.

From P. L., *Omaha, Neb.*—In the February issue of the paper "C. E. S." asks how to obtain the diameter of a circle when the width of opening and the hight of the arch is given. The following is, in my judgment, an infallible rule: The square of half the opening divided by the hight, plus the hight, gives the diameter. For example, suppose A B of Fig. 7 equals 12 and C D equals 4; then $\frac{6^2}{4} + 4 = 13$, which is the diameter. The following is an algebraic solution of the same from which the above rule is deduced. Referring to Fig. 8 let x equal radius. Then $x^2 = (x-4)^2 + 6^2$. Simplifying $x^2 = x^2 - 8x + 16 + 36$. Canceling and transposing, $8x = 52$ and $x = 6\frac{1}{2}$ radius or diameter = 13.

Note.—We have a number of answers to the inquiry of "C. E. S.," all of which are of the same general tenor as one or the other of the solutions presented above. Many of the correspondents whose letters we have received in reply to this question favor the rule of squaring half the chord, dividing the product by the rise and to the quotient adding the rise. Still others prefer to solve the problem by squaring half the chord, adding the square of the hight and dividing by twice the hight. The list of answers includes letters from "Constant Reader," Denver, Col.; "J. P. H.," Basin, Mon.; "A. C.," Kearney, Neb.; "J. H. L.," Council Bluffs, Iowa; "L. G. R.," Salt Lake City, Utah; "L. P.," Manayunk, Philadelphia, Pa.; "J. W.," Fall River, Mass.; "J. H. D.," Knoxville, Tenn.; "J. N. H.," New Orleans, La.; "F. T.," Iowa Falls, Iowa; "F. H. D.," Silverly, Pa.; "J. F. P.," Thomasville, Ga.; "J. M. C.," Watsonville, Cal.; "E. J. M.," New Orleans, La.; "F. D. R.," Decatur, Ill.; "E. P. B.," Winter Park, Fla.; "F. J. E.," Elizabeth, N. J.; "D. W.," Chattanooga, Tenn.; "J.," Washington, D. C.; "F. C. P.," Petoskey, Mich., and "J. McA.," Crown, Pa.

Laying Out an Octagon Bay Window.

From M. G., *Weedsport, N. Y.*—I have noticed in recent issues of *Carpentry and Building* that the subject of laying off an octagon bay window is receiving no little attention from the readers of that journal.

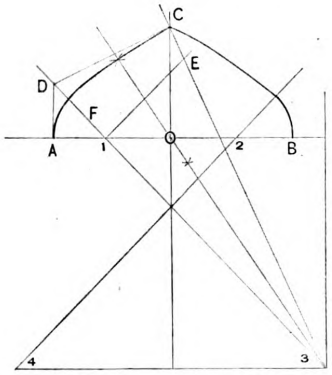


"M. G's." Plan of Laying Out an Octagon Bay Window.

I wish to offer what I consider a very simple rule for finding the length of bay window on the line of the house when the lengths of the outside of bay window are given; also, to find the lengths of the outside of the window when the distance on the line of the house is given. Referring to the sketch which I inclose, it will be seen that 1 foot from A to B and 1 foot from C to D equals 8½ inches on the line A D. It will also be observed that 1 foot from B to C equals 1 foot on the line A D. The addition of the 1 foot and the two sections of 8½ inches each equals 2 feet 5 inches. The rule is as follows: To find the distance on the line of the house when one side of the octagon is given, multiply the given length by 2 feet 5 inches. To find the length of the side of octagon when the distance on the line of the house is given divide the given distance by 2 feet 5 inches.

Method of Drawing a Pointed Arch.

From E. D. E., *Axtell, Kan.*—I have been a reader of *Carpentry and Building* for some time, and am greatly interested in what appears in its columns. I have a method of drawing a pointed arch

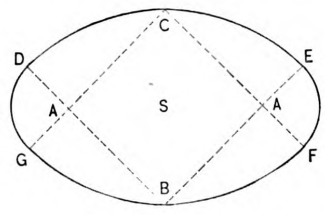


Method of Drawing a Pointed Arch, Suggested by "E. D. E."

which may be of some interest to other readers of the paper, and I therefore take the liberty of sending a demonstration of it. Referring to the engraving presented herewith, let it be understood that the width of the arch is A B and the apex hight is O C, while the tangent to the upper circle is C D. In this case draw A D perpendicular to A B, and set out A 1 equal to A D. Draw C 3 perpendicular to A D, and make C E equal to A D or A 1. Join 1 E and bisect the same, as shown by a perpendicular meeting C E produced in 3. Join 3 1 and produce toward F; then 1 and 3 will be centers for half the arch. Transferring the points across, 2 and 4 will be the centers of the other half.

Laying Out An Elliptic.

From J. W. R., *Santa Cruz, Cal.*—I herewith inclose a sketch in answer to the request of "A. C. H.," Farley, Iowa, which appeared in the January issue of *Carpentry and Building* for the present year, for a simple but accurate method of laying off an elliptic. Referring to the sketch which I submit, lay off the square S and let the lines at A A continue indefinitely. Take a pair of compasses and

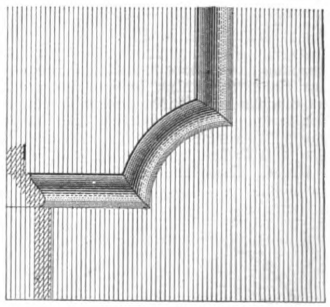


Laying Out an Elliptic, as Practiced by "J. W. R."

set them from B to C and then scribe from D to E. Again, set the compasses at C and scribe from F to G. Next set them from A to D and scribe from D to G. Set them at A to E and scribe the arc E F.

Mitering a Circular with a Straight Molding.

From M. B., *New Westminster, B. C.*—Will some of the practical readers give me, through the columns of *Carpentry*

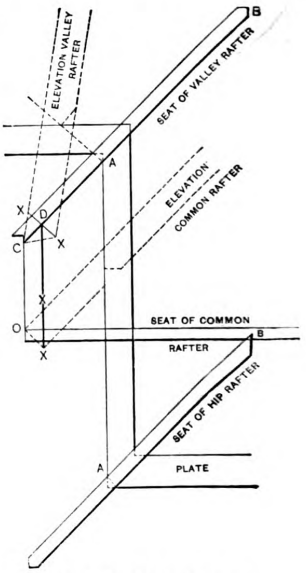


Sketch Submitted by "M. B."

and Building, the simplest way of mitering a circular molding with a straight one? What I mean may be readily understood from an inspection of the sketch which I inclose herewith.

Bevel for Valley Rafter.

From A. L., *Napa, Cal.*—I notice in the September number of *Carpentry and Building* for 1890 an inquiry from "F. H. W.," Williamsport, Pa., for a method of obtaining the bevel for the lower end of a valley rafter, so that a piece of molding running along the ends of the common rafter will meet and properly miter on the end of the valley rafter. As I have seen no answer to this inquiry I will endeavor to enlighten the correspondent to



Bevel for Valley Rafter.

the best of my ability. The sketch which I send herewith so fully explains itself that very little need be said concerning it. The elevation of valley and common rafters are shown by dotted lines for the purpose of avoiding confusion. Measure back from the point of the valley rafter C on the base line to D as shown. In half pitch O x equals C D. Draw the plumb line X X through D, which must be the same length as X X in the common rafter. Connect C S as shown and work

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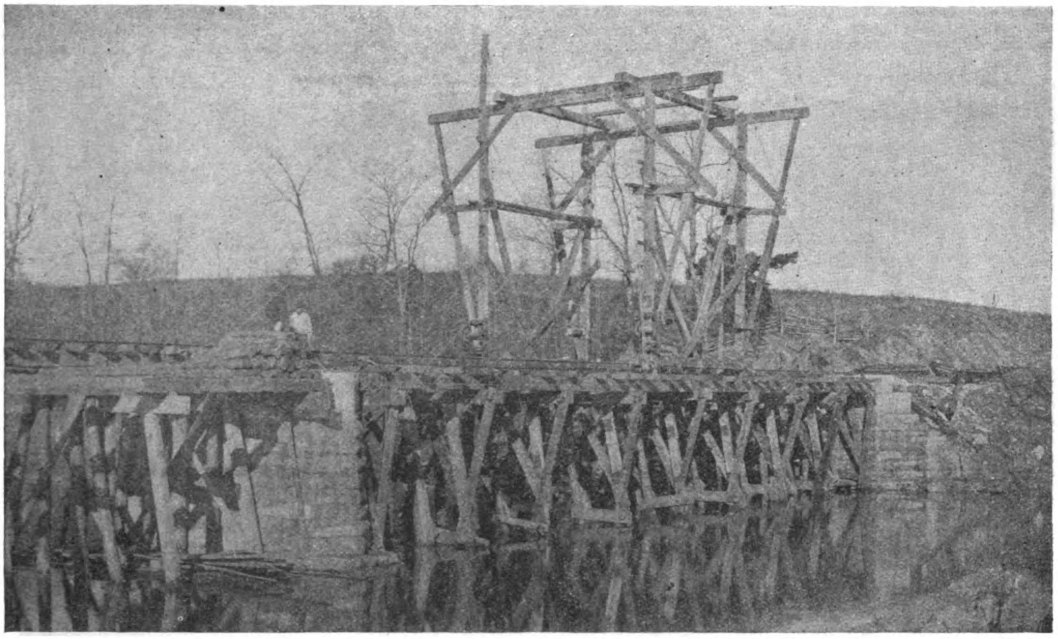
from the point A in the hip and valley rafters. It will be observed that the length A B in the hip rafter is to the point of the miter, while A B in the valley rafter is to the heel of the miter. "F. H. W.," will find additional information on this point in a communication of mine from Fairfield, Iowa, which was published in the May issue of *Carpentry and Building* for 1885.

Wooden Traveler for Raising Iron Bridges.

From H. N. SIMS, *Shenandoah, Va.*—In reply to "H. H. F.," Denver, Col., whose inquiry was published in the February issue of *Carpentry and Building*, I send a photograph of a wooden traveler used in the erection of three 100-foot spans, two being shown in the photograph, the third having been erected about 8 miles away. The timber used in framing the traveler was part of what was left of two 100-foot wooden Howe truss spans after the flood of June 1, 1889, had put in its work upon them. At first glance the framing looks somewhat complicated, but it is really very simple, as a little study of the photograph will show. The same is also true of the substructure, but in order to make this a little clearer I inclose a rough pencil sketch.



Wooden Traveler for Raising Iron Bridges.—Fig. 1.—Showing the Traveler in Position.

Note.—From the photograph sent us by the correspondent above we have produced the picture shown in Fig. 1 of the illustrations, which indicates the traveler in position, while from the pencil sketch we have made Fig. 2 of the illustrations. Referring to the latter it may be stated that the full lines represent the original trestle. The timbers indicated by the dotted lines were put up by the bridge builders in order to carry their traveler, the bridge being erected in such a way as not to interfere with the running of trains. The bents were set 12 feet from center to center. Fig. 3 of the illustrations is reproduced from a photograph of two spans erected by means of the wooden traveler described by our correspondent.

The Question of Foundations.

From L. E. T., *Columbus, Ga.*—I very often find that due consideration is not given to the foundation of a building, which is one of its most important parts, especially in small structures. Very often the fault lies in the dishonesty of the builder, who will use inferior material for the sake of saving a few dollars. Again, the fault lies in the fact that the builder or workman has no knowledge as to what should, or should not be employed, and in other cases there is a lack of attention or knowledge on the part of the architect or superintendent in charge of the work. I have in mind a building which cost nearly $250,000. It was designed to have a concrete foundation. The trenches were dug 6 to 8 feet wide, and from six to 8 feet below the grade line of the street. The stones were broken, wheeled and dumped into the trenches, and sand put upon the rock and then barrels of cement broken and emptied thereon. The hose was then turned on to the material in the trenches with the expectation of obtaining a concrete mixture by reason of the water running through the rocks and carrying the sand and cement with it. The foundation was finished in this way, and the brickwork started. The utter worthlessness of the foundation was only discovered by reason of the fact that it became necessary to dig down beside the foundation to put in a cross-wall. When this was done the dry stone, sand, and in some places the cement, fell out. It was then decided to dig out the whole foundation and have the concrete mixed in a box, as it should have been done in the first place, and then carried and emptied into the trenches. There is no doubt that the loss of time and material amounted to many thousands of dollars, but had it not been discovered the building might have been nearly completed, or entirely finished before the crash came. For certainly the building would have sunk with such a foundation as that which I have described.

How often it is that fine buildings of every description are ruined by lack of proper foundations; especially is this the case with dwellings and fine residences. People thinking to cheapen the cost will employ only pillars for the structure to rest upon, and the contractor to save himself all he can, will put them in as small as possible. It is often the case that they extend into the ground only about 4 to 6 inches. All are made about the same size with no calculation for the difference in weight at various parts of the building. It is obvious that no rule can be laid down by which to build foundations, without describing methods which would cover all kinds of ground and all conditions. It is well known that different structures require different foundations, and no one

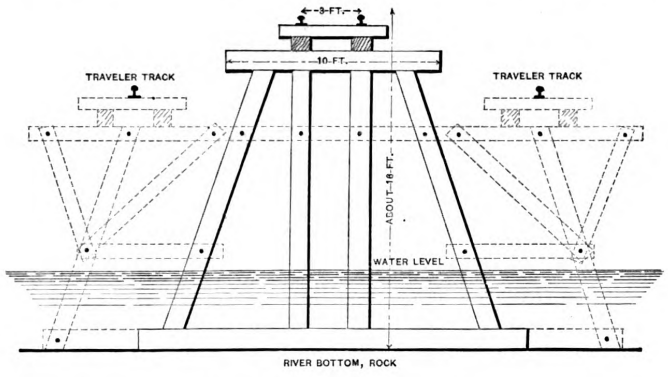


Fig. 2.—Detail of Substructure.

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contemplating building should take any chances. It is better to know that one is going to leave a foundation which will sustain twice the weight likely to be placed above it, than to put in a foundation which is considered only good enough, without making sure, and then to have it prove seriously faulty. Again, the health of the occupants of a building or house depends a great deal upon the contruction of the foundation. It should be so put in as to prevent dampness arising in the building, and in order to prevent this it is necessary in some instances, to lay a tiled drain along the outside of the walls for the purpose of carrying off the water which soaks through the ground or runs down the outside of the walls. If this drain was not provided, water would probably find its way under or into the building, creating dampness and resulting in disease. It is always desirable to put in a course of slate, asbestos, or other material, in order to prevent the dampness entering through the walls. While it is true that a great many buildings are put up without these precautions it is always best to be on the safe side, and the few dollars spent in securing a properly constructed foundation may save many dollars that would otherwise be expended in repairs and doctors' bills.

Size of Page of Estimate Book.

From SUBSCRIBER, *Hickory Corners, Mich.*—I desire to learn through the columns of *Carpentry and Building*, which is the more convenient size of a page for copying estimates into book, 7 x 15 inches or 8 x 12 inches? I would be glad to have some of the readers of *Carpentry and Building* give the results of their experience in this direction.

Barn Ventilator.

From J. C. W., *Pine Hill, Pa.*—Will some of the many readers of *Carpentry and Building* please give dimensions, style, &c., of cupolas or ventilators for the top of barns? I think this is a point which is too much slighted at the present time in our barn building, and what I would like are some designs of cupolas which will keep out snow and rain. I have watched the columns of the paper for some time and have failed to see anything meeting my requirements. I have, however, seen some too large for my purpose, some too small and others too low. Some will not keep out the snow at all. I think this would prove an interesting topic to other readers of the paper, as well as myself, if it were discussed.

A Spring Floor.

From O. H., *Bishop, Cal.*—I have been a subscriber to *Carpentry and Building* for a period of five years and now I desire to ask, what is the best plan for making a spring floor in a hall 26 x 75 feet in size? The hall is in a stone building and is over a storeroom. The ceiling joist over the store will be supported in the middle by a girder and joists. For joists we have nothing but pine, or a species of pine. The stone wall of the first story is 2 feet thick and the second story stone wall 18 inches thick. The fire wall above is 12 inches thick and 5 feet high. It is something new in this country and I desire to ask the practical readers of *Carpentry and Building* to enlighten me as to the best method of procedure.

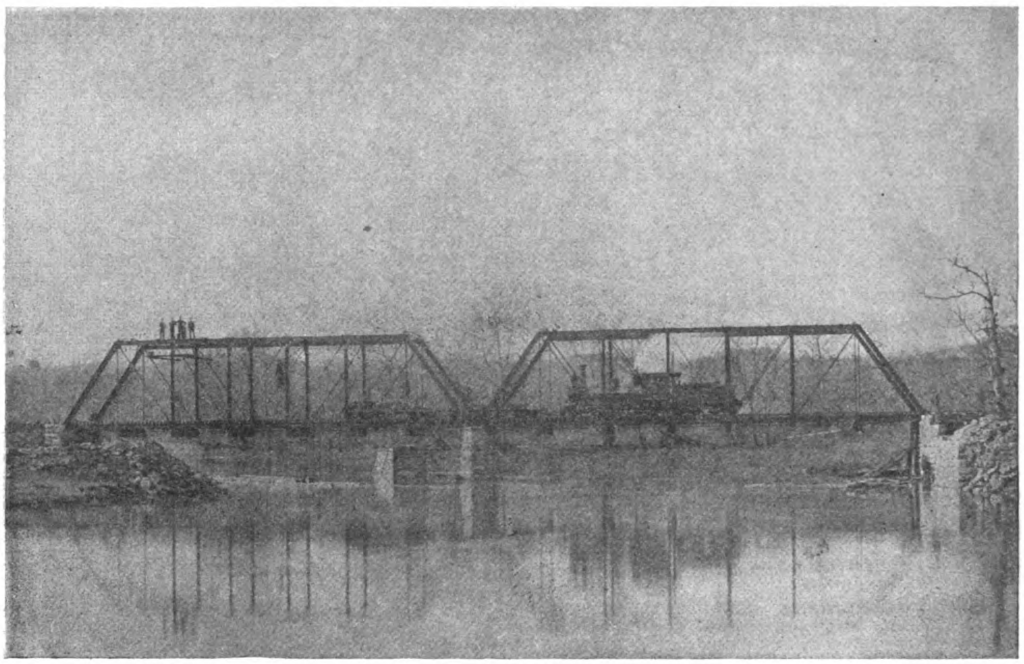

Fig. 3.—Showing Two Spans Erected by Means of the Wooden Traveler.

Recipe for Water-Proof Glue.

From N. J. H., *Grand Rapids, Ohio.*—Will some of the readers of *Carpentry and Building* give me a recipe for making a water-proof glue?

Building Felt vs. Tar Paper.

From W. A. P., *Burritt's Rapids, Ont., Canada.*—I would like to ask some of the practical readers of *Carpentry and Building* to tell me if the brown felt used in building is as durable as the tar paper, which is so unclean to handle. I have been informed by those who sell felt that the brown will not last very long, but will decay in a very short time, so as to closely resemble sawdust.

Note.—The question raised by our correspondent above, is one which opens up an excellent field for discussion, and without attempting to reply to it we refer the matter to our practical readers, in order that they may take it up and thus enable us to present a record of experience which cannot fail to prove not only interesting, but instructive as well.

A Question in Planceers

From J. P. B., *Guy's Mills, Pa.*—In reply to "W. H. C.," Lenox, Mass., who inquired in the January number of *Carpentry and Building* how to draw the plan for the planceer of a conical tower, I send a sketch, Fig. 1, which I think will answer his question. It so clearly shows the method employed as to require little, if any, explanation. Referring to the sketch, take C as a center, and with C D as radius describe the circle required.

From F. D. R., *Decatur, Ill.*—As I am always ready to help any one out of trouble, I thought I would answer to the best of my ability the question in planceers proposed by "W. H. C." of Lenox, Mass. I would say that the diameter of his conical tower has nothing whatever to do with the planceer, but as he says 20 feet is the diameter I have so marked the sketch shown in Fig. 2 of the illustrations. It is very true, as he says, that if it were level there would be no trouble. If "W. H. C." will look at my sketch I think he will understand what I mean. He must take the length of the rafter, or outside slant of the cone, whatever that may be, and use a board wide enough to make the planceer; then with the same radius sweep the board, which will give the right curve. If the board is too stiff, it will be necessary to kerf it, so it will spring easily.

From A. L., *Napa, Cal.*—In answer to "W. H. C." of Lenox, Mass., whose inquiry appeared in the January issue of the paper, I would say that the question comes under the same general principle as splayed door jambs with circular or Gothic heads, so thoroughly explained in previous issues of *Carpentry and Building*. The sketch, Fig. 3, which I inclose will probably furnish the desired information. The dotted lines C, B, E are a plan of a quarter circle. C A is the hight from the lower edge of planceer, as shown, and A B is the pitch of the roof. Now, with A as a center, describe the arcs B D and F G. Space to correspond

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with B E for saw kerfing and to obtain the length of the quarter pattern. The saw kerfing may be as close as desired, but must radiate from the center A.

From F. T., *Iowa Falls, Iowa.*—"W. H. C." of Lenox, Mass., asks a question in cornice work in the January number of *Carpentry and Building*, which I have waited for some one to answer. As no replies have yet been presented, I will venture to solve the problem. If "W. H. C." will cut his roof from the apex to the foot of the rafter perpendicularly, and unroll it on his lawn, he will have something similar to that shown in Fig. 4 of the illustrations, I, I, I, I being the rafters. He will instantly discover that the apex A, Fig. 5, is the center of the circle, and the length of the rafter is the radius. He must bear in mind that if the sheeting is on the outside of the rafters the radius of the circle will be A B of Fig. 5; but as the planceer is on the under side of the rafter the radius of the circle will be E F of Fig. 5. Now, if "W. H. C." places a plumb cut on the foot of the rafters the facia and mold are easily put on. If a square cut, as C, Fig. 5, is made, then the radius of the circle will be C D, drawn at right angles to C A, and the intersection of A C and C D will be the center of the circle.

From J. W. R., *Vandalia, Ill.*—I have been a reader of *Carpentry and Building* for a number of years past and have found in its columns much valuable information. I am comparatively young at carpentry and have gained most of my knowledge of laying out different styles of roofs by practice and experience. Seeing the inquiry of "W. H. C.," Lenox, Mass., in the January issue of the paper, I make bold to present a drawing as an answer to it. Referring to the sketch, Fig. 7, I make a drawing of the conical roof and measure from the outside edge of the planceer to the center on a line with it, as for example, from A to B. This distance in the drawing which I inclose is 27 feet 6 inches, which is the radius for the planceer. Proceed in the same manner for obtaining the facia, and we find the distance from A to C to equal 11 feet 6 inches. The drawing so clearly indicates the general method advocated that further explanation seems unnecessary.

From E. P. B., *Winter Park, Fla.*—In reply to "W. H. C." of Lenox, Mass., allow me to say that the edges of the planceer will be segments of circles, but will have radii different from what would be the case if the planceer was level. In the sketch, Fig. 6, which I inclose, take the distance B D for the radius of the outside edge and C D for the radius of the inside edge of the planceer. If the rafter were cut plumb the radius of the outside edge would be A D, which is evidently equal to the entire length of the rafter.

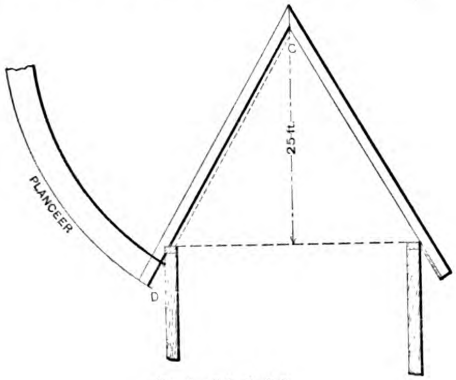

Fig. 1.—"J. P. B."

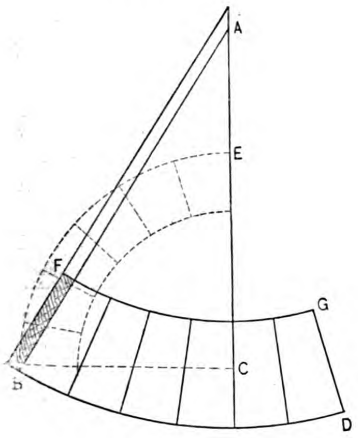

Fig. 3.—"A. L."

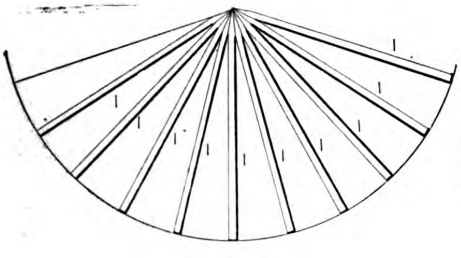
Fig. 4.—"F. T."

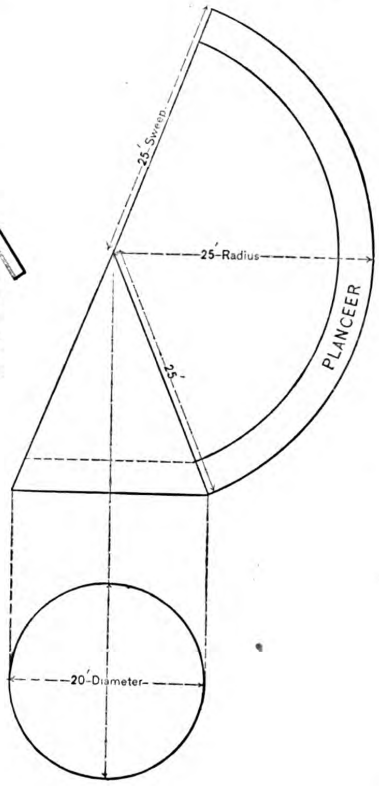

Fig. 2.—"F. D. R."

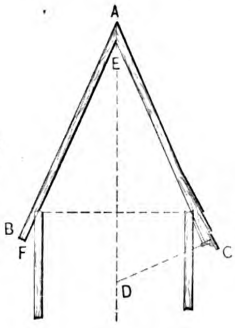

Fig. 5.—"F. T."

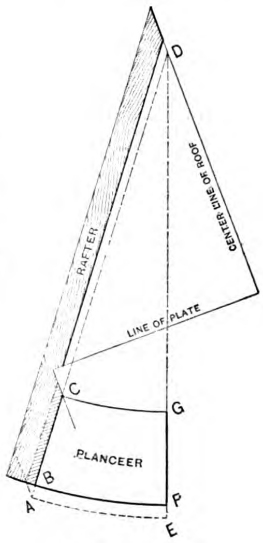

Fig. 6.—"E. P. B"

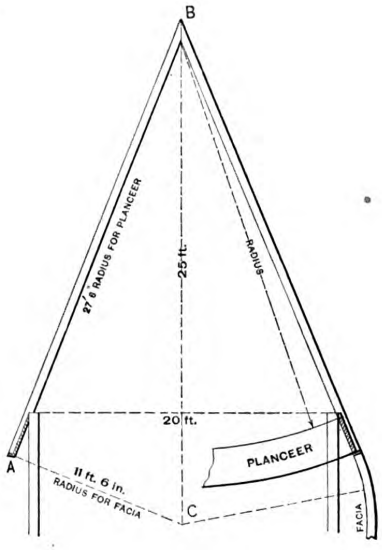

Fig. 7.—"J. W. R."

A Question in Planceers.—Diagrams Submitted by Various Correspondents.

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TRADE NOTES.

THE WARREN-EHRET COMPANY, 432 Market street, Philadelphia, Pa., favor us with a copy of a descriptive catalogue and price-list of Black Diamond Prepared Roofing, coal-tar products, roofing materials, building and sheeting papers, deadening felts, carpet linings, tarred felts, two and three ply felts, pitch, caps, nails, brushes, &c. In their announcement to the trade it is stated by the company that nearly all their papers are now put in rolls containing 250, 500 or 1000 square feet, thus facilitating calculations as to quantities required to cover a given surface, as well as exact amount of expenditure incurred. It is expected that this departure will prove of special advantage to the trade, as it is pointed out that it is much easier to sell by the roll than by the pound. The little work is profusely illustrated, and presents information which cannot fail to prove interesting and valuable to all engaged in the roofing business. Accompanying the catalogue is a package of samples of building and sheeting papers, 29 in number. Upon each sample is printed the name by which it is known, the dimensions of the rolls in which it is put up and the price.

THE CLOSING EXERCISES of the male department of the school connected with the General Society of Mechanics and Tradesmen of the City of New York were held at Mechanics' Hall, No. 18 East Sixteenth street, on Tuesday evening, March 24. The exercises were opened by prayer by Rev. Field Hermance, after which the chairman of the School Committee of the society made a few introductory remarks. Oliver Barratt, president of the society, made an interesting address, as did also Rev. Field Hermance. The diplomas were awarded to the students by John C. Babcock, superintendent of the school. During the exercises Prof. George Lechler rendered a number of selections on the zither. On Monday and Tuesday the drawings and models representing the work of the various classes in the male department were on exhibition, and were viewed by numbers of interested visitors.

THE STANLEY RULE AND LEVEL COMPANY have enjoyed a much larger business in Stanley's Roofing Brackets than was made to appear by our remarks in the last issue of the paper. In place of 1500 brackets, as there stated, the quantity which had been sold by the manufacturers up to the first of the present year was 1500 dozen roofing brackets. The total sales of these brackets up to the present time are said to have been 1800 dozens.

THE MONROE MFG. AND LUMBER COMPANY, Lima, Ohio, are meeting with a good inquiry for their specialties and for the Hill Inside Sliding Window Blind, which is something of a novelty in that section. The company are enjoying a very extensive trade and one that is constantly growing. They are also doing a good business in the Perfection Sliding Window Screen, which has just been placed upon the market. This screen can be adjusted at the top or bottom of the window, sliding up and down in a grooved strip.

JOHN Q. MAYNARD has recently removed from 12 Cortlandt street, New York City, to 114 Liberty street, where he will continue the business of manufacturing and dealing in hydraulic, steam and hand power elevators and dumb waiters, as well as overhead railways, traveling cranes, &c.

WE HAVE RECEIVED from the Campbell Furniture Company, Ironton, Ohio, a large poster showing a number of designs of mantels which they manufacture for the trade. A new feature of construction, to which they call attention in connection with wood mantels, are strips which are placed on the inside of the stiles by means of screws, and which may be taken off when used as a box mantel. When it is desired to make a flat mantel these strips are left on, while adjustable strips, packed with each mantel, are fitted to the iron front and then nailed in position. The mantel is made in two widths, but is so constructed that it may be employed on four different widths of chimney.

S. C. JOHNSON, Racine, Wis., is distributing a folded circular relating to ornamental hardwood floors, for the manufacture of which he claims to possess exceptional facilities. The circular states that the manufacturer is in a position to make up floors in any design or thickness to match the trim of a house or to meet the ideas of an architect. The floors are made ⅜ and ⅝ inch thick, according to the requirements of the case. It is stated that these parquetry floors and borders are very attractive, and appeal to the refined taste of the fashionable world.

IN ANOTHER PART of this issue the Thompson Mfg. Company, Columbus, Ohio, refer to their line of corrugated iron, which is adapted to meet varying requirements.

M. MAHONY, Troy, N. Y., has issued an interesting catalogue relative to the Mahony boilers for steam and hot-water heating, which will be found of value to builders generally. The goods made by Mr. Mahony are enjoying a wide popularity and embody features of construction which render them powerful in operation.

THE SAFETY FURNACE PIPE COMPANY, 11 and 13 Atwater street, Detroit, Mich., are meeting with a good demand for the Safety Furnace Pipe which they manufacture, and are in receipt of testimonials referring in very flattering terms to the satisfaction which their goods have given. Circulars relating to this pipe will be mailed by the company upon application.

THE STAN-ALUMIN METAL COMPANY of Canton, Ohio, are offering the trade metal roofing, eave troughs, conductor pipes, alleys, shingles, &c., made of aluminous metal, which is said to be non-corrosive and superior to copper. The statement is also made that no paint for protection is required. The company will forward to any address, upon application, samples and prices.

THE E. D. ALBRO COMPANY, Cincinnatti, Ohio, inform us that they have just received direct from the the west coast of Mexico, a cargo of very fine Prima Vera, which is said to be above the average in lengths, widths, color and texture. The company are enjoying a good spring trade in all kinds of veneers, as well as in fine cabinet woods of all kinds, and carry in stock an excellent line of Mexican, Cuba and St. Domingo mahogany.

THE J. L. MOTT IRON WORKS, 84 to 90 Beekman street, New York City, direct the attention of the trade to their line of stable fittings, wrought and cast-iron mangers, hay racks, stall guards, gutters, watering troughs, weather vanes, crestings and finials, lamps, &c. The company have issued what is known as their "F" catalogue, a copy of which will be mailed to any address on application. The company give attention to the manufacture of fountains, vases, settees, statuary, lamp posts, railing, gates, &c.

THE MURRAY & PORTER LEVEL COMPANY, Pittsburgh, Kan., are now producing a finely-finished 6-inch pendulum level, designed to be attached to a common try square. The device is constructed on the same principle as the 28-inch levels, and is claimed to give very satisfactory results.

THE ELLRICH HARDWARE COMPANY of Plantsville, Conn., are meeting with a good demand for their screw driver, which is regarded by the trade as a very satisfactory tool. From testimonials which the manufacturers have recently received it would appear that this device is rapidly growing in favor with the trade, and that it is adapted for a wide range of work.

WE HAVE RECEIVED from Paul O. Moratz, Bloomington, Ill., a copy of what is known as Design Sheet No. 4, presenting illustrations of an interesting variety of gable ornaments, veranda railings and columns and stair designs. Mr. Moratz makes a specialty of manufacturing and designing fine veranda and builders' supplies, and turns out a great variety of work.

J. E. BOLLES & Co., manufacturers of iron and brass grills, elevator inclosures, bank and office railings, artistic metal work and wrought and cast iron work, have just taken possession of their new factory building on Second avenue and the railroad crossing, Detroit, Mich. The works have a frontage of 250 feet on Second avenue and extend 240 feet on the railroad. There is a spur track from the Michigan Central Railroad running through the center of the yard the entire length of the buildings. The factory consists of a two-story brick structure having 250 feet frontage and a depth of nearly 120 feet. The basement is occupied for the storage of sheet iron, castings and heavy materials. On the first floor is the main workshop equipped with the latest improved machinery, including planers, punches, &c. On this floor is also the iron room and blacksmith shop, occupying a space 60 x 60 feet. On the second floor is the department for light work; also the brass room for electro-plating, occupying a space 20 x 70 feet; the pattern room, 60 x 60 feet, and the temporary office. It is stated that there are 36,000 square feet of floor surface in the building. The flooring is of double thickness of pine and 3-inch hard maple on top. The company expect to have their office building completed some time in June, and their foundry, located in the rear of the factory, some time during the summer. At present about 100 men are employed, but when the plant is completed it is expected that a force of over 200 men will be given employment. The officers consist of J. E. Bolles, president; Horatio Barr, vice-president, and E. H. Chamberlain, secretary and treasurer.

THE J. A. RITZLER CORNICE AND ORNAMENT COMPANY, 1209 and 1211 Walnut street, Kansas City, Mo., invite correspondence from architects and builders in all sections of the country relative to their specialties. They give attention to cornices, building fronts, skylights and stamped and spun ornaments. A copy of a catalogue which they have issued, together with prices, will be sent to any address on application.

C. E. LITTLE, 59 Fulton street, New York, is exhibiting an interesting line of foot power machinery made by the W. F. & John Barnes Company, for which he is agent. To those interested, Mr. Little will send, upon application, lists showing the exhibits.

THE DETROIT HEATING AND LIGHTING COMPANY, 419 Wight street, Detroit, Mich., call attention in another part of this issue to the Bolton Hot Water Heater, for warming the better class of modern dwellings, schoolhouses, hospitals, churches, greenhouses, &c. The statement is made that this heater is constructed of wrought iron and that the vertical circulation is rapid and free.

THE EASTERN AGENT for the line of wood-working machinery manufactured by J. A. Fay & Co. is George Place, whose office is at 120 Broadway, New York. Mr. Place is in a position to furnish the goods of the company named, as well as cold rolled steel and iron shafting, patent compression couplings, adjustable self-oiling hangers, and solid and split pulleys.

H. GILBERT HART & Co., Utica, N. Y., are pushing with a great deal of enterprise the merits of the Royal, Prince Royal and Victor Furnaces, which they manufacture in styles and sizes to meet varying needs. These goods are well built, and are so arranged as to give satisfactory results in operation. The Western branch of the company is at 231 Lake street, Chicago, Ill.

WE HAVE RECEIVED from George F. Barber, architect, Knoxville, Tenn., a copy of "The Cottage Souvenir, No. 2." This is a volume of 168 pages, bound in paper covers, and contains over 50 designs of modern cottages ranging in cost from $400 to $8000. In connection with each design is presented ample descriptive letter-press, in which attention is called to the leading features of construction and arrangement. Many of the designs presented represent work already executed, thus adding to their value as a guide for those contemplating the erection of a home. The designs cover dwellings, stores, barns, churches and summer houses, porches, verandas, shelving brackets, gable ornaments, wall cabinets, &c. The price of the volume is $2.

THE BUCKEYE MFG. COMPANY, Union City, Ind., are directing the attention of builders generally to the Boss Two-Speed Boring Machine, which they have placed upon the market. It is stated that by this machine the operator is enabled to use a 2-inch auger with the same effort required in using a 1¼-inch auger in any other machine. It is said that two augers may be kept in the machine, to use either of which it is only necessary to turn it downward, by first taking the gear frame out of the main frame, inverting and replacing it.

THE KINNEAR & GAGER COMPANY, successors to W. R. Kinnear & Co., Columbus, Ohio, report an especially good demand, considering the season of the year, for their Paneled Steel Ceiling. The manufacturers state that they have subjected the Kinnear ceiling to fire test, and find that it will withstand intense heat without rolling up or dropping off. The officers of the new company are W. R. Kinnear, president, and E. B. Gager, secretary and treasurer.

THE JOSEPH DIXON CRUCIBLE COMPANY of Jersey City, N. J., will begin on April 1, the erection of handsome offices three stores high on a lot measuring 100 x 25 feet. Their present offices will be used for factory purposes together with an addition 100 x 100 feet in size and four stories high.

THE MCLEAN MFG. AND LUMBER COMPANY, Middleport, Ohio, have recently issued an announcement to the trade to the effect that they are in a position to make prompt shipments of screen doors of all sizes. These doors are made of well seasoned lumber, joints mortised and glued and best quality of wire cloth, walnut stained in oil or painted as may be preferred. The company also announce that they are sole agents for Stiveson's Patent Adjustable Wagon Jack.

THE SAMSON CORDAGE WORKS, with office at 164 High street, Fort Hill Square, Boston, Mass., are increasing their facilities for the manufacture of the "Massachusetts" brand of Sash Cord. This is a competitive article and the demand for it has assumed such proportions as to render it necessary for the company to enlarge their producing capacity. The Samson Cord, which is regarded as a very durable article, and much the cheapest for consumers, has a limited sale, the makers state, "because price and not quality is the basis on which dealers buy their goods."

E. T. BARNUM, 179 Jefferson avenue, Detroit, Mich., has recently issued a new catalogue embracing a great variety of modern designs in artistic wire and iron work, as well as a long line of seasonable goods which he manufactures. It is a volume of something over 100 pages, bound in colored paper covers and is profusely illustrated with all descriptions of wire and iron goods. Brief descriptive particulars are also given, together with a price-list and directions for ordering. The work is neatly gotten up and is likely to prove interesting to builders, contractors and carpenters who have occasion to use wire and iron goods.

W. J. BURTON & Co., Detroit, Mich., report the receipt of numerous inquiries from all parts of the country relative to their goods, and especially concerning the Eastlake Metal Shingles, which they manufacture. They have also been receiving many flattering testimonials from agents and through recent shipments to property owners, referring to the general satisfaction which their goods have given. Burton & Co. are getting out a fire proof brick siding, which they expect to place upon the market within a few days, and from which they expect gratifying results in the way of business.

THE WARNER ELEVATOR AND MFG. Company of Cincinnati, Ohio, have recently secured, adjoining their present works, a piece of ground fronting 90 feet on Eighth street and running back to Seventh street, in that city, upon which they propose erecting additional factory buildings for the purpose of increasing their capacity. The new buildings, two in number, will be of brick, one being 140 x 90 feet in size and two stories in hight, and the other 20 x 90 feet in plan. It is expected that these additions will be completed about April 1, and, when equipped with new machinery, will give the company 25 per cent. additional manufacturing capacity.

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CARPENTRY AND BUILDING.

A MONTHLY JOURNAL FOR THE BUILDING TRADES.

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MAY, 1891

Answers to Questions.

It is our habit in the conduct of *Carpentry and Building* to refer a great many questions to our readers which it would be comparatively easy for us to answer. The reason of this our older readers well know. It is simply to provoke discussion and call forth from our subscribers as many expressions of views as possible. We make this explanation now in the interest of those who have recently commenced reading our pages. Our Correspondence department the present month is no exception to the general rule, and, therefore, we take this occasion to say that we desire every question that appears to be considered a personal appeal to the reader—in other words, a target toward which we would like to have directed letters from all who are able to contribute a single idea upon the point raised. No two men answer a question in the same way. No two persons are able to view any fact in this world from exactly the same standpoint, or express their views in the same terms. Hence the proverb that there is wisdom in a multitude of councilors. Those who ask questions of us are men in the trade who want to know the best practical methods; accordingly the best answers that we can secure for them are such as are contributed by those who have had experience and who can tell just how things should be managed. However great our own theoretical knowledge, and however broad our observation, we are unable to compete with our practical readers in matters of this kind. Accordingly we greatly value answers from our readers to the questions published, and we should be glad to have very many more of them than at present.

LIKE ONE WHO DRAWS THE MODEL OF A HOUSE BEYOND HIS POWER TO BUILD IT, WHO, HALF THROUGH, GIVES O'ER, AND LEAVES HIS PART-CREATED COST A NAKED SUBJECT TO THE WEEPING CLOUDS — *Shakespeare.*

Tall Buildings.

The tall buildings of the metropolis are what the visiting builder first desires to see when he reaches New York. He may know something about the tall buildings of Chicago, of St. Paul, of Minneapolis and of other cities but, after all, he wants to become familiar with what New York builders have done in this respect. A little while ago some buildings far downtown commanded the visitors' attention in this regard with more reason for interest than any others. For example, there was the Washington Building, at the foot of Broadway and there was also he Produce Exchange, not so high in itself, but made prominent by reason of the big square tower which serves such an excellent purpose as an observatory and makes the whole structure look like a slaughter house with chimney in the rear. It is also true that the Tribune Building, further uptown, and also the Western Union, with certain office buildings, have long been monuments but latterly attention has been diverted from these older buildings and has centered in newer ones. The Pulitzer Building, the home of the *World* which towers almost as high above the Tribune Building as the Tribune soared above other buildings in its neighborhood as long ago as when it was erected, is now the center of interest. Ere long, however, we think that it will lose its prestige if certain building plans now under consideration are carried out. The high ground about the Park already has some buildings of respectable hight. In fact, some of them are very high buildings save only by comparison with a limited number of higher ones that the metropolis has to show in other sections; but the new hotels which are to be erected very near the Fifth avenue entrance to the Park are to tower far above anything that now stands in that section, and, perhaps, even overreach the downtown structures already referred to. One of these is illustrated in a plate sent out with this issue and is fully described in another column.

NOVELTY IS INDEED NECESSARY TO PRESERVE EAGERNESS AND ALACRITY: BUT ART AND NATURE HAVE STORES INEXHAUSTIBLE BY HUMAN INTELLECTS; AND EVERY MOMENT PRODUCES SOMETHING NEW TO HIM WHO HAS QUICKENED HIS FACULTIES BY DILIGENT OBSERVATION.—*Dr. Johnson.*

The American Style.

A visit to the extremes of the country at the present time shows less variation in styles of building than such visits have revealed at any other period of our national existence. Formerly the architecture of the East was as unlike the architecture of the West as the architecture of the South was unlike either of the others. But now, go where we may, we find something that is the exact counterpart of something else that we have seen in some distant part of the country. When it is not an exact counterpart it betrays a resemblance in so many features as to convey to the mind the general idea that building is much the same wherever it is carried on. Not only are these remarks true as far as concerns planning and general design, but they are particularly true with respect to various details and as to color effects. There are several reasons why this is so, to one or two of which we shall direct attention. The architectural periodical of the day has done very much to harmonize taste and reconcile questions of style. The Association of Architects, as a national organization, in its meetings where different designs and schools of style are discussed, has done much to familiarize each of its members with the work of all the others. Again, builders of late travel very much more than they did formerly, and they pick up ideas and rapidly assimilate them. Fashions and fads travel very much more rapidly now than formerly, whether they be fashions in clothing, fashions in speech or fashions in houses, and what is once fashionable rules the land. But there is a better reason than any of these, perhaps, for similarity in appearance of buildings East and West at the present time, and it is that slowly but surely the American style of architecture is being evolved. We shall not attempt at this time to point out any of its features. It is yet too new to be described or indicated with precision, but little by little it is coming. Fragments of it are now to be seen in residences, and sometimes public buildings reveal something of the idea more broadly and with much better effect. It is even seen occasionally in business blocks, not fully embodied but happily suggested. And yet, with all these resemblances recognized, the buildings of the East and of the West, of the North and of the South, are not sufficiently alike to make it unprofitable for the builders of one part of the land to study the work of those of another part. There still remains sufficient variety to warrant thorough investigation and most careful study. There are at present greater variations in material and methods of combining different kinds of material than in mere external design. These conditions necessarily prevail because the supply differs. But we look to the future to still further reconcile styles and designs, and eventually to evolve the American style in all its appropriateness and beauty for both domestic and public buildings.

ARCHITECTURE IS THE PRINTING PRESS OF ALL AGES, AND GIVES A HISTORY OF THE STATE OF THE SOCIETY IN WHICH IT WAS ERECTED, FROM THE CROMLECH OF THE DRUIDS TO THE TOY SHOPS OF ROYAL BAD TASTE.—*Lady Morgan.*

Milestones of Metropolitan Growth.

When the building operations of any city are examined and reviewed it does not become a difficult task to point out some of the milestones in the progress of that city. Perhaps, however, by reason of its peculiar shape and environment there is no place in which the milestones are more apparent than in New York. The city began in the lower part of Manhattan Island and for a long while was a snug little town of no very great importance and apparently with very little expectation of being much more, even in the future. As recently as when the City Hall was built, that elevation which faces toward Chambers street, being that which is furthest up town, was finished in brownstone, instead of marble, like the rest of the building. This was done as a matter of economy, for it was supposed the city was about done growing. It is on record that the City Fathers of that date felt that the city would never extend beyond

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the City Hall, and that, therefore, the uptown face of the city building would seldom be observed. Our readers know the sequel. City Hall is now away downtown, and there are many thousands of people living in the metropolis who have not yet been downtown far enough to learn that recently this face of the building has been made to agree with the others. We shall not attempt at this time to point out all the milestones which mark the growth of New York, as shown in her buildings, nor yet to mention any considerable number of them. Our purpose at present is simply to draw attention to some of the more notable facts and their bearing upon what is now in progress.

WHEN WE MEAN TO BUILD, WE FIRST SURVEY THE PLOT, THEN DRAW THE MODEL; AND WHEN WE SEE THE FIGURE OF THE HOUSE, THEN MUST WE RATE THE COST OF THE ERECTION, WHICH IF WE FIND OUTWEIGHS ABILITY, WHAT DO WE THEN BUT DRAW ANEW THE MODEL IN FEWER OFFICES, OR, AT LEAST, DESIST TO BUILD AT ALL ?—*Shakespeare.*

Uptown Movement of Theaters.

It is within the recollection of some of the present generation that the best theater or place of amusement which New York possessed when they were young men was at the extreme southern point of the island. Jenny Lind, under Barnum's management, sang in Castle Garden, a building which has for a long time past been used as an emigrant depot. But with the constant progress of the city the theaters have long since departed from that part of the city. A little later in the history of the metropolis Chambers street had one or two good theaters and then still later Niblo's, above Canal street on Broadway, was a famous place. But all signs of a theater in Chambers street have long since been removed, and Niblo's is now too far downtown to attract fashionable people. Other theaters in its immediate neighborhood have moved uptown or been abandoned entirely. For many years Wallack's Theater was on the corner of Thirteenth street and Broadway. But when a new and better place was to be built this manager went almost a mile further uptown, locating near Thirtieth street. Places of amusement which have been opened since that date have found locations still further uptown. What is true of the theaters is also true of hotels, and together they are a correct index of the growth of the city.

EVERYTHING THAT IS NEW OR UNCOMMON RAISES A PLEASURE IN THE IMAGINATION, BECAUSE IT FILLS THE SOUL WITH AN AGREEABLE SURPRISE, GRATIFIES ITS CURIOSITY, AND GIVES IT AN IDEA OF WHICH IT WAS NOT BEFORE POSSESSED.—*Addison.*

Uptown Hotels.

It was but a short time since when the most famous hotels of the metropolis were downtown, as the theaters were downtown. But all this has changed, just as the theaters have changed. Hotels which formerly did a flourishing business in the lower part of the city have long since been converted into business blocks, and each year has witnessed the opening of new hotels further and further uptown. Ten years ago the Rossmore, as it was then called, on Broadway, near Forty-second street, appeared lonesome as a hotel, but since then a dozen new hotels have sprung up to keep it company, and when the Stewart Home for Women was built, which has since become the Park Avenue Hotel, it was considered very far uptown indeed. At present there are several hotels still further uptown, but what is still more surprising, several millions of dollars are now being invested in hotel property as far up as Fifty-eighth and Fifty-ninth streets. We illustrate one of these new buildings in this issue of *Carpentry and Building*, and now refer to this milestone in the progress of building in New York City simply to direct attention to the movement of which this is an index. The progress in the construction of the buildings themselves, whether devoted to amusements or used as hotels, is no less marked than the change in locality. But of this the reader already knows. No one would think of building a theater or a hotel in New York at present to the specifications that were deemed adequate 40 or even 20 years ago.

METHOD, LIKE PERSEVERANCE, WINS IN THE LONG RUN.—*Duclos.*

The Patent Centenary.

Since our last issue was published the one hundredth anniversary of the birth of the American patent system has been celebrated in Washington with appropriate ceremonies, President Harrison making the opening address. A number of essays were read and speeches delivered. In an address delivered by Carroll D. Wright, Commissioner of Labor, on the "Relation of Invention to Labor," he, among other things, said: "Under the influence of inventions the workingman has learned that, from a rude instrument of toil, he has become an intelligent exponent of hidden laws; that he is not simply an animal, wanting animal contentment, but is something more, and wants the contentment which belongs to the best environment. The mistake should not be made of assigning the cause of strikes and controversies to retrogression, or to supposed increasing antagonism, or to any desire to destroy the grand results of past inventions. How a new system shall be established with perfect justice to capital and to labor, recognizing the moral forces at work contemporaneously with the industrial, and the perfectly just distribution of profits relative to the use of inventions, is the great problem of the age. Machinery is young—in fact, is only the forerunner of more golden deeds." Justice Blatchford, the recognized authority on patent law in the United States Supreme Court, explained that the principle upon which the patent laws are based is to give the inventor an exclusive right, for a limited time, in consideration of his fully disclosing his invention so that it might be made and used by the public after the limited time has expired. The speaker said that American inventors had played no small part in the mechanical progress of the world, and he believed that 100 years hence they would still occupy an equally prominent position. Other interesting speakers were Robert S. Taylor of Fort Wayne, Ind., Senator Platt, Senator Daniel and others. During the second day of the proceedings other papers were read, while on Friday, April 10, the centennial anniversary of the signing of the patent law by President Washington, Dr. Toner delivered an address upon "Washington as an Inventor and Promoter of Improvements."

The Lighting of Detroit.

Detroit has been lighted for several years past upon a unique system, one, indeed, that has attracted world-wide attention and one that has often been commented upon by travelers and writers for the press. A large number of masts have been put up in different parts of the city and powerful electric lamps are located at their tops. The ordinary street lights, with the exception of in what is known as the "half mile limit" about the business center of the city, are dispensed with. The masts, or towers, as they are sometimes called, stand so close together as to make their respective circles of illumination tangental. The general effect is not unlike bright moonlight. The city has justly claimed to be one of the best lighted cities in the world. Up to a very recent date the electric lighting upon this plan has been a monopoly in the hands of the company that first inaugurated the system. At a recent reletting of the contract, however, the old company was very much surprised to find that a young competitor had outbid it, and this too without any existing equipment of masts or towers. The contract was let to the new concern, and with commendable energy it at once put up its own towers and at present the city is lighted from them. However, the old company does not propose to surrender without a struggle, and a patent, which it seems existed on the construction of the old tower, is now being used as the basis of litigation. The end, as we understand it, has not yet been reached. Irrespective of the outcome of the suit the citizens are looking forward to the end of the present contract term with pleasant anticipations of lower rates. With two sets of masts in existence they very reasonably expect lively competition at the next letting, and as a consequence a very low price for illumination.

THE PLATES.

One of the plates accompanying this issue presents a general view of the New Netherland Hotel now in process of erection in New York from plans prepared by W. H. Hume, architect, of this city. A description as well as floor plans will be found on pages 112 and 113 of the paper.

Another plate shows a general view of a cottage erected in Middletown, Conn., from drawings prepared by J. D. Sibley, architect, of that place. Elevations, floor plans and details together with descriptive particulars will be found upon the pages immediately following.

The third plate accompanying this number shows in a very interesting manner some of the color effects that may be produced by combining bricks of different shades. The practical bricklayer, of course, will readily perceive how designs can be varied to adapt the idea to brick work of different dimensions from the constructions shown in the plate. The descriptive article will be found on page 130.

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A COTTAGE IN MIDDLETOWN, CONN.

J. D. SIBLEY, ARCHITECT.

COTTAGE IN MIDDLETOWN, CONN.

IT NOT infrequently happens in connection with the erection of a dwelling that after the work has been commenced the plans are changed, for good and sufficient reasons on the part of the owner or builder, so that when the structure is completed it represents something quite different perhaps from what was called for by the original drawings. In many instances these changes are confined largely to exterior features, leaving the arrangement of rooms practically as at first contemplated, while in other cases there is a modification of both interior and exterior. The cottage shown by one of our supplement plates this month is an interesting example of a deviation in external features from the construction contemplated at the time operations were commenced. The house was erected for Frederick B. Chaffee of Middletown, Conn., from designs prepared by J. D. Sibley, architect, of that place. After the work was under way the owner decided to change the exterior construction somewhat, giving the house when completed the appearance indicated in our supplement plate. The elevations presented herewith show the external features as at first designed. By comparing these with the plate it will be noticed that, instead of a circular tower at the left, there is a two-story octagon window; that the veranda is made to conform to the shape of the bay, and that the second-story bay window at the right has been abandoned and a cut-off corner substituted. The terra cotta chimney tops indicated on the elevations have been omitted and the roof made somewhat lower than shown on the elevations. The change made necessary in the floor plans has been in the shape of the rooms at the front of the house, rather than in their arrangement. The sections of floor plans presented in connection with this study indicate the changes which were made in the first and second stories during the process of erection. We call attention to these several points in order to explain the apparent discrepancies between the elevations and the completed house, as shown in the supplement plate.



Cottage in Middletown, Conn.—J. D. Sibley Architect.—Front Elevation.—Scale, ⅛ Inch to the Foot.

Upon the first floor of the house are three good-sized rooms and a commodious hall, from which rises an oaken staircase, finished with curb and paneled strings, carved newels and angle posts. Drawers fitted in the paneling are so made as to be useful as well as ornamental. The under side of the stairs are open and paneled from the top of the drawers to the ceiling. The hall is finished in oak, with floor of the same material. At the right of the hall is the parlor, which is entered through sliding doors. It is fitted with an open fire place, which assists ventilation and provides means for a pleasant fire in moderate weather. The mantel which adorns this tile fire place is finished in white and gold. The room is finished in white wood, painted in enamel white and gold. The floor is of oak. Across the corner of the room between the parlor and bay window is a spindle screen, giving just a suspicion of separation between the two, that is suggestive of cosy quietness and retirement. The dining room may be reached directly from the reception hall and also from the parlor through folding doors or *portieres*. This room is also fitted with an open fire place, above which is a colonial mantel. The room is finished in oak and wainscoted to the hight of 4 feet with molded face wainscoting. The floor is of Georgia pine. In the rear is the kitchen, finished in North Carolina pine and having a floor of Georgia pine. This room is isolated from the rest of the house in such a way that no odor or smell of cooking is likely to reach the dining room or parlor. A large storeroom opens from the rear of the kitchen, while the pantry affords a means of communication between the kitchen and dining room, rendering service easy.

On the second floor are three large sleeping rooms and a bathroom, as well as abundant closet room. The chambers over the parlor and dining room are each provided with an open fire place, with tile hearth and facings and white wood mantel. The finish of the entire second floor, with the exception of the bathroom, which is in hard wood, is white wood in its natural state. The slight swell given to the chamber over the kitchen adds to the appearance of the house, and at the same time gives the occupants a view of the

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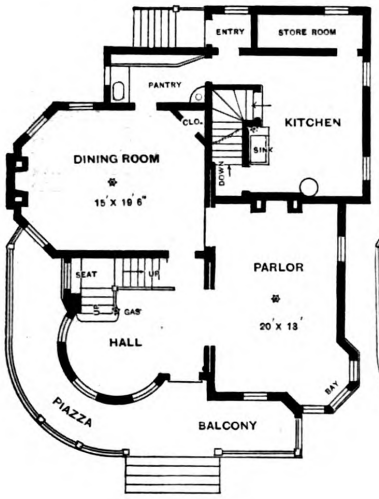
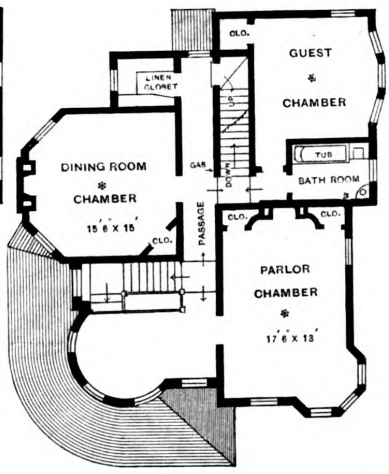
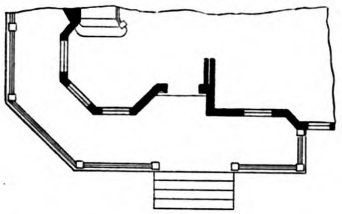


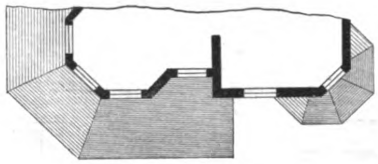
First Floor.



Second Floor.



Plan, Showing Changes in First Story.



Plan, Showing Changes in Second Story.

street. In the third story there is one room for the use of the servants. A broad, spacious veranda conforming to the general shape of the bay window extends from the dining room to the parlor, terminating in a balcony extension.

GROUND HAS been broken for an additional building to the high class technical school in Brooklyn, known as the Pratt Institute. Although Mr. Pratt had expended over $1,500,000 in equipping and endowing the school, he concluded to invest at least $500,000 more in the institution.

"THE SUPERINTENDENT of a pulp works at Marion, Ind., was arrested on the 25th ult. for working his men over eight hours for a day's work." This announcement in the press dispatches called attention to a law on the Indiana statute books, but whose enactment has not received much notice outside of that State. The arrest referred to is the first attempt thus far known to enforce the provisions of the law, which was approved March 6, 1889, and makes eight hours the legal day's work for all classes of mechanics and workingmen except those engaged in agricultural or domestic labor. It permits overwork for an extra compensation by agreement between the employer and employee, but otherwise it makes the exaction of more than eight hours' work a misdemeanor, punishable by a fine not greater than $500. Indiana employers believed it necessary, in order to avoid incurring the penalty of the law, to hire their workmen by the hour. When the cause came up for a hearing, however, the law was promptly pronounce dunconstitutional.



Cottage in Middletown, Conn.—Side (Left) Elevation.—Floor Plans.—Scale 1-16 Inch to the Foot.—Elevation.—Scale ⅛ Inch to the Foot.

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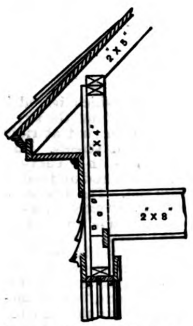
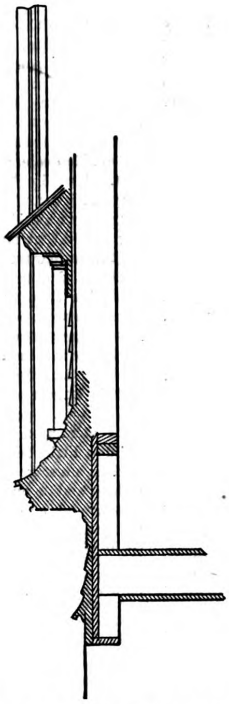
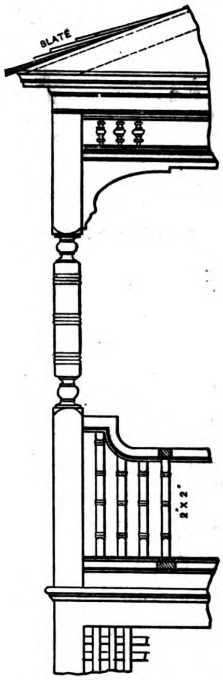


Detail of Cornice.—Scale, ⅜ Inch to the Foot.

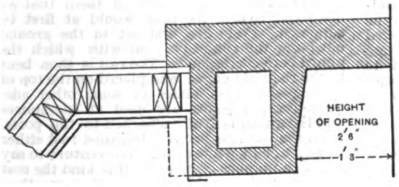
Detail of Gable.—Scale, ⅜ Inch to the Foot.



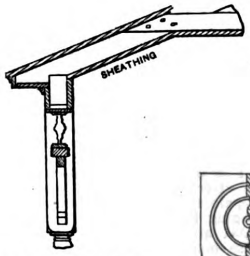
Section through Gable—Scale, ⅜ Inch to the Foot.



Detail of Veranda.—Scale, ⅜ Inch to the Foot.



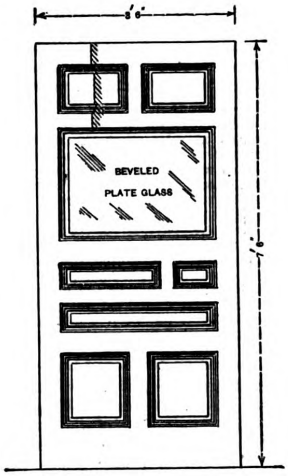
Detail, Showing Relation of Wood Work to Dining Room Chimney.—Scale, ½ Inch to the Foot.



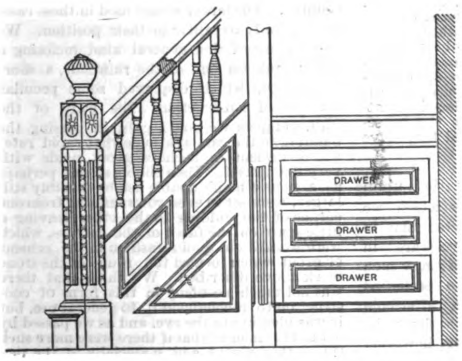
Section of Veranda.—Scale, ⅜ Inch to the Foot.



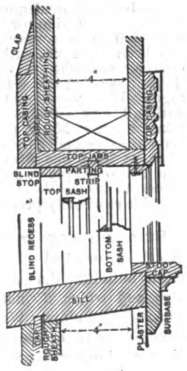
Corner Block—Scale, 1½ Inches to the Foot.



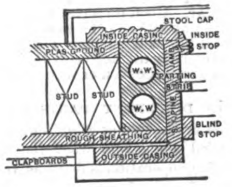
Detail of Front Door.—Scale, ⅜ Inch to the Foot.



Detail of Main Stairs.—Scale, ⅜ Inch to the Foot.



Vertical Section through Window Frame.—Scale, 1½ Inches to the Foot,



Horizontal Section through Window Frame.—Scale, 1½ Inches to the Foot.

Details of Cottage in Middletown, Conn.

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BUILDING WAYS AND MEANS.

THE ERECTION of the new depot in Jersey City by the Pennsylvania Railroad Company shows current practice in the management of large structures in a way to be interesting to architects, builders and engineers everywhere. It is an instance in which the construction of the building has been adapted to the location. It rests in part, if not entirely, upon made ground, and what is not made ground is upon the site of a swamp that skirted the western shore of the Hudson River before Jersey City was built. The object of the depot, comparing it with that which it is superseding, is to admit trains at a level above the streets so as to avoid grade crossings. To secure a good foundation under the circumstances became, therefore, a matter of considerable importance. Without going into engineering details, a brief description of how it was done will have to suffice on this occasion. Piles were driven, representing the lines of the exterior of the building. On these the masonry foundation for the several piers was laid. The stone and brick work were carried up until the proper level was reached. Instead of attempting to carry the tracks upon trusses, leaving the basement of the building—a term which we use for lack of a better one—open for whatever use it could be put to, the whole space inside of the walls up to the level of the tracks was filled in with earth, thus obtaining a solidity which it would have been impossible to secure by any other plan. The superstructure is in the form of an arch, extending from foundation to foundation, and is of such excellent proportion in several parts as to present a process of construction spider-web like in appearance. We shall have occasion to refer to this structure again, for it is yet far from completion. Our only object at this time has been to direct attention to the way in which the foundation was secured.

THE OLD ADAGE that nature abhors a vacuum is paralleled by many other truths. We might improvise a corresponding formula something in this wise: "Nature abhors a corner in a building." At least it would seem that the forces of nature have a special spite against corners, as, for example, in rooms. Every builder knows how prone plastering is to crack in the corners, either vertical or horizontal, as the case may be, when the building is seasoning and settling. In some buildings we inspected a short time since, in which, by the way, exceptional care had been exercised in the construction, in order to have as little strain as possible to affect the corners and draw the timbers apart, all the corners were rounded. Instead of the sharp square angle between wall and ceiling, for example, the corner was filled in to a radius of perhaps 2 or 3 inches. The result was pleasing in the extreme, while the builder, who explained this feature to us, asserted that it had been the means of avoiding the unsightly cracks that so often appear.

THE MOST COMMONPLACE materials can sometimes be used with advantage for decorative effects. We examined some houses not long since the ceilings of which were formed of plaster and pebbles, a construction which the builder described as "pebble cast." Good mortar of ordinary character was employed. This was laid on the ceiling in panels, the stiles or separated strips of which were of wood. The plaster was sunken an inch below the surface of these division pieces. Then ordinary pebbles, such as are frequently employed by gravel roofers, and which are often sifted out of the sand which plasterers use, were "cast" upon the surface of the ceiling and imbedded in the mortar. Good material being used, the mortar set about the pebbles and held them firmly, resulting in a surface unique in its way and particularly attractive to those who do not at first grasp the idea of its construction.

IN DIFFERENT PARTS of the country what are known as "building operations" are carried on. Just what the definition of a building operation is depends very much upon the section of the country in which it is located. Some building operations consist of long blocks of houses in the cities, each house exactly like its neighbor, and all of the parts in construction worked out on factory principle at the smallest possible cost. Operations of this kind in Philadelphia, for example, sometimes extend to the point of 150 to 200 houses each, although in most cases the number is somewhat smaller. The object which the builder has in view is to sell his house, just as a manufacturer sells his product, whatever may be the article made, at a reasonable advance over cost. Accordingly he does just as little in the way of finish and decoration as possible and in all respects considers cost and the corresponding profit that may be made when selling at the lowest market price. Building operations of this kind in the cities were formerly more profitable than they are at present, because then they were newer and because there were less builders engaged in them than now. Accordingly it is incumbent upon the man at the present time who would secure the best prices and the largest profit to do a little more than his fellow builders are doing. He must seek some attraction to influence trade. He must build a little better house than his competitor, he must arrange it in a more attractive fashion and he must go a little further in decorations and embellishments and in point of material comforts and conveniences. At present in the neighborhood of all large cities there is a growing demand for suburban houses, by which is meant houses just outside of the corporation limits, built on plots of, say, a half acre each and offered for sale upon attractive terms, either in the price or in the stipulations of payments. How to bring the "operation" principle to bear upon houses of this kind and yet save the landscape from being spoiled by monotonous rows of dwellings all alike, is one of the most important problems that arises. Again, how to have the houses comfortable and attractive to those who are used to city conveniences, are still other questions that arise and must be satisfactorily answered in order to make the desired profit. We saw these questions and still others of a similar kind very happily solved in some work that we recently inspected. A very charming location for a suburban site had been found. The slope of the ground was such as to insure perfect drainage. The first step in laying out the place, therefore, was to install an adequate system of sewerage. Waterworks were constructed and water pipes were run through the plotted streets. A steam plant was erected and steam pipes were likewise run through the streets. Architects were employed to prepare the most attractive plans for houses ranging in building cost from $2500 up to $5000, and perhaps a higher figure. Then these houses were erected on the operation plan, in lots of 10, 20, or 50, as circumstances seemed to justify, but instead of being placed all of a kind together, or even near each other, they were so scattered, and the different designs alternated with still further variations in colors, in which they were painted, that it is very difficult indeed for the lay member of the community to assert that there are any two houses just alike in the whole plot, and yet the low cost of the operation plan was fully secured. The business scheme, of which the above is a very inadequate outline, has been in successful operation for several years past. A most delightful country town, as the result, has been built up, with library, club house, churches and schools. Just at present electric lighting is being added to all the other advantages. Who would not live in the country, with all city advantages and conveniences taken along? Many persons are anxious to leave the city under these conditions. This is what at least one firm of builders have attempted to supply as a reason for the householder to prefer these houses, and they have found it extremely profitable.

BUILDERS ARE frequently called upon to put up crooked buildings, by which we mean buildings that are not rectangular in plan and which do not stand "square" in various particulars. We have seen many such buildings, and in the past have presented diagrams illustrating some of the rafter cuts which this peculiar construction demands. We do not know of any building, however, that is quite as crooked as the New York Central Railway station at Auburn, N. Y. A number of different considerations seemed to have influenced the planning of this building. In the first place, the streets which bound it at the ends do not run parallel, and the street which flanks it on one side is not at right angles with either of the end streets. Further than this the railroad is on a curve at this point. It passes in at one end and out of one side near the opposite end. The trusses of the roof have been set apparently so as to compromise between the two side walls which are not parallel, and the purlins which run corresponding to one of the walls are very much at an angle with the opposite wall. The ridge of the roof is so arranged as to show a regular gable at each of the ends, but the several ventilators which pass up through the ridge are set square with the trusses and purlins, and not with the ridge. The result is further confusing, after looking upon these details, by the fact that one of the side walls of the building—that is, when viewed from the inside of the structure—runs parallel to the curve of the track. This is explained by the fact that after the building was put up in the general form indicated an interior wall, parallel to the track, was run from one end around to one side, thus cutting off from the main structure a space which was used formerly for the entire freight department of the town, but more recently for local freight alone. We have passed through this depot many times, and it has always commanded attention by reason of its apparent twistiness.

THE FIRST SUGGESTION of ornamentation, perhaps, that ever occurred to a builder, going back to the early days of art and architecture, was to use material with which he was working in a way to produce a pleasing effect while still serving its original purpose. True, art to this day has scant sympathy with applied decoration. It demands that the materials necessary to any construction shall be used decoratively and artistically and that in no case shall they ever be made to resemble what they are not. How even the roughest mechanic and those who are engaged in but little better than ordinary day's work, without trade or skill, can sometimes bring out of the crudest material something that commands attention, is illustrated by a number of guards about switch houses and flower plots along the line of the New York Central Railroad. Old rails, particularly old steel rails, are not a very valuable material. Accordingly, there is less real waste in the use of them that we are about to describe than would at first be supposed. Posts are first set in the ground outlining the round or oval with which the guard is to correspond. The rail is then bent to the required curve and placed on the top of these posts. Fish plates or some other adequate form of joints are used at the splices and the guard is firmly attached to the posts. Then the whole is protected against rust either by paint or by whitewash. We venture to say that in a number of cases of this kind the cost of the material employed has been more than saved by the freedom from accident to the walls of the flag house. The effect is pleasing in the extreme, and, as we stated at the outset, shows how common material, even refuse material, may be used with skill and judgment in a way to accomplish very satisfactory results.

GROUT AND GRAVEL HOUSES are occasionally encountered in different parts of the country. The larger stones used in these cases are generally irregular in their position. We saw a house of this general kind inclosing a water tank on one of the railroads, a short time since, which displayed some peculiar features of construction. The body of the wall, so far as we could gain in passing the building in the cars at a somewhat rapid rate, was of cement or perhaps grout, made with very fine gravel. Then cobble stones, perhaps as large as a man's double fist or possibly still larger, were set in even rows running from one corner of the building to the other, leaving a little space on the faces of the corners, which were worked out quoin fashion in the cement or grout which formed the ground of the stone work above described. We think that there was not much economy in this form of construction to recommend it to general use, but it was pleasing to the eye, and as we passed by led to the thought that if there were more such things they would add materially to the picturesqueness and charm of roadside architecture. A unique building, like a bright landscape, often has utility which minds of sordid ideas do not appreciate.

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MASONRY AND STONE CUTTING.*

DOMED-UP GROINS.

WE HAVE RESERVED the question of domed-up groins to be treated after that of pendentives between pointed arches because, although nominally groins, they are surfaces of the same nature as the pendentives studied in the last article. We have in London an example of groining, formed by the intersection of elliptical and circular cylinders, and an example of domed-up groining at but a few hundred yards' distance from one another. The first is the vaulting over the carriage-way of the Horse Guards, the second is the vaulting over the side passages to the carriage ways which give access to the courtyard of the Foreign Office. I believe that anybody who studies carefully these two examples will have no difficulty in concluding that the domed-up groin construction is infinitely neater and more sightable than the classic construction of the Horse Guards.

Sir Gilbert Scott, the architect of the Foreign Office, gave in his lectures at the Royal Academy the following system for producing these domed up groinings, Fig. 142: "On the plan of the larger vault, of span C D, we draw the groin lines A E and B F, the elevation of which is the semi-ellipse A' Y' B'. Then the surface of the cell between the groins will be generated by moving the centering of the face arch A B parallel to itself, and guided by the groin lines, with which it will be bound to remain always in contact. It is what in geometry is called a 'channel surface'—that is, the path of a solid or a curve moving through space."

To draw the section through the center line of the small arch we place on plan a series of successive positions of the centering, such as M N, P Q. By plumbing upward we get the points M' N', P Q', where the centering would touch the groin when placed in these positions. Taking the hight R S of the crown of the arch above the line M^2 N^2 and carrying it on the left-hand section in its proper position we get a point of the curve formed by the crown of the cell. Sir Gilbert Scott tells us it is an ellipse, and sometimes the ellipse is so strongly marked that it is unsightly. This occurs when pointed arches are used.

To draw the joint lines of the vaults, we begin by dividing the section of the larger arch in an equal number of stones, and draw the bed joints of that vault on plan and elevation up to the groins. Then, starting from the points where the joints meet the groins, the joints of the smaller arch are drawn on elevation radiating from the center of the arch (this does not give equal divisions for the stones of the small arch). Each bed joint being a plane, by marking its intersections with the several positions of the centering we obtain points on plan which give the curve formed by the joint. These bed joints can also by similar means be delineated on the left-hand section.

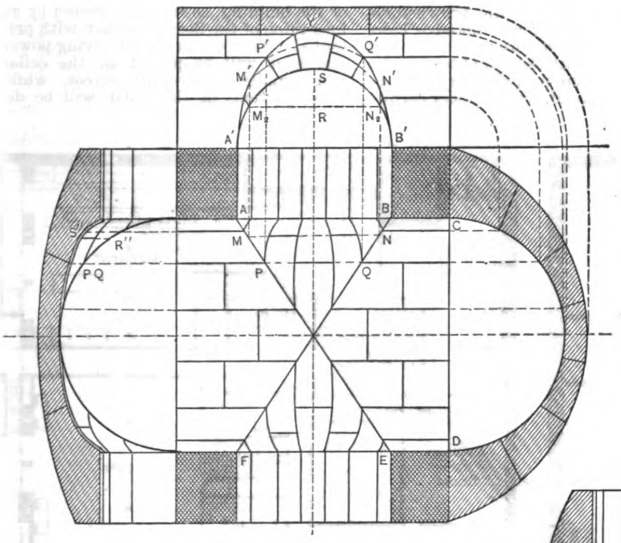

Fig. 142.—Showing Method of Producing Domed-up Groins.

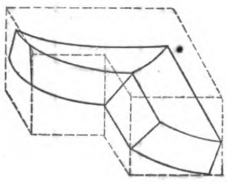

Fig. 143.—Diagram Showing Method of Cutting the Stone.

The cross joints which separate the several stones of each course will follow the lines of the centerings: the surface of these joints may be formed as conical zones on the same principle as the horizontal joints of the pendentive, Fig. 130. To work the stones we shall have to get the molds of the bed joints of the small arch, which we do as usual by turning down the beds around the center line of the arch.

In cutting the stone, Fig. 143, we square off the plan of a stone which will contain the arch stone, as we have done in the "Return Angle of Cloister," Fig. 84. The part of the arch stone which belongs to the larger arch is, of course, worked in the usual way, as in cylindrical arches; but for the branch which belongs to the smaller arch we begin by delineating the arrises of the joints on the plane of the beds. This we do by the help of the bed molds. Then we work the channel surface which forms the soffit of the stone. We produce this by means of a zinc template cut to the curve of the arch, and which we move parallelly to itself along the bed joints previously delineated.

In the Foreign Office archways the stones which form the groins offer a broad soffit on one side and a very narrow one on the other. This is certainly unsightly. To disguise it, Sir Gilbert Scott has had a painted rib decoration stenciled in distemper along the arrises of the groins. Of course, in mediæval architecture, with specially constructed projecting ribs, this difficulty does not occur and the soffits of all the arch stones which fill the cells within the ribs may be of the same width.

Fig. 144. The cells of Gothic vaulting are often filled with skew surfaces generated by the motion of a straight line bound to touch the face arch and the groin, sometimes bound, as a third condition to determine its motion, to remain always horizontal, but in English vaulting remaining parallel to a line which is approximately at right angles with the line which bisects the angle formed by the groin and the face arch at their springing. Can we use such a surface here, where round arches are used?

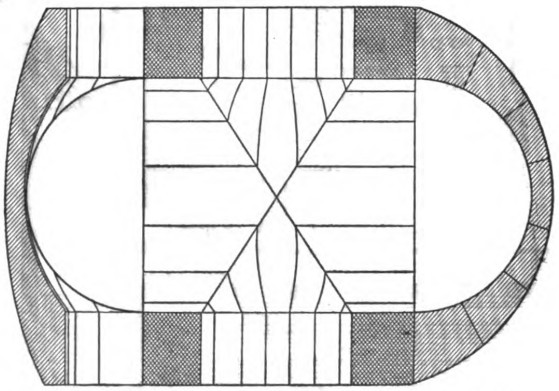

Fig. 144.—The Same Elevation as Shown in Fig. 142.

Let us try a skew surface of the nature of a cow's horn. The cell would then consist of two skew surfaces, each guided by the center line of the face arch, but also by the opposite halves of the face arch, and by the opposite groins. These surfaces will be continuous if on the generator which they have in common they have in three points the same planes tangent in common to each surface. 1. Where the generator meets the center line of the face arch we know that the

* Continued from page 92, April issue.

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plane which contains the generator and the center line is tangent to both surfaces. 2. At the crown of the face arch the plane which contains the generator and the horizontal tangent to the face of the arch is a plane tangent to both surfaces. 3. But, where the groins meet at the crown of the larger arch, the planes tangent to each surface contain the generator and the tangents to each groin line; these planes do not coincide, but meet in an angle on the generator. We conclude, therefore, that the surface of the cell would present a projecting arris, more and more marked as it neared the crown of the vault.

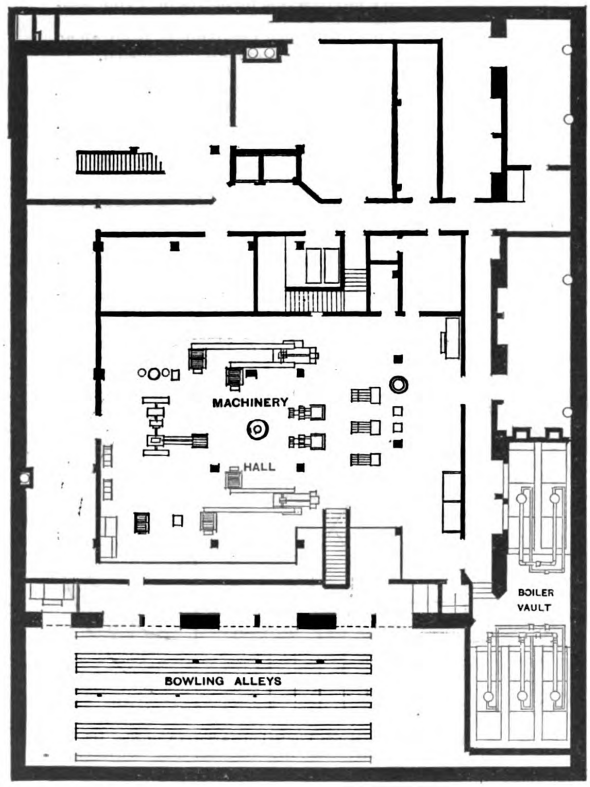
On the other hand, if we strike an arc of a circle, X W Y, on the section, passing through the crowns of the two opposite face arches and the point where the groins meet, then use this arc instead of the straight generator of the cow's horn described above, we shall produce a continuous surface like that of the pendentive, Fig. 138. This surface is easy to work, and is to be recommended where large stones are used. As to working the stone, what we have said of the pendentive, Fig. 132, applies here, and need not be repeated.

THE NEW NETHERLAND HOTEL.

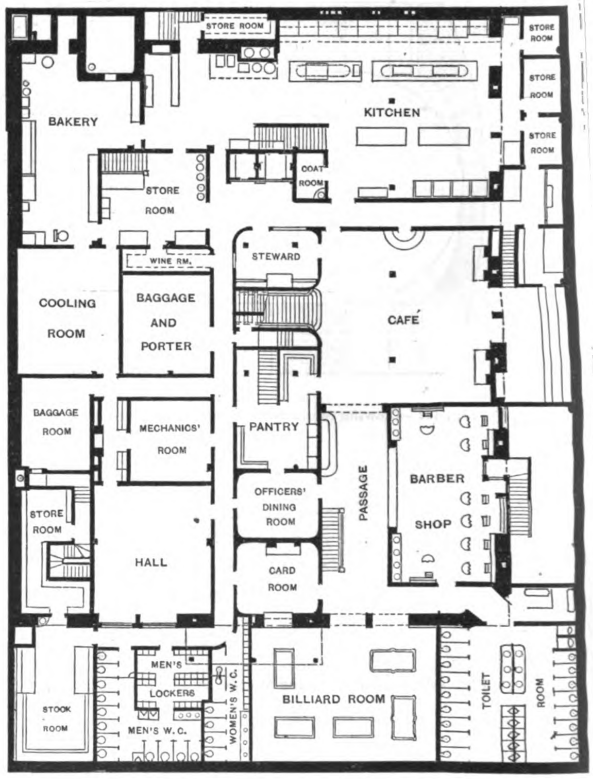
A STRUCTURE that will rank among the most imposing hotels in the metropolis is now in process of erection at the corner of Fifth avenue and Fifty-ninth street, New York, near the entrance to Central Park. The structure will cover five lots, having a frontage on Fifth avenue of 100 feet and a depth on Fifty-ninth street of 125 feet. The cellar and basement are below the sidewalk, while above the building will tower no less than 17 stories. The four upper stories will be in the angle or slope of the roof, which will thus reduce somewhat the appearance of excessive hight in the structure. A general view of the hotel as it will appear when completed forms the subject of one of our supplement plates this month, while a clear idea of the arrangement of rooms upon several of the floors will be gathered from an inspection of the plans presented upon this and the following pages.

The building will be of modern Romanesque design, and is to be constructed according to designs and plans prepared by Architect William H. Hume of New York. The first four stories will be of heavy rock-faced Belleville brownstone, thus giving a strong and massive base, while the superstructure will be of buff brick, relieved with stone and terra cotta trimmings. The twelfth story will be entirely stone-faced, with a heavy cornice finished by a balcony and stone balustrade, this story, in fact, forming the main cornice of the building. It will be so arranged as to break in a pleasing manner the towering appearance of the structure. An attractive feature of the exterior treatment of the building will be the interposition of horizontal lines or band courses so disposed that while separating the several parts, they will not affect the union of the whole composition. In the building of this hotel it is proposed to have the structure as thoroughly fire proof as possible, and in order to give it great strength the brick walls will be relieved of the strain or weight usually imposed by the use of heavy steel columns built in the walls.

The architect has given a great deal of careful study to the interior arrangement of the building, as may be inferred by an inspection of the floor plans herewith presented. The boilers for supplying power and heat will be placed in the cellar vault under Fifty-ninth street, while other portions of the cellar will be devoted to the necessary machinery and to stores. Bowling alleys will also be located in the cellar. The basement will contain *café*, billiard room, barber shop, store rooms and a very complete kitchen. The first story will be devoted to a restaurant, occupying the entire southerly face of the building on Fifty-ninth street, with front on Fifth avenue and entered through a porch. Besides this, there will be the usual offices, ladies' reception room, private dining rooms and other apartments, clearly indicated on the floor plan. The grand staircase will be of marble and bronze, which will also be the materials employed in the finish of the main hall and offices. On the second floor will be the parlors, and a large pri-



Plan of Cellar.



Plan of Basement.

Scale, 1-32 Inch to the Foot.

The New Netherland Hotel.—William H. Hume, Architect, New York City.

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THE NEW NETHERLAND HOTEL.

W. H. HUME, ARCHITECT

NEW YORK CITY

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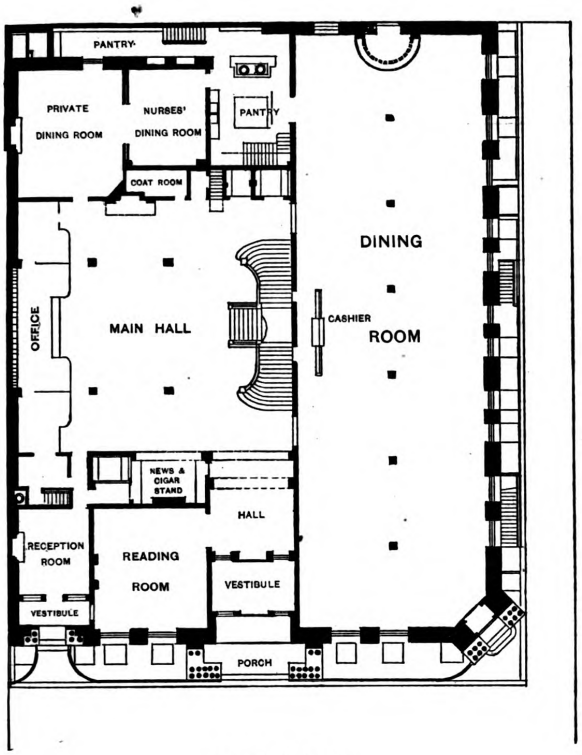
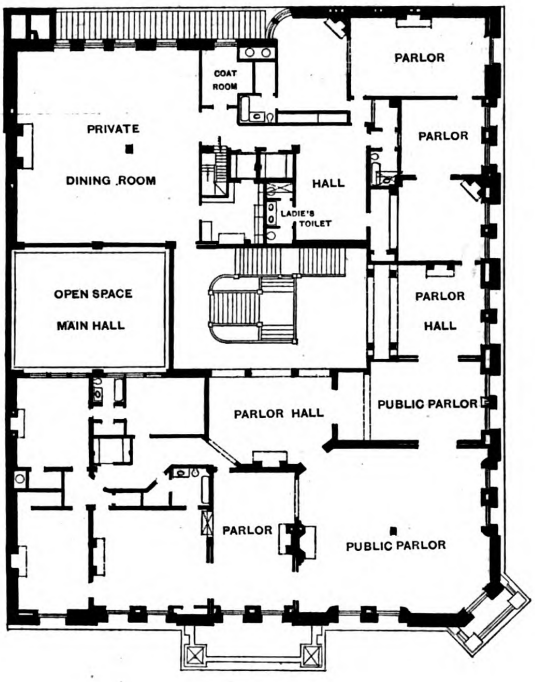
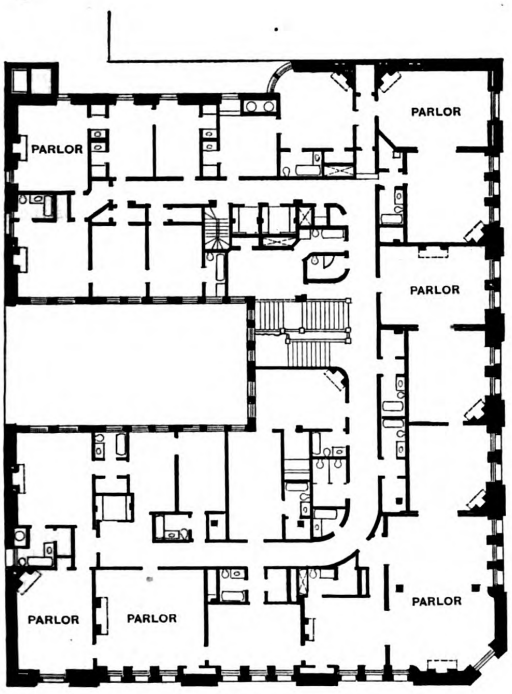


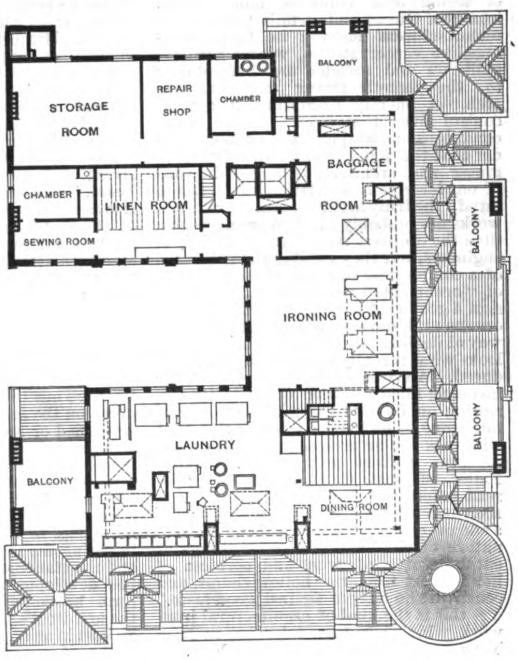
Plan of First Floor.



Plan of Second Floor.



Plan of Third Floor.



Plan of Seventeenth Floor.

The New Netherland Hotel.—Floor Plans.—Scale, 1-32 Inch to the Foot.

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vate dining room connecting with other rooms for the accommodation of those who may wish to give a dinner or reception. The third story, a plan of which is presented herewith, is fairly typical of the arrangement of the rooms upon the floors above up to the seventeenth, in which is located the laundry. The variation in arrangement above the third floor is found largely in the rooms on the corner of the street, caused by the circular wall and tower at that point. Special attention is to be given to the heating, ventilation and plumbing of the building. Electricity will be employed for lighting. It is expected that this hotel, which is being erected by W. W. Astor, will be completed and ready for occupancy about September 1, 1892. When completed it is to be under the personal supervision of Ferdinand Earle, the present proprietor of the Hotel Normandie. It is estimated that the cost will be between $2,000,000 and $3,000,000.

THE ARCHITECTURAL USE OF IRON AND STEEL.

WHY HAS iron construction occupied such a subordinate position in modern architecture? Why are architects so shy of using a material that has such strong claims upon their attention? These questions have never yet been quite satisfactorily answered, says the *Building News*, nor will they be till the profession have made up their minds to master the conditions and become as well acquainted with the properties and manufacture of iron as they are with those of stone or wood. When the architect knows as much of these matters, and the mathematical principles involved in the strength of this material, as the engineer, he will be able to accomplish what his brother in the sterner art has not, nor will ever be likely to accomplish. And for this reason: The knowledge of science to the engineer is the end for itself; he does not try to go further, but to the architect it is only the ladder to another and higher stage. The one stops at science; the other is supposed at least to make it subserve his art. When the engineer in designing an iron bridge performs the functions of architecture, he does so unwittingly; the consequence is that the work is often designed in ignorance of æsthetic laws. The architect's fault is that he does not master the A B C of iron construction, and in consequence is satisfied to take his ideas from the engineer. Hence we are constantly in the habit of seeing iron columns and girders, iron roof trusses and details taken from manufacturers' sheets; in fact, buildings like conservatories, winter gardens, gallieries and arcades are handed over to the manufacturing engineer, the architect merely exercising a general control over the work. Under such conditions and auspices we cannot wonder that the joint productions of the engineer and architect, as we see in some of our large railway station roofs, fail to satisfy the truly architectural sense: these works are probably a trifle more agreeable than the ordinary types intrusted solely to engineers, but they exhibit the evidences of a compromise that has the appearance of "ornamented construction." To design a good roof truss and overlay it with ornamental devices is not a satisfactory way of dealing with iron; the ornamental looks what it really is, "put on," or introduced. An iron spandrel to a roof, for instance, filled up with quarterfoils and resting on foliated capitals made to imitate stone, is no longer a conception that will pass for an architectural treatment. As was pointed out by T. Claxton Fidler, M. Inst. C. E., in his able paper read before the Society of Architects at their last meeting, we must resolutely set aside every device for disguising the real nature of the material. Such things as entabulatures of iron and cornices of hollow cast iron are "hollow shams, and constitute an offense against good taste." Yet this is the kind of architectural ironwork which has been tolerated in New York and other of the great Western States. A Gothic façade, moldings, tracery, reveals, buttresses, and all have been reproduced in cast iron. These disguises have arisen, as Mr. Fidler says, "from an adherence to long-cherished ideals." There may not have been an intention to deceive, but there was at least a desire to imitate styles of architecture that had no sympathy with iron. But the chief reason why an old style was chosen is to be found in the timidity with which a new and untried material is dealt with. It has been the same whenever a new material made its appearance. When the Greeks invented the Doric order they clearly simulated the earlier types of wooden construction; the Lycian tombs, as Mr. Fidler points out, had details borrowed from wooden prototypes; the Romans, when they employed brick, copied the monolithic style of the Greeks. In each case the new material, whether it was stone, marble or brick, was wrought to imitate the older material. Thus it has been with iron; the orders and styles of architecture have been turned to account. The "column, the beam and the arch were executed in iron after the pattern of their masonry prototypes." Many of the older cast-iron bridges are examples of this appropriation—the piers of many viaducts and bridges are made to represent Doric columns; cast-iron arches, with radiating voussoirs, are seen in many of the earlier iron bridges. Westminster Bridge, one of the more modern and elegant structures that cross the Thames, is designed upon a Gothic model—the face, or front arches, are designed as late open-traceried perpendicular arches, and the moldings and details are reproductions of pierced stonework. Iron construction has passed this phase of reproduction; it has already entered into a more definite phase of development, in which its peculiar properties, tenacity and tensile strength have become more apparent. Hitherto it has been made the vehicle of expressing compressive or transverse resistance; but it has lately assumed its rightful functions of elasticity and tensile strength. It is a very instructive lesson in the philosophy of structural evolution to trace the steps by which these true functions of iron construction have been applied. The solid beam, for example, was first imitated; but it was soon found that the greater portion of the metal lying above and below the neutral axis was doing very little except adding materially to the dead weight of the structure. The middle portion was reduced to a web, leaving the upper and lower flanges to perform the functions—one of resisting the compressive, and the lower the tensile forces. The plate web ultimately gave way to the lattice web, or some system of bracing in diagonal lines. Thus the complex stresses engendered on the solid beam or web have been simplified or reduced to two stresses, tension and compression; each diagonal member acts as a tie or a strut, while the main stresses are met by the flanges. The iron braced girder then is the scientific development of the beam, the bow-string truss has in the same manner succeeded in taking the place of the cast-iron arch, and the stanchion may be equally said to be a development of the column. These forms are somewhat harsh and crude for the architect's purposes, yet they express, at least in an approximate way, the typical forms of iron construction. As Mr. Fidler says: "Whatever the iron style of the future may be, it will not be an architecture of masses or of broad surfaces, but an architecture of lines marking and emphasising the principal lines of stress." Iron construction, then, if it seeks for definite architectural expression, must be dictated by these principles. The linear style, whatever it may be, must express the functions of stress which are adapted to iron and steel, and the nearer the forms of construction are made to emphasize these the more truthful the style will become. The architecture of lines need not be dictated by any old style. It is true, as the author says, the slender shafts of piers, the moldings of groined vaults, were not dictated by stone construction, but were selected for a light and linear mode of expressing the lines of stress and the subdivision of function; yet these forms of architecture carried out the compressive system of the Gothic construction. Structurally, any truly metallic style must be made to emphasize the lines of stress, and any interference with or contravention with these lines must be wrong in principle. We have only one structure carried out in a truly logical manner as an expression of iron—the Crystal Palace—and for its object and purpose it is unique; iron roofs of great span have since been erected embodying scientific principles in their construction, like those of the Midland Terminus and the Olympia; and the Eiffel Tower is the latest, and perhaps, on the whole, the most architectural, adaptation of the material. These are, however, tentative and imperfect. An architectural treatment of iron and steel, while it is committed to a truthful expression of the stress lines and functions of iron, may not stop there. It should, above all, avoid the imitation of any style developed from another and totally different material. While the elastic properties of steel and wrought iron make it suitable for curved lines, variety and elegance are qualities that can be bestowed. Hitherto the limitations of manufacture and the stereotyped forms of the engineer have been a great obstacle to development, but these restrictions are being diminished day by day. So long as the engineer remains sole master of the situation we may expect an advance in proportion to the study he brings to bear upon the subject, but no great improvement will take place till the subject is approached from both sides, and the architect has qualified himself to treat the material as he does stone or brick or timber.

PUTTING UP THE iron work on the Philadelphia City Hall Tower has commenced. The tower is now 335 feet high and will be carried 212 feet higher.

THE MANUAL TRAINING conference in Boston was attended by 15,000 persons. The schools in New York, Boston, Philadelphia and Chicago were all the subjects of inquiry and comparison, and the school at Wilmington, Del., where forging and machine-tool making are taught, received special attention. The Boston Institute of Technology made a good display of work in machine-tool making.

A NEW TAX LAW in Ohio goes into effect June 1, which prescribes the manner in which manufacturers shall list property for taxation. On the first of each month they shall add to the value of raw material on hand the value of the product on hand; at the end of the year they shall strike an average, and the result is the amount they must list for taxation.

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Loose Leaves From the Prospectus of the Imm Practical Building Corporation, Limited.

By C. A. WADY.

HAVING recently come into possession of advance sheets of a book of "Practical Building Plans," which I think will be of interest to every working reader of *Carpentry and Building*, I beg to present a specimen in *fac-simile*, after first quoting the introduction, which reads as follows:

"In furnishing the citizens of this country a cosy, not to say luxurious, cottage in appearance and general outline, for the small sum of $500, this corporation is filling a long-felt want and growing demand. The American man to-day wants a place of his own—a building he can call "home, sweet home"—and have it come. The exorbitant prices of other building associations have hitherto rendered this impossible. For a building such as we offer in Fig. 1 for $500 other companies demand $510.57 up to $2,399.99, and express charges. We wish it distinctly understood that we make nothing by the sale of these structures; they are offered simply to advertise our business and in the hope that the purchaser will be induced in a short time to buy one of our larger houses, on which we could make a profit to cover cost—and a trifle over.

"We add that we have never had a case where the new owner did not come to us within two weeks and wish to exchange or sell the property. This speaks volumes for our scheme."

"A COSY COTTAGE FOR $500."

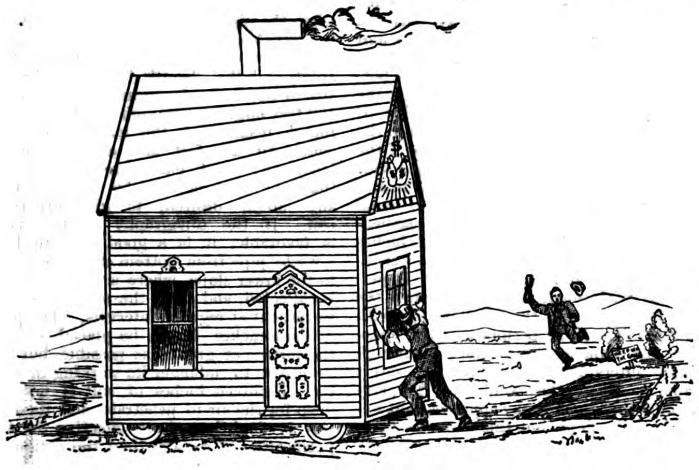
"The accompanying Fig. 1 is from a photograph of a cottage recently erected by us, for our late esteemed ex-mayor, on leased land, and gives a correct impression of its appearance. The illustration shows a quantity of smoke issuing from the chimney. The cottage can be built for less money without the smoke, and some people do not care for this feature. Other special features, which combine to make this building a dandy, are as follows:

"It is mounted on wheels, and may therefore be used to great advantage on leased land, where ease of manipulation is an essential. We make a great many with this precaution.

"The chimney is reversible, to accommodate the change of wind. In warm weather it makes an excellent observatory, or may be packed away with other winter garments.

"The roof is of planed boards, allowing rain drops to slip off without saturating the wood in the least. It looks better than the old-style method of shingling, and we have lately introduced an improvement in our 'oblique cracks.' This is accomplished by laying the boards of the roof slightly oblique, the gutters being placed at the ends of the building, running front to back. The plan also insures the running off of all water, on account of the steepness thus afforded.

"The outside doors open outward, a valuable feature in case of fire, when nearly every one is in more or less haste.



A "Cosy" Cottage for $500.—Fig. 1—General View.



Fig. 2.—Finish of Gable.

"The front door is solid soft pine, grained with first quality horn comb. Door knob, brass, stained with the new agony cherry shade; so also are the basswood front steps.

"Finish of the gable is shown in Fig. 2. The design is unique in the history of house building and speaks for itself.

"The floor plan is presented in Fig. 3, showing the arrangement of the rooms. Partition P is movable. This allows the enlargement of either or both rooms. Directions for permanent enlargement: Moving the partition back from the front

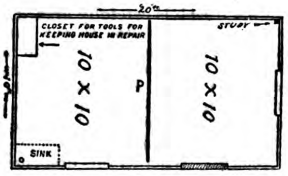


Fig. 3.—Floor Plan.

5 feet makes the parlor 15 feet instead of 10; then placing it 5 feet from the front wall gives a length of 15 feet for the rear room, adding total length of 30 feet to the house. Quite an item.

"Piped for water and gas: A $1.50 pump is furnished, and a trap goes with the sink, but no cheese is included at this price. Provision is made for the entrance of an abundant supply of sewer gas without extra charge."

A FEW HINTS ABOUT DRAINAGE.

IN THE SELECTION of a site for the country house, writes Mr. F. W. Chandler in the *Quarterly* of the Massachusetts Institute of Technology, however great the attractions may be, avoid any not well drained naturally. Much can be done by artificial drainage, but any ordinary filling only raises the finished surface a few feet more or less above the wet which is difficult to drain away. This applies particularly to level lands, as on a slope drains may be laid that will lead the water to the surface at a lower grade than the bottom of the house cellar.

On the other hand, the soil may be perfectly dry, but hard and clayey, land that in the spring time makes the plastered walls of the cellar damp, and wet spots to show perhaps, on the cellar concrete; for after heavy rains, because the soil will not leach, the water will follow down along the house and easily find an entrance through the ordinary cellar wall. This is land perfectly healthful to live on, if it can be drained to take care of the few wet months, for during the long summer everything is perfectly dry. If there is a public sewer, both the sewage and this water can be taken care of satisfactorily. If there is no public sewer, then reliance must be placed on the cesspool. In considering either case, the draining of the cellar wall is the first part of the system to be arranged for in the order of building. The bottom of the wall begins commonly from 12 to 18 inches below the finished cellar floor. The trench from the outside of the cellar wall to the bank should be at least 12 inches wide at the bottom and 2 feet at the top; this allows plenty of room to examine the building of the wall, to see that it is carefully pointed to shed water, or to see that the outside of the wall is thoroughly plastered with clear cement—a valuable precaution to take with a wet soil. At the bottom of this trench the drain pipe is laid, and above this the filling may begin with small stones, gravel free from clay, or sand, allowing 18 inches at the top for

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loam. In the laying of this drain pipe care must be taken to have a regular fall to the outlet: The grade may be as little as one in 400 and be effective.

THE DRAIN PIPE.

The highest point of this drain pipe should be at the bottom of the footing stone of cellar wall, and the lowest point nearest to the sewer or cesspool, as the case may be. The drain pipe used for this work should not be the agricultural tile drain so commonly used, but should be of second quality glazed pipe 4 inches in diameter, as advised by Mr. Ernest W. Bowditch. This second quality is perfectly strong, but the glazing is imperfect, or it may be twisted, or the hub cracked or broken, all faults of no consequence in this work. In regard to expense, this second quality costs less than the ordinary drain tile. The great advantage of this pipe is the security of a large, clean aperture effected by the hub. The tile drains are only 2 or 3 inches in diameter, and are usually laid from ¼ to ½ inch apart; this aperture is covered with tarred paper or cloth to prevent the earth working in, and then the trench is filled up; but with the greatest care taken, these tiles often get entirely choked up, and the porosity of the tile amounts to nothing. Mr. Bowditch has been called upon a number of times as an expert to find a reason why the cellar walls and floors should be wet, when the system of drain tiles had been laid in the most thorough manner, and has invariably found the choking up of the tiles with earth to be the cause, and has replaced the same with the 4-inch glazed pipe with entire success. This pipe should be laid with the hubs pointing downward, as a better protection against earth entering the joints, which are of course uncemented. When the trench is carefully graded, it is better in laying this pipe to cut out still more of the earth for each hub, to insure an even bed for the pipe; and when the entire circuit of the walls is made, and the two ends joined to make one outlet, this must be entered into a trap, and this connection made as thoroughly as possible with clear cement. Whether this drainage pipe enters into the trap, or is led out to the surface at a lower level, it is important that a copper wire netting should be so placed as to prevent rats or other vermin entering, as they might if the pipes became dry: This netting should be put into the end of the second length, so that the last length can be crowded against it, and so insure its remaining. The trap must hold a large amount of water to guard against too rapid evaporation; it should be at least 2½ feet in diameter, with 14 to 16 inches depth of water. It may be built of brick laid in cement, or it may be of one of the patterns now found in the market. The outlet from this to the drain must begin with a bend which should lead down to almost touch the bottom, and where passing through the wall of trap must be cemented in the most thorough manner, and the rest of this outlet pipe must be laid carefully in cement, the hubs pointing upward to its connection with the sewer—this outlet pipe being of the best glazed pipe.

SUBSOIL DRAINAGE.

It must be borne in mind that during the summer months the soil will probably be entirely dry, the water in the trap will naturally evaporate, the seal be thus lost, and sewer gas then have free entrance through trap and inlet, and so about walls of house. To avoid this danger it is best to lead one of the rain water conductors from roof into this trap, and as a further precaution, as in case of a drought, build a chimney from trap to top of ground with an iron cover, so that it can be filled by a hose or other artificial way. In this case the rain water conductors should each have an S-trap, or a larger one if possible, at its foot, to lead into a system of their own similar to that draining the walls, the final outlet to enter wall waste-pipe beyond the trap. It must be understood that the work thus described is from necessity, not choice, as in every case where it is possible to do so this sub-soil drainage should be led to lighter soil, where it can leach away and be a system of its own, not even connecting with a sub-soil sewage system, in which case there need be no trap, but do not omit the copper wire netting before spoken of. It may be found as the work progresses that at times water comes up through the cellar floor, and this must also be taken care of. Such a floor must be covered with at least 6 inches of broken stone throughout, besides the finish of concrete; but in addition a graded trench should be dug, say 6 inches deeper at the lowest part and 12 inches wide. This trench should be the whole length of the inside walls running parallel with them, and, say, 12 inches away. At the lowest part of this trench put in a trap, and from this trap lead a 4-inch iron pipe with bend, turned down to almost touch bottom, and lead the other end through the outside wall into trap above water line, if waste must finally enter sewer, or into the sub-soil drain of a water conductor if the overflow is allowed to leach into the soil. This cellar trap is made by the Akron and Portland Companies, and seems to be all that is wanted. It is of glazed earthenware, with an iron cover, about 16 inches in diameter and 2 feet long. It is a regular cylinder, and the upper half is perforated with small holes, and when the trap is sunk so that the cover is flush with finished floor these perforations are opposite the broken stone stratum through which filters the water. It very rarely happens when the walls are properly drained that there is any appearance of wet on the cellar floor, but this is a very valuable expedient for an old building where the foundation walls are so poorly built that the earth cannot be removed from the outside of them to put the drains there, without endangering its stability, or for any cause where it is not desirable or feasible to put in the outside drain. The inside drain will do the work perfectly well, but, of course, it would be better if this dampness were outside the cellar walls.

One could hardly wish to build where all these precautions are necessary, and it might be said that such conditions are rare; but there might happen even a more complicated case where there is no sewer, and tight cesspools must be used either because the earth will not leach or there is not area enough to allow of sufficient subsoil drainage. In this last case there must be a cesspool for the sewage and another for the cellar drainage. Pumps should be fixed over them, and they must be emptied regularly.

THE CESSPOOL.

Thus far there has only been considered the drainage necessary for a dry cellar, and the mode of entering the soil-pipe into the sewer is too well known to need further explanation; but in the case where the sewage can be disposed of by sub-soil drainage the method as carried out by Mr. Bowditch seems by far the best, and this method was also devised to take the place of the intermittent flushing tank with its system of main and lateral tile drains, which may under favorable circumstances work well enough, but cannot be relied upon. The same difficulty obtains in this case as about the cellar walls; the small pipes are too easily choked. More or less of the system thus becomes inoperative, the drainage becomes too concentrated, and the first sign of failure is the appearance of wet on the surface of ground—it "fountains up." Then again, the complication of flush tank should be avoided in every case, until a better reason for using them is found than now exists; they are liable to, and do, get out of order. The sytem, as carried out by Mr. Bowditch, is to have a tight cesspool at least 50 feet from the house, into which is led the soil pipe and overflow from grease trap. This cesspool should be 3 feet in diameter and 5 feet high, and the inlet should enter at the top, and the outlet to run out, say, 3 feet from the bottom, so that all solid matter shall remain in the cesspool, which must be cleaned out occasionally. Of course the connection of house with cesspool must be of the best pipe and with tight joints, but the outlet is to be built of the second quality of glazed pipe, as before spoken of, to be 5 inches in diameter, laid with the hub pointing downward. If the soil will allow it, Mr. Bowditch digs trenches for the main and lateral drains from 3 to 4 feet deep, say, 10 inches wide at bottom and 18 inches at top. This trench is then filled in with broken or small stones, so that when the pipe is laid on them there shall be 18 inches of loam over the top of pipe. The lateral drains are put in 20 to 25 feet apart, and their length is limited by the size of the land; for example, a lateral of 100 feet might be enough; but if it were found insufficient the main should be continued 20 feet and another lateral built on; and gates are put in so that the sewage may be directed into any lateral desired, to give others a rest. If the topography of the land is favorable, it is a good plan to lead a waste pipe from bottom of cesspool out to the lower slope, where a compost heap is collected, and allow the entire cesspool to run out at regular intervals. The pipe in the trenches should be placed as near the surface of ground as possible, but not so near as to endanger its working in winter. Eighteen inches of soil is not too deep for the air to penetrate, and its oxygen is doubtless more effective in the purification of sewage than the action of plant life. During the winter, the one is of course inoperative, and the other must be very much hindered by the frozen ground, so that during this time sewage must be got rid of principally by leaching.

Protection for Laborers in Europe.

Germany seems to be far ahead of all other States so far as legislation for the protection of laborers is concerned, but in some respects Switzerland is more liberal in that respect. The law in Switzerland makes the happening of an accident *prima facie* evidence, and it only releases the employer from liability in case he may show that the accident was caused by superior force or criminal act of a third person, or by the own fault of the deceased or injured party. And, in cases where any business detrimental to health is being carried on, the owner is also liable in case the employee contracts any disease caused by such business, as, for instance, match factories, white lead and mirror factories, wall paper factories (where arsenic is used). The law there further requires a record to be kept by the owner of all accidents, cases of sickness or deaths apparently caused by the business in which the laborer is engaged, and embraces all factories, railroads, steamboats, telegraphs, telephones, buildings, quarries, mines, &c. Another feature, which is also found as yet only in Austria, is the law which fixes the maximum time during which labor can be demanded. That time is 11 hours per day, and on Saturdays or days immediately preceding holidays it is ten hours. It applies to all persons over 14 years of age, and prohibits work by all under that age and prohibits night work for females and for boys under 18 years.

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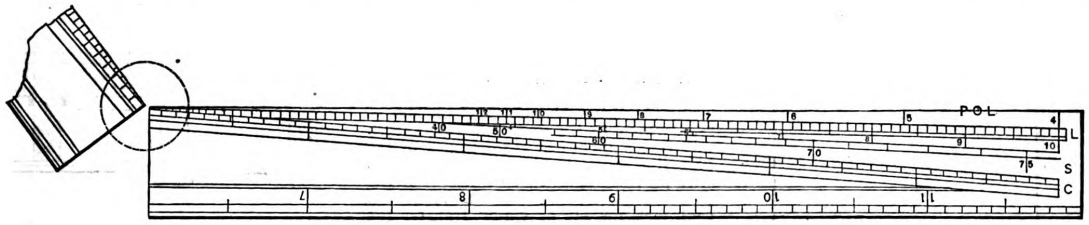
CORRESPONDENCE.

Miter for an Octagon Joint.

From A. B. McD., *Harrison, Tenn.*—I would like very much to have some one tell me what points on the steel square will give the miter for an octagon joint.

A Curious Rule.

From RULE, *Red Wing, Minn.*—I inclose a sketch of a rule, the use of which I would like to have some one explain in the columns of *Carpentry and Building*. I would also like to know the name of the

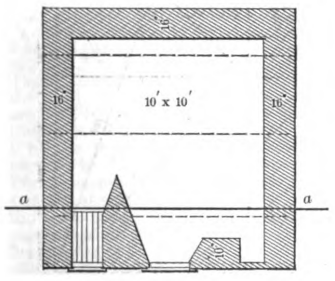


Sketch Submitted by "Rule."

rule and the meaning of the figures and letters upon it. The sketch shows only one side of one-half of the rule and is made full size. Will some of the readers of the paper, who are familiar with this rule, kindly enlighten me?

Plans for a Bake Oven.

From J. C., *Meadville, Pa.*—In the March issue of *Carpentry and Building* "W. S. C." of Corpus Christi, Texas, asks for plans of a bake oven. I inclose drawings of a bake oven that I erected a short time ago. The fire box is 26 x 14 inches, the door 12 x 12 inches, the ash pit door 12 x 24 inches, while the door of the oven marked B in the elevation is 12 x 24 inches. The door slides in a frame and has at its top a hole to which a light rope is attached and passed upward through a pulley at the ceiling of the room. By means of this rope the door may be readily opened. Referring to the elevation indicated by Fig. 2 of the cuts, C C are dampers and should slide in an iron frame. The oven flue is 12 x 12 inches and starts level with the oven floor. The direct draft flue is 4 x 6 inches, and connects with the fire box and main flue, as indicated by the dotted lines on the elevation. Fig. 1 of the illustrations represents the floor



Plans for a Bake Oven.—Fig. 1.—Floor Plan.

plan of the oven, while Fig. 3 is a section through the oven at the line A A, indicated on the floor plan. In making this oven I filled in with cinders, tamping them hard and solid and paved with two thicknesses of brick, laid flat in mortar, with the floor 1 inch higher at the rear end. The arch starts 6 inches above the highest end of the floor, and should be all headers with joints broken. Grout thoroughly with liquid mortar, after which lay a course flat in a good bed of mortar.

Effect of Mortar on Timber.

From L. A., *Sioux City, Iowa.*—In the Correspondence department of *Carpentry and Building* in the March issue, I notice an article by "Dry Rot" of Rutherford, N. J., brought out by the communication from "S. S.," Ithaca, N. Y., and am much amused to see how poor Mr. Mortar is made the scapegrace for others' follies. If lime mortar was used, as I infer was done in the cases referred to by "S. S." and "D. R.," why have not the ends of the trimmers, lintels, joists, &c., failed long years ago? In the construction of buildings at Fort Niagara by the French before the Revolutionary War lime mortar was used in abundance, and on its reconstruction by the English when they occupied it lime mortar was plentifully employed. This I know to be a fact, as some of my ancestors were superintendents of a portion of the work executed, and I failed to find any serious effect on

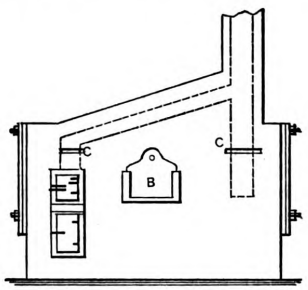


Fig. 2.—Elevation.

the timbers in the year 1856. Again, would not buildings which were sheathed with boards on the outside, lathed on the inside, then filled with grouting composed of pounded stone, sand and lime, have become destroyed long ere this if the trouble referred to by the correspondents mentioned was due to the cause they assign? I know of buildings over 50 years old which are yet in good condition, ordinary wear by weather and usage excepted. I have spent over 40 years in the construction of all kinds of work in different States and climates, and have been a close observer of the durability and strength of different materials required, but I have failed to see or learn of lime mortar being destructive to wood. I think in the case referred to by the correspondents mentioned above, that the trouble arose from the method of construction. There were no precautions used to check moisture from rising from the ground in the wall. Stone is a natural absorbent of moisture, as may be easily proven by placing a stone on the dry earth. Upon removing the stone after it has lain there for a few days the earth will be found very moist. Stone is often used by nurserymen in transplanting trees in very dry soil in order to attract moisture to the roots. Before leveling the walls for the sills some precautions should be taken by using cement in layers to break the connection of moisture rising from the ground, similar to breaking an electrical current. The timber should also be well salted, and if these precautions had been taken the trouble would have been averted. Lime box says lime mortar is his preserver. I would like to hear from others on this subject.

Rake Molding Intersecting a Level Molding.

From J. H. P., *Grennell, Iowa.*—I would like to say a word with regard to the article from "A. R.," North Indianapolis, Ind., published in the February issue of the paper for this year. I am convinced that he does not fully comprehend the meaning of "O. A. H.," Chariton, Iowa. Making a molding in the manner explained by "A. R." is a very common thing, but where the profile of raking molding requires to be made different from the level molding greater skill is necessary. I presume many carpenters do not understand how to work the rake molding so that it will fit to its place.

Perspective Board.

From BEGINNER, *Tampa, Fla.*—I have taken *Carpentry and Building* for several years, and I find it very useful to me. I desire to ask through its columns if there

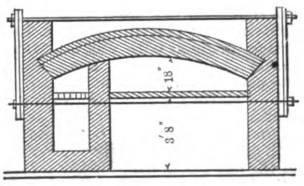


Fig. 3.—Section Through Oven at a a of Fig. 1.

is any such thing as a perspective board on which perspectives may be drawn without the aid of a centerolinead. My space is limited, and the old way is practically impossible under the circumstances. If there is such a thing as a perspective board I shall be glad to have the readers of the paper tell me where I can get one.

Raising Large Barn Frames.

From J. M. B., JR., *Burlington, Pa.*—I would like very much to have some of the practical barn builders who are readers of *Carpentry and Building* furnish drawings and description showing apparatus and methods for raising large frames. I have a number of barns to build this season, 40 x 50 feet in plan, with timber 10 x 12 inches in section. The hight of

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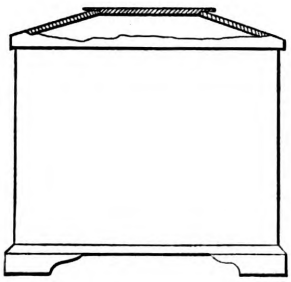
the barn is to be 20 feet to the main plates, without counting the basement. I have generally employed a gin pole, but this is a clumsy affair and takes nearly as many men to handle as it ought to require to raise the barn frame. If any readers of the paper will contribute something on this subject it will be a favor to me and, I have no doubt, will interest many others as well.

Design for Tool-Chest Top.

From W. K. H., *Chase City, Va.*—Among the numerous plans presented in the columns of *Carpentry and Building* for tool chests, the fact seems to have been overlooked that the chests are often exposed to the weather, and the tops are not made to turn water.



Tool-Chest Top Suggested by "W. K. H."

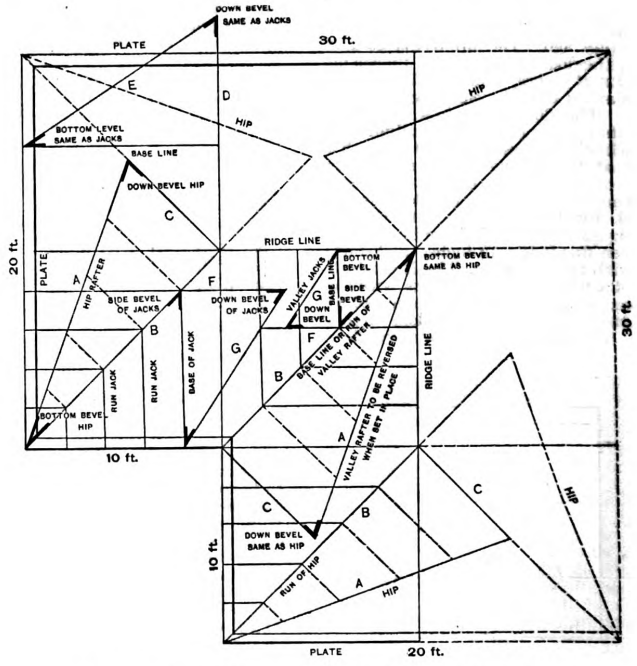
Permit me to present my idea of a good chest top, a sketch of which is shown in the accompanying engraving. In addition to forming a good roof, the top is so constructed as to make it a convenient place for a saw rack. The bottom edge of the top frame should be a trifle larger than the chest itself and rabbeted over the outer edges of the chest top.

Length of Jack Rafters.

From J. H. P., *Grennell, Iowa.*—In the January number of *Carpentry and Building* for the present year I. P. Hicks criticises my sketch published in the August issue for 1890, and I must confess that it justly deserves what he says, and more also. I was very careless in making the plan, and I ought not to have sent it in such an imperfect condition. Such things tend to show that we are far from being infallible. I inclose another sketch, which this time is really for a one-third pitch roof. I would like to see my plan of this roof, which, by the way, I do not claim as original with me, but which, as "G. W.," of Wauson, Iowa, says, "I have used for many months," get a fair trial. I claim for it practicability in all hip and valley pieces, roofs of any pitch and unequal pitches—in fact, I do not see much difference between "G. W.'s" plan and the one I submit. He has a different method of finding the length of jack rafters, and right here I wish to say I believe he has made a mistake in his plan with regard to the side bevel of the jacks. Now, a hip or valley placed plumb over a base line which is at an angle of 45 degrees to the plate would require the ends of the jack to be cut on the miter. I cannot see how his will fit if cut as the plan indicates they should be. I beg to be allowed to say a few words more about "G. W.'s" plan, which I consider a good one. He does not explain in such a way that one who is not an experienced hand can understand how to find the length of hips, valleys and jacks. For instance, he says, "The line from *a* to *b* is the length of hip and valley dropped down to get the length of jacks;" but there is no demonstration of that point. Of course one who understands framing can see how it is done, but for others it might prove a little puzzling.

I find that according to Mr. Hicks the first jack, placed 2 feet from the foot of the hip, is 28¾ inches long, but that "figuring each succeeding one 28¾ inches longer than the one before it" does not give the common rafter long enough by nearly 1 inch. It makes the common rafter, according to the span of roof I submit, 11 feet 11¼ inches. While figuring it by the rule for finding the hypotenuse of right angle triangles, I find the common rafter to be 144.23 inches, or 12 feet and nearly ¼ inch. Of course I do not split hairs in framing, but the common rafter should not be framed 1 inch too short. If the jacks should by chance be cut a little too short they can be moved and made to answer. I like Mr. Meloy's method of finding lengths of rafter from the square, although it has been in use many years.

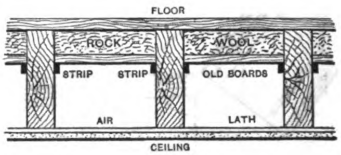
Referring to the plan which I submit let A A A represent the hip and valley rafters and B B B their runs or base lines. To find the length of hip and valley rafters which are cut, check off length, set the rise of roof at right angles to the base line of each, as at C C C. Then the lines at A A A will give the hypotenuse of the triangle—the length of hip and valley. To find the common rafter, set the rise of roof, which in the accompanying sketch is 6 feet 8 inches at right angles to the base line, as at D. Then the line at E will be the hypotenuse or length of the common rafter. To find the length of each jack for hip or valley, transfer the distance shown by the dotted lines, which are, or should be, at right angles to the base line of hip and valley, and touching the hip or valley line, to the base line of the jack rafters and at right angles to the same, as at F F. Then the line at G G will be the lengths of the jack and valley rafters. Each jack is found in the same manner, but there will be a difference evident in the manner of cutting the jacks for the hip and for the valley. The top end of the jack for the hip will be cut to the bevel against the hip, while the valley jack will be cut with the same down bevel, but without any side bevel, so as to fit against the ridge line. The bottom end will be cut with the same down bevel, and also with side bevel in accordance with whichever side, whether right or left of valley rafter it is designed to fit. The jack for the hip is cut at the bottom, the same as the common rafter, to fit the plate. In framing the different rafters, one-half the thickness of the ridge lines should be taken out of the length, also one-half the thickness of the hip and valley taken from the lengths of the jacks. The valley rafter has to be reversed in setting, as in framing or making span for framing the top and bottom ends are evidently brought wrong end to. It is the same with the jacks. The pitch of the roof represented in the sketch is one-third, or a rise of 8 inches to the foot.



Length of Jack Rafters.—Diagram Submitted by "J. H. P."

Deadening Floors.

From G., *New York City.*—The letter relating to the effect of mortar on timber, published on page 11 of the January issue of *Carpentry and Building*, is very interesting. To my mind it would have been much better had the builder deadened his floors and increased their fire-proof quality by the use of mineral wool or rock



Method of Deadening Floors Recommended by "G."

wool, laid on a false partition 2 or 3 inches below the floors, as clearly shown in the sketch which I send herewith. The strips are nailed along the joists, after which short lengths of ¾ inch stuff—any old stuff will answer—are cut and laid on the strips. After this has been done the bags of rock wool, or of mineral wool, are poured out and the shallow space above the partition filled level with the face of the joists. Tar paper is then laid upon it and the flooring put on. The wool must not be tamped, as it is the air within that makes it a non-conductor of heat and sound. The tar paper may be omitted if the floor is well tongued and grooved. It serves, however, to make it water tight, which is a *desideratum* under ordinary conditions, and a still greater one in case of fire. Sawdust will deaden the floors to sound, but is a poor conductor of heat,

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while in case of fire its presence is not desirable. Instead of the thin strips indicated in the sketch thicker ones may be used, and in that case lengths of board for the false bottom may run the same way as the joists. If they shrink the strips will be wide enough to hold them and prevent the filling from falling through.

Framing a Bank Barn.

From D. K., *Oakridge Station, Pa.*—I am a reader of *Carpentry and Building*, and noticing plans and suggestions relating to barn framing I take the liberty of sending rough sketches of a barn which I built for a gentlemen in Dime, Pa. The barn is one which I think will be found equal to any I have yet seen illustrated in the paper. The plans cover a bank barn 50

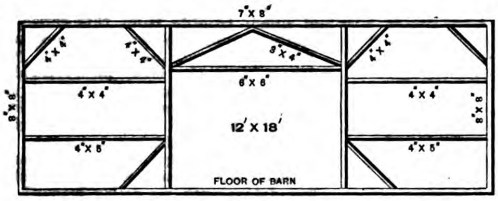

Fig. 1.—Side View.

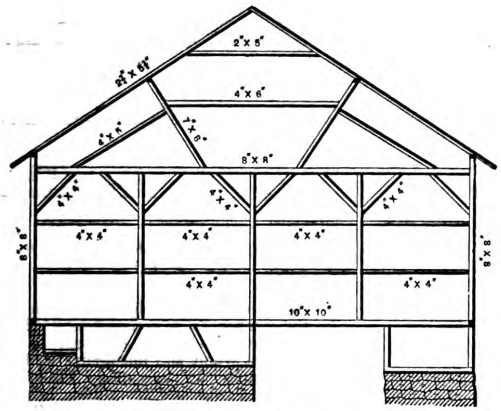

Fig. 2.—End View.

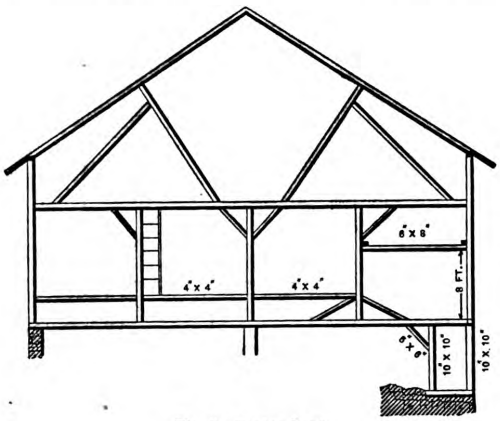

Fig. 3.—Center Bent.

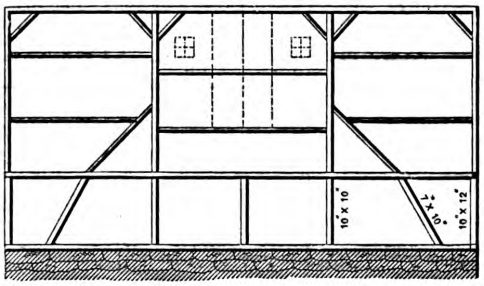

Fig. 4.—Rear Elevation.

Framing a Bank Barn.—Method Suggested by "D. K."

x 46 feet in size. The sills are 10 x 12, the cap sills 9 x 11 and the cross sills 10 x 10. These, however, can be made heavier over the shed, if desired. The cross beams are 8 x 8 inches, and the plates and purlins 7 x 8. Fig. 1 of the sketches which I inclose represents a side view of the barn; Fig. 2 shows an end view, while Fig. 3 represents the center bent. In Fig. 4 of the sketches is shown a rear view of the barn, in the lower story of which the posts measure 10 x 10 and 10 x 12, while the leaning or batter posts are 7 x 10. The pitch of the roof is 9 feet rise in 16, which I consider a very good pitch for a shingle roof.

Convenient Door Holder.

From W. K. H., *Chase City, Va.*—I had supposed that "J. N. H.," with his "pickaninny" door holder, published in the January issue of *Carpentry and Building*, settled the question, but I see that "S. F. B." and "C. E. J." are yet dissatisfied. Now, brothers all, I move that "J. N. H." take the cake, but I hope he will divide with the family. However, I must say there are some objections to his "device." In the first place, machines of that size and color require an immense amount of fuel to keep them going. In the second place, a very short time in the position shown in his Fig. 2, will produce total insensibility and consequent inactivity, together with looseness of joints. In the third place, while the "device" is easily produced in the localities mentioned by "J. N. H." and not expensive except as to fuel, Brother "H. H. C." of Denver might find them difficult to obtain. In the last place, although others might be mentioned, Brother Chips in Northern States sometimes object to working on the same job with machines of that color, and we do not want any more causes for strikes in the future.

If "H. H. C.'s" foreman would put the lock on while the door is on the bench, he would get my idea and would not have to "take his off the hinges." Two brothers have said that my bootjack would be too lively and move about while the door is being planed. They will not experience trouble in this way if they will have the bench made heavy and the feet sawed to rub flat on the floor. Perhaps we have not yet got the Denver "hustle" on us, but after the following order we can "get there" with some of the best: Plane the butt edge of the door straight and square. Lay it flat on the trestle; then try the frame square in the tongue and bottom corners of the door frame with the blade of the square in the butt rebate and the tongue in the top rebate and then on the carpet strip. If the frame is not square, notice the deflections. Then with the strip straightedge obtain the hight of the frame in the butt rebate and mark the hight on the butt edge of door, allowing ¼ inch for play. Then place the blade of the square even with the edge of the door and a straightedge along the tongue of the square, having it at the marks on the door. It should be in the same relation to the tongue of the square that the top rebate and carpet strip hold when the square is in the frame. Mark by the straightedge. Obtain the width of frame on the strip bottom and top and mark this on the bottom and top of the door. Strike a line between by means of the straightedge. Work to these lines at the bottom, top and lock edge. Place the bottom butt 9 inches from the bottom of the door and the top butt 7 inches from the top, and in rebate place butts 9 $\frac{7}{8}$ inches from the bottom and 7 $\frac{1}{16}$ inches from the top. Put on the lock and place the door in position. If the work has been properly done, it only remains to put on the gauge, but a little trimming is usually necessary, which can be easily done with the smooth plane. I think "S. F. B." would need a dray to move his door-hanging outfit.

From S. F. B., *Wellington, Ohio.*—Last summer I built a house on the second floor of which there were four doors fitted with rim locks. In doing the work I used the method suggested in a recent issue by "N. P. W.," with very satisfactory results. There were three outside doors fitted with locks, and altogether a total of 13 doors. I cheerfully contribute this testimony in support of the method adopted by "N. P. W.," but should be glad to hear from other readers touching the question of door holders.

Width of Siding.

From F. K., *Kieler, Wis.*—In response to "J. M. B.," Burlington, Pa., whose letter appeared in the September issue of *Carpentry and Building* for 1890, I desire to say that I find Stanley's Clapboard Gauge a very handy thing for siding. The correspondent states that in his section of the country it is customary to lay siding 5 inches to the weather. In my opinion this is too small a lap for a good job. Six-inch siding will not be any wider than 5½ inches when dressed, and siding not lapped more than ½ inch will, if not painted, dry out so rapidly that in a few years there will be hardly any lap left. This siding will then have such a small lap that the water will easily get

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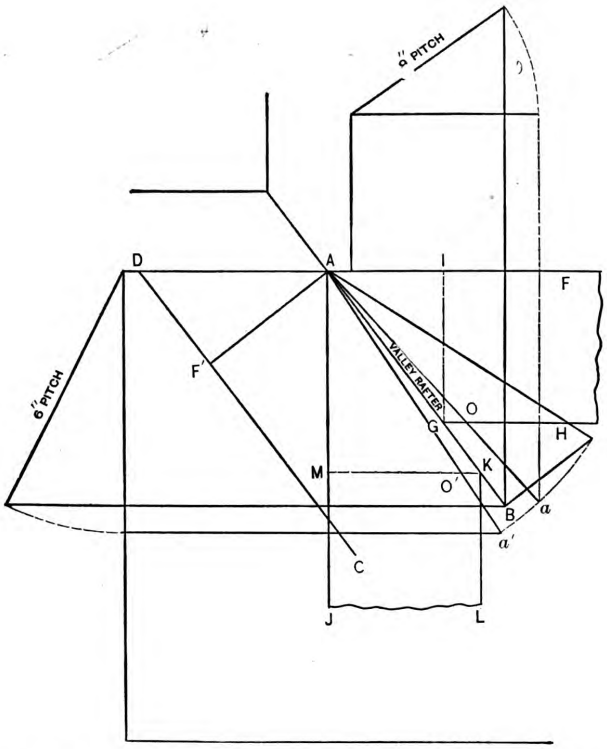
in. I think ⅛-inch bevel siding 5½ inches wide should be laid not more than 4¼ to 4½ inches, and even then, if posts are no nearer than 16 inches between centers, the water will come through in a heavy storm from that side. I would advise every reader of *Carpentry and Building* who is in doubt on this point to make a trial, which I am convinced will prove to his satisfaction that it is a fact.

Meloy's System of Framing Roofs.

From J. W., *Paterson, N. J.*—D. H. Meloy kindly asks me to make clear that portion of his description relating to Fig. 13, of the serial article published in the January number of *Carpentry and Building* for the present year. In his reply to my original communication he says, the side bevels of the jack rafters are found



Meloy's System of Framing Roofs.—Sketch Accompanying Letter from "J. W."

by the same method. Referring to the sketch which I inclose, the line A F represents one side of the jack rafter for the 9-inch pitch roof. Find the exact thickness of the rafter and lay it off on a plane parallel with A F, as shown by the line G H. Then square across from G to I and the distance from K to G is the difference between the two down bevels on the jack rafter. I claimed in my first notice of the article that the jack rafters would not fit when raised to the pitch, and I see no reason to alter my views. I have added a few lines to Mr. Meloy's drawing, which shows a gap to be filled up from his bevel, which is I A G. The level seat of the valley rafter being A B, the bevel of the jack rafter could not be F I A B, the difference being from G to O and from O' to K. There must be some misunderstanding which I hope Mr. Meloy will clear away and close the gap between F A B and F A *a*, the last letters giving the true bevel according to my mind.

Something on Handrailing.

From STUDENT, *San Antonio, Texas.*—If I. P. Hicks will give us something on handrailing as simple as his hip-roof framing in the January number of *Carpentry and Building*, he may make stair builders of some of us who are forced to be general all-round workmen.

Finishing Wood Patterns.

From PATTERN MAKER.—I notice in the March issue of *Carpentry and Building* an inquiry from "H. E.," Greenfield, Ohio, relative to the finishing of wood patterns. With the permission of the Editor I will give my experience for the benefit of this correspondent and of other readers of the paper. In the first place make the pattern as smooth as possible; then give it one coat of shellac varnish. After this has been done, sandpaper it nicely until it is smooth, and then repeat the operation of varnishing. It is necessary to exercise some care in order that the varnish be not too thick. For lathe work give one coat of varnish, then sandpaper and give it another coat. Use a clean rag and rub off while running. Use lamp black for black varnish mixed with shellac. Use alcohol for thinning the varnish. The patterns should have the varnish applied often when much used, as it preserves the pattern and will save both time and money.

Polishing Hard Wood.

From W. W., *Philadelphia, Pa.*—Will some of the readers of *Carpentry and Building* kindly give me a recipe for polishing hard wood?

Pleased with Carpentry and Building.

From W. L. R., *Mount Carmel, Ill.*—You can count on me as a subscriber until I die or quit carpentering, if the paper holds its present standard. I think I will have time this winter to send several articles of interest to the readers of *Carpentry and Building*.

Waterproof Glue.

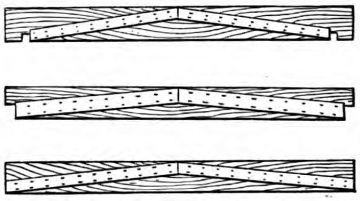
From F. B., *Mount Vernon, N. Y.*—In answer to "N. G. H.," Grand Rapids, Ohio, permit me to recommend the following method of making a waterproof glue: Take unslacked lime and pot cheese and mix well together with a little water to the consistency of thick glue. I have found this combination to work very satisfactorily.

Finding the Center of a Circle when Spring and Chord are Given.

Since the April issue of *Carpentry and Building* went to press we have received additional letters from correspondents in reply to the inquiry of "C. E. S.," Tacoma, Wash., who asked in the February issue of the paper for a rule for obtaining the diameter of a circle when the chord and rise are given. We take this means of acknowledging receipt, remarking that we have discovered nothing in them that was not shown in the selection of letters published.

Sagging of Floors.

From W. Q., *Humboldt, Iowa.*—With regard to the question of floors sagging, permit me to say that for many years I had much trouble from this cause, especially in buildings provided only with a foundation wall and no cellar. Most builders have the floor joist crowning, owing to the fact, no doubt, that all joist have a natural crown, and most builders get that edge up. After repeated trials, I found that would not overcome the difficulty of sagging. Take, for instance, the lower tier of joist, which are laid on a foundation with no cellar beneath the building. These joist absorb a great deal of moisture, and as the dampness is



Manner of Trussing Joist Adopted by "W. Q."

greater at the lower edge, the floor sags in the center as a consequence. Then again, the same thing happens to the upper joist when the plastering is done, and the upper tiers are more difficult to prevent sagging and trembling, because in the case of the lower tier we can put a beam under, while with the upper tier we cannot. I do not wish to be understood as saying that the correspondent has not devised and advocated a good plan for fixing joist, but that it is not certain to work satisfactorily under all circumstances. I have hit upon another plan, and although it is not so cheap as the method described by the correspondent in a recent issue, it is, however, I think, much more reliable. In putting in joist 16 feet long or more, I truss them in the manner shown in the accompanying sketches. If I am using 2 x 7 stuff for joist, I employ a 1 x 4 piece for the truss; but if the joist are wider, I use a 1 x 6 piece, always being careful, however, that the crown edge is close up to the floor. Strike a mark across the side, at the center of the joist, lay on a strip and nail it firmly to the joist with two rows of nails about 16 inches apart. The strip is now ready to saw off at the center, plumb with the mark. Join on the other one, being careful to have a good joint in the center. This method has given the best of satisfaction. I have used the truss on 24-foot span, 12-inch centers, with three tiers of bridging, and find it capable of sustaining great weight. This is especially true of buildings where there are long spans, and it need only be tried to be appreciated. The joist may be comparatively dry. A truss on one side only is all that is necessary.

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ARRANGEMENT FOR LIGHTING BASEMENT.

WE ILLUSTRATE herewith a very convenient arrangement that has been adopted by G. S. Crosby & Co., 176 Clinton street, Chicago, Ill., for lighting the engine room in the basement of their building. It is very essential to many city stores to provide illumination underground, but it is seldom that daylight can be utilized for this purpose, and there is therefore the necessity of making use of gas or electricity, which are neither so pleasant or convenient as natural light. The special feature of the arrangement illustrated is that it interferes very little with the office space on the first floor. Fig. 1 is a perspective view of a cabinet, or set of drawers or compartments, that extend, the full front of the building. At the right is a glass window, over which ment can be adopted in almost any building. Furthermore, the arragement of drawers and compartments can be made to suit the requirements of the particular office that is fitted up with such a case.

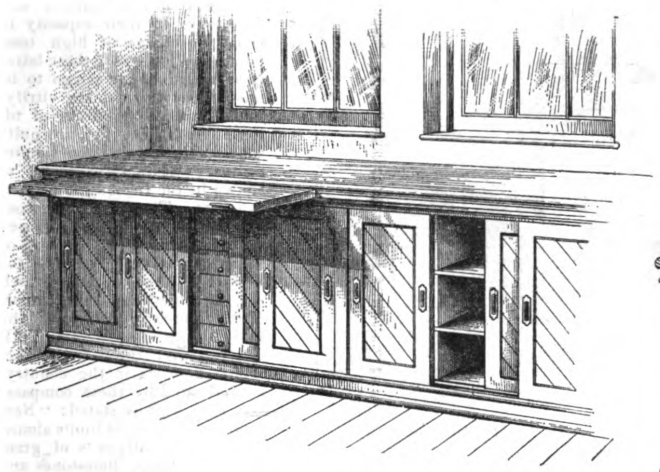

Fig. 1.—Perspective View of Cabinet.

Fig. 2 is a sectional view through the basement and first floor, showing the depth of the cabinet and the method that is employed for admitting light to the basement. The cabinet is about 3 feet broad, and between 3 and 4 feet high, the top forming a broad shelf just below the window sill. At the top of the drawers are drawing boards that slide in and out, one of them being shown partially pulled out in Fig. 1. Beneath these boards the space is divided into drawers or square box compartments. On account of the slanting back the lower compartments of the cabinet are very shallow, increasing in depth, however, toward the top, until they are nearly the full depth of the case. a wire screen is placed to prevent it from being broken; for it will be noticed that the lower part of the window is just on the level of the sidewalk. This particular construction, of course, applies only to buildings in which the office floor is at the elevation shown above the sidewalk, but it will be evident that a similar arrange- The front of the case is protected with sliding doors, as shown in Fig. 1, which keep out dust from the drawers, and when closed give the case the appearance of being paneled. Each door slides twice its width and fits closely. The top of the case can be used for books, or a bookkeeper's desk can be placed upon it, while within the drawers and compartments is room for a large quantity of office supplies, &c. The case is finished with a molding in front and gives an ornamental appearance to the offices, which are handsomely fitted up with Georgia pine. Fig. 2 is a sectional view of the work, A B being the partition which separates the desk or case from the engine room below.

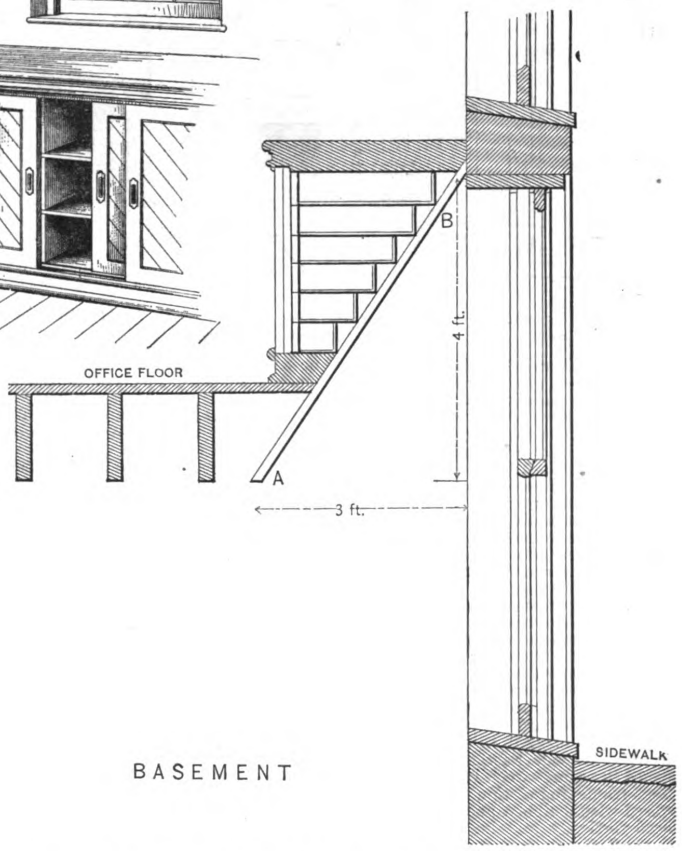

Fig. 2.—Section through Basement and Office, Showing Lighting Arrangement.

An Arrangement for Lighting a Basement.

American Building Stone.

In speaking on the subject of building stone Prof. J. S. Newberry of Columbia College School of Mines recently expressed himself as follows: "It is a little singular that wealthy New Yorkers who are constructing palaces in this city will go abroad to the uttermost parts of the earth for stone to decorate the interiors of the palaces. I can account for it in no other way than upon the hypothesis that what is difficult to obtain and what is expensive is the most desirable. There are marbles in America finer and better in all respects than can be brought from Africa or Mexico or Sunny Italy. There are building stones within 200 miles of New York, easy of access, cheap and far superior as to durability and beauty to the marbles which form the wainscotings, stairways, bathrooms and other interior decorations in some of these New York palaces. Anybody who has been in the Smithsonion Institution at Washington and has seen specimens of building stones from various sections of this country must concede that I am right. The finest variegated and blue marble in the world can be found in Vermont. I think it is at Manchester. I have seen specimens on exhibition here in New York that very closely resemble the African marbles which decorate the panels of the cash room of the United States Treasury, and have been used with good effect in the most recently built hotel here, and these specimens will bear me out in this general statement."

BLACK BIRCH, which is rapidly coming into favor, is a close-grained and very handsome wood, and can be easily stained exactly to resemble walnut. It is just as easy work, and is suitable for nearly, if not all, the purposes to which black walnut is at present applied. Birch is of much the same color as cherry, but the latter wood is now very scarce, and, consequently, dear. When properly stained it is almost impossible to distinguish the difference between cherry and walnut. In the forests throughout Ontario birch grows in abundance, especially if the land is not too boggy. There is a great difference in the wood of different sections. Where the land is high and dry the wood is firm and clear, but if the land is low and wet the wood has a tendency to be soft and of a bluish color.

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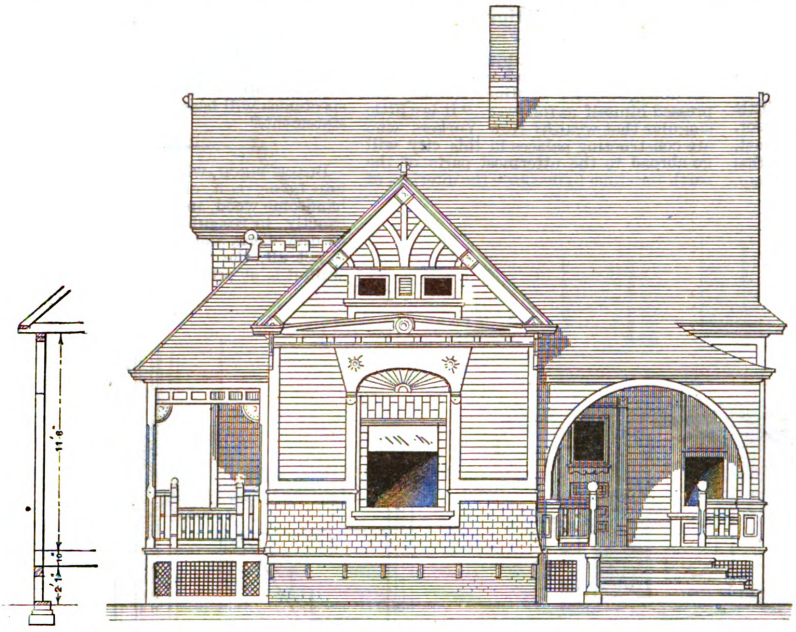
A CALIFORNIA COTTAGE.

THE DWELLING of which we present plans and elevations upon this and the following pages was recently built for C. P. Mallory of Orange, Southern California from designs furnished by C. B. Bradshaw, architect, of that place. As will be seen from an inspection of the ground plan, the rooms are arranged upon one floor, this being the common practice in that section for moderate cost dwellings, as it is in the other sections of the country where the climate the year round is somewhat tropical in its character. The house shown herewith is a frame structure resting upon a timber foundation supported by a brick wall, provision being made for a sitting room, dining room, kitchen and three sleeping rooms, all of comfortable size. The sitting and dining rooms are connected by portières, the latter room being furnished with a neat angle fire place and mantel. The location of the chimney is such as to furnish flues for three rooms on the first floor and one in the attic above. On this attic floor is a hall, two large bedrooms and ample closet room. The front chamber on the first floor has a plate-glass window with cathedral glass margins, also a French window opening out upon the side porch. All inside finish is of selected redwood, Eastlake design, and finished in natural wood with hard oil.

The frame foundation of the house is covered with matched and beaded ceiling placed vertically and laid off in panels. The porch foundations are latticed for the purpose of ventilating under the floors, and the gables of the lower portion of the front are covered with 6-inch V-rustic, while the sides of the front porch and the roof are shingled. The gables are shingled or paneled, as may be desired. The architect states that the house is so planned that a portion of it can be built at a time, if so preferred, or if too large to meet the requirements of a family, may be changed, without injuring the appearance in any way. As illustrated herewith the cost of the house in the locality named is placed at $2000.



A California Cottage.—C. B. Bradshaw, Architect, Orange, Cal.—Front Elevation and Section.—Scale, ⅛ Inch to the Foot.

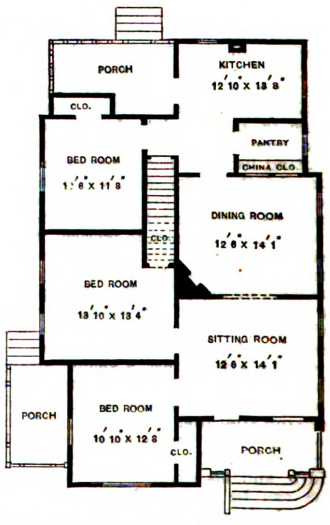
IT MAY BE USEFUL to note that in modern granite architecture, as in the true granite style of the ancient Egyptians, says *The Stonemason*, simplicity in design should be a *sine qua non*. Such a treatment certainly gives the most pleasing effect, and is in perfect accordance with the hard nature of the material. Any attempt at elaboration is altogether out of place. Overwrought granite is always painful to the sensitive eye—influenced no doubt, by the remembrance of the vast amount of labor involved in the work. Over polishing, too, has a peculiarly harsh and repulsive appearance, especially in the Aberdeen variety. A better and more pleasing effect may be obtained by employing a breadth of unpolished surface to highten the value of the highly polished portions.

NEW PUBLICATIONS.

BUILDING STONE IN NEW YORK. Bulletin No. 10, State Museum. By John C. Smock. Pages 191–400; map, 58 x 60 cm.; table. September, 1890. 40 cents.

The State of New York is peculiarly rich in geological history. Many of its terms have been derived from the numerous localities which furnished great facilities for the study of typical formations and periods of geology. This bulletin is a practical treatise on the building material in these formations. It is arranged in accordance with the order of succession in the geological series and with the accepted classes of rocks—both crystalline and fragmental, with particular attention to the limestones and sandstones, in their several orders of occurrence.

The distinctions in the massive crystalline rocks, such as the granites, gneisses, syenites and feldspars, are not strictly scientific, but of accepted use among builders and architects. The places of their occurrence, as of other building stones, are very clearly and discriminately indicated wherever they have been worked and are accessible. The descriptive notes show a wide and careful observation and judicious use of reports. There is a valuable and interesting section of this bulletin upon the use of stones in New York and other cities in this State, with particular mention of houses and buildings, and of the effects for beauty and utility, which have been critically noted. The importance of scientific tests, the methods and results, are presented, partly in tabulated form and in more easily comprehended ways, by Prof. Francis A. Wilbur of Rutgers College, who personally made collections of all the samples used from quarries in New York, and conducted the tests of these with stones from the most noted localities in other States. These tests have proved the superiority of the better sandstones to the granites, marbles and limestones in their capacity to resist the effects of high temperature—fires—and these latter classes of stone are shown to be unable to withstand the vitrifying and calcining effects of intense heat. Yet they are quite as durable as sandstones under ordinary weather exposure, as shown by the freezing and thawing tests. There are other considerations of appearance, beauty, ease and economy of working, as well as value for fire proof construction, which are, at times, not less important. The superiority of the best stones from New York quarries over those from other quarry districts in the country, as indicated by these comparetive tests, is thus stated: "New York has within its limits almost inexhaustible deposits of granites, sandstones, limestones and marbles of such superior quality, and for durability some of its sandstones and bluestones are the best in the world. The 'life' of such stones or the length of time which they may last as durable material in buildings cannot be known from the oldest structures, in which they are still almost as fresh and strong as ever."



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

While the durability of stones is shown to depend greatly on their physical structure and its interstitial spaces, as well as the strength of their chemical constitu-

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tion, the accident of position in a building is shown to be a more important element of durability than is generally regarded. "Nature is a great teacher, and her object lesson, so easily read, is before us. In building, the horizontal position of the bedded stone is of greatest importance—that is, the stone should be laid on its bed, and not on edge. Improper position in the wall, where it is exposed to the weather, has more to do with the disintegration and decay of building stone than the chemical composition, and in many cases it is more effective than the inherent weakness in its physical structure." In New York and in smaller cities of this State the common practice is to pile the stone up edgewise, making a veneer, as it were, of the stone. The brown stone of Connecticut has been, almost without exception, subjected to the more effective action of the atmospheric agents through this faulty system of erection. The varying nature of the material for any great thickness, and the oblique lamination and cross-bedded structure, so common in sandstones, occasion the exposure of material of unequal hardness, and consequent unequal weathering, when the stone is dressed or smoothed to a plane surface, and is set on edge in the wall, . . . so that the life of our brownstone front scarcely exceeds that of its well-preserved owner.

MUSHROOMS—HOW TO GROW THEM. By William Falconer. Illustrated with 29 engravings; 172 pages; bound in stiff board covers. Published by Orange Judd Company. Price $1.50, post-paid.

This is a practical treatise on mushroom culture for profit and pleasure. Although the name suggests a subject entirely foreign to that in which the carpenter and builder is interested, it contains much that may prove profitable to him, as particulars are presented at some length of the construction and interior arrangement of mushroom houses and cellars. The author has devoted many years to the practical cultivation of mushrooms, both in this country and abroad, and in the pages of this work he covers the subject from the preparation of the bed, planting the spawn and gathering the mushrooms on a small or large scale down to their culinary preparation. The book is full of valuable suggestions not only to those who grow mushrooms for their own table, but also for those who grow the plant for the market. Ample directions are given for raising mushrooms in the open field, in the cellar, in the greenhouse and in buildings erected especially for the purpose. Of course the chapter in which the readers of *Carpentry and Building* will be specially interested is the one describing the construction and arrangement of mushroom houses.

Expansion and Contraction in Metal Structures.

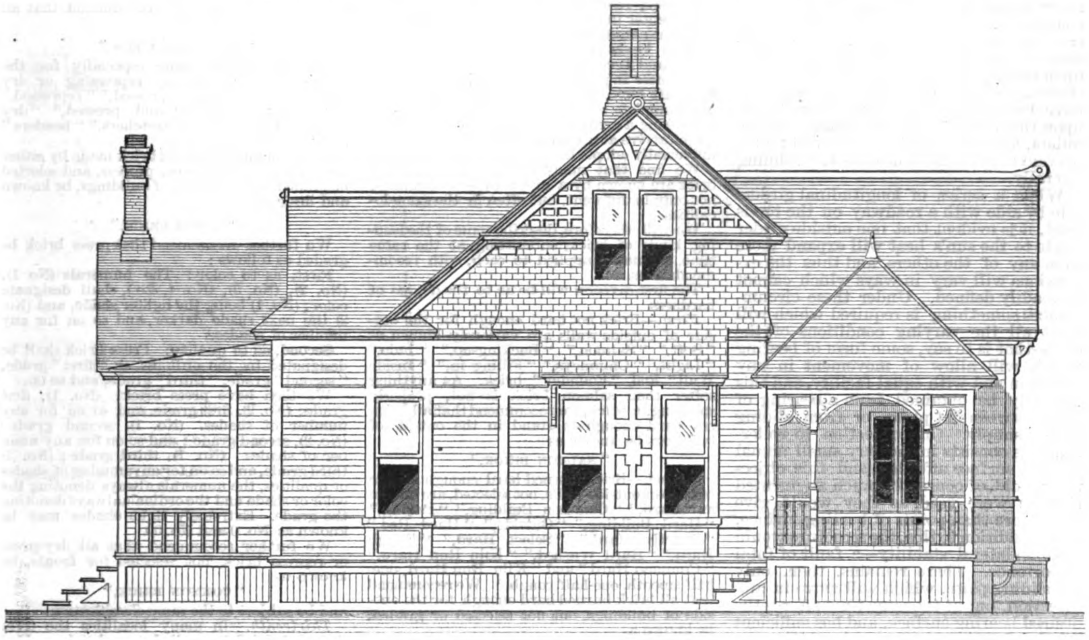
With the adoption of metal as a material for structural work came the necessity of providing against the effects of expansion and contraction in the works in which it occurs, says a writer in a late issue of the *Building News*. This seems a very simple matter at the first glance, yet many different methods have been used to meet it, and those by men of considerable practice. At first sliding plates for openings of small span and roller bearings for others of large extent became the most general practice, but now we find sliding plates reverted to in constructions of the greatest magnitude. As the importance of this provision for change of size and form increases necessarily with the linear dimensions of the work the return from the use of rollers to that of sliding plates for very heavy elements must attract the attention of those who have constantly to deal with the question in one form or another. Other arrangements, such as slings and rocking posts, are also available. The latter term does not sound satisfactory in connection with buildings wherein stability is of importance, but with this point we shall deal subsequently.

The linear expansion of iron in England, when made up in riveted structures, is about 1 inch in 150 feet, taken between the extremes of temperature, and this is about equal to the extension caused by a stress of 6 tons per sectional square inch; if, therefore, a piece of metal were rigidly confined when at its minimum length, the rise of temperature would subject it and the abutments confining it to a pressure of 6 tons per sectional square inch of the bar so confined, and this irrespective of its length. In arched bridges the expansion will cause a variation of form, as fixed abutments are in this case indispensable; but this class of work we are not now considering, our remarks having reference to structures on the girder principle, which, therefore, merely require vertical support.

That which has first to be determined is the nature of the supports and their foundations, for this will most likely settle the question as to whether plates or rollers should be used for the expansion bearings of the superstructure. There is no doubt that the splitting of the brick piers of some railway bridges has been due to the pull exercised upon them by the superincumbent ironwork, by reason of the friction between the sliding plates being in excess of the cohesion of the mortar used in building the supports; hence in doubtful cases expansion bearings should, as a precautionary measure, be made with rollers.

If the top courses of the supporting masonry or brickwork are made so as to form practically one continuous bed of sufficient cohesive strength, there will be no danger of splitting the work beneath, and then the expansion joints can be designed in accordance with the requirements of the superstructure only.

The way in which a work will expand must be considered carefully in view of making the movable parts of expansion bearings capable of motion in the required direction or directions; otherwise there will be a binding action, and, consequently, undue strains not provided for will be brought upon the structural elements. If we take, for example, an ordinary bridge carried by longitudinal girders with a timber flooring upon them, the expansion will be longitudinal, though it may not be the same for each girder, especially if there are longitudinal girders underneath, between the side girders, as they will be protected by the road covering from the direct heat of the sun. All that will be necessary in this case will be to provide for the longitudinal expansion and contraction of each girder. If, however, the main carrying girders are bound together by a metal platform carrying the road surface, the results of changes of temperature will be widely different. The work will expand and contract in various directions and in dif-



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

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ferent degrees. Single-webbed main girders on each side of the roadway will expand pretty equally, because one will not shield the other from the heat of the sun when it is high enough to have an important effect, and deep girders are almost invariably of the lattice or triangular form, and therefore will not obstruct the heat rays.

In addition to the longitudinal expansion, there will be the lateral expansion of the metal platform to deal with; therefore, assuming the bridge to be supported at its four corners, the movement at those points will be in diagonal directions; therefore, if roller bearings are used, a line running at right angles with the axis of the rollers should be in a diagonal direction. Out of some hundreds of iron and steel bridges, with the construction of which we are acquainted, we have not noticed one in which this point has received attention; the rollers have invariably been laid at right angles to the longitudinal main girders. Under such conditions, lateral expansion and contraction must be met by sliding lengthwise of the rollers or the plates resting upon them; but in many cases this is precluded, because the plates in question have been made with longitudinal ribs upon them which take into grooves in the rollers, and similar ribs on the bed plates prevent the rollers themselves from sliding laterally.

When a series of longitudinal girders side by side with a roadway on the top is used, it is evident that one outside girder liable to the sun's heat will expand more than any of the others, and thus the expansions will vary in ways which cannot be readily defined. Under these circumstances something is required which will meet all the varying conditions of the case—that is to say, some form of bearing which will allow of movement in any direction and with equal facility, and this can only be obtained from a bearing of balls between flat plates, or from sliding plates simply. One objection to roller-bearings consists in the very small actual bearing surface afforded, and this objection would, of course, be much augmented if balls were used, as they would give little more than points of bearing surface, and in addition to this, the structure would have no lateral stability—a fault of fatal importance. There remains, then, only the sliding plate, which will move in any direction, but at the same time affords the desired bearing surface, and has sufficient friction for the requirements of the case, as far as stability is concerned.

When sliding plates are used, precautions must be taken to prevent their becoming locked through rust, which may be accomplished by coating or facing them with some metal, such as tin or nickel, which will resist corroding influences, and at the same time admit of a smooth finish to facilitate the movements of the structure resting upon them. Lubricants may also be applied.

Slings supported at their upper ends by shafts carried in bearings on standards have been used, and in one or two cases for works of considerable weight to support the movable ends of girders; but this arrangement seems costly and complicated, without presenting any compensating advantages.

The use of sliding plates on the tops of columns or their piers is precluded by the lack of lateral stability in the supporting elements, but as some provision is called for in the case of a market or other large building constructed with a metal framework, rocking joints, and in some cases ball-and-socket joints, have been used with apparent success. As, however, the adoption of such a system sacrifices all stability pertaining to the supports, a very perfect system of counterbracing must be introduced to preserve the form of the building and resist the vibrations which wind pressure tends to set up. In solid or hollow columns the strength is very much reduced by placing them on rocking foundations, hence the amount of material required will be much increased when the supports are in this form, but if braced uprights are used this objection does not exist.

The metal work used in warehouses and buildings of moderate size is so protracted that but little expansion and contraction occur, more particularly in buildings which are warmed artificially during cold seasons.

The Nomenclature of Brick.

At the fifth annual convention of the National Brick Manufacturers' Association, held at Indianapolis, Ind., during January of the present year, the Committee on Nomenclature of Brick presented the following interesting report:

Your committee, appointed by the association in convention at Philadelphia, October, 1890, to recommend to this convention for its consideration a brick nomenclature, begs leave to submit the following report:

Your committee has sent out a large number of letters, reaching almost every important brick center in the United States, soliciting the different names and descriptions applied to the various kinds of brick made in the several States and Territories.

To these inquiries the several members of the craft have, almost universally, given full and complete replies, and, at the same time, expressing a great desire that the convention might arrive at a nomenclature that would be universally adopted.

We find that many of the same kinds of brick are known by a great variety of names, not only in different, but often in the same localities.

We will, therefore, describe some of the leading kinds of brick, submitting, at the same time, the names applied to each, with recommendations.

The first division will be as to the degree of hardness.

First.—Brick not hard enough for the outside of outside walls are variously known as "Soft," "Salmon," "Backing-up," "Pale," "Light," "Chimneys," "Filling in," "Inside Wall" and "Foundry" brick. As anything softer than salmon brick is not, properly speaking, a brick, we recommend that all brick not hard enough to stand in the outside of buildings be known as

"SALMON BRICK."

Second.—Brick burned hard enough for the outside of outside walls, not selected, are known as "Hard," "Common Building," "Paving," "Hard Building," "Outside," "Hard Red," "Strictly Hard," "Select Hard," "Rough Hard," "Hard Washed," "Kiln Run Hard," "Common Hard" and "Kiln Run Hard, one-half smooth, one-half rough." We recommend that all brick burned hard enough for the outside of buildings, but not selected or graded, be known as

"HARD KILN RUN."

Third.—Brick set from the top of the arches to the bottom of the kiln are known as "Arch," "Bench," "Eye," "Over-hangers," "Foundation," "Cistern," "Cellar" and "Hard Rough" brick. We recommend that all brick set in the arches, or benches, which are discolored, broken or twisted in the burning, be known as

"ARCH BRICK."

Fourth.—Brick selected for the fronts or the outside of outside walls are known as "Fall," "Outside," "Select Common," "Reds," "Hard Fronts," "Fronts," "Veneering," "Smooth Hard," "Straight Hard," "Common Fronts," "Light Hard," "Chimney Tops," "Liners," "Select Reds," "Headers," "Stretchers," "Dark Fronts," "Stock," "Select Hard," "Side and Back Walls," and "Croton Front Brick." We recommend that common brick selected for the outside of buildings be known as

FRONT BRICK { NO. 1, LIGHT BURNED; NO. 2, MEDIUM BURNED; NO. 3, HARDEST BURNED.

Fifth.—Brick used for sidewalks are known as "Pavers," "Sidewalk," "Hard," "Selected Hard," "Hard Burned," and "Yard Pavers." We recommend that such brick be known as

"SIDEWALK BRICK."

Sixth.—We recommend that

"SEWER BRICK"

shall mean good, straight, hard burned brick.

Seventh.—We recommend that

"FOUNDATION BRICK"

shall mean a good, hard, well burned, but not selected brick.

Eighth.—We find that all the brick in the kiln (not strictly soft) are known as "Kiln Run," "Merchantable—(one-half select and one-half soft)," "Merchantable—(one-third select, one-third hard, and one-third soft)," "Building Brick," "Common Building," "Average Brick," "Two-thirds Front, one-third Salmon." We recommend that all the brick in the kiln not strictly soft, taken together, be known as

"MERCHANTABLE BRICK."

Ninth.—We find in two or three localities brick molded in sand by machine or hand, not repressed but handled with extra care, burned in the best part of the kiln, and well selected for fronts, are called "Headers," "Stretchers" and "Croton Fronts." We see no reason why these brick should not be classed with common brick, and known as

"FRONT BRICK,"

which we recommend.

Tenth.—We recommend that all the brick that are set in the kiln, when burned, be known as

"KILN RUN BRICK."

Eleventh.—All the brick left in a kiln after the "front brick," "sidewalk brick" and "sewer brick" are taken out of the kiln are variously called "inside brick," "sewer," "cistern," "inside walls," "double coal," "shrunkery," "clinkers," "rough kiln run" and "backing up." We recommend that all such brick be known as

"ROUGH KILN RUN."

Twelfth.—Brick made especially for the fronts of buildings, by repressing or dry pressing, are known as "pressed," "repressed," "stock," "fronts," "sand pressed," "dry press," "line brick," "stretchers," "headers" and "face."

We recommend that all brick made by either the repress or dry press process, and selected or graded for the fronts of buildings, be known and designated as

"PRESS BRICK."

We further recommend that press brick be graded as follows:

First, as to color: The numerals (No. 1), (No. 2), (No. 3), (No. 4, &c.), shall designate color; (No. 1) being the lighter shade, and (No. 2) the next shade darker, and so on for any number of shades.

Second, as to quality: Press brick shall be designated by the ordinals, as "first" grade, "second" grade, "third" grade, and so on.

We then have press brick: (No. 1), first grade; (No. 2), first grade, and so on for any number of shades. (No. 1), second grade; (No. 2), second grade; and so on for any number of shades. (No. 1), third grade; (No. 2) third grade, and so on for any number of shades or qualities, the numerals always denoting the color or shade and the ordinals always denoting the grade. Extremely light shades may be known as No. 0 and No. 00.

We further recommend that all dry-press or repress brick, not selected for fronts, be known as

"COMMON BRICK,"

and be subject to the same classification.

Thirteenth.—In many localities the term "stock brick" is applied to a brick molded either by hand or machine in rough, coarse sand, and repressed without rubbing, so as to give the brick a rough sand finish. We recommend that such brick be known as

"STOCK BRICK."

Fourteenth.—We find a great many varieties of names applied to molded or ornamental brick, among which are the terms "stretchers," "headers," "bay windows," "trimmers," "cornice," &c. We recommend that brick other than square brick be known as

"ORNAMENTAL BRICK"

For the various kinds of which the committee is not ready to suggest a nomenclature.

Fifteenth.—We find that the terms "Headers" and "Stretchers" are often applied to the manner in which the green brick are set in the kiln; as you enter the kiln you see the ends of the "Headers" and the sides of the "Stretchers."

Sixteenth.—"Platting," "splatting" and "flatting" are terms applied to one or more courses of brick placed on top of a green kiln to hold the heat when burning. These brick are often set on edge or laid singly flat as in paving, and often two courses are laid flat one above the other. We recommend that all brick used to cover the top of a green kiln set for burning be designed as

"PLATTING."

Since preparing the foregoing we have received a number of valuable letters on the subject of brick nomenclature, and representing many different localities, and because of the incompleteness of this report, we recommend that a further investigation should be made and reported to the association at its next convention.

W. A. EUDALY, Chairman,
D. V. PURINGTON,
WILLIAM H. BRUSH,
Committee.

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A SIMPLE METHOD OF HANGING DOORS.

IT IS PECULIAR to note that, practically, but little improvement has been made in the hanging of room or outer doors, except that which has been effected by the hinge maker. He certainly has introduced a good deal of ingenuity into his work, particularly of late years, but the improvement has not been such as to do away with the unsightly gaping crack that always appears down the hinged edge of a door when it is opened to even a trifling extent, this crevice permitting any one outside to view the greater portion of the apartment within almost at a glance, and also allowing a keen draft to pass through, which, although not objectionable in summer, is intolerable in winter, and it is in winter that the draft is stronger, by reason of the fire being alight in the room.

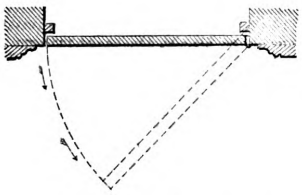

Fig. 1.—Showing Swing of the Door.



Fig. 2.—Section of Circular Bead.



Fig. 3.—Bead at Extreme Edge of Molding.

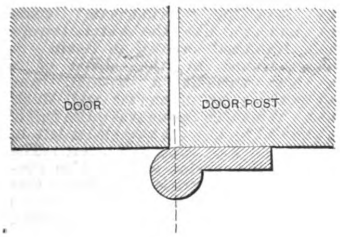

Fig. 4.—Position of Bead Over the Joint.

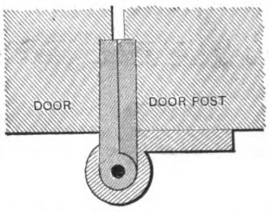

Fig. 5.—Showing Butt and Outline of Bead

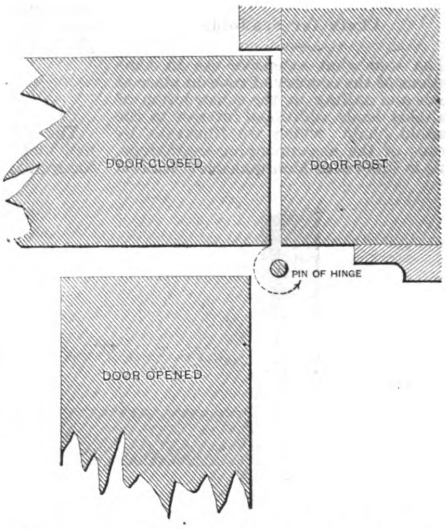

Fig. 6.—Showing How the Stile Travels Around the Bead as Door is Opened.

A Simple Method of Hanging Doors.

Yet both of these objections can be obviated in a most simple and inexpensive manner—so cheaply, in fact, that every door in the house might be so fitted from the kitchen to the attic.

The want of such a remedy, says a writer in a late issue of an English exchange, has been recognized for many years, probably from the time doors were first introduced, and efforts have been made to supply it by the use of strips of ornamental leather, draft tubing, &c. In the case of valuable doors a remedy has been sought by making the edge of the inner stile semi-circular, this rounded edge fitting and working in a circular recess in the door frame, or post; but this latter means necessitates very skillful workmanship, and, as a butt hinge cannot be used, the door has to be pivoted top and bottom at proportionately greater expense. There are also other ways of fashioning the stile edge and door frame to the same end; but none have general favor for common doors on account of the greater cost.

The method about to be described may have occurred to the minds of many readers, and may probably be found in use, its simplicity being so marked that it cannot have escaped notice; but that it is not generally know is quite certain, and this fact makes a description of it desirable.

It is, of course, within everyone's knowledge that a hinged door when in the act of opening describes a segment of a circle, as indicated by the arrows in Fig. 1, and this circular movement not only takes place at the outer edge, but at all points along the width of the door, even at the hinged edge (where, of course, the circle described is much smaller), as indicated by the arrow point and dotted line in Fig. 6. It is this circular movement that throws open the joint that must exist between the door stile and the door post, this joint being perhaps perfectly close while the door is shut.

Now, if we take a slip of wood with a circular bead at its edge, as Fig. 2 (section about full size), or the bead could be provided at the extreme edge of a piece of molding, as Fig. 3 (about half natural size), and place it so that the bead covers the joint between the stile and the frame, the remedy is complete, as the hinged edge of the door will be found to work around this bead without the least difficulty. It will be seen that it does not in any way come in contact and wedge one against the other, as may be supposed, but works freely, and in a manner that will please the eye of a skilled workman. The object aimed at will be found to be fully attained, as this bead will obstruct the view through the fissure, and it will make it very nearly draft tight.

In applying this bead for the purpose explained it is necessary to observe three things: 1, The bead must be round, as shown in Fig. 2; 2. It must be placed so that the center of the bead comes over the joint (when the door is closed), so that a straight line continued from the joint would intersect the bead as near as possible exactly across the center, as in Fig. 4; 3, The size of the bead is governed by the projection of the knuckle of the butt, so that a 3-inch butt which is commonly fixed with the knuckle projecting $\frac{1}{8}$ inch to the center of the pin would require a $\frac{1}{4}$-inch bead—*i. e.*, whatever the projection from the stile to the center of the hinge pin it requires a bead just double the size; but this is only a theoretical measurement, as the edge of the stile never comes perfectly tight against the door frame, and a little larger bead will generally be found desirable. This, however, can be ascertained by offering up a piece of bead, or even a pencil, but it is not at all necessary that a very exact fit be obtained, as moderate accuracy will be found sufficient.

Fig. 4 shows the position of the bead over the joint, the dotted line showing how the center of the bead should be made to come opposite the joint; and Fig. 5 shows the butt and the outline of the bead (which comes above and below it, as no bead can be placed just where the butt projects). By referring to Fig. 6 it will be seen how the stile travels around the bead as the door is opened, the bead all the while obstructing the view and the passage of draft through the joint. This can be even more readily understood by cutting a piece of carboard, as Fig. 5, but making two pieces of it, so that by placing a pin through the center of the butt knuckle, the door portion can be made to open and close, as it were, on its hinges.

It will be noticed that in Fig. 5 a large-sized bead is shown, this being necessary by the greater projection of the butt knuckle. This suggestion will be found easy of application, and there is no reason why it should not be adopted with all doors, as it is generally recognized that although an open crack always shows itself down the hinged edge of a door when it is open, it would be much better were the crack absent.

Polishing Wood with Charcoal.

The method of polishing wood with charcoal, now much used by French cabinet makers, is thus described in a Paris technical journal: All the world now knows of those articles of furniture of a beautiful dead black color, with sharp, clear-cut edges and a smooth surface, the wood of which seems to have the density of ebony. Viewing them side by side with furniture rendered black by paint and varnish, the difference is so sensible that the considerable margin of price separating the two kinds explains itself. The operations are much longer and more minute in this mode of charcoal polishing, which respects every detail in carving, while paint and varnish will clog up the

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holes and widen the ridges. In the first process they employ only carefully selected woods of a close and compact grain, then cover them with a coat of camphor dissolved in water, and almost immediately afterward with another coat, composed chiefly of sulphate of iron and nutgall. The two compositions, in blending, penetrate the wood and give it an indelible tinge, and, at the same time, render it impervious to the attacks of insects. When these two coats are dry, they rub the surface of the wood first with a very hard brush of conch grass (chien dent), and then with charcoal of substances as light and friable as possible, because if a single hard grain remained in the charcoal this alone would scratch the surface, which they wish, on the contrary, to render perfectly smooth. The flat parts are rubbed with natural stick charcoal; the indented portions and crevices with charcoal powder. Alternately with the charcoal the workman also rubs his piece of furniture with flannel soaked in linseed oil and the essence of turpentine.

Chain for Scaffolds.

The somewhat extensive use in some sections of the country of rope in place of cleats and nailing in the construction of scaffolds lends additional interest to the scaffold chain which we illustrate by means of the accompanying engravings. This is known as Montgomerie's Scaffold

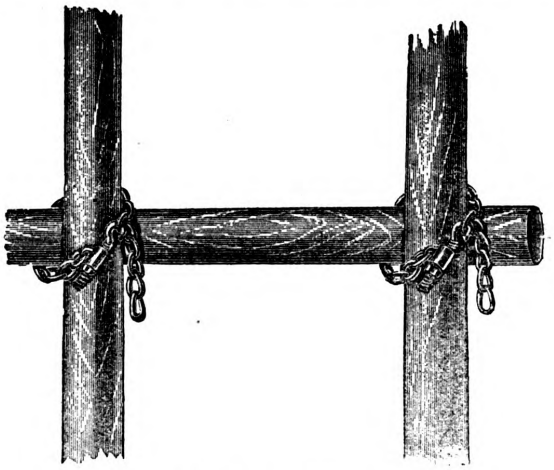
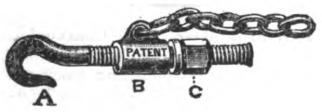


Fig. 2.—Method of Using Chain.

Chain, being the invention of James Colin Montgomerie of Bitterne, near Southampton, England. It is designed for binding together the poles forming the scaffold. Referring to Fig. 1 of the accompanying illustrations, it will be seen that the device consists essentially of a short piece of chain attached to a large nut working

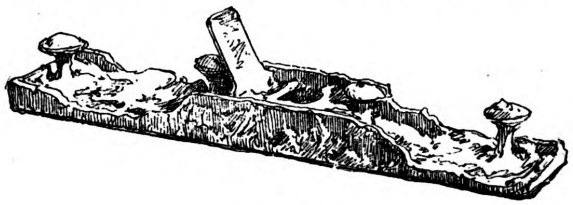


Chain for Scaffolds.—Fig. 1.—View of Chain and Hook.

upon the shank of a hook. In using the chain it is passed around the scaffold poles which it is desired to bind together, and the link most convenient hooked into the end at A. When it is in this position the nut C is turned up, acting upon the loosely fitting part B, to which the first link of the chain is attached, thus taking up the slack and binding the poles securely together. Two chains of this description are shown in position in Fig. 2 of the illustrations. What is known as a spanner can be applied to the nut for tightening up the chain. It will be observed from an inspection of Fig. 1 that the end of the screw shank is slightly expanded in order to prevent the nut C from coming off and becoming lost. This device is said to prove a practical substitute for the usual rope lashings, as employed in English building practice, and that it possesses the merit of being easily applied, as well as strong and durable.

An Ancient Plane.

The old saying that there is nothing new under the sun is well illustrated by the results of comparatively recent excavations conducted on the site of the old Roman city now known as Silchester, in the neighborhood of Reading, England. These excavations were conducted under the auspices of the Society of Antiquaries, and the collection of antiquities made in the excavations referred to was transferred to the Burlington House, where it was on exhibition from January 1 to January 16 of the present year. Among this collection were a number of tools used by mechanics living at the time the ancient city existed, the number including several carpenter's tools, including chisels, gouges and planes. It is said that extremely few specimens of carpenter's planes of the Roman period have as yet been discovered. The one found in the excavations referred to was of wood plated on the sides and bottom with iron, and, as will be seen from an inspection of the accompanying illustration, very much resembles some of the American planes of the present day. The general construction of the tool is clearly indicated in the cut. The finding of this carpenter's plane would seem to indicate that the ancients possessed tools and appliances which were well adapted to the purpose for which they were intended, and that the mechanics of the present day are making use of devices which do not differ very radically from those of their brothers of long ago.



An Ancient Plane.

Building in Carthage.

The cisterns at Carthage occupy the site of a wretched Arab village (Malkah), of which, in fact, those of them which still remain unchoked up constitute the greater portion. Shaw says there are 20 of them, each above 100 feet long and 30 broad. According to Dr. N. Davis, at present 14 only can be traced; these are about 400 feet in length and 28 feet wide. They contain, says an exchange, such an accumulation of earth that we are unable to state what their depth is. A fifteenth runs transversely. Its arched roof appears a few feet higher than any of the others, but it is about 10 feet narrower. It is possible that this was never intended to contain water, and may in reality only be a gallery. The earth is now on a level with the imposts of the arch of the cisterns. These cisterns were constructed in a somewhat similar manner in which Pliny says the "formaceous" walls were made, or like the watch towers which Hannibal erected in Spain. A wooden frame, in the shape of a long box without a bottom, was filled with layers of mortar and small stones. When the frame was quite full it was allowed to dry. It was either left in this state or was cemented over. The solidity of the mortar employed in constructing these cisterns is astonishing. One actually sees in numerous places the stones worn away by time, while the mortar, though exposed to the same vicissitudes, retains still all its adhesive properties. Carthagenian stone is described by Pliny as useless for building unless covered with a cement of asphalte (*pice*). Hence arose a standing jest against the people of Roman Carthage, that "they stopped their wine jars with mortar and covered their walls with pitch." This perishability of the stone when exposed readily accounts for the disappearance of the ruins of Carthage. Their covering would be destroyed by the operation of fire, and when it was once gone atmospheric influences would soon do the rest. It was into the cisterns that the great aqueduct, the remains of which constitute the chief, if not the only, indication above ground that a great city once stood on the site of Carthage, discharged its waters. The question whether it is of Punic or Roman times is not yet decided.

The labor representatives in the Illinois Legislature have succeeded in their efforts to secure the passage of a weekly pay bill by corporations. It passed the State Senate some time since, and afterward passed the House. The sentiment in the House was so strongly in favor of it that it was taken up in advance of the regular order, under which it would not have been reached for weeks, and was passed without debate. The provisions of the bill are quite stringent, penalties being prescribed for its violation. A commendable feature, however, is that which gives employers six days to make up their wages accounts. Otherwise it would have been necessary to greatly increase the clerical force in order to meet its requirements.

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The Builders' Exchange

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Suggestions for a Universal Building Law.

At the fifth convention a committee of seven was appointed for collaboration with committees from other organizations interested in the framing and adoption of a model building law. The meeting was held in New York City April 2 and 3. The delegates were composed of seven members from the American Institute of Architects, National Association of Builders, National Board of Underwriters, National Association of Building Inspectors and National Association of Fire Engineers. There was a very good attendance, and Mr. L. P. Webber, Chief of Fire Department, Boston, chairman, called the meeting to order; Henry A. Hill, Cincinnati, secretary. At the roll call the following members were present:

From the American Institute of Architects: Napoleon Le Brun, New York; W. W. Carlin, Buffalo; George C. Mason, Jr., Philadelphia, Pa.; Alfred Stone, Providence, R. I.; T. M. Clark, Boston, Mass. From the National Association of Builders: William H. Sayward, Boston; Stacy Reeves, Philadelphia, Pa.; Warren A. Conover, New York, and W. H. Gorsline, Rochester. From the National Board of Underwriters: E. A. Walton, New York; George P. Sheldon, Brooklyn. From the National Building Inspectors: John S. Damrell, Boston, Mass. From the National Association of Fire Engineers: D. J. Sweenie, Chicago, Ill.; Wm. R. Joyner, Atlanta, Ga.; A. C. Hendrick, New Haven, Conn.; G. W. Taylor, Richmond, Va.; Henry A. Goetz, New Albany, Ind.; Hugh Bonner, New York; A. P. Leshure, Springfield, Mass., and H. A. Hills, Cincinnati, Ohio.

After roll call an essay on the "Desirability of Uniform Building Ordnances and the Loss of Life They Would Prevent if Buildings Were Properly Constructed" was read by John S. Damrell. Following this there was general discussion by various members, which finally resulted in the appointing of a committee by the chairman, consisting of Messrs. Stone, Sweenie, Walton, Reeves and Clark, to draft a set of resolutions in order to expedite the business of the convention. After this the meeting adjourned until the following morning, when the committee presented a report which was amended and adopted in sections, each section being discussed and considered separately.

REPORT OF COMMITTEE AS ADOPTED.

The committee appointed to prepare suggestions for consideration believe that it would be impracticable at present to draw up a detailed building law which would be applicable to all cities without local modifications, and that more good could now be accomplished by presenting the points which are agreed to be of the greatest importance and of universal application, and which should form the basis of all codes of building regulations. In reporting, however, only such suggestions of special importance as they think it best to adopt at present, the committee recommends that a standing sub-committee be appointed to receive and consider such observations as may be made from time to time in regard to improvements and additions to the code proposed, and to endeavor to promote its adoption throughout the country; and that the various bodies uniting in this effort to improve the construction of buildings be requested to continue their delegates so that the combined committee may be a permanent one, with at least annual meetings.

The committee advises that the Legislatures of the various States should establish State building laws for the general control of the construction of buildings throughout the State, and that in all incorporated cities there should be a separate and distinct department for the inspection of buildings, whose officers should be appointed for long terms by the chief executive of the city, and should be removed only for inefficiency or maladministration, and that reasonable opportunity should be provided for appeal from the decisions of the department.

That fire departments, where such exist in any city or town, should be consulted by the Building Inspection Department on all matters pertaining to fire risks, and the Building Department should furnish the Fire Department with records of the methods of construction of any buildings.

GENERAL REGULATIONS.

1. That all buildings over 70 feet in hight be constructed throughout of incombustible materials, protected in the most approved manner for resisting fire.

2. That interior structural iron work in al buildings be covered and protected by fireproof material.

3. That all buildings over 50 feet in hight be furnished with permanent stand pipes and ladders for the assistance of the fire department.

4. That the hight of buildings to be erected should not be more than two and a half times the width of the principal street on which they are located, and that no building or portion of a building, except church spires, should be more than 125 feet high in any case, except under a special permit.

5. That the open floor space, not divided by walls of brick or other incombustible material, in all buildings hereafter erected for mercantile or manufacturing purposes, should not exceed 6000 square feet without special permission, based upon unusual and satisfactory precautions.

6. That every building to be erected, which shall be three stories high or more, except dwelling houses for one family, and which shall cover an area of more than 2500 square feet, should be provided with incombustible staircases, inclosed in brick walls, at the rate of one such staircase for every 2500 square feet high in area of ground covered.

7. That wooden buildings erected within 18 inches of the boundary line between the lot on which they stand and the adjoining property, should have the wall next the adjoining property of brick, or when built within 3 feet of each other shall have walls next to each built of brick.

8. That if damage occurs to property by fire or by any other cause, which can be proven to result from failure to comply with provisions of the law, then the owner of the property where the fire or defect originated shall be responsible therefor. A certificate from the inspector of buildings or other proper official to be considered sufficient evidence that the law has been complied with.

SPECIFIC REGULATIONS.

This committee also suggests the following, for specific regulations of the highest importance:

(*a.*) In all buildings, of every kind, the space between the stringers of wooden stairs, if plastered or boarded underneath, should be stopped by filling with incombustible material at three places at least in every flight of stairs.

(*b.*) All hear ths in buildings with wooden floor beams should be supported by trimmer arches of brick or stone.

(*c.*) In every building, the space between all studding and furrings, both of inside partitions and outside walls, in the thickness of the floor and for six inches above, should be filled with incombustible material. Also that the continous space between the joist of every floor, ceiling and roof shall be effectually cut off at every point where the joist are supported.

(*d.*) All brick party walls, and brick outside walls adjoining neighboring property, should be carried up above the adjoining building.

(*e.*) At least 4 inches of brick should intervene between the ends of wooden floor beams entering a brick party wall from opposite sides.

(*f.*) The walls of brick buildings should be tied at intervals by the floor beams, which, if of wood, should be so anchored to the walls that in case they are burned off, they will not, in falling, overthrow the walls.

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The meeting, after passing the following resolution, adjourned to meet at the same time and place as shoul i be fixed upon by the National Association of Builders for their next annual convention.

RESOLUTION.

Resolved, That this committee having examined with some care the preliminary suggestions made to the Combined Committee by the National Association of Fire Engineers, wish to make this minute: That while time has not permitted the committee to go over section by section the various requirements proposed, they have been very favorably impressed with the general character of the regulations, and do not hesitate to say that their leading features might with advantage be incorporated in any building law for the larger cities.

ALFRED STONE,
D. J. SWEENIE,
JOHN S. DAMRELL,
STACY REEVES,
E. A. WALTON,
T. M. CLARK,
Sub-Committee.

The Uniform Contract.

One of the very best comments as to the value of the uniform contract appears in the April issue of a Western architectural journal. The Inland Publishing Company, being the official printers of the contract, have collected various expressions of approval from architects in most of the prominent cities in ten different States where it has been introduced.

The value of a uniform contract cannot be too highly estimated, and wherever the standard form has been used both builders and architects are loth to sign any other.

The value of the standard form lies in its uniformity, upon the fact that it is always the same, whether found in Chicago or New York City. Representing as it does the result of conference of the selected minds of both parties thereto, the architect and the builder, it is a practical guarantee of the good faith of either party to the contract.

Every point upon which in the past there have been possibilities of difference between the architect and the contractor has been taken up by committees of an equal number from each side and carefully considered separately and together, and the result shows the best solution of the questions. Once the builder and the architect become familiar with the standard form all opportunities for misunderstanding are at an end, for neither will be expected to sign a document the terms of which may be strange or capable of more than one construction.

The form contains ample space for the introduction of any special conditions which may be considered necessary, and the moment extra words are inserted in the form either party to the contract will at once note the same, for the reason that peculiar or unusual conditions must be written into the instrument and are therefore made more conspicuous. There is no possible chance for a builder or an architect to deny the conditions of a standard, uniform contract, for the use of the same must bring most perfect familiarity with every clause and must preclude any effort to avoid its intent by misinterpretation.

One of the best letters above referred to is from Stone, Carpenter & Wilson of Providence, R. I., and reads as follows:

"We have used the standard contract from its first publication to the present time with entire satisfaction, and do not know of any changes which we would suggest. We think that the clause making the architect the agent of the owner, which has been somewhat criticised, is properly inserted, as the architect is thus fully recognized as such by both the owner and the contractor, and it gives him the necessary authority to have the work properly carried out; and it places upon him a moral as well as a legal responsibility, which a conscientious practitioner fully realizes and carefully exercises. The architect's authority over the contractors, and his right to order work to be done, are admitted. But he cannot escape the obligations which attach to every agent who has important trusts confided to him, and it is to the credit of the profession that we rarely hear of any abuse of the confidence bestowed. So far in our practice we have had no objections raised on the part of owner or contractor to the contract, and we have had lawyers among our clients who have signed the contract as one party to the same."

A sample copy of the standard form of contract, as approved by the American Institute of Architects and the National Association of Builders, will be mailed to any person making application to W. H. Sayward, secretary, 166 Devonshire street, Boston, Mass.

New Exchanges.

Since the last issue of this journal an exchange has been organized in Chattanooga and has affiliated with the National Association.

This is the first city that may be properly termed Southern that has joined the national body; and as Chattanooga is only on the border of "the South," it is to be hoped that other Southern cities will follow her example and give the National Association and themselves the benefit of association and representation in the annual conventions.

From Mr. M. Bunker, secretary of the newly-formed Builders' Exchange of Davenport, Iowa, comes the information that the members of the new organization are desirous of connecting themselves with the National Association, and desire to conduct their Exchange upon lines advocated by the national body and which have been proven successful in other localities.

Death of L. H. McCammon.

The Builders' Exchange of Cincinnati will feel most keenly the loss of Mr. McCammon from its membership. Besides being one of its most active members in a business sense, Mr. McCammon was one of the few noble characters which draw about them the better elements of the community in which they exist, and by their nature command the respect and love of all with whom they are thrown in contact. He was one of the most popular young business men of Cincinnati, and although often solicited to accept political honors had always declined.

The members of the National Association who attended its earlier meetings will remember Mr. McCammon as one of the earnest workers for the welfare of the builders of the country. He was one of the foremost members of the Cincinnati Exchange, having been its first president. He was first vice-president of the Industrial Exposition of 1886, chairman of the Finance Committee of the Centennial Exposition of 1888, and an active member of the Mechanics' Institute.

Mr. McCammon's death is regretted by all those who knew him with sensations of most heartfelt sorrow.

Committees of the National Association of Builders for 1891.

The following named gentlemen have been appointed by the President to serve during the current year on the committees under which their names appear:

STANDING COMMITTEES.

Committee on Uniform Contracts.

GEORGE C. PRUSSING, Chicago.
JOHN J. TUCKER, New York.
IRA G. HERSEY, Boston.

Committee on Resolutions.

J. MILTON BLAIR, Cincinnati.
J. B. WARE, Grand Rapids.
CHAS. F. KINDT, Milwaukee.

Legislative Committee.

EDWARD E. SCRIBNER, St. Paul.
WM. N. MILLER, San Francisco.
B. F. SWAIN, Kansas City.

Committee on Statistics.

JOHN DE CLUE, St. Joseph.
W. D. COLLINGWOOD, Buffalo.
VALENTINE JOBST, Peoria.

SPECIAL COMMITTEES.

Committee on Lien Law.

JOHN S. STEVENS, Chairman, Philadelphia.
WARREN G. VINTON, Detroit.
RICHARD SMITH, Omaha.
SAMUEL D. TIPPETT, Cincinnati.
JASPER T. DARLING, Worcester.

Committee on Building Laws.

Appointed for conference with committees from the National Association of Fire Engineers, the American Institute of Architects, National Association of Building Inspectors and the National Board of Underwriters.

ARTHUR MCALLISTER, Chairman, Cleveland.
W. H. SAYWARD, Boston.
STACY REEVES, Philadelphia.
JOSEPH DOWNEY, Chicago.
J. B. LEGG, St. Louis.
W. H. GORSLINE, Rochester.
WARREN A. CONOVER, New York.

Exchange News.

Boston, Mass.

The Master Builders' Association is in a prosperous and healthy condition, with a large number of applications for membership on file.

The extensive alterations and improvements in the Exchange building belonging to the association, that have occupied nearly nine months, are rapidly approaching completion, and when finished will give the association a building particularly well adapted to the uses of an exchange. The offices are being rapidly rented by builders and concerns interested in building, and there is no doubt but that they will all be taken in the near future.

The alterations have been of a very extended nature, and comprehend a complete remodeling of the interior of the building. The Exchange room has been enlarged and the hight nearly doubled by removing a portion of the floor above. A balcony has been run around the entire room, and is accessible both from the 'Change floor and from the halls of the next story. Upon this balcony are placed ten estimating rooms, containing every facility for figuring plans and traansacting private business.

Every possible convenience has been provided for the members and the public, and when the improvements are finished the members will have a home to be proud of.

Since the convention the Mason Builders' Association, which is largely composed of members of the Master Builders' Association, has adopted the form of arbitration suggested at that meeting, and has applied it practically to the conduct of the business of its members. The form is working in a most satisfactory manner with all classes of employees, and from the result of so short a trial gives promise of offering a permanent solution of the difficulties which arise between employers and workmen.

The Carpenter Builders' Association has been much maligned by the unions because of its refusal to treat with certain carpenters who persist in declaring that there is a strike

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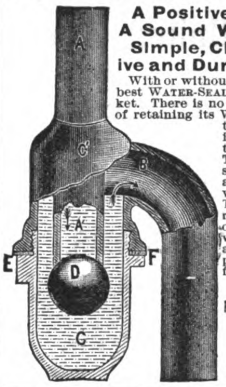

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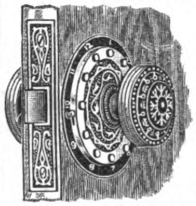

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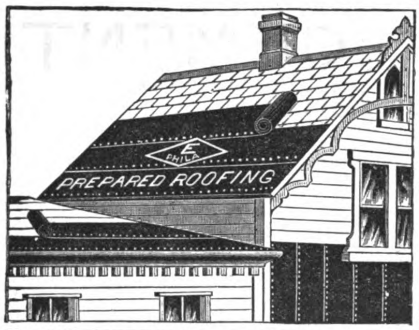

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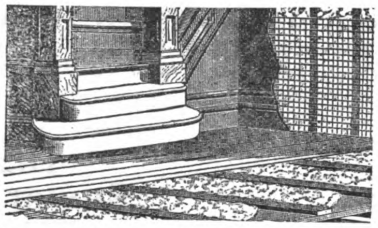

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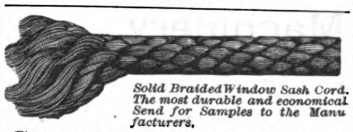

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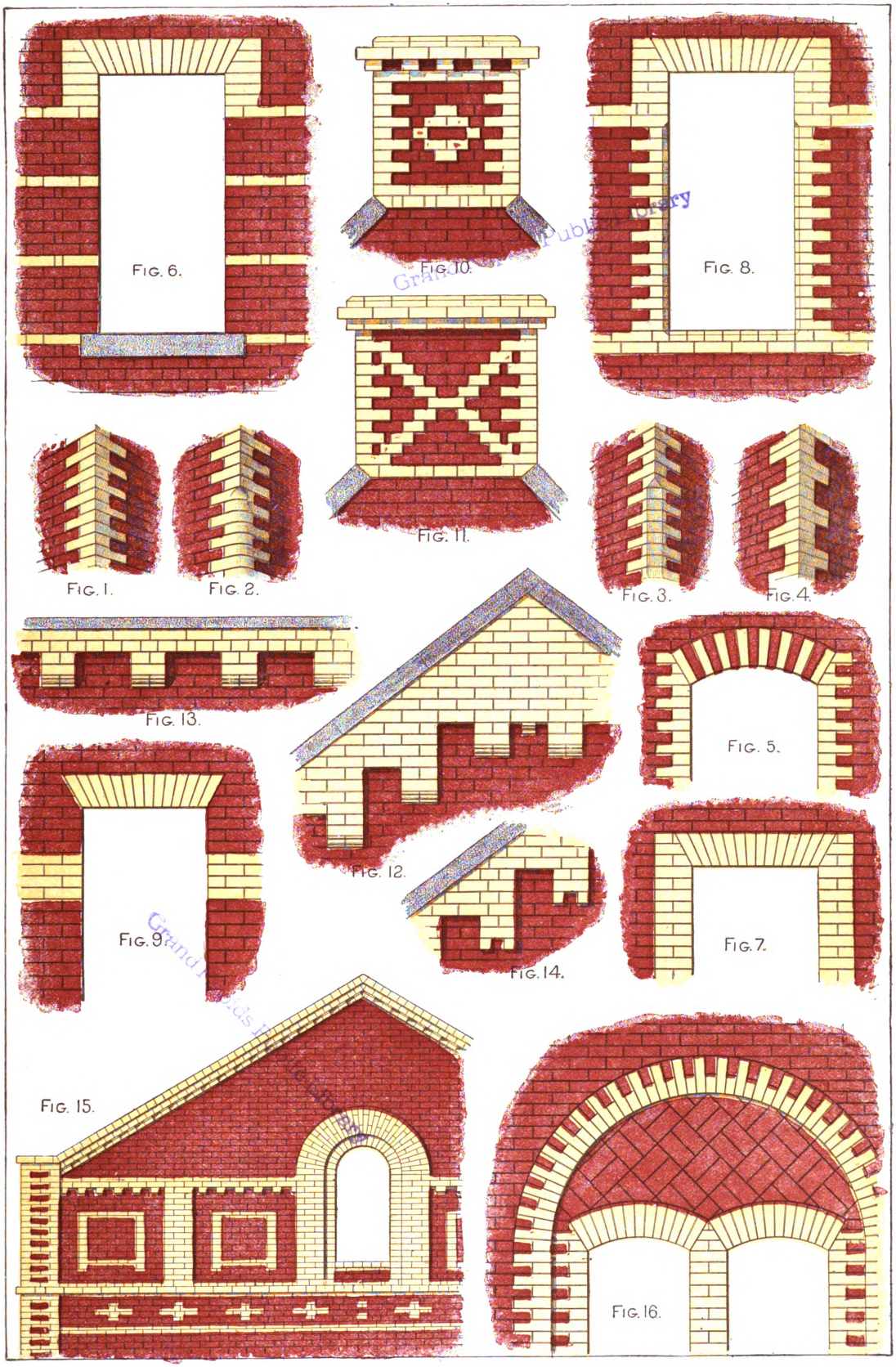

DETAILS OF BRICK-WORK, SHOWING EFFECT IN COLORS.

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JUNE, 1891

New York Hotels.

In a recent issue we gave some account of the mammoth hotels with which the Central Park section of New York is soon to be provided, referring particularly to the structures that are in progress near the Fifth avenue entrance. It would seem that the west side is also to see important improvements of this kind. In the course of the present month ground is to be broken for a building at Eighth avenue and Seventy-first and Seventy-second streets, which will rival if not surpass all the other new structures of its class. It is to be known as the Hotel Majestic, and will cover a space of 204 feet front by 139 feet depth. It is to be 12 stories in hight, with a basement and sub-cellar. It will contain 600 living rooms supplied with no less than 265 bath rooms. The architect is Alfred Tucker. The estimated cost is upward of $3,000,000. The materials to be used are Scotch stone, brick and terra cotta, and the building is expected to be ready for occupancy in the autumn of 1893.

GREAT COMPLETION MARKS THE PROGRESS OF ART — ABSOLUTE COMPLETION USUALLY ITS DECLINE.—*Ruskin.*

Complimentary.

One of the highest compliments that it has ever been our opportunity to hear concerning this journal was paid us a short time since by one of our advertisers, a gentleman who manufactures a specialty in which builders are interested, and which figures more or less conspicuously upon a large number of buildings in different parts of the country. After saying that the returns from his advertisement were larger in this journal than in several other papers combined, referring to periodicals in the same general field, he continued: "And that is not all. Not only do I receive more returns from my advertisements in your paper than from any other four or six with which it may be compared, but the character of the replies is also of the highest grade. I have so much respect for those who write me, saying that they have seen my card in *Carpentry and Building*, that I am frequently disposed to trade with them without first investigating their financial responsibility, for experience has demonstrated that the very best men follow its pages. Every man who has bought my goods on the strength of my advertisement in your journal has proven to be an intelligent man. I have had no trouble with such customers. They always understand what they want, they are direct in their correspondence, and we get along comfortably together. Personally I like *Carpentry and Building* on account of its high technical excellence, and I believe that those who take it prefer it on this account. Therefore it is not strange that they prove on acquaintance to be the very best builders and mechanics there are in the trade." We lay this before our readers because it imposes quite as much responsibility upon them as it does upon us. If the advertisers in our pages have reason to claim so much for the periodical, it becomes incumbent upon us ever to keep it up to the high standard of excellence to which it has attained. Again, if there is such a high character imputed to the readers of the paper, then it is incumbent upon all our subscribers to live up to the good name which they have obtained. In no event must their reputation for discrimination and integrity be lowered. We will try to do our part, and we hope our readers will co-operate with us so far as their part is concerned. It is always a satisfaction to be ranked in the first class, and it is comparatively easy to retain a good character when it has once been built up. Let us make the effort together.

TRUE ART IS BUT THE ANTI-TYPE OF NATURE—THE EMBODIMENT OF DISCOVERED BEAUTY IN UTILITY.—*James A. Garfield.*

Does History Repeat Itself?

In conversation with a prominent builder in a Western city a few days before the 1st of May strike was inaugurated in that place, we heard some remarks which we think are quite worthy of repetition here. The builder was defining his conception of the present situation in labor affairs. He said: "I have been reading, and find that the difficulties with which we are now contending are not at all unlike those with which business men have been compelled to contend in other periods of the world's history. It would seem to me that this idea of shorter hours, higher wages and the various steps that are taken to improve the condition of the mechanic and laborer is nothing more than an epidemic that sweeps over the world from time to time and after having spent its strength subsides, only to be revived again. Understand me, I am not opposed to shorter hours and higher wages for workingmen. Far from it. I believe in the advancement of the workingman just as rapidly as circumstances will justify. I believe he is entitled to all the pay he can get and to work just as few hours as will enable him to support his family comfortably and decently, but I am opposed to the absurdities into which laboring men plunge themselves in an attempt to work out so-called social reforms.

THERE IS A GREAT AFFINITY BETWEEN DESIGNING AND ART —*Addison.*

A French Incident.

"For example, take the attempts of unions to keep non-union men from work. Efforts looking to the exclusion of non union men from buildings and from shops are at present being made in every part of the country. Compare this with what has happened in the past. I read the other day of a certain series of events occurring in Paris, France, many years since which, to my mind, are the exact counterpart of what is now taking place with us, although we have not gone to the extreme that was shown in this case. The workmen of a certain section or district in Paris—a division, I suppose, corresponding somewhat to a ward in one of our cities—petitioned the Government not to allow the workmen from any other section of the city to enter their section for the purpose of working. In other words, building was specially good in one ward and perhaps very dull in all the others, and with characteristic enterprise, not to say selfishness, the workmen happening to live in the ward in which the building was good petitioned to be protected in their good fortune against the workmen living in other and less favored parts of the city. What is the difference between this and the effort which workmen in certain towns and cities make at the present time to keep outsiders away, or the effort which certain unions make to keep non-union men from working?"

WHATEVER IS NEW IS UNLOOKED FOR; AND EVEN IT MENDS SOME AND IMPAIRS OTHERS, AND HE THAT IS HOLPEN TAKES IT FOR FORTUNE, AND HE THAT IS HURT FOR A WRONG.—*Bacon.*

Tendency of Labor Management.

The writer continued in the same vein, discouraging about the tendency of labor management at the present time to establish classes of men who should always be laborers, and to keep them on one plane. He referred to an instance in which certain workmen organized a co-operative company for carrying on the same work as their employers had been carrying on. But the union opposed them just as it opposed the employers, for, it argued, if these fellows become employers they will not be like us. The speaker then said: "The effort would seem to be to build up special classes and to keep men in these classes without the hope or chance of advancement, upon the plan of 'like father, like son.' This idea is entirely foreign to American ideas. Our civilization and our national interests demand that a man in the lowest rank shall have the right to rise to the top, provided he has the necessary qualifications. But the labor leaders would seem to hold that it is wrong for a man to rise in any case, for more than once a strike has been threatened, and, in fact, actually inaugurated, on account of workmen being paid a little more than schedule rates, just the same as strikes are sometimes instituted on account of workmen being paid a little less than schedule rates. Good men must not be shown any preferences. Further, I know that bright workmen who have had the opportunity of starting in business on their own account have been intimidated by their former fellows, for the labor leaders argued if these men start and succeed they will be employers of labor, and,

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accordingly, will be different from us, and therefore we must stop them." The gentleman with whom we were talking uttered these remarks simply in the sense of showing the absurdities of some of the efforts that are made at the present time by the labor agitators to carry their points. He is a large employer of labor, and one, we have reason to believe, who is a true friend to all laboring men and mechanics. He has helped many a mechanic in his employ to advance, and is himself a man who has come up from a comparatively low plane to a position of importance and responsibility. Accordingly, his remarks are entitled to more consideration than would be the case had they proceeded from a mere capitalist, a man who inherited his money, instead of making it for himself by honest endeavor.

THERE ARE CERTAIN EPOCHS IN ART WHEN SIMPLICITY IS AUDACIOUS ORIGINALITY.—*Achilles Poincelot.*

The Lumber Handlers.

As we go to press the situation as regards the differences existing between the New York Lumber Dealers' Association and the lumber handlers is somewhat complicated, although negotiations are in progress which may bring about a speedy termination of the trouble. At a conference held on May 22 an agreement was drawn up and signed by representatives of the Dealers' Association and the Board of Walking Delegates to the effect that all the lumber yards should be opened at once, all strikes declared at an end and an Arbitration Committee to consist of three members from each side be selected with power to act until July 6 and settle by a majority vote all differences that might arise. This Arbitration Committee was duly appointed and orders were given to all lumber handlers to return to work on the morning of Saturday, May 23. When, however, the agreement was presented to the Dealers' Association some of the members expressed dissatisfaction with its provisions, and declared no authority to sign had been given their representatives. A meeting of the association was held and the Advisory Committee instructed to examine the agreement and report to the association, whether or not the agreement shall be recommended for adoption. As soon as the walking delegates learned that the agreement had not been accepted they notified the lumber handlers not to return to work on Saturday morning. This is the situation at the hour of writing, and from what has been said it is evident that much depends upon the result of the pending meeting of the Dealers' Association.

THE TEMPLE OF ART IS BUILT OF WORDS. PAINTING AND SCULPTURE AND MUSIC ARE BUT THE BLAZON OF ITS WINDOWS, BORROWING ALL THEIR SIGNIFICANCE FROM THE LIGHT, AND SUGGESTIVE ONLY OF THE TEMPLE'S USE.—*J. G. Holland.*

Street Pavements.

Pavements of city streets are not the smallest problem which a corporation must face. As a rule, cities neglect their streets until the mileage is such that the amount to be spent is so enormous that the tax payers stand aghast at the proposition of street improvements. And yet a city is measured by her streets, and she is rated either as enterprising or unenterprising, progressive or unprogressive, as her streets may appear. A few years ago it was the boast of certain Western cities that they had extremely wide streets and most magnificent avenues. But as these same cities grew in population and in commercial importance it began to dawn upon the tax payers that broad streets were a source of great expense, and that there was something else than glory connected with them. They have to be paved and maintained. It is one thing, however, to pave a street 60 or 75 feet wide, and quite another thing to pave a street double that width. One or two Western cities have made changes in the width of streets in order to save expense in this regard, while others have succeeded in avoiding a part of the expense of paving broad streets while at the same time beautifying them by running a park plot down the center of the space with occasional fountains between the trees and shrubbery. Still others, where wider streets prevail, have run two strips of park down the space with rows of trees in the center and also a row of trees at each curbstone. Examples of this plan are to be seen in several places, notably in Columbus, Ohio. The effect is pleasing in the extreme, and is perhaps the best interpretation of the broad-street problem that has yet been found. The houses on either side of such thoroughfares have ample light and air, there is abundant space for vehicles, for there are three stretches of roadway, and yet the width to be paved and kept in repair is not unreasonably great.

OF EVERY NOBLE WORK THE SILENT PART IS BEST; OF ALL EXPRESSION, THAT WHICH CANNOT BE EXPRESSED.—*W. W. Story.*

Unpaved Streets.

To see a country road scraper going down the center of the principal street in a city of 60,000 inhabitants is perhaps something unusual, and yet there is at least one city in the country where such a thing was witnessed quite recently. An effort was being made to remove what had proven an almost bottomless mass of mud during the winter and spring. The streets in question have never been paved. For many years, indeed, continually up to the time that the city assumed its larger importance and took on its greater growth, the clean river gravel which was spread over the streets from time to time kept them in excellent repair. It is true that they were somewhat dusty in summer, but there was always a firm foundation and a good roadbed. But as travel increased, and as wagons and trucks became heavier, this solution of the street problem was not altogether satisfactory. The gravel cut through, and the pebbles were ground to powder, and what cost that city $100,000 or more to spread upon her streets in the fall, in an effort to make them endurable for the winter, cost about as much more to remove in the spring in the effort to clean up before the dry weather of summer converted the covering into dust and the wind carried it into the houses. This is an instance in which a city has neglected its streets too long, and where an immense amount of money must be spent whenever the proper solution of the problem is discovered and good streets are instituted. Just now the tax payers are trembling with apprehension.

NOVELTY HAS CHARMS THAT OUR MINDS CAN HARDLY WITHSTAND.—*Thackeray.*

St. Louis Pavements.

A visitor to St. Louis a few years ago who went about the city at all was sure to come away with the idea that that place had the poorest streets of any city of its importance in the country. Nicholson pavement had been largely used in the earlier paving contracts and had long since been worn into the holes for which that material is notorious everywhere. It was worth the price of a horse almost to drive through any of the leading streets, for it was practically impossible for the animal to escape a fall or a broken limb. All that, however, has been changed in the recent past, and to-day we doubt if there is any city in the nation that has more attractive and better kept streets than St. Louis. Granite pavement has been laid to the extent of some hundreds of miles, and most excellent work has been made of it. The streets are clean, and what with the good pavement and the excellent system of cable cars and electric cars the city now has, St. Louis is a pleasure to visitors and a place that is cordially praised by them wherever they go.

NOVELTY IS AN ESSENTIAL ATTRIBUTE OF THE BEAUTIFUL.—*Beaconsfield.*

Brick Pavements.

Brick pavements are coming into favor for street use in many parts of the country. Experiments are being tried in various directions, and those cities which have had the brick pavements down for a number of years seem to be the most enthusiastic concerning this form of pavement. The bricks employed are of a special pattern, although of about the same dimensions as the usual building brick. They are laid upon a suitable foundation, edgewise. The upper corners are rounded, so as to overcome the abrasion to which sharp corners would be subjected. They are placed reasonably close together and then the joints are paved with asphaltum or coal tar. Longitudinal grooves on the sides of the brick receive enough of the asphaltum to form a key or lock to hold or bond the brick together. The brick are hard burned and vitrified. The resulting pavement is something like that which comes from granite or Belgian blocks and is free from the objections with which many pavements are charged in that horses do not slip. It would seem to be a happy compromise between the smooth asphalt pavement, which, however pleasant to drive over so far as the rider is concerned, is extremely dangerous to horses, and the granite pavement, which, however satisfactory for heavy trucks, is still a little rough for other vehicles. A very large quantity of this pavement has been laid the last few years in Columbus, Ohio, where we hear it well spoken of. It has also been used in St. Paul and Minneapolis, Minn., and in Indianapolis, Ind. We hear of experimental work of this kind in various other directions.

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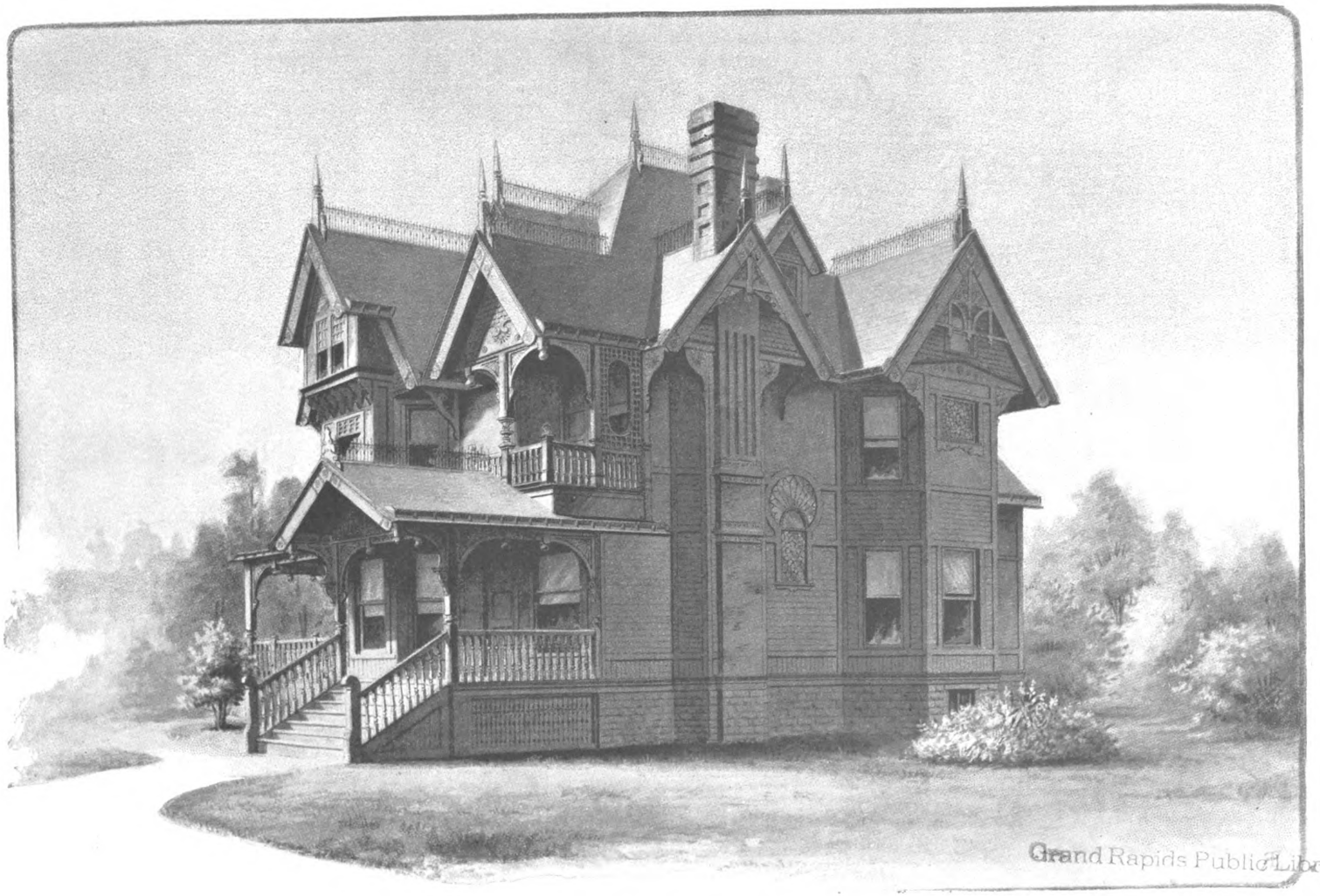

Grand Rapids Public Library

STUDY IN HOUSE DESIGN.

PERSPECTIVE VIEW.

GEORGE F. BARBER, ARCHITECT, KNOXVILLE, TENN.

FOR ELEVATIONS, FLOOR PLANS, DETAILS, ETC., SEE PAGES 133-138.

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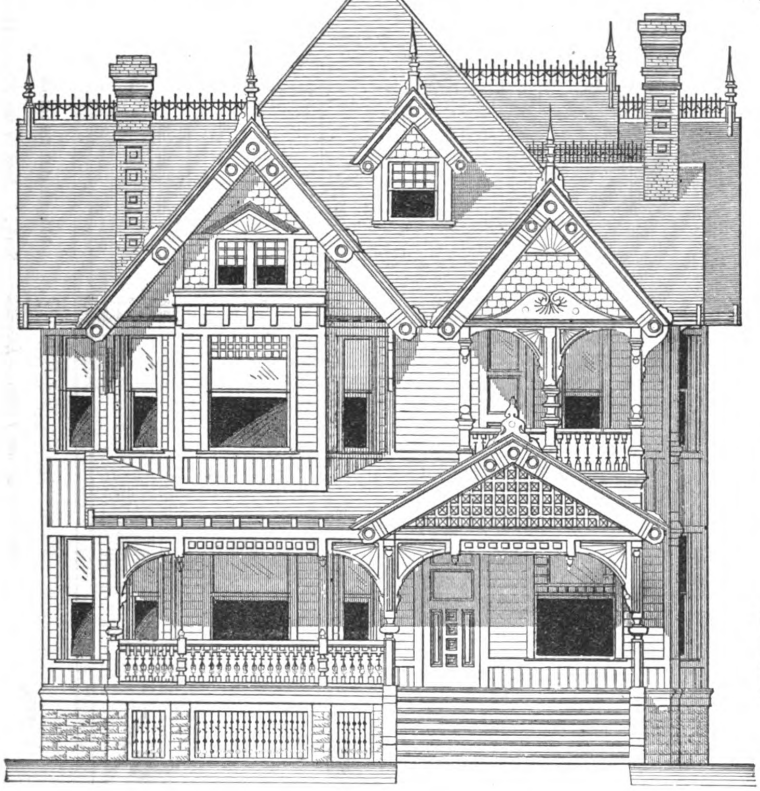
STUDY IN HOUSE DESIGN.

THE ELEVATIONS, floor plans and details which we present upon this and the following pages illustrate a house designed by Geo. F. Barber of Knoxville, Tenn. The perspective view forms the subject of our supplement plate. From the author's description we learn that the house is built for a cold rather than a warm climate, and is provided with a vestibule at the main hall entrance for the exclusion of cold in winter. By the introduction of this feature a cozy nook is obtained, which is separated from the hall by a neat Mooresque screen or arch, which is indicated among the details in the engraving showing a view of the hall looking toward the entrance. In this cozy retreat, on either side of a broad window, are arranged upholstered seats. The hall is fitted with an open grate and handsome mantel, adding materially to the comfort and cheerfulness of the apartment. Beyond the grate and built into the stairway is another seat, thus permitting the hall to be utilized as a reception room.



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

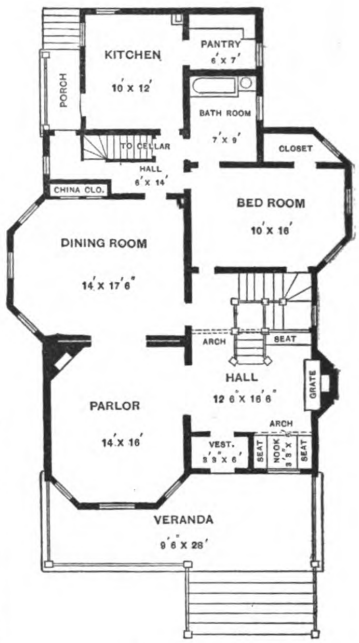
Study in House Design.—George F. Barber, Architect, Knoxville, Tenn.

Communicating with the hall by means of a wide opening, which may be covered by richly draped *portieres*, is the parlor, measuring 14 x 16 feet. This room contains a fire place, and is well lighted by three windows, which permit a fine view to the front. This apartment communicates with the dining room directly in the rear by means of folding doors. In the octagon end of the dining room are three large windows, giving plenty of light, and rendering the room cheerful and pleasant. Opening from it is a china closet and two doors, one leading to the front and the other to the back hall. Directly in the rear of the main stairs and communicating with the front hall is a sleeping room 10 x 16 feet, out of which opens a commodious bathroom and closet. If so desired, this sleeping room may be used as a dining room, and the bathroom shortened in such a way as to utilize it as a serving room from the kitchen. In that case the closet opening from the bedroom could be omitted. The present dining room could then be used as a sitting room or library. Both the bedroom and bathroom may be reached from the rear hall and back stairs, and are therefore accessible from every room in the house without the necessity of passing through others. The back hall serves as an entrance from the rear, and gives access to the dining room, bedroom, bathroom and kitchen, the latter being located in the extreme end of the house.

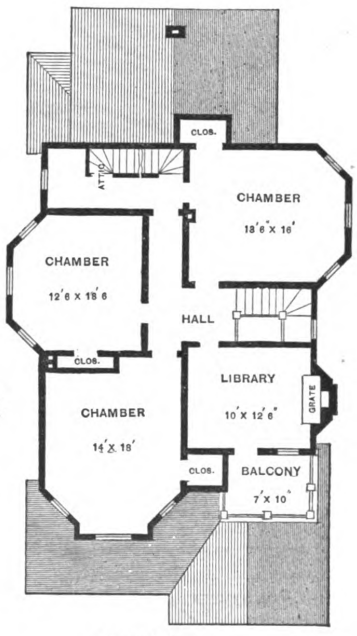
By this arrangement the author states that the kitchen is entirely cut off from the rest of the house and prevents all odor of cooking from entering the living rooms. The kitchen is furnished with a pantry of good size, is light and conveniently arranged. It opens directly upon the back porch, and does not necessitate passing through the hall in order to get out of doors.

The second floor of the house contains five sleeping rooms, and by extending that portion containing the kitchen up half a story a servant's room and bathroom could be provided. Three of the rooms are provided with closets, while the fourth, which is designated as a library on the plan, is provided with an open grate. This room opens out upon the balcony directly over the front porch.

According to the architect's specifications the exterior of the house is to be sheathed tight on the sides and roof, the sides to be covered with water-proof building paper and the roof is to be covered with slate. The interior is to be plastered three coats, and hard finished. All trim or casings are to be of neat design. The doors throughout are to be of five panels, molded two sides. The three principal rooms and the hall on the first floor are to be finished in hardwood, the remainder being painted. The estimated cost of the house in the locality mentioned, including heating and plumbing, is placed at from $3600 to $4000.



First Floor.



Second Floor

Scale, 1-16 Inch to the Foot.

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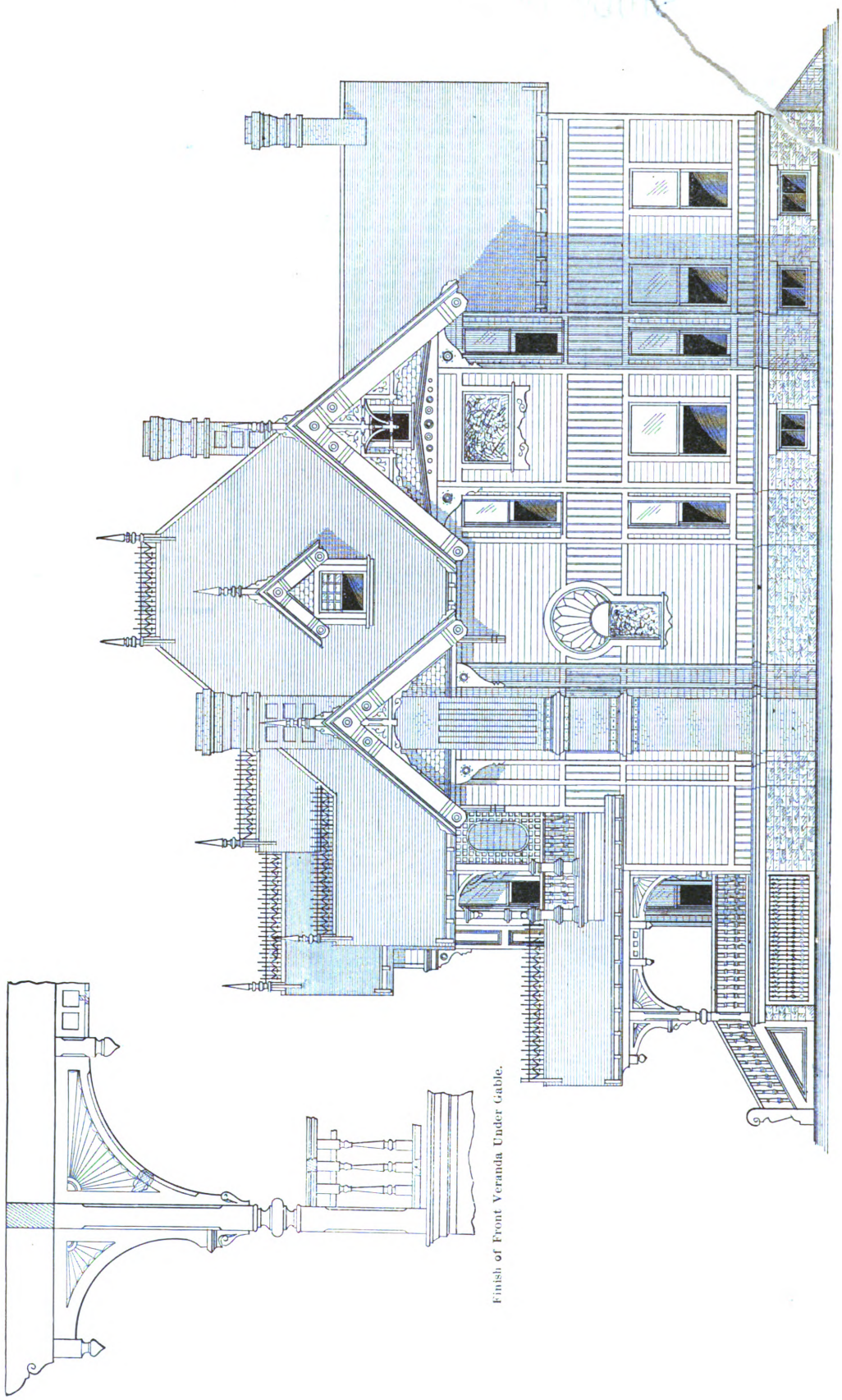

Side (Right) Elevation.

Finish of Front Veranda Under Gable.

Study in House Design.—Elevation.—Scale, ⅛ Inch to the Foot. Details.—Scale, ¾ Inch to the Foot.

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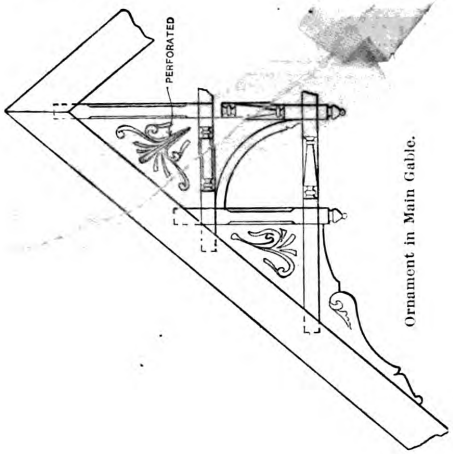
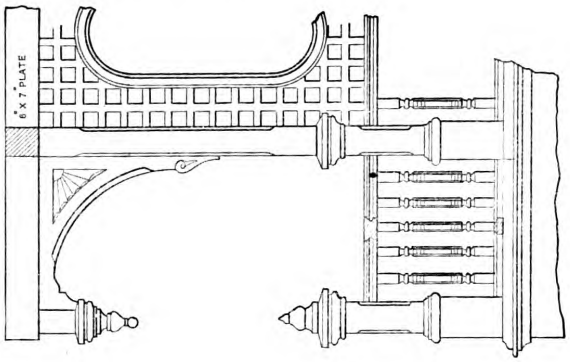
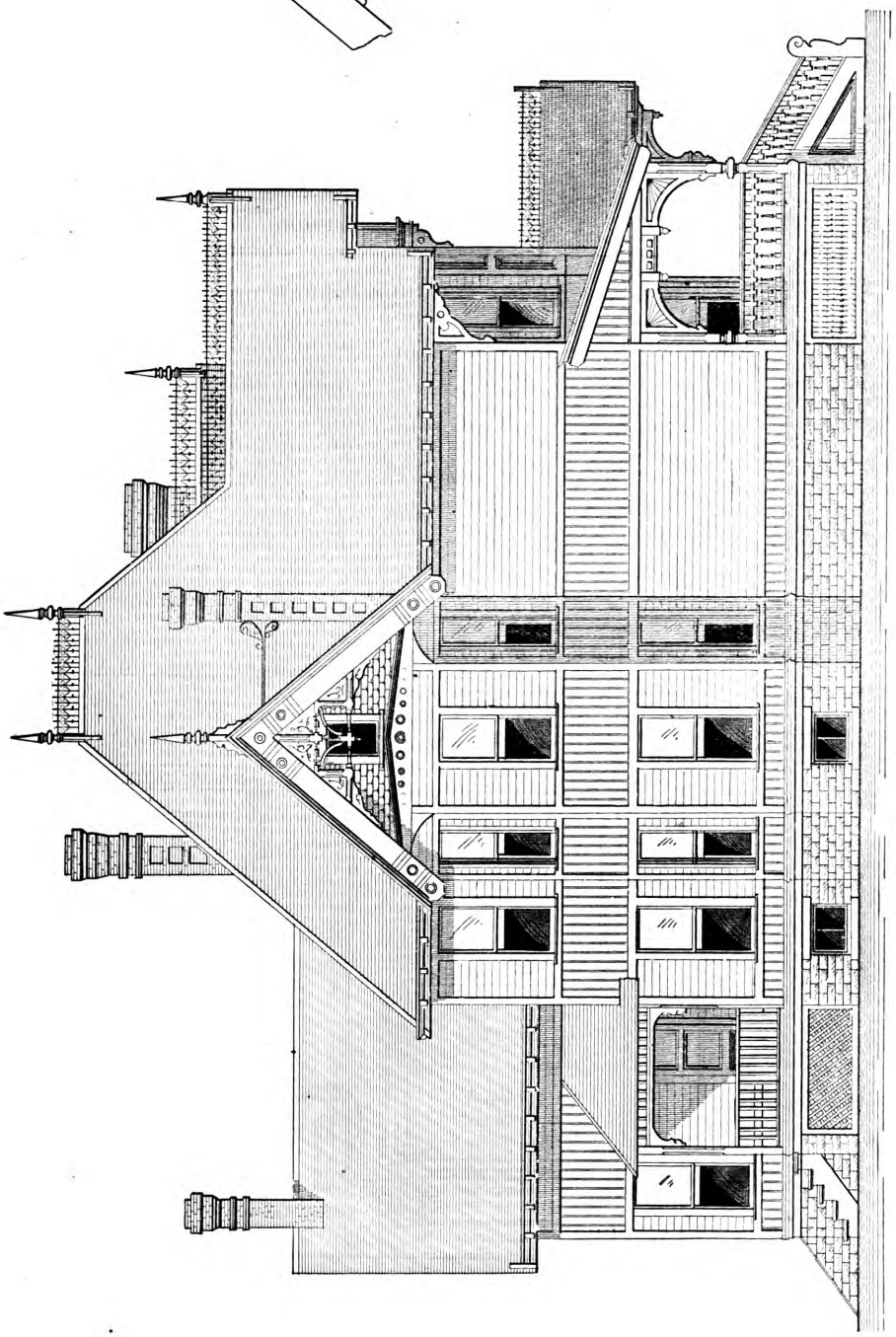


Ornament in Main Gable.



Side of Balcony.



Side (Left) Elevation.

Study in House Design.—Elevation.—Scale, ⅛ Inch to the Foot. Details.—Scale, ¾ Inch to the Foot.

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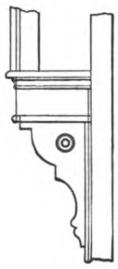
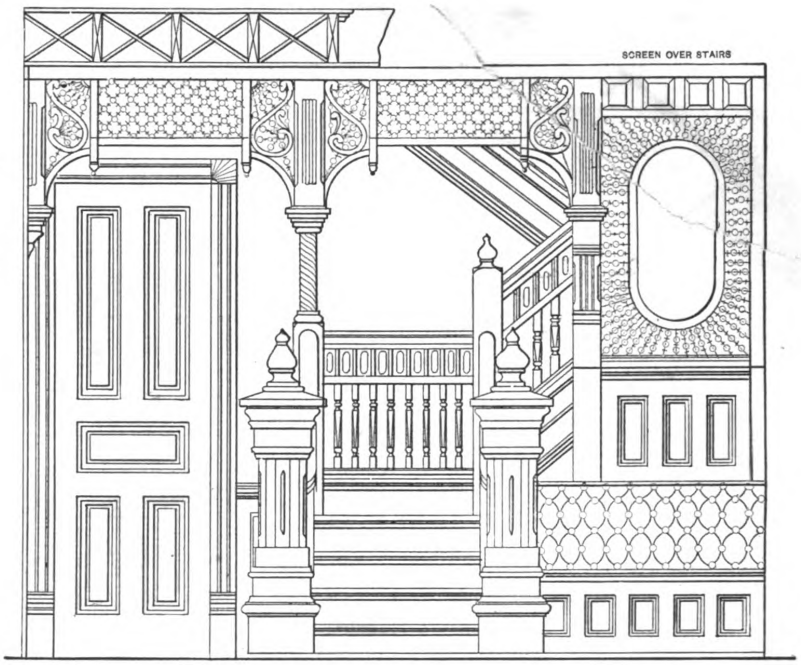
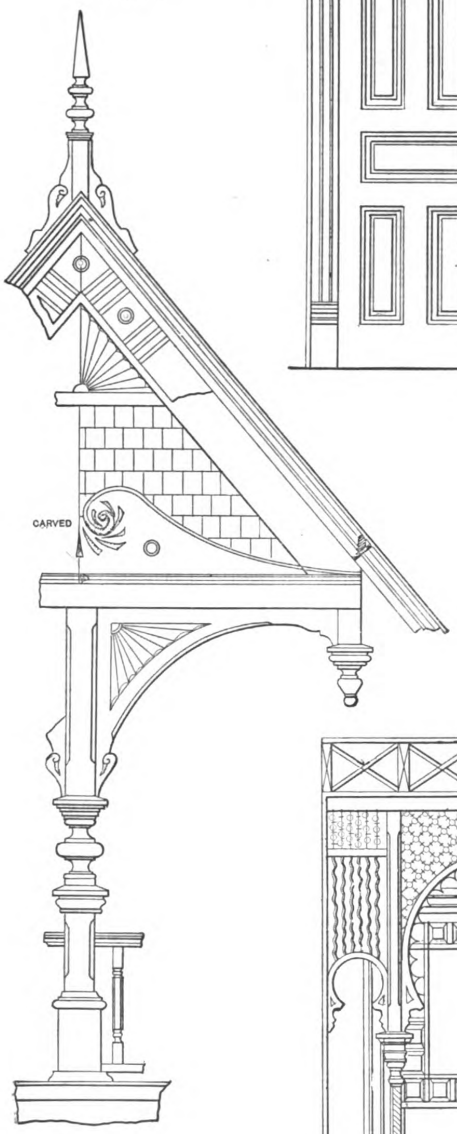


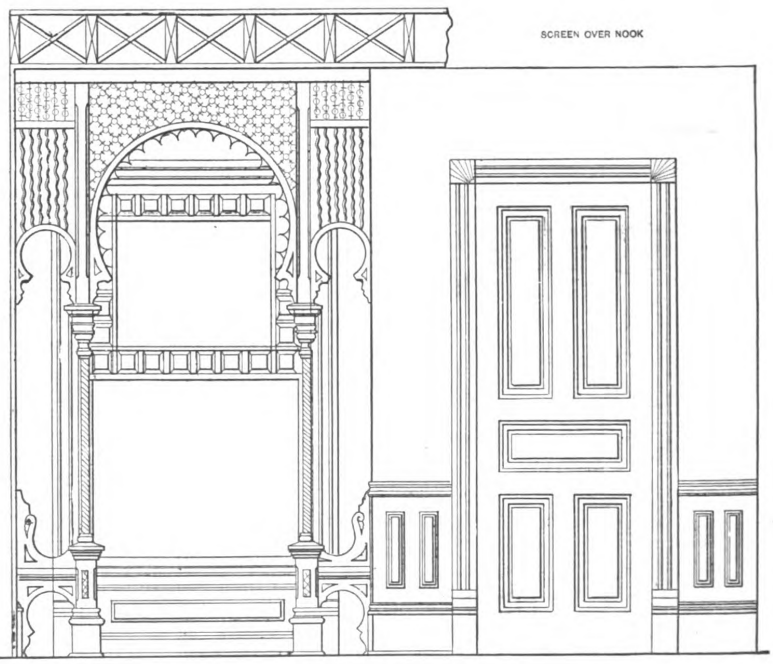
Bracket Under Front Gable Attic Window.



Interior of Hall Looking from the Entrance.



Detail of Front Balcony.



Interior of Hall Looking toward the Entrance.

Study in House Design.—Details.—Scale ⅜ Inch to the Foot.

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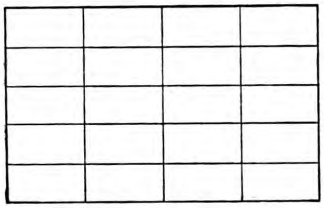
CORRESPONDENCE.

Drive Wells and Foundations.

From R. G., *New York City.*—The architect of one of the most superb and solidly constructed office buildings in this city protested against drive wells being sunk beside the foundations of buildings, taking the ground that such a course would cause cracking of the walls. The protest was disregarded, and two wells were driven close to the exterior of the structure. When the wells were drawn upon it was not long before the effect was apparent in cracks in the walls just beside the wells, and the use of the latter was promptly stopped by the owner. Now, there are few foundations that are broader or deeper than those upon which were constructed the walls that so promptly showed cracks on account of a little pumping below them. This may serve as a note of waring not to risk the safety or appearance of walls by driving wells too near them on Manhattan Island. It also suggests the thought that architects and builders do not know all about the construction of foundations, and that there is



Drive Wells and Foundations.—Fig. 1.—*Badly Constructed Pier.*

not enough bonding lengthwise of the walls. A properly constructed foundation should be like a masonry bridge—equally loaded all along. It should not deflect much when one pier is carried away in part. Of course, if bricks are laid in rows, with so many in a row, without any bonding, as is the case in the piers of public buildings in one of the prominent Eastern cities of the country, it must not only be expected that no one layer has any hold on any other layer, independent of the masonry, but that no one layer has any dove-tailed hold upon any other row. Such a pier will be very likely to let go its hold on the slightest provocation, and such provocation is afforded by carrying away the earth or sand from below it, even where there is a concrete course below the brick work.

Referring to the accompaning sketches, Fig. 1 shows a plan view of one course of a pier badly constructed. Yet there are thousands of them similar to it to-day holding up buildings, or at least pretending to hold them up. In some cases it may be said that they are hanging to the walls. Fig. 2 of the illustrations shows a trifle better construction, the bricks breaking joints, but not bonding. Fig. 3 represents a still better construction, there being no long seams, and the bricks both breaking joints and bonding with others in the same course. In Figs. 2 and 3 it will be seen that half bricks are necessary at the points marked A A A A.

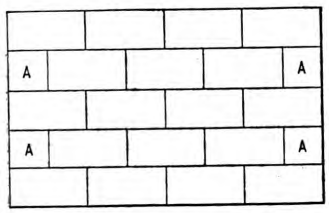


Fig. 2.—*Showing Little Better Construction than Indicated in Fig.* 1.

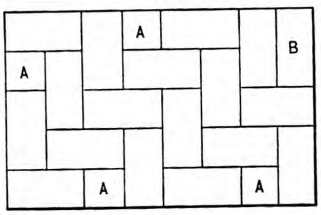


Fig. 3.—*Showing a Better Construction than Fig.* 2.

The next courses break joints with these. A further development of Fig. 3 is shown in Fig. 4, in which there is bonding, not only of the rows in each course with others in the same course, but of one course with another. In the plan Fig. 4 C C C C are on edge, and by these each course is bonded to the one above it. A further development of this idea is to place certain bricks endwise so as to bond four courses together. This bonding of one course with another would not answer very well with bricks made in "bar machines," by which a stream or bar of clay is cut into lengths as it issues from the die.

Hanging Glass Doors.

From R. A. G., *Menlo, Iowa.*—I would like to ask the readers of *Carpentry and Building* for a proper method of hanging glass doors—that is, a common sash door and a queen door. I desire to know whether the putty should be on the outside or on the inside. I have hung several

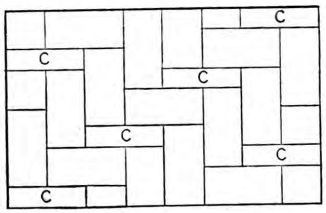


Fig. 4.—*An Improvement upon Fig.* 3.

and put the putty inside. Some of my friends say I am right and others say I am wrong. I should be glad to hear what the practical readers of the paper have to say on this point.

Note.—This question has been up for discussion before, but perhaps it is still interesting. We very much doubt if such matters are possible of settlement with the definiteness of a mathematical formula.

Setting Knives on Molding Machines.

From G. W. W., *Woodlawn, L. I.*—I would like to ask through the columns of *Carpentry and Building* the proper way to design and set the knives of a molding machine.

Choice Excerpts.

From G. A. L., *South Hanson, Mass.*—I desire to ask the editor if he will publish in the next number of the paper the beautiful poem of Longfellow entitled "The Builders. This, it seems to me, is a poem especially appropriate for the perusal of carpenters. I enjoy the excerpts which are printed very much, and consider them, indeed, an interesting feature of the publication. I think first Corinthians, 1st chapter and 1st verse, would be appropriate for publication. It reads as follows:

"According to the grace of God, which is given unto me as a wise master builder, I have laid the foundation, but another buildeth thereon. But let every man take heed how he buildeth thereupon."

Note.—The poem to which our correspondent above makes reference is as follows.

THE BUILDERS.

"All are architects of Fate,
Working in these walls of Time;
Some with massive deeds and great,
Some with ornaments of rhyme.

Nothing useless is, or low;
Each thing in its place is best;
And what seems but idle show
Strengthens and supports the rest.

For the structure that we raise,
Time is with materials filled;
Our to-days and yesterdays
Are the blocks with which we build.

Truly shape and fashion these;
Leave no yawning gaps between;
Think not, because no man sees,
Such things will remain unseen.

In the elder days of art,
Builders wrought with greatest care
Each minute and unseen part;
For the Gods see everywhere.

Let us do our work as well,
Both the unseen and the seen;
Make the house where Gods may dwell
Beautiful, entire, and clean.

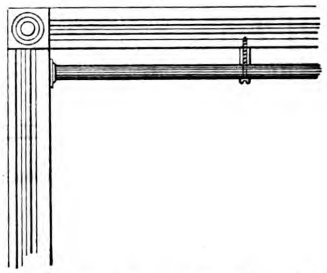
Else our lives are incomplete,
Standing in these walls of time,
Broken stairways, where the feet
Stumble as they seek to climb.

Build to-day, then, strong and sure,
With a firm and ample base;
And ascending and secure
Shall to-morrow find its place.

Thus alone can we attain
To those turrets, where the eye
Sees the world as one vast plain,
And one boundless reach of sky."

Poles for Curtains and Portieres.

From E. G. S., *New York.*—As carpenters and builders are required to furnish curtain poles and fixtures for almost all first-class houses and flats which are now



Poles for Curtains and Portieres.—Sketch Submitted by E. G. S.

erected, a few suggestions touching this matter may not be without interest to the trade at large. With very few exceptions the poles now hung are either too massive for ornamental purposes or too light to bear, without sagging, the weight of the curtains. The rings in most cases bind after being up a short time, resulting from the accumulation of dust and the use of a ring too small for the purpose. One way to remedy this, if no changes are to be made in the size of the rings to be employed, is to moisten a cloth with sweet oil and rub the pole thoroughly. This should be done in the case of every pole, whether it be of wood or of metal. The result of this is to brighten and clean

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the pole, and at the same time it prevents friction. Other mixtures, as oil and turpentine, can also be used, but this combination is not always available in the household, and sweet oil serves the purpose just as well, if not better, as it does not harden or make a sticky surface.

Poles ranging from 1 to 2 inches in diameter should have rings ½ inch greater inside diameter—that is, on a 1½-inch pole ring should be used which has an inside diameter of 2 inches. On poles 2½ inches in diameter or over a ring having a diameter ¾ inch greater than the pole should be used. This allowance will give sufficient space to prevent the ring from binding, provided always the pole is kept free from dust. A greater allowance than this would be of no special advantage, while it would leave too large a space between the top of the curtain and the pole. In the case of a window this space would be such as to admit a greater line of light than would look well.

With regard to the spacing of the rings, not more than 5 inches should be allowed. This would call for ten rings on a 4-foot pole, 12 rings on a 5-foot pole and so on, always placing an even number on each pole, unless under 4 feet in length. On spaces 5 feet 6 inches in width or under and less than 9 feet in hight the pole should be 1½ inches in diameter if made of wood. In spaces wider than those named and for the same hight the same diameter of pole may be employed by supporting it in the center by means of a bracket, or a brass headed screw run through the pole, as shown in the sketch I inclose. That portion of the screw between the pole and the jamb should be covered by a brass ferrule. In spaces over 5 feet 6 inches in width and over 9 feet in hight 2-inch poles should be employed, and if the space is over 6 feet in width the pole should be supported in the center in the same manner as just indicated.

In cutting the pole always allow it to project about ¾ inch beyond the casing or bracket for the end ring. This does not include the ends, which should always finish outside of the trim, unless the casings are ornamental, carved or have the brackets already on the trim, in which case the less prominent the ends the better. Where spaces are over 6 feet and cannot be supported in the center, use either all brass or iron lined tube poles.

Framing a Barn.

From L. E. W., *Newport, N. Y.*—I noticed in the March issue of *Carpentry and Building* for 1890 a sketch of a barn frame from a correspondent signing himself "F K.," Kieler, Wis. To me it appears similar to Jennings' patent barn, of which I inclose a circular.

Note.—From the circular furnished by our correspondent we have prepared the accompanying engravings, and present in connection therewith some particulars likely to interest our readers. The style of framing indicated in Fig. 1 of the cuts is the invention of David Jennings of Lyons, N. Y., and was patented by him July 29, 1879. It is claimed that the principle of construction involved is such that there is no outward pressure to the building after it is finished, but rather has an inward tendency. In order for the building to spread, it is said to be necessary to break the truss plate, the purlin and main plates, while lifting the entire weight of the roof in moving in either direction. In Fig. 2 of the cuts is presented a section showing an inside bent, while Fig. 3 shows a partial view of an end bent. In the various engravings similar letters refer to similar parts. On each side of the barn and beneath the roof is a bridge or truss, which extends lengthwise. This bridge consists of the main plate A, Fig. 2, and the purlin plate B, which are situated, it will be seen, parallel to each other at a suitable distance apart, and which extend from one end of the barn to the other. These stand at an angle corresponding with the pitch of the roof and support the rafters. The letters C C designate a series of cross braces, each in the form of an X, which rest between the main and purlin plates. An idea of this construction is indicated in Fig. 4 of the engravings. These braces are mortised into the main and purlin plates and serve to stiffen the parts. In the same cut D D are tie rods or bolts, which connect the main and purlin plates between the braces C C and in line with the purlin posts. The ends of the rods are threaded, and the parts are drawn firmly together, thus tightening the braces. Referring to Fig. 2, E E are the purlin

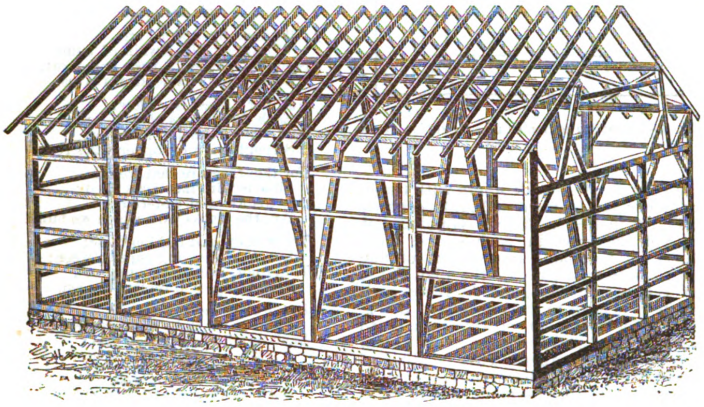

Fig. 1.—Showing Complete Framing.

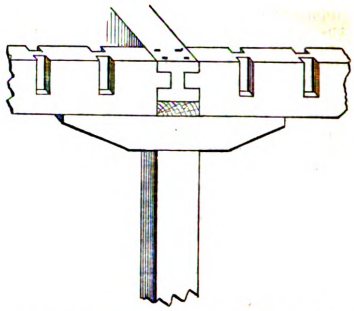

Fig 6.—Method of Connecting Trimmers to Cross Sills and Adjusting Post in a Basement.



Fig. 5.—Showing Method of Connecting Purlin Post to Purlin Plate.

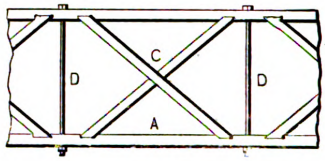

Fig. 4.—Showing Manner of Trussing the Plates.

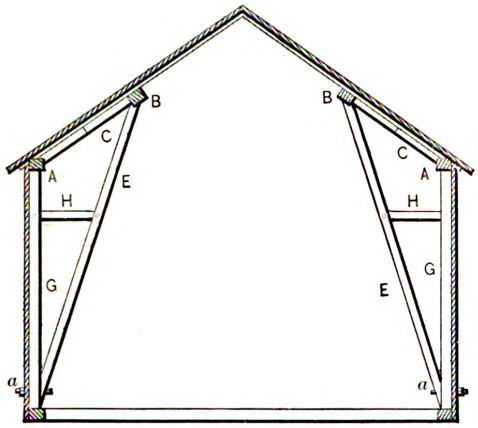

Fig. 2.—Sectional View, Showing Inside Bent.

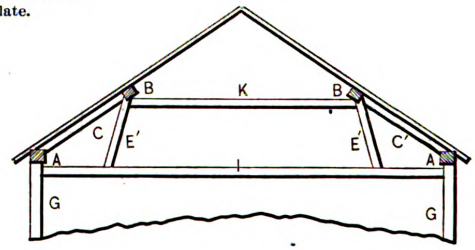

Fig. 3.—Partial View of End Bent.

Framing a Barn.—Method Adopted by David Jennings.

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posts, extending from the side posts G G up to and supporting the purlin plate. They are attached to the bottom of the posts by strong bolts, indicated by *a a* in the engraving. Short girts are employed to connect the purlin posts and the exterior frame posts at any desired hight and serve to stiffen and brace the parts. These are indicated by J H in the engraving. The short purlin posts E' E' of Fig. 3 are placed at the ends of the barn and correspond in position with the other purlin posts, but are shorter and connect the cross sill and adjusting post in the basement.

The advantage claimed for this form of construction is that it dispenses with the cross beams in the clear of the barn and leaves the whole interior so as to facilitate the use of a hay fork and the operation of unloading and stowing away of the hay. It is claimed that greater strength is secured while the cost of framing is reduced, as there are a less number of bents and no heavy beams extending across the barn. It is stated that this construction can be readily applied to old barns by cutting out or removing the cross beams and building the trussing within the barn.



Fig. 1.—Showing a Portion of the Staging in Position.

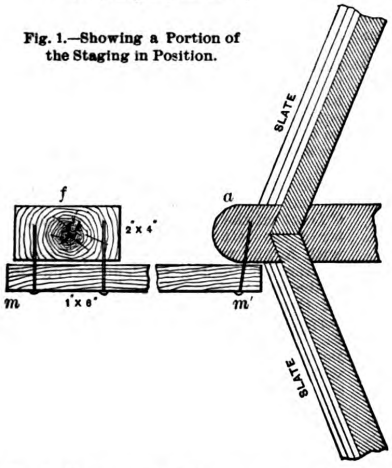

Fig. 3.—Manner of Attaching Horizontal Pieces to the Steeple.

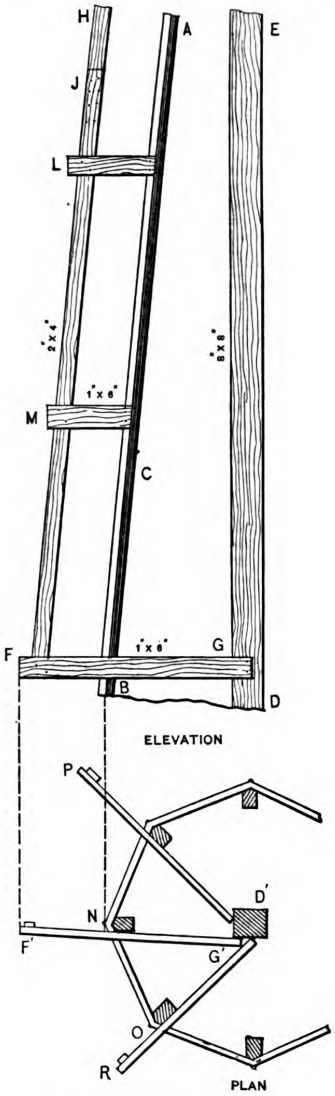

Fig. 2.—Method of Constructing the Staging.

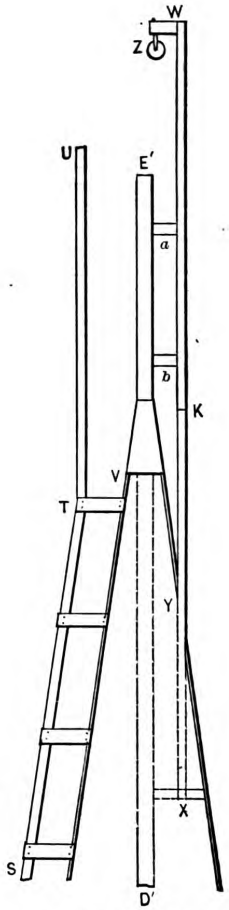

Fig. 4.—Construction of the Staging Above the Steeple.

Scaffolding a Lofty Steeple.

purlin plate with the end cross beams. K is a purlin girt at each end of the barn connecting and embracing the two end posts E' E'. The short arms serve to support the ends of the purlin plates B. B. The tie rods referred to are used on every inside bent, but not on the end of the building, so that a structure with six bents would require four rods on the side and four short bolts for the foot of the purlin arms. Fig. 5 shows the manner of connecting the purlin arms or posts to the purlin plates, to be secured with spikes or small bolts, while Fig. 6 indicates the manner of connecting trimmers to the

Scaffolding a Lofty Steeple.

From BUILDER, *Chicago.*—As the galvanized work about the steeple on the Cathedral of the Holy Name, North State street, in this city, had begun to show the ravages of time, it was decided that in place of applying paint to cover the defects the iron work should be removed and either stone or copper substituted in its place. This has been done, and a few notes concerning the operation may prove interesting. Where stone was not adapted to the requirements copper has been used, as the action of the elements upon this metal gives it a dark color that harmonizes with almost every shade of brick or stone. The substitution of stone in place of galvanized iron for the four pinnacles at the base of the octagon part of the steeple and other changes rendered it necessary that considerable of the slating and sheathing with which the steeple was covered should be removed from the base in order that the men could do the necessary work. The placing of four copper dormer windows in the sides of the steeple also required the removal of some of the slating, and as tar paper had not been placed under the slate, it was decided to remove all of the old slating. As much of the slate was likely to be broken during its removal, and on account of the difficulty in matching old slate with new as to color, the old slate was entirely removed, tarred paper applied to the steeple and new slate put on. As the paint had disappeared from the

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surface of the galvanized-iron cross at the top of the steeple, it was decided to replace it with one of gilded copper.

The slaters were unable to begin their work at the base of the steeple until the masons had placed the stone in position, so it was decided to remove the old cross, from which measurements could be taken for the construction of the new one, particularly in regard to the size of the wood work over which the cross was to stand. The cross was held in position by a center pole or timber which projected a distance above the apex of the steeple, and extended down so as to be thoroughly braced. In Fig. 1 is shown a view of the steeple after a portion of the staging had been removed. Before this part of the staging was constructed an upper staging was built for the purpose of removing the cross and for slating that part of the steeple. In Fig. 2 is partly shown the method of constructing the upper staging, which was done about as follows: Near the top of the steeple and where the center pole for holding the cross could be used for supporting the ends of the needles an opening was made in the side of sufficient size for a man to pass through. Supposing this opening to have been made at N O in Fig. 2, the needle F' G' was placed in position and nailed to the center pole D', and also at N if necessary. The needle F' G' having been placed in position a small opening was made in the steeple at O and the needle R put through the opening and nailed to the center pole D. The two needles F' and R having been secured in position boards were laid on them, forming a staging on the outside of the steeple from F' to R. The needle P having been placed in position in the same way as the two previous ones boards were laid from F' to P, thus completing another side of the staging. This process was repeated until the staging had been carried around the steeple. The process of building the staging upward is further shown in the elevation and in Fig. 3. A 2 x 4 was nailed to the needle F' G', as shown at F in elevation, extending upward parallel with the side of the steeple. At convenient distances, say every 6 feet, cross pieces were placed, as shown at M L, being nailed to the 2 x 4 and to the steeple. In Fig. 3 is shown in plan an enlarged view of the construction of the staging at M in elevation. The 2 x 4 *f* extends upward from F in Fig. 2, the cross piece *m m'* being nailed to the 2 x 4, as shown, and to the ridge molding *a*, which was securely nailed to the steeple and against which the slating joined. Supposing that one 2 x 4 had been secured to the steeple, as shown by F J in Fig. 2, another could be attached in a similar manner, when boards could be laid from one cross piece to another if desired. In this manner the staging could be built about the steeple as far as the first set of uprights would reach, after which another set could be spliced on, as shown at J.

After having reached the top of the steeple, as indicated by S T in Fig. 4, another principle of construction was employed, the 2 x 4 uprights being carried parallel with the center pole D' E', as shown by T U. About these uprights boards were nailed horizontally, upon which the boards for the staging were placed, thus forming a staging about the cross that was to be removed. For the removal of the cross and the placing of the new one an upright was required with a cross piece at the top to which a pulley could be fastened. Through this a rope passed to be used in lowering the old and raising the new cross. This upright is shown by X W, and was made from two 4 x 4 pieces each 20 feet long. An opening was made in the side of the steeple at Y, through which the first 4 x 4 was placed and secured to the braces between the sides of the steeple and the center pole E' D'. After this had been done the second 4 x 4 piece K W was placed in position, the splice or joint at K being made by nailing boards on each of the sides. The iron cross having been removed, the braces *a b* were nailed from the center pole D' E' to the upright K W for the purpose of rendering the upright and the upper part of the staging more steady while the new cross was being elevated to its position.

In Fig. 1 is shown the general manner in which the stagings were made about the base of the steeple for laying the copper work and slate. At a convenient point above the tops of the pinnacles and gables, and near the floor, which is at the bottom of the openings in the dormer windows, larger needles were put through the sides of the steeple, as shown in the engraving, and planks having been placed from one side to another, a staging was thus made about the steeple which could be reached from the dormer windows, one of which is shown in the engraving. This staging served as a support to the one that had been previously built, the same principle of construction having been used, as may be seen by an inspection of the engraving.

The slating having been completed, the next step was to place in position the base and cross. These were made in two parts of 16-ounce copper, the cross being 15 feet high, 7 feet 6 inches in width, while the base is 4 feet 2 inches in diameter at its widest part and 7 feet high. The cost of covering the cross and base with gold leaf was about $400. After having been covered with gold leaf, the two parts were wrapped in cotton batting and cloth so they could be elevated without injury. The base having been placed on the ground below the steeple, the rope passing through the wheel Z was attached, when the base was elevated to the top of the steeple, which is about 240 feet in hight. A guy rope was used to prevent the base from striking against the stone work until the staging was reached, when men stationed on the staging guided it. Upon reaching the top the base was slipped over the center pole at E', when the brace *a* was removed; then it was lowered to brace *b*, which was also removed, when it was lowered to its position, the lower part of the base reaching the point V in Fig. 4.

This much having been done, the brace *a* was replaced and the cross elevated and slipped over the center pole at E'. Then the brace *a* was again removed and the cross lowered to its final position. After the wrappings had been removed from the cross and base and the two properly secured in position, the work of taking down the staging commenced. This was done by taking it to pieces from the top, the lumber used in its construction being lowered to the ground by means of a rope and pulley. As the cross pieces similar to *m m'* in Fig. 3 were removed, the hips, as shown at *a*, were covered with a copper molding, extending slightly over the slate on each side. While no unusual precautions were taken to avoid accidents, the men engaged in the work were sufficiently careful to escape without injury. The contractor for the copper work and slating was R. Hughes of No. 175 West Adams street.

Framing Roofs of Different Pitches.

From I. P. H., *Omaha, Neb.*—Each number of *Carpentry and Building* brings a fresh surprise to me in the art of hip and valley roof framing. For the few months just past there seems to have been unusual interest manifested in roof framing, and to many it must seem as though the whole subject has by this time been well-nigh exhausted. Still there comes a letter from "A. D. F.," expressing a desire to see the correct method, by means of diagrams, for obtaining the different cuts of jack rafters when there are three or more gables of varying pitches in one roof. Had he been a constant reader of *Carpentry and Building* in years past he would have long since found the desired information in an article which appeared in the September issue of 1880 and in the August number for 1883. "A. D. F." asks only for the cuts of the jack rafters, but I presume he would like a general knowledge of the whole roof in question, hence I will try and cover the ground thoroughly as far as I go, leaving no doubt in the minds of the readers as to the correctness of the methods presented.

Fig. 1 represents a plan of a roof having three gables of varying pitches. The right gable A B C is 16 feet wide and has a rise of 8 feet. The front gable D F G is 18 feet wide, and has a rise of 8 feet. The left gable J H I is 21 feet wide and has a rise of 8 feet. It will be noticed that the left gable has two different pitches within itself. This plan shows as much irregularity as can be desired and as much as is generally encountered in actual practice. I will now proceed to find the lengths and different cuts of the various rafters required in this roof. The dotted lines represent lines plumb under the ridge of the gables. The lengths of the common rafters and their proper cuts may be taken from each of the three gables separately, and are so plain and easily understood from the diagrams that further explanation is unnecessary, The roof has two valleys of different pitches, of which the lines N L K are the seats or runs. To find the length of the valley rafter on the right side of the front gable on the line K L, square up the rise of the roof from L to M, connect M with K, and we have the length of the valley rafter. A bevel set in the angle at M will give the down bevel at the top and at the angle at K, the bottom cut fitting the plate. To find the length of the valley rafter on the left side of the front gable on the line N L, square up the rise of the roof from L to O and connect O with N for the length of the valley rafter. A bevel set in the angle at O will give the down bevel at the top, and at an angle at N the bottom cut fitting the plate. Now, if I were to draw all the lines in Fig. 1 necessary to show the lengths and proper cuts of all the different jack rafters required in this roof there would be such a number crossing each other at various angles as to confuse and discourage the beginners. In this roof there are four different cuts of jack rafters, and it is better not to have them mixed up with the valleys and common rafters, hence I will make another small diagram. As the jacks of the left gable and on the left side of the front gable join the same valley rafter, they can be conveniently shown in the same diagram. Referring to Fig. 2, first draw a horizontal line, A B, in length equal to the runs of the common rafters on the two sides of the gables for which we are to find the jacks. Next set off the run of the common rafter of the front gable A C. From C erect a perpendicular line any length, as C D. On the line C D set off the length of the common rafter of the left gable C to E. Connect E with A, and we have the valley rafter in position for finding the lengths and cuts of the jack rafters in the left gable. Space off the jacks on the line A C and draw perpendicular lines, joining the valley A E. This will give the lengths of the jacks, and a bevel set in the angle at G will give the bevel across the backs of the same. The down bevel or plumb cut will be the same as that of the common rafter on the front side of the left gable. To find the jacks on the left side of the front gable take the run of the common rafter of the left gable, represented in the diagram by C B. From C on the line C D, set off the length of the common rafter of the front gable C to F; connect F with B and we have the valley rafter in position for finding the lengths and cuts of the jack rafters on the left side of the front gable. Space off the jacks on the line C B, and draw perpendicular lines joining the valley B F. This will give the lengths of the jacks, and a bevel set in the angle at H will give the bevel across the backs of the same. The down bevel or plumb cut will be the same as that of the common rafter for the front gable. As there is a difference in the run of the common rafters of the two gables it makes a difference in the space for jacks; hence if the jacks are to meet on the valley rafter it will be necessary to space them wider in one gable than the other, as shown in the diagram. Another diagram similar to Fig. 2 would be required

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to show the jack rafters of the right gable, and on the right side of the front gable, but as it would only be a repetition of the plan already described it may be omitted. The principle evolved is the same all the way through, but as the runs and lengths of common rafters are taken for each gable of a different pitch, the lengths and cuts of the required jacks are found. The method I have given is very simple if correctly understood, yet it may cause many to study it carefully before they will be able to see just why it gives the desired results.

In order to throw as much light as possible upon the subject, and present a choice of methods, I will give another diagram showing the different cuts of the jack rafters in a much plainer manner, and which to many, perhaps, will be more satisfactory. Fig. 3 shows the wall plate lines exactly the same as in Fig. 1, except it is divided on the ridge line of the front gable, and spread apart so far that when we develop the roof, showing the different jack rafters in their various positions, we finding the lengths and cuts of the two divisions of jacks—namely, the left gable and the left side of the front gable. The valley lines K M and K M^2 are of the same length, but show the valley rafter in different positions for finding the lengths and cuts of the other two divisions of jacks—namely, the right gable and the right side of the front gable.

Now, suppose we elevate the four sections of the roof containing the different jacks to their proper pitch, and shove the two divisions of the diagram together till the dotted lines L S and L^2 S^2 meet plumb under the ridge of the front gable. What would be the result? N O and N O^2 would join as one line and would be the left valley, K M and K M^2 would also join as one line, and would be the right valley. This also would bring every jack into its required position in the roof, as can be plainly seen in the diagram. The cuts of the two valley rafters must be taken from Fig. 1, as shown and described before. The cuts could be shown in Fig. 3, but as they would only serve to make of front gable 9 inches on the tongue, and the blade will give the cut across the back of the jack rafters on the front side of the left gable. The lengths of the jacks may be found in the following manner. Divide the length of the common rafter by the number of spaces for jacks. This will give the length of the shortest jack, and the second will be twice that length: the third three times, and so on till the required number are found. Each gable, or each side of a gable, may be worked in the same manner till all the different lengths and cuts are found. The whole thing boiled down results in a few simple facts. 1. That the run of the common rafter on the tongue of a square and the length of the common rafter on the blade will always give the bevel across the back of a jack rafter on roofs of equal pitch. 2. If the roofs are of different pitches the length of the common rafter on the blade and the run of the common rafter on the opposite side of the hip or valley on the tongue will give the cut of the jack on the

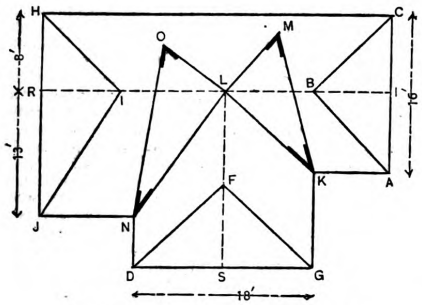

Fig. 1.—Plan of Roof, Showing Gables of Varying Pitches.

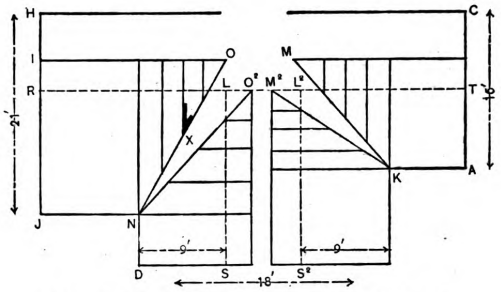

Fig. 3.—Showing Position of Jack Rafters in Roofs of Different Pitches.

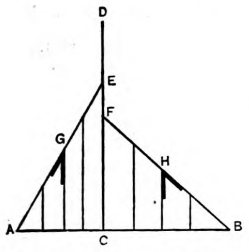

Fig. 2.—Plan, Showing Jack Rafters in Roofs of Dfiferent Pitches.

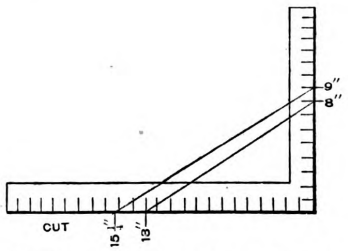

Fig. 4.—Cut of Jacks on Roofs of Unequal Pitches.

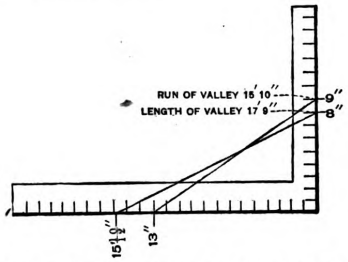

Fig. 5.—Length and Cuts of Valleys in Roofs of Unequal Pitches.

Framing Roofs of Different Pitches.—Sketches Accompanying letter from I. P. H.

will not have a series of lines crossing each other to cause confusion. Let H C A K I D N J represent the wall plate lines. The dotted lines R L S and S^2 L^2 T are the lines plumb under the ridge of the gables. I will now proceed to find the jack rafters and their proper cuts. Taking the left gable first on the line J H, set off the length of the common rafter from J to I; from I at right angles draw the line I O, which is the ridge proper, and extends to the center of the front gable represented by the dotted line L S. Connect O with N for the valley rafter. On the line I O space off the jacks and draw the lines connecting them with the valley N O, as shown in the diagram. This will give the lengths of the jacks in the left gable, and a bevel set in the angle at X will give the bevel across the backs of the same. The down bevel will be the same as that of the common rafter on the front side of the left gable. A similar plan is followed for each gable, or each side of a gable, where the jack rafters are of different lengths or have different cuts, as will be readily seen by referring to the diagram. The valley lines N O and N O^2 are of the same length. They simply show the valley rafter in different positions for the diagram more complicated I omit them. If any one would like to see a diagram showing all the rafters and different cuts in a roof of this kind they can draw the lines of Fig. 1 and Fig. 3 in one diagram. If they will imagine one of these diagrams placed over the other I think the result will be satisfactory.

I will now show by a few simple diagrams that the length and cuts of any rafter may be easily obtained by the proper application of the steel square and a 2-foot rule. Referring to Fig. 1, it is found that the run of the common rafter on the front side of the left gable is 13 feet, and that it has a rise of 8 feet. Referring now to Fig. 4, take 13 inches on the blade of the square, and 8 inches on the tongue and measure across. This gives $15\frac{1}{4}$ inches, equal to 15 feet 3 inches, which is the length of the common rafter on the front side of the left gable; 13 inches on the blade and 8 inches on the tongue gives the cuts—the tongue gives the top cut and the blade the bottom cut fitting the plate. Now, take the length of the common rafter on front side of left gable, $15\frac{1}{4}$ inches on the blade, and the run of the common rafter on the left side side of the roof from which the length of the common rafter was taken. The blade gives the cut. Hence the bevels of jack rafters on roofs of different pitches may be found as easily as on roofs having gables all of the same pitch.

The next step will be to show a simple plan for obtaining the length and cuts of the valley rafter by means of the square and 2-foot rule. Take the left valley, for example. Referring to Fig. 1 it is seen that the run of the common rafters on the gables joining this valley are different. These I will represent on the blade and tongue of the square as follows, see Fig. 5: Left gable run of common rafter on blade, 13 inches. Front gable rim of common rafter on tongue, 9 inches. Measuring across we have $15\frac{19}{32}$ inches, equal to 15 feet 10 inches, the run of the valley rafter. Now take the run of the valley, $15\frac{19}{32}$ inches, on the blade and the rise of the roof, 8 inches on the tongue, and measure across and we have the length of the valley rafter $17\frac{7}{16}$ inches, equal to 17 feet 9 inches; 8 inches on the tongue and $15\frac{19}{32}$ inches on the blade will give the cuts. The tongue gives the down bevel at the top and the blade the bottom cut fitting the plate.

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MASONRY AND STONE CUTTING.*

GROINING IN ANNULAR VAULT, OR INTERSECTION OF ANNULAR VAULT BY CIRCLE ON CIRCLE ARCH.

THE PRINCIPAL VAULT of this structure is annular—that is, a vault supported by two concentric ring walls, described on plan, Fig. 147†, with radii ω D, ω A, ω *d*; a vertical erected over the center ω is the axis of the annular vault; the intrados or soffit of this vault is a torus or annular surface, engendered by the revolution of a vertical half circle, A′ F″ E′ B′, Fig. 148, round the axis ω. The Fig. 148 is a meridian section of the annular vault.

Now, begin by drawing the jointing of the vault on the meridian section as that of any ordinary arch. In this diagram I only use five arch stones for clearness sake, but, of course, many more are to be used, according to the span of the vault, as in Fig. 146. It is evident that in the revolution of the meridian section round the axis of the structure the points F′, E′, ... describe horizontal circles F M..., E N..., which are the arrises of the bed joints of the annular vault; in the same time the joint lines F′ G′, E′ H′...., which prolonged would cut the vertical axis ω, describe conical zones; these are the bed joints of the annular vault. To complete the jointing of the annular vault divide each course of stones by cross joints, breaking joint; these cross joints are meridian planes.

This annular vault is intersected by arches, each of which is comprised between two vertical planes, C *c* and D *d*, Fig. 147, which converge to the axis of the structure. The arches spring from the same level, and rise to the same hight at the crown as the annular vault. The soffit of these arches is a conoid engendered by a horizontal line moving up and down in contact with the vertical axis ω and the outline of the face arch from C to D, the delineation of which is given below.

Rectify arc C O″ D along the tangent C″ O″ D″; then describe an ellipse, the major axis of which is C″ D″ and the minor axis O″ Z″, equal to the radius O′ Z′, Fig. 148, of the annular vault. Cut this ellipse out of a flexible sheet of zinc, and roll it on the surface of the wall. Its outline will then form the opening of the face arch, which is the base or directing curve of the conoid.

In drawing this ellipse in Fig. 149 I have used the method of the circles described on the axes, because I find thereby directly the points *e*″, *f* . . . which are at the same level as E′ F′ . . . This method also facilitates finding the tangents in these points.

The intersection of the conoid and the annular surfaces is found by cutting them by a series of horizontal planes. The plane at the level of F′, Fig. 148, will cut the torus along two circles projected on plan in FM and F_1L; it will cut the conoid along two straight lines $f\omega$ and $f_2\omega$. The points M and M_2, L and L_2, where these four lines meet, are on the intersection of the conoid and torus.

To find the generator $f\omega$, take on the ellipse, Fig. 149, the point *f*″ at the same level as F″, Fig. 148; then taken the arc O″ *f*, Fig. 147, equal to O″ *f*, Fig. 149. To measure these lengths on the circumference to the outer wall, the easiest way is to cut the circle out of thick cardboard, pin it down on the plan, then take the lengths on a flexible strip of paper and roll them on the edge of the cardboard circle. The point *f* found, join it with ω, and $f\omega$ is the generator required.

The intersections of the conoid and torus are on plan the curves A M N O K_2 L_2 B_2 and B L K O N_2 M_2 A_2; these curves are Archimedean spirals. The intersections themselves are curves of double curvature, and they form groins separating the annular vault from the circle on circle arch.

Normal Joints (Figs. 147–50).—In the annular vault the surfaces of the bed joints form conical zones; but in the circle on circle arch the surfaces of the bed joints are the locus of the normals to the soffit of the arch along a joint line, such as *f* M ω; as we have seen in former skew surfaces, the normals are found by the help of a connecting paraboloid in which a tangent is used instead of the directing curve.

For this operation select a projection plane, Fig. 150, perpendicular to the generator *f* M ω, and on which this generator is projected on one single point M′ placed at a hight U′ M′ = *f*′ *f*′ = F F′; then, after finding, Fig. 149 the tangent *f*″ T″, carry the subtangent *f* T″ on *f* T, Fig. 147, tangent to the base of the base of the outside wall; *f* T, M′ T′ are the plan and elevation of the tangent to the directing curve of the conoid. Now, if on the tangent (*f* T, M′T′) and on the vertical axis ω a horizontal line is made to slide, it will engender a paraboloid which will have common tangent planes with the conoid all along the generator (*f* M ω, M′); and the line T ω drawn at the level of the plan is a generator of that paraboloid. Cutting the paraboloid with planes M P, L Q . . . perpendicular to *f* M ω and therefore parallel to the directing lines, we know that the sections will be straight lines; it follows that, projecting P, Q, . . . on Fig. 150 in P′, Q′, . . . the planes M′ T′ T, M′ P′ P, M′ Q′ Q, . . . are tangent to the paraboloid, and therefore also to the conoid, in the points *f*, M, L, . . .

The normals to the conoid are the lines (M′ R′, *f* R), (M′ S′, M S), (M′ V′, L V), . . . of which a series taken close together form the surface of the joint; this is also an hyperbolic paraboloid, and one which coincides exactly with the connecting paraboloid when the last is turned round one quarter of a circle round the horizontal generator (ω M *f*, M′). The upper horizontal plane of the stone cuts the joint of the circle on circle arch at the same level as that of the annular vault; take, therefore, on Fig. 150 the vertical U′ G″ = G G′ of Fig. 148, then draw the horizontal plane G″ R′ which will cut the normals in the points (R′ R), (S′ S), (V′ V), . . . through which draw the curve R S V, . . . intersection of the bed-joint of the circle on circle arch by the upper horizontal plane of the stone. This curve is an equilateral hyperbola of which the asymptotes or limits are the line ω M *f* and a line at right angles with it through ω; the apex of this hyperbola will, therefore, be found by a mean proportional to the two co-ordinates of any point of the curve as drawn in our diagram.

The hyperbola R S V meeting in the point X the circle G X, upper edge of the conical bed joint of the annular vault, the point X is a point of the intersection M *x* X of the two bed joints. To find another point of that intersection, cut the surfaces by a horizontal plane at the level of *g*′, Fig. 148, mid point of F′ G′; this plane will cut the conical joint along the circle *g x* and the parabolic joint along a hyperbola *r x* similar to the one already drawn. The point *x* will be the point required.

For the upper joint of the arch stone E′ F′ G′ I′ H′, Fig. 148, the same operations are required as for the lower joint. The elevation plane for the circle on circle arch bed joint is taken, Fig. 151, perpendicular to the line ω N *e*. In finding the tangent, as the horizontal trace would be too far, we use instead the point θ where the tangent cuts the vertical plane ω O″. The point θ does not coincide with the point t'' in Fig. 149, but it is further up the line ω in *z*″. Place, therefore, the point θ', Fig. 151, at a hight $u'\theta' = \zeta\zeta''$, Fig. 149, and the line (*e* θ, N′ θ') is the tangent to the curve of the face arch. With this exception the operations are the same as for the lower joint. The upper edge of the bed joint will be a hyperbola *g s v*, of which the asymptote is the line ω N *e*. This hyperbola meets the circle H Y in the point of Y, which belongs to the intersection N Y of the parabolic bed joint with the conic bed joint.

Molds (Figs. 147–152).—Let the arch stone be limited on the annular vault by the meridian plane $\gamma\,\varepsilon$, and on the circle on circle arch by the vertical cylindrical surface $\alpha\,\beta$; the plan of the stone will then be contained within the outline $\alpha\,\beta\,\chi\,\gamma\,\varepsilon$ N α. To work the stone, begin by prolonging the cylindrical surface $\alpha\,\beta$ to the point δ on the meridian plane, and produce a prism of base $\alpha\,\delta\,\varepsilon$ N, and of hight equal to the difference of level of F′ and H′, Fig. 148.

On this prism we must delineate the intersections of the cylindrical sides $\alpha\,\delta$ and N ε with the soffit and the bed joints of the circle on circle arch. To do this, develop these cylindrical surfaces, Fig. 152, taking the distances $a'\psi'$, $a'\lambda'$, $a'\mu'$, $a'\theta'$, $a'\delta'$, equal to the arcs of the same denomination in Fig. 147; then carry above these points their hights, the levels of which are found in Figs. 148, 149. For the intermediary point λ'' a generator $\lambda\,\pi\,\omega$ has been prolonged to the point l_2, where it meets the outer face of the wall; then developing arc O″ l_2 in O″ *l*′, get the point *l l*″ on the ellipse, from which deduce level of λ''. The intersections of the soffit of the circle on circle arch by concentric cylinders are ellipses when developed, and therefore the curves $a''\,\lambda''\,\mu$, N″ $\pi''\,\eta''$, Fig. 152, are portions of ellipses, the major axis of which = the rectified arc of the sections, and the minor axis = the hight of the vault at the crown. To delineate the curve $a''\,\psi''$ intersection of the cylindrical face by the upper bed joint, take the hight $\psi'\,\psi'' = H\,H'$, Fig. 148, and to delineate the curve $\mu''\,\beta''$ of the lower bed take $\beta'\,\beta'' = G\,G'$. For intermediary points their levels are taken on Fig. 148, and the developments of the distances on the circles of the plan as shown before. In the second mold y'' N″ $\pi''\,\eta''\,\varepsilon''$ the intersection of the surface by that of the lower bed joint is not delineated, because this bed joint must not be prolonged beyond its intersection with the annular bed, where it forms a valley and not an arris. The development of the lower conical joint of the annular vault is also required; delineate it as in Fig. 148, G′ X″ M″ F′. The axis on the plane of the meridian section is at right angles with the ground line, and W″ is the center of arcs G′ X″, F′ M″.

Working the Stone—(Fig. 153). After having worked the operation prism of base $\alpha\,\delta\,\varepsilon$ N, Fig. 147, and of hight = to difference of levels of points F′ and H′, Fig. 148, as shown in Fig. 153, place on the convex and concave faces of the prism the molds of Fig. 152, then delineate the outlines y N′ $\pi\,\eta\,\varepsilon\,\varepsilon'$ and $\psi\,a'\,\lambda\,\mu\,\beta\,\delta''\,\delta'$, and also the straight lines a' N′, $\mu\,\eta$ and the hyperbola $\psi\,y$ taken from Fig. 147. Then cut away all the stone shown by dotted lines, the soffit of the circle on circle arch to be worked with a straight-edge $\lambda\,\pi$, the upper bed point with the help of a straight-edge sliding along the line a' N′ and the hyperbola $\psi\,y$ and held at right angles with the line a' N′. Then the stone will have the shape shown by the dotted lines in Fig. 154.

Now, Fig. 154, on the generators $\lambda\,\pi$, $\mu\,\eta$, . . . of the soffit of the circle on circle arch carry the lengths $\lambda\,\sigma$, μ M, . . . taken from Fig. 147, and delineate the curve N σ M, which will form the

* Continued from page 111, May issue.

† Notice, the plan drawn in Fig. 147 is supposed seen from above the vault; the joint lines on the extrados are therefore full, and those on the soffit are dotted.

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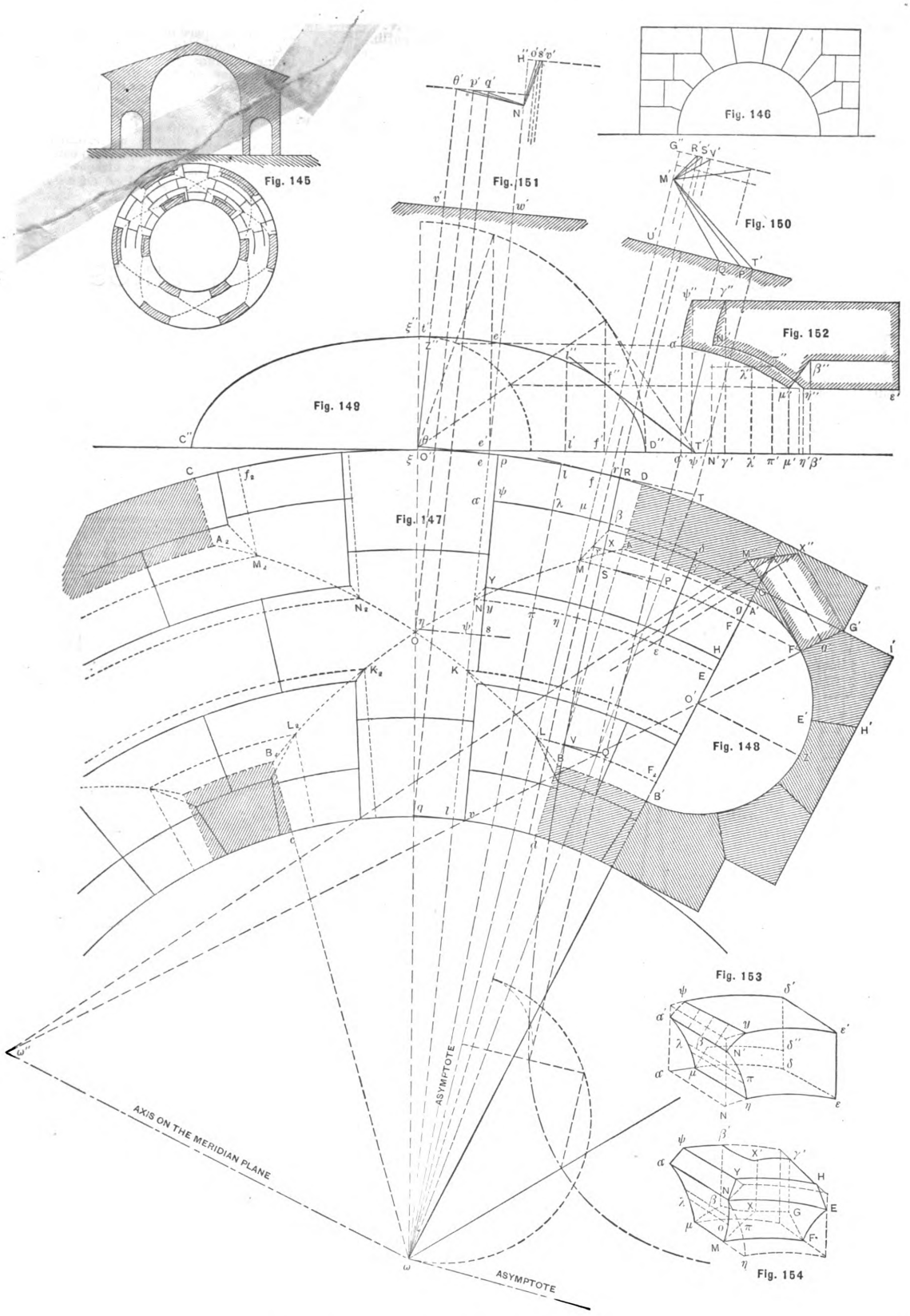

Masonry and Stone Cutting.—Figs. 145 to 154 Inclusive.

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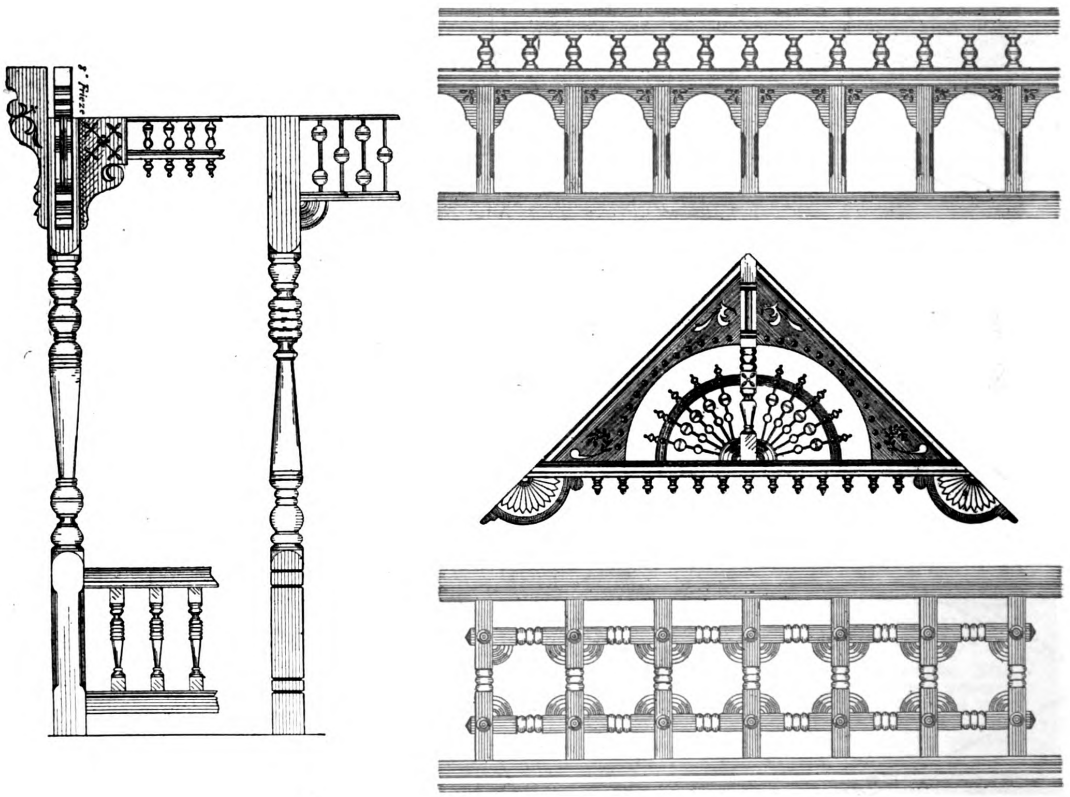
groin of the stone; draw similarly the curve N Y on the upper bed joint a N $y\psi$; then on the lateral face of the prism delineate the outline E F G γ' H from the section E' F' G' I' H', Fig. 148; and, lastly, delineate the arcs of circle N E, Y H, M F, either with a flexible straight-edge or with templets cut to the curves on plan, Fig. 147. The soffit of the annular vault is then cut with the help of the meridian section sliding on the lines N E and M F; the templet must be held in its proper position by means of guiding marks obtained from the plan. The upper conical joint of the annular vault is cut with the help of a straight-edge sliding on the arcs Y H, N E. Then mark on the upper plane the outline β' χ' γ' taken from the plan, and cut therefrom the two vertical cylindrical sides β' β χ χ', γ' G χ χ'; mark on these sides with a trammel the arc of a circle G χ and the arc of hyperbola B χ, then work the lower conical joint of the annular vault progressively until the mold F' G' χ'' M'', Fig. 148, can be neatly placed on it; thus the curve χ M intersection of the bed joints will be obtained. Lastly, the lower joint of the circle on circle arch is worked with the help of a straight-edge sliding on μ M and β χ and held at right angles with μ M.

The central space may be covered by a cupola, as shown in Fig. 145, forming a circular building, or by a semi-dome, as in a circular choir with surrounding aisles. The face arches on the inner ring wall are often designed to be circular, in which case begin by applying the semi-circular templet of the face arch on the inside wall, and deduce therefrom the outer face arch. The same also can be done with pointed arches, although the usual constructions are done on an entirely different principle.

DESIGNS OF VERANDA COLUMNS AND RAILINGS.

THE USE of ornamental railings, columns, gable ornaments, &c., in the construction of buildings, especially those designed for dwelling purposes, has grown to such proportions that it has become an industry by itself. Many manufacturers are engaged in this line of business and are producing designs both varied and extensive. From a catalogue recently issued by Paul O. Moratz of Bloomington, Ill., we have selected the designs of veranda columns and railings which are presented herewith. These designs which are turned out in large quantities by machinery made especially for the purpose, and add materially to the appearance of the buildings in connection with which they may be employed. The designs are turned out in a workmanlike manner and are carefully packed for shipment. The material employed is thoroughly seasoned and kiln-dried stock. Mr. Moratz is a practical architect, and has given special attention to the production of new and attractive designs of the character named.



Designs of Veranda Columns and Railings.

Asiatic Workmen and Their Tools.

A correspondent of the New York *Tribune* gives the following interesting description of the Asiatic workman and the primitive tools with which he works: One more illustration of the stage of advancement which has been reached by the mechanical geniuses of Amasia, I will borrow from a cutler's shop. Remember that it is the best work of men who are in the full heat of the struggle for life that we are noting. These cutlers have to compete in the streets of their city with the work of the men of Sheffield. And this is the device that they have been able to originate as the climax of ingenious machinery for the sharpening of knives. They have a grindstone mounted on an axle fixed on the platform of the little stall where they do their work. A rope is passed three or four times around the axle of the grindstone, and out in the middle of the narrow street, in front of the cutler's shop, stands a man with one end of the rope in each hand, gravely pulling away. When he pulls the right hand, the grindstone revolves toward him; when he pulls the left hand it revolves from him. By the grindstone squats the knife grinder cross-legged, obliged to turn the knife over every moment as the stone changes its course of revolution. There is something pathetic in the spectacle of these men who have wrestled with the problem of changing a reciprocating motion to a rotary one; have wrestled doubtless as valiantly as Edison with his mighty problems of electric dynamics, and then have given up the problems as insoluble, like the problem of the flying machine, and have settled down to such devices as the most favorable basis on which they can contest their market with the aggressive European.

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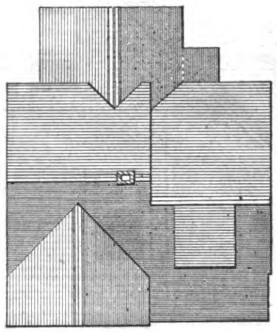
DESIGN FOR FIVE-ROOM COTTAGE.

THE dwelling illustrated by means of the floor plans, elevations and details presented herewith has been designed to meet the demand for a small house of moderate cost, combining economy of construction, convenience of arrangement and an attractive exterior. In the preparation of this set of drawings the architect, J. D. Sibley of Middletown, Conn., has intended that the house shall stand upon a lot with a width somewhat greater than that of the cottage, with the ground sloping gradually away on all sides. The position intended is such that the sills of the house shall be about 2 feet 2 inches above the grade line, this hight being sufficient for a cellar window and low enough to render rails to the steps unnecessary. The cellar extends under the entire house. The foundations are to be of local building stone, 16 inches thick, projecting 4 inches outside and inside of the underpinning and built up from 3 inches below the cellar bottom to the grade line. The underpinning is of 8-inch hard burned brick. The cottage is of balloon frame, sheathed with good square-edged stuff, surfaced to a uniform thickness, and laid with close joints edge to edge. Over the sheeting boards is placed building paper, and this in turn is covered with weather boarding and shingles, as indicated in the elevations. The roof is covered with shingles. Reference to the drawings will show that the veranda and hood roof are continuous with the main roof, this plan resulting in economy of construction, while giving attractiveness of design and at the same time preventing troublesome leaks. The single chimney, which is made to answer for the entire house, has an extra large flue pierced on the first floor for the parlor and dining room. The kitchen stove connects with it by means of pipe, which passes through the attic floor, through the partition between the attic and the stairway and above the landing. Where the pipe passes through the floor and partitions the wood is protected by double tin or sheet-iron thimbles.

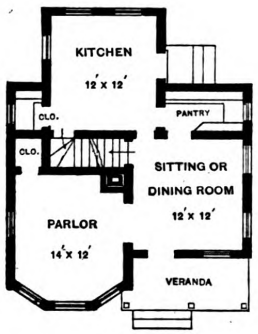
The plans show three rooms upon the first floor, consisting of parlor, sitting or dining room and kitchen. These are of convenient shape, and are arranged with a view to meeting the requirements of a small family. The sitting or dining room opens directly from the veranda and connects with the parlor by means of folding doors or *portières*. The kitchen is in an extension in the rear and connects directly with the dining room through a door, and indirectly through a conveniently arranged pantry. The kitchen has been planned in such a way as to bring the coarser work, such as the handling of pots, kettles, pans and stove utensils, near the sink and tin closet, the location of which is shown on the floor plan. This closet is provided with broad shelves for mixing purposes and a place beneath for a flour barrel, the lid being hinged. The pantry is fitted with copper sink for washing china, silver and glassware, and is designed to save steps between the pantry and sink. The stairs leading to the cellar are directly under the main stairs, thus economizing space. Upon the second floor are two sleeping rooms, with closets to each of good size, and also a linen closet. Over the kitchen is an attic, a portion of which could be utilized as a bathroom in case the cottage were located where there is a water service. The entire arrangement of rooms has been made with special reference to economy of labor



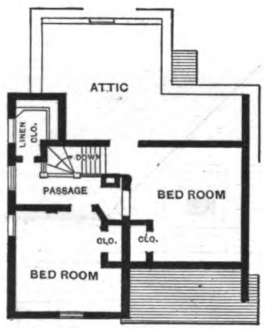
Front Elevation.—Scale, ⅛ Inch to the Foot.



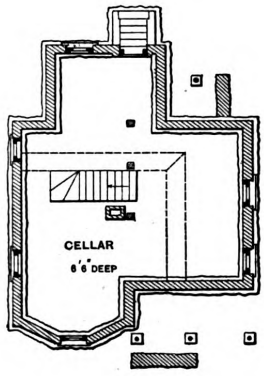
Roof Plan.



First Floor.



Second Floor.



Foundation.

Scale of Floor Plans, 1-16 Inch to the Foot.

Design for Five-Room Cottage.—J. D. Sibley, Architect, Middletown, Conn.

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and to save the busy housewife as many steps as possible. A dwelling is now being erected in Middletown from these plans for Frank Sneath of Farmington, Conn.

Working Agreement of Chicago Carpenters.

The working rules adopted by the joint committee of Carpenters' and Builders' Association and United Carpenters' Council of Chicago, in effect April 13, 1891, to April 1, 1893, are as follows, to be enforced during the continuance of the contract, unless otherwise ordered by the joint committees:

1. That the working day shall be eight hours, commencing at 8 a.m. and ending at 5 p.m., but the noon hour may be curtailed by special agreement between the contractor or his representative and a majority of the employees, but not in such a manner as to permit more than eight hours' work. But if two or more shifts of men are worked in one day the same men shall not work on more than one shift, and such shifts will not be considered overtime.

2. That the pay shall be by the hour.

3. That the minimum rate of wages shall be 35 cents per hour from April 13, 1891, to April 1, 1893, inclusive.

4. That overtime shall be rated as time and one-half, and Sunday time shall be rated as double time.

5. That all journeymen carpenters shall receive their pay as often as once in two weeks; but when a journeyman is discharged he shall be paid on the day of his discharge or on demand at the office.

6. That the apprentice system shall be governed by the State law.

7. No member of the Carpenter and Builders' Association shall during the term of this contract make a reduction in the rate of wages of a carpenter without giving him due notice previous to making said reduction. This article shall in no way be construed as conflicting with Article No. 3.

8. No member of the Carpenters' and Builders' Association shall sublet or piece out their carpenter work. Neither shall any journeyman who is a member of any association represented in the United Carpenters' Council be permitted to take piece work in any shape or manner from any owner or contractor, whether man... member of the Carpenters' and Builders' Associ... he be a ...iation or not.

9. Any journ... ...neyman carpenter, being a member of any orga... ...ganization represented in the United Carpenters' ... Council, may work for any person who does not pay ... less than the minimum rate of wages.

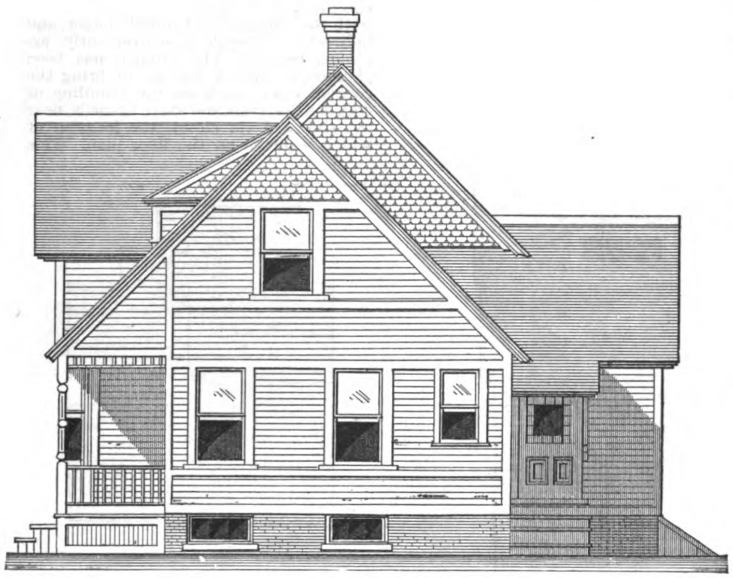
10. Any member of the ... Carpenters' and Builders' Association may at his ... discretion employ one helper to every five carpenters ... on each job, who shall be at liberty to use a saw, hammer and hatchet at any work on the job, and the rate of wages shall be as agreed between the employer and employee.

11. All apprentices now in the employ of any member of this association shall complete their apprenticeship with such member.

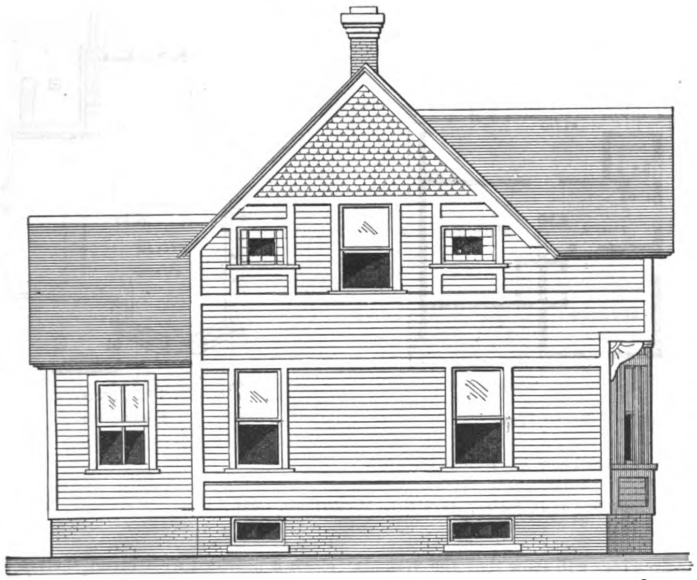
12. Any infraction of the provisions of this agreement by a member of either association, parties to this contract, shall be reported to the chairman of the respective arbitration committees, and to be by them investigated, and upon sufficient proof of the violation of any of the provisions of this contract, he or they shall be fined. The amount of fine to be determined by the joint committee. Upon non-payment of the fine, he or they shall be suspended from the association of which he or they are members; and it is further agreed that no employer shall again employ said journeyman carpenter while such fine remains unpaid. And no journeyman carpenter shall work for any employer who has been fined and the same remains unpaid.

Wilbur F. Behel, Francisco Blair, W. Irving Clark, Wm. Maror, John Ramcke, committee Carpenters' and Builders' Association.

J. Gilbert Ogden, George W. Blackford, J. B. Cogswell, J. H. McCune, Robert Whimsett, committee United Carpenters' Council.



Side (Right) Elevation.



Side (Left) Elevation.

Design for Five-Room Cottage.—Elevations.—Scale, ⅛ Inch to the Foot.

Rubbed Brick Moldings.

Some architects are so particular about having the profiles of all moldings worked according to their own designs, says a recent issue of the *Brick and Tile Journal*, that they refuse to avail themselves of the molded bricks which can be obtained ready manufactured, notwithstanding the fact that the latter can be obtained in almost endless variety. Of course the time and expense that would be involved if molded bricks were specially manufactured for every new building would not be contemplated, and so recourse is had to the process of rubbing to produce the moldings required. This method has certain advantages. It enables the architect to vary his moldings as much and as often as he pleases; and, in connection with parts placed near the eye, it enables the slightest irregularities to be removed, either before or after the work is built, so that the whole will be perfectly even at the joints—a point which is particularly appreciable in relation to arch moldings. But that the system has its disadvantages cannot be denied. The process of rubbing removes that protecting outer skin which the brick has acquired in the process of burning, and, although the action of a smoky atmosphere, like that of London, is supposed in some degree to remedy this, yet we must consider, when we are using rubbed brick moldings, that we are not putting up work which will defy the assaults of the weather for an unlimited period.

Red rubbers are frequently preferred, on account of their color, for the class of work referred to, and they are probably the easiest to rub, and therefore the most liable to be worn away. Architects should endeavor to arrange their moldings in such a manner as to be least exposed to the destructive influence of the weather. Acute, prominent angles and under-cut hollows should be avoided, and when we are not dealing with Gothic work this is easily done. There is a peculiar charm about bold ovolos and cushion moldings in red brick, and strong lines of shadow can be obtained by means of deeply cut quirks without any danger of weakening the section.

There is no difficulty about rubbing moldings whose sections comprise the most delicate gradations of curvature,

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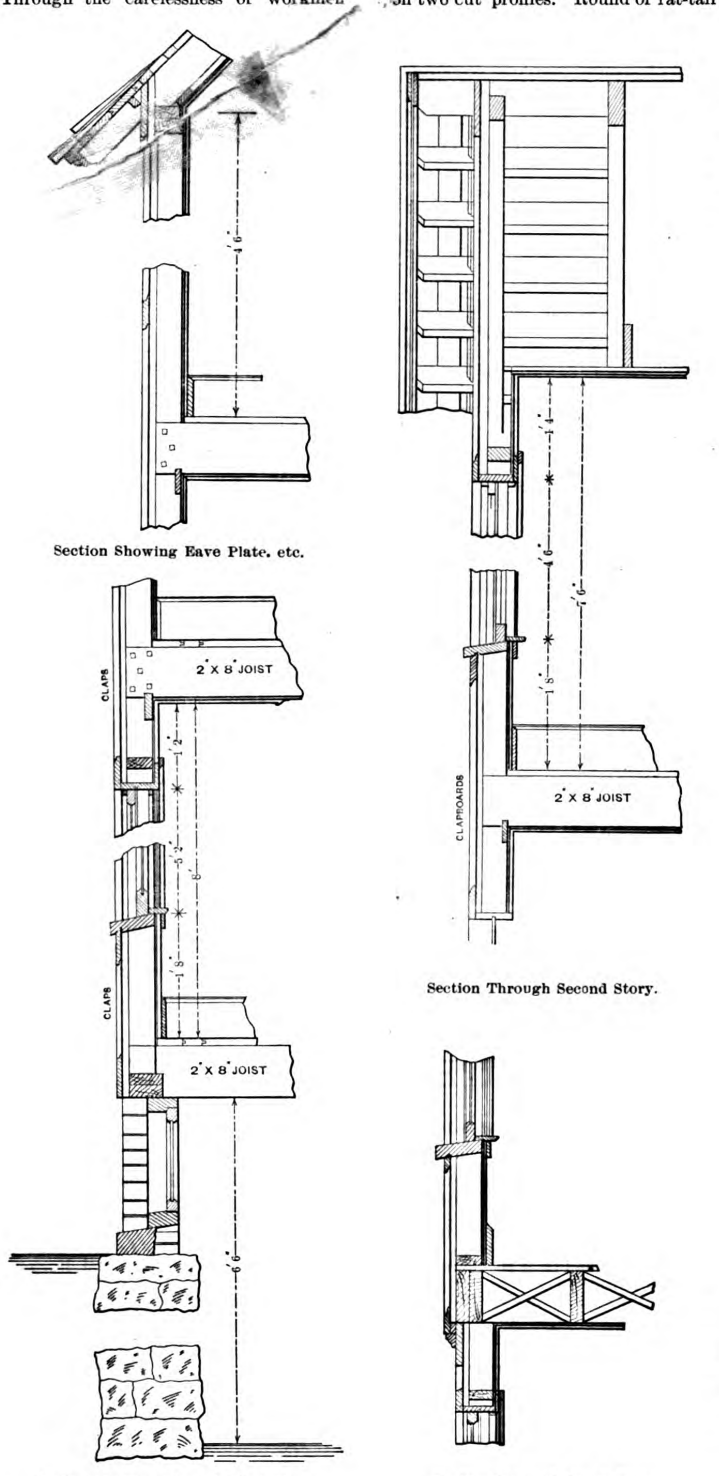
provided that proper precautions be adopted. The brick should be firmly wedged into a box having a cut profile at each end for the tool to work upon. Through the carelessness of workmen [illegible] expedients are often adopted. F[illegible]nich are parallel from end to end w[illegible]roduce regular moldings, even in [illegible]ost unskillful hands, when they rest [illegible]n two cut profiles. Round or rat-tail



Section Showing Eave Plate, etc.

Section Through Second Story.

Vertical Section Through First Story.

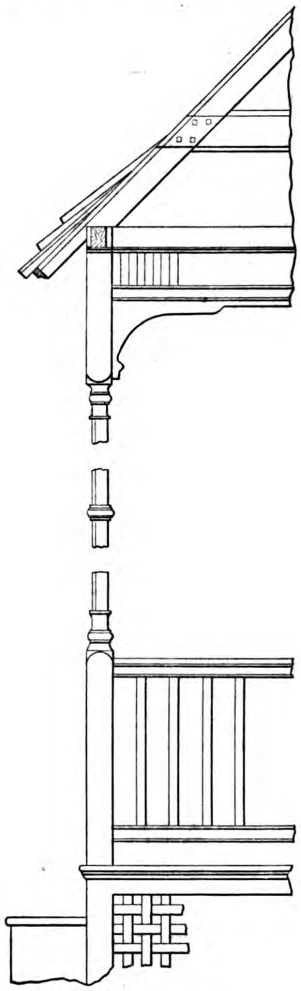
Section Through Front Bay.

Details of Five-Room Cottage.—Scale, ¼ Inch to the Foot.

only one profile is sometimes used, with the result that the moldings produced are not uniform in contour. Various files are useful for this kind of work, although the files are useful for hollows; swaged and curvilinear files do for working convex sections, and banking and feather-edged files are almost indispensable in forming deep quirks. But many bricks are so soft that portions of them can be rubbed away with a wooden ruler—a sign that durability must not be expected.

Composition for Retarding the Setting of Plaster.

Edward Watson of Grand Rapids, Mich., gives the following description of a composition for retarding the setting of plaster, which may prove interesting to our readers: I take the clean-washed hair as it is prepared for plastering, and reduce it to a solution in water by boiling it with an alkali—caustic soda or potash.



End of Veranda.

In practice I use sal soda or soda ash, and render it caustic by boiling with enough lime to combine with the carbonic acid, and thus form a solution of caustic alkali. I mix all the materials together—hair, soda and lime—add water and boil until the hair is entirely dissolved and a limpid solution is made. After effecting the complete solution of the hair it may be used in the liquid form and thus mixed with the water in which the plaster is to be mixed, or it may be reduced to a dry mass and finely powdered, and then mixed with the dry calcined plaster, so as to be ready for use by mixing with water. The proportions of material used in forming the solution of hair are as follows: Hair, 1 pound; sal soda or soda ash, or an equivalent of potash, 1 pound; lime, ½ pound; water, ½ gallon or more. Mix all together and boil until the hair is en-

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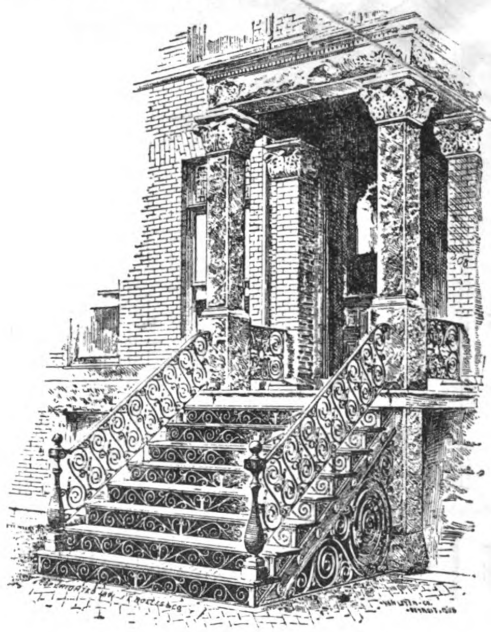
tirely dissolved. If desired to be used in the liquid form the clear liquid may be strained out and at once mixed with the plaster, or the entire mass may be reduced to a dry powder and then mixed with the dry calcined gypsum either before or at the time of mixing the mortar. This makes an excellent material for restraining the setting of plaster. It is freely soluble in cold water, and thus intimately mixes with the mortar and produces uniform results, and appears to render the resulting plaster harder when dry than plaster set without any restraining material. The quantity of my material to be used with each ton of calcined gypsum will depend upon the time desired to retard the setting of the plaster. About 5 pounds to a ton will be all that is required for general use. Too much would so set the plaster back as in many cases to be impracticable.

A Handsome Piece of Iron Work.

The use of artistic iron work in connection with buildings of both a public and private character, is rapidly growing in favor by reason of the charming effects which may be produced. A very happy illustration of this is found in connection with the block of dwellings recently erected for Sidney D. Miller of Detroit, Mich. The work consists of front entrance steps turned out by J. E. Bolles & Co. of that city, from designs prepared by Architect Grodon W. Lloyd. An idea of the appearance of these steps and the effect of the artistic iron work is clearly indicated in the accompanying illustration. The stringer and treads are made of cast iron, the newel posts and risers are of wrought-iron scroll work, as are also spandrel railings and hand rail. The porch and columns are of stone, beautifully carved, the whole design combining to produce an exceedingly rich effect.



A Handsome Piece of Iron Work.

Art Schools.

In England, one of the first efforts in the direction of systematic art training was made by Sir Godfrey Kneller, who in 1711 founded an institution for giving professional instruction in design. In 1724 Sir James Thornhill established a similar academy in his own residence. The well known St. Martin's-lane academy, founded by William Shipley, where for 30 years those who afterward became the leading artists of the time received their training, was superseded by the schools instituted by the Royal Acadamy after its foundation in 1768. The establishment of the South Kensington Department of Science and Art marks an important epoch in the history of art instruction in England. It may be said to have arisen out of the report of a Select Committee of the House of Commons appointed in 1835, "to inquire into the best means of extending a knowledge of the arts and principles of design among the people (especially the manufacturing population) of the country." On the recommendation of this committee a sum of £1500 was devoted to the establishment of a Normal School of Design, with a museum and lectures. The school was opened in 1837, and by 1851-2 the government grant for this school and its various branches throughout the country had attained the amount of £15,055. In 1852, in accordance with a report of a Select Committee, the scheme was reconstructed, and a "Department of Practical Art" created, with Sir Henry Cole, K.C.B., as superintendent; and a science department was added in 1853. It was under the management of the Board of Trade till 1856, when it passed under the control of the lord president and the vice-president of the council on education. In 1886 the number of schools and branch schools under the Science and Art Department throughout Great Britain was 226, in which a total of 40,134 students were being trained. The South Kensington Museum, founded in 1851, has played an important part in the art education of the country.

ARCHITECTURAL PERSPECTIVE.

By F. JERMAN.

PERSPECTIVE is that branch of drawing which enables us to represent objects as they appear to the eye, while geometry shows objects as they really exist. For example, Fig. 1 shows front and end of a building, drawn in geometry, to the scale of 12 feet to an inch, and Fig. 3 the same in perspective. The reader will notice that the corner of the building furthest from the spectator is not shown as high as the one nearest him; but by referring to the elevation, Fig. 1, he will find that in reality they are of the same hight. Thus, the further the vertical lines are from the eye the less will be their apparent hight.

The horizontal lines in Fig. 1 are all parallel, while in Fig. 3 they incline toward two certain points called vanishing points, on the line known as the horizontal line, which latter is supposed to be on the same level as the spectator's eye. All the horizontal lines above the eye run down to it, and those below run up. The ground, base or picture line, for it is called by these three names, in this example touches the bottom of the nearest corner of the building. This ground line forms the bottom edge of the picture plane. In Fig. 3, A B C D represents the picture plane. It is an imaginary plane or surface between the object and the spectator, and on it the picture is supposed to be drawn.

In Fig. 3 the horizontal line is drawn at 5 feet from the ground line, which is the average hight of a man's eye from the ground when standing.

The point of light or center of vision is a point in the horizontal line immediately opposite the spectator's eye.

The station point is where the spectator stands, and the view is taken.

The line of direction is an imaginary line drawn from the station point to the point of light. This line and the station point can be best seen in the plan, Fig. 2.

The method of drawing the perspective, Fig. 3, from the geometrical drawings is as follows: First draw the picture plane, then put the plan touching it, with the point at an angle of 30° and the end at 60°; draw the line of direction 18 feet from point of light to station point. Then draw lines from the latter parallel with the sides of the plan and produce them to the picture plane. Where they touch it will become the vanishing points of the plan.

Draw the ground line further down in the paper, with the horizontal line at 5 feet above and parallel with it. Drop lines from the vanishing points on the plan to the ground line below to form the sides of the picture plane; where they meet the horizontal line will be the two vanishing points of the perspective; then draw lines from the corners of the building and the doors and windows to the station point. Where they cut the picture plane produce them below and they will form the vertical lines of the perspective.

Measure off the hights of doors, windows and roof on the nearest corner which touches the picture plane. The horizontal lines on the left run toward vanishing point 1, and in like manner those on the right incline to vanishing point 2. Draw in firm lines where the vertical and horizontal lines form door and windows, &c.

To find the ridge of the roof measure off on the front elevation the hight from

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ridge to eaves, and put them on the upright measuring line, and draw from thence to vanishing point 1; where it intersects with the vertical line from the middle of the end of building shown on plan is the nearest edge of the ridge E. Draw from E to vanishing point 2. The other end is found by drawing a line from plan in the same manner to F. E F is the ridge line. Draw in the gable and the perspective is complete.

In the following examples the terms used in perspective will be abbreviated thus:

Picture plane	P. P.
Ground, picture or base line	G. L.
Point of light or center of vision	P. S.
Station point	S. P.
Vanishing point	V. P.
Horizontal line	H. L.
Line of direction	L. D.

Fig. 4 shows the front elevation of a terrace house, with dwarf wall and railing, 8 feet from the face of the main wall, which is required to be put in perspective.

The reader will find that the best angle for a perspective of this description is one about 15° or 20°, or even less. If it is more than 30° the picture will look cramped and appear to be made up almost entirely of vertical lines, and the horizontal lines will be very short. Put the station point too close to the object and the same effect is produced. In this example the station point is shown 36 feet from it. Supposing it is placed further back, the perspective will become broader, and the nearer you approach the picture plane the narrower it will appear.

The front line in Fig. 5 is shown at 20° with the P. P. and the H. L. is 10 feet high. The first difficulty the reader will find is in the three-sided bay window. This can be got over by making a square bay of it, as shown, with the nearest corner touching the P. P. at A. Produce this line to B, and B will become the vertical measuring line of the perspective, and all the lines will be first measured on it.

The P. S. is shown at 3 feet 6 inches to the left of A. Draw the lines required from the vertical lines of bay and door and windows, as shown in the plan, to the station point, as explained in the first example. Most of these lines are omitted in Fig. 5, so not to produce confusion in the lines of the perspective, and to show more clearly to the reader the method of obtaining the bay window and chimneys. Lines are then drawn vertically from where they touch the picture plane, and the hights set up on A B to meet them, and produce the string courses and windows in the front of the bay.

To obtain the architectural features of the main front, the hights must be first measured on A B, then transferred to the line C D by vanishing them to V. P. 2. From the line C D they must vanish to V. P. 1, to meet the downward lines, and thus form the door and windows. The V. P. 1 is such a distance on the left that it could not be shown on the sheet; but the reader can easily find it by drawing two of the horizontal lines to meet each other on the horizontal line.

The roof of the bay is easily procured, as the finial is just over the face line of the house. First measure the hight on A B and then transfer to C D, and vanish to meet the line from the finial shown on the plan. The hight of the finial is obtained in the same way. Then draw the hips of the roof to the corners of the bay to base of finial. The eaves of the roof are obtained in the same manner, as explained in Fig. 3.

The chimneys are first measured from the elevation, and put in on line A B, and, in turn, transferred to C D, E F, and G H, whence they are vanished to V. P. 1.

Where the railings touch the P. P., produce the line I J; then from J measure 3 feet for the wall and 4 feet for the railings. Vanish the horizontal lines to V. P. 1. In a future example the method of obtaining gate piers and a gate will be shown; meanwhile, the reader could try and get them himself from the rules before mentioned.

He should thoroughly study the drawing, and see how the bay windows and the chimneys, and particularly the line G H, are obtained from the plan.

Next draw in the parapets between the houses and the arches, windows and rainwater pipes, and the door and panels, with fanlight above, and anything else to finish the drawing. Directions will be given for finishing line perspectives, with shadows, &c., in the course of these papers.

Fig. 6 shows the best method of putting circular lines in perspective. This circle is supposed to lie flat on the ground, 16 feet in diameter and 10 feet to the left of spectator, and touching the P. P.

First draw the plan and inclose the circle within a square with 20-foot sides. Draw the diameter and diagonals, and where the latter cut the circumference draw lines C D and G H parallel with the diameter E F. Draw lines from B D F H and J direct to the ground line below; as they are all on the P. P., they will not have the first drawn to the S. P., and vanish them to K.

Then draw the line from A to the S. P., and where it touches the P. P. drop a perpendicular to touch at A on the line below. Draw A I parallel with B J. Put in the diagonals and draw the circle required freehand through the points corresponding with those on the plan above.

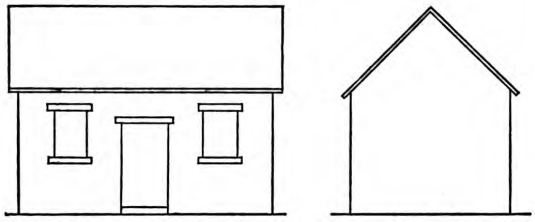
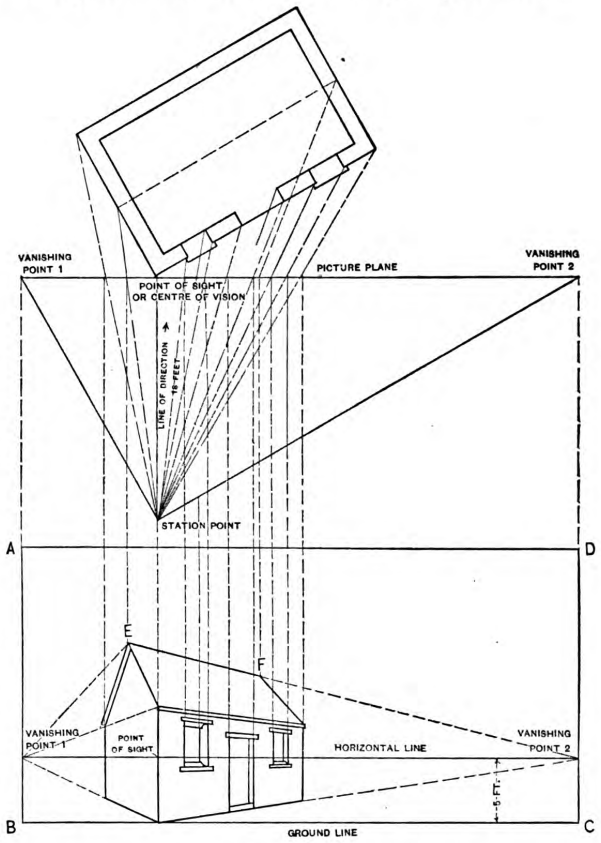


Fig. 1.—Elevation and End View of Building Shown in Perspective in Fig. 3.



Figs. 2 and 3.—Perspective and Plan of Building Shown in Fig. 1.

Architectural Perspective.

What "Staff" Is.

The building material called "staff," not "stuff," of which it is proposed to construct the Chicago exposition buildings, was invented in France about 1876, for use in the construction of the buildings for the Paris Exposition of 1878. Its first use was in those buildings, but it has been largely used ever since throughout Continental Europe. The name "staff" is a French word, without any inherent significance, and was invented when the material was invented. Staff is composed chiefly of powdered gypsum, the other constituents being alumina, glycerine and dextrine. These substances are mixed with water, without heat, and cast in molds, in any desired shape, and allowed to harden. The color is a dark shade of white, and other colors are produced by external washes, and not by new ingredients. To prevent brittleness the material is cast around a piece of coarse cloth or bagging, or, more commonly, loose oakum. The casts are generally shell-like, and are not more than ½ inch thick, but may be several inches thick. They may be in any conceivable form, in imitation of cut stone, rock-faced stone, moldings, carvings, and the most delicate floral ornaments. For the lower portions of walls, which are exposed to rough usage, the material is mixed with

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cement, which makes it so hard that wagons may run against it without injuring it. When well made, staff is impervious to water, and is as permanent a building material as marble or granite, though it costs less than a tenth as much. Several specimens of this material, in slabs about 2 feet square, have been left with Chief of Construction Burnham as samples, and have excited admiration. Any one can manufacture it with a little instruction. It is by no means certain that the exposition buildings will be faced with staff. All that has been settled is that they will be faced with that or some similar material, such as terra cotta or the other French invention, "carton pierre." These other kinds of material, however,

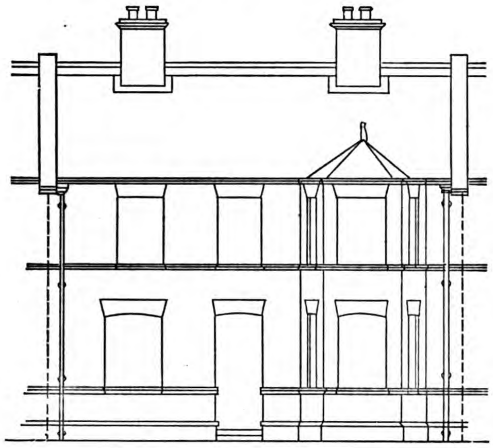

Fig. 4.—Front Elevation of a Terrace House.

have a poor show for competing with staff. They are dearer, heavier, and not near so strong or beautiful. "Carton pierre" means "stone cardboard," and is made of paper pulp, whiting, glue and rosin.

THE HISTORICAL FRIEZE which will ornament the third story of the Barnum Institute of Science and History about being erected for the Scientific and Historical Societies at Bridgeport, Conn., will contain five panels, the figures being about one-half life size. The first, with its group of Indians in the foreground, a canoe, the warrior on horseback with shield and spear, represents Bridgeport during the year 1690. The next panel shows the early settlers reclaiming the virgin soil, hunters returning from the forest, farmers plowing the field, and the dawning life of civilization. The second panel indicates the period of 1760. The third and central panel shows Bridgeport in the year 1810, when schooners were sent on their coasting expeditions from this port, and when whaling vessels could often be seen in the harbor. The fourth panel indicates Bridgeport during the year 1861; volunteers have answered the call to arms and Bridgeport's quota of brave boys are assembled ready to march to the scene of action. The fifth and last panel shows Bridgeport in 1870, beginning her career of prosperous manufacturing industry, with the Rosedale dock in the foreground and factories in the distance.

THE NEW BUILDINGS in 25 cities of this country, having an aggregate population of 7,500,000, says an exchange, reach an aggregate during the year 1890, 61,420, and the estimated value $226,351,691. The total population of the country was about eight and one-half times that of the cities named, the cost of the new buildings during the year in all other cities and towns of only one-half as great per capita as the cost in the cities named would aggregate about $850,000,000, making the total for the entire country over $1,076,000,000.

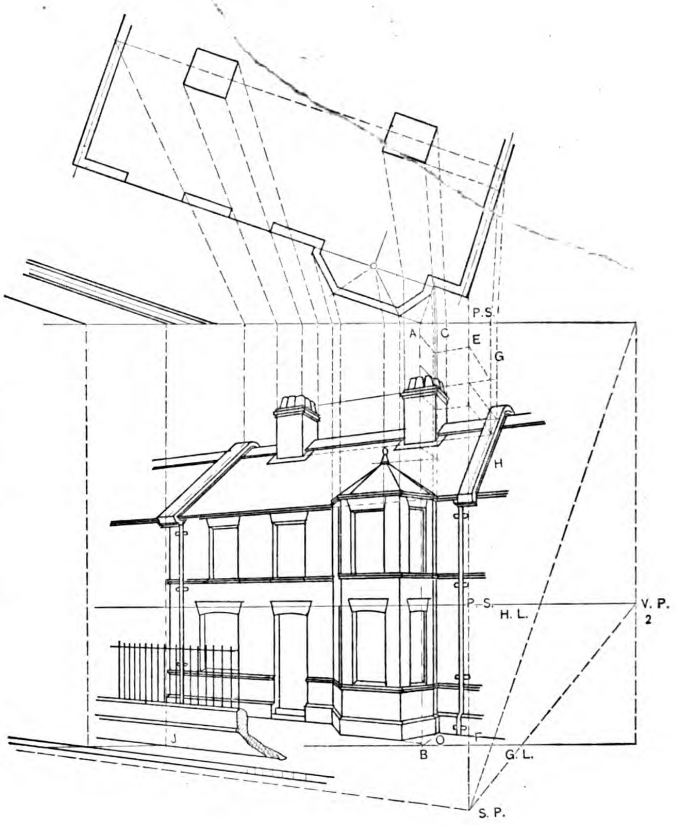

Fig. 5.—Perspective and Plan of House Shown in Fig. 4.

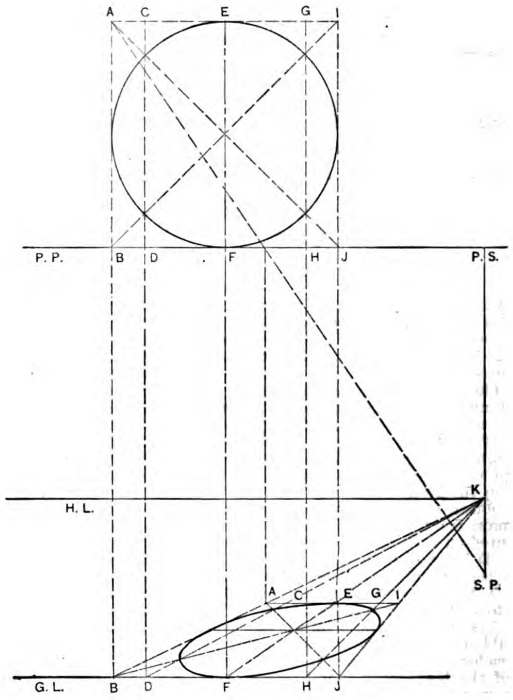

Fig. 6.—Drawing a Circle in Perspective.

Architectural Perspective.

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LAW IN THE BUILDING TRADES.*

MECHANIC'S LIEN IN INDIANA.

IN INDIANA, the fact that the notice filed in a mechanic's lien case claims a lien for more than the claimant is entitled to will not defeat the lien where no one has been prejudiced by the mistake. Failure to state in the notice of a claim for materials furnished to the contractor whether the amount is due or whether the material man gave credit to the contractor does not affect his lien as against the owner. A verbal notice of lien by a material man to the owner is sufficient. Where a material man signs a writing that he is willing to hold the contractor personally for lumber furnished, "and release my right to take a lien, provided he receives the amount due him for the erection of said house," whereupon a building association advances some of the necessary money to the owner, who pays only part of it to the contractor, the material man's lien is not thereby released.—Albrecht *vs.* C. C. Foster Lumber Company, Supreme Court of Indiana, 26 N. E. Rep., 157.

LIABILITY FOR DISTURBANCE OF BUILDING.

The owner of two adjoining lots with buildings thereon, part of one of which was occupied by a tenant under a written lease, contracted for the removal of the other building, giving the contractor sole charge of the work, and requesting him not to interfere with the walls of the adjoining building. In an action by the tenant against the owner for injuries to his property by the removal of the walls of the other building, leaving part of his premises exposed, it did not appear that the lease contained any covenant to repair or keep in repair the premises, or that the adjacent property should remain in the same condition as at the time of hiring, nor was it claimed that there were any false representations as to the condition of the premises; and the evidence justified a finding that no disturbance of such premises was contemplated by the owner when he made the contract, or was necessarily involved in doing the work under it. There was nothing in this showing to justify a recovery by the tenant from the landlord.—Ratter *vs.* Goerltiz, Common Pleas of New York, 12 N. Y. Supp., 210.

NOTICE OF MECHANIC'S LIEN.

In a notice of a claim of lien for work and materials furnished a corporation, whose name is the "Installment Building and Loan Company," under a contract made with the corporation itself, it is an immaterial variance that the defendant is styled the "Installment Building and Loan Association." As a foreclosure of a mechanic's lien is a proceeding cognizable in a court of equity, the mere fact that defendant in such a suit interposes a counter-claim for damages, as he is allowed to do by the laws of Washington, is not sufficient to divest such court of its jurisdiction and to entitle defendant to demand a trial by jury. Installment Building and Loan Company *vs.* Wentworth, Supreme Court of Washington, 25 Pac. Rep., 298.

RIGHTS OF SUB-CONTRACTORS TO MECHANICS' LIENS.

Where a contract to build houses between the owners and principal contractors stipulated that, before the last payment shall be due, the contractors shall furnish releases from all persons having a right of lien against the houses or property on which they are located for any work or materials, sub-contractors were not deprived thereby of their right to file mechanics' liens.—Murphy *vs.* Morton, Supreme Court of Pennsylvania, 20 At. Rep., 1049.

PROVISION FOR ARBITRATION IN CONTRACT.

Where a building contract provide that "any question in regard to the quality or quantity of the work shall be referred to the superintendent, whose decision shall be final," the contractor cannot recover for a disputed claim under said contract which he has refused to submit to the superintendent. Where no exception is taken to the reservation of a point as a question of law, objection thereto cannot be taken on appeal.—Fulton *vs.* Peters, Supreme Court of Pennsylvania, 20 At. Rep., 936.

LIABILITY FOR FALLING BUILDINGS.

The owner of a building is responsible for the damage occasioned by its fall when it is caused by his neglect to properly brace it so as to prevent its fall; but the damage may be reduced according to circumstances, if the owner of the thing has exposed it imprudently. When a building threatens ruin, the neighbor has a right of action against the owner to compel him to cause such a building to be demolished or propped up. In the meantime, if there be danger of any damage by its fall, he may be authorized to make the necessary works, for which he shall be reimbursed, after the danger shall have been ascertained.—Factors' & Traders' Ins. Co. *vs.* Werlein, Supreme Court of Louisiana, 8 South. Rep., 435.

PERFORMANCE AND CONSTRUCTION OF CONTRACT.

When a contractor in good faith substantially performs a building contract, he can recover on the same, less a just reduction for slight defects or omissions. A provision in a contract that "all flooring to be laid smooth and level, and free from knots," means free from all kinds of knots, both hard and soft. The evidence as to the number of knots being conflicting, it was for the jury to determine whether such knotty condition was a trivial or material violation of the contract.—Rust *vs.* Wagner, City Court of Brooklyn, 12 N. Y. S., 2.

DEFECTIVE PROOFS OF FIRE INSURANCE LOSS—CHANGE OF OCCUPANCY AND TITLE.

When there are defects in the proofs of loss, whether formal, substantial, or, indeed, in any respect, which could have been supplied if specific objections had been made thereto by the underwriters, a failure on their part to object to the proofs on that ground, or to point out the specific defect, or call for information omitted, within a reasonable time, is considered a waiver, however defective, informal or insufficient such proof may be. If it is essential for an underwriter to know by what title the insured holds the property insured that inquiry should be made at the time of issuing the policy, and not deferred until after a loss has occurred. Whenever there has been a change of occupancy or of business or the erection of additional buildings adjoining or near by the insured property, the question whether there has been a material increase in the risk or not is a question of fact to be determined by the jury, but whether an increase of risk avoids the liability of the insured is a question of law for the court.—Peet *vs.* Dakota F. & M. Insurance Company, Supreme Court of South Dakota, 47 N. W. Rep., 532.

MECHANIC'S LIEN ON SEPARATE LOTS.

Under the code of Virginia, 1873, which provides that persons "performing labor or furnishing materials for the construction, repair or improvement of any building or other property, shall have a lien upon such property," a sub-contractor who furnishes materials for the construction of two houses erected under a single contract on lots on opposite sides of the street has a joint lien on both houses and lots for the entire amount of materials furnished for both houses.—Sergeant *vs.* Denby, Supreme Court of Appeals of Virginia, 12 S. E. Rep., 402.

CONSTRUCTION OF BUILDING CONTRACT.

A provision in a building contract that "no new work of any description done on the premises, nor work of any kind whatsoever, shall be considered as extras unless a separate estimate, in writing, for the same before it is commenced shall have been submitted by the contractor to the superintendent and proprietor, and their signatures obtained thereto," may be subsequently waived by parties by verbal agreement. The owner of a building is liable for work and materials furnished by the contractor in its construction not called for by the original written contract, where the owner or his authorized agent, by a subsequent oral agreement, promised to pay therefor, or knew that the contractor would charge for the same as extras, and assented thereto or permitted the same without objection. Where a contractor omits to furnish materials called for by his contract he is liable therefor in damage to the owner. The contract provided for the completion of the buildings by a specified date, "provided there be no interference from labor strikes." The fact that the mechanics quit work upon the building on account of the contractor failing to pay them their wages as agreed did not release the contractor from completing the building by the time agreed upon.—McLeon *vs.* Genius, Supreme Court of Nebraska, 37 N. W. Rep., 473.

MECHANIC'S LIEN FOR LABOR AND MATERIAL.

Where a corporation, organized to manufacture and furnish vapor for cold storage, contracts to furnish and erect machinery on its own land, and also to furnish and lay pipes through the streets to convey the cold vapor to its customers. The Code of Tennessee provides that "there shall be a lien upon any lot of ground or tract of land upon which a house has been constructed . . . or fixtures or machinery furnished or erected," in favor of him who furnishes the materials or does the work. And as the pipes are essential to its operation and are an integral part of its plant, the contractor is entitled to a lien on the land that will cover the value of the material and labor furnished in connection with the pipes, as well as in connection with the machinery erected on the land itself.—Steger *vs.* Arctic Refrigerating Company, Supreme Court of Tennessee, 14 S. W. Rep., 1086.

MECHANIC'S LIEN—FILING ACCOUNT.

Although the mechanic's lien is given on "the building" by Mansf. Dig. Ark., it is not necessary under an entire contract to furnish materials for seven houses situate on contiguous lots to file a separate account of the material furnished each house, but the whole seven may be charged with the lien by filing a single account of all the materials furnished. Tenny *vs.* Sly, Supreme Court of Arkansas, 14 S. W. Rep., 1091.

Pittsburgh Carpenters' Strike.

As many of our readers are doubtless aware the carpenters of Pittsburgh, Allegheny City and vicinity went out on strike May 1, owing to the refusal of the master builders to reduce the working day to eight hours, with compensation at the rate of 35 cents per hour. The average wages paid previous to the commencement of the strike is said to have been $2.75 for a working day of nine hours. A large force of workmen in the cities named and their immediate vicinity are now idle, their number being estimated to exceed 1000. Several meetings have been held with a view to adjusting the differences existing between employers

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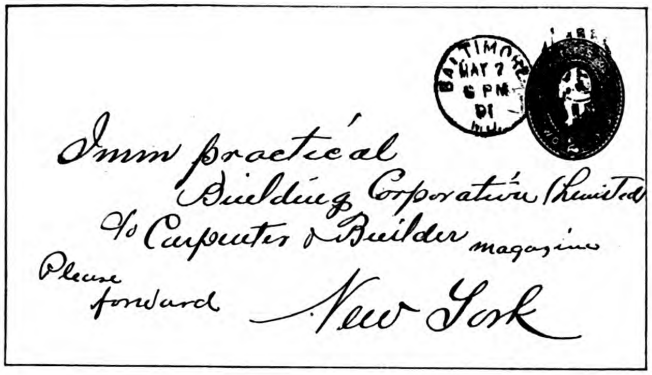
and workmen, but up to the hour of latest advices, Friday May 22, the situation showed no important change. A conference between P. J. McGuire, General Secretary of the Carpenters and Joiners of the United States, and a number of the prominent members of the Builders' Exchange in Pittsburgh, was held on May 11, but no satisfactory solution of the difficulty was reached. It appears to be the impression that should the master builders agree to reduce the working day to eight hours, the striking carpenters would agree to accept a proportionate reduction in wages. On Saturday, the 16th of the month, the idle carpenters received their first strike benefits, which, in many instances, caused no little dissatisfaction, as the amounts paid were considerably less than appears to have been expected. In some cases the men intimated that unless subsequent payments should prove considerably larger than the first one they would return to work. The master builders maintain that nothing less than a compliance with their demand for nine hours will be considered, while on the other hand, the strikers hold for a reduction to eight hours per day.

A "Building" Curiosity.

In the May issue we presented an article from a correspondent touching in a humorous vein the question of ready-made house plans. We naturally supposed that every one would regard it in the light of a joke, but subsequent happenings have conclusively proven that in this view we were mistaken. One of the letters called out by the publication of this article is presented herewith. The superscription upon the envelope is reproduced in *fac simile* in Fig. 1, while in Fig. 2 is shown the letter, with the exception of the name of the writer, which was inclosed. While this is not a pleasant commentary on the intelligence of a trade to which architects and builders so largely cater, it is a striking example of the length of absurdity to which things are often carried not alone in the building trades, but in the great world in which we live. If a joke is taken for sober reality, is it any wonder the public can be deceived by artful schemers?



A "Building" Curiosity.—Fig. 1.—Fac Simile of Address Side of Envelope.

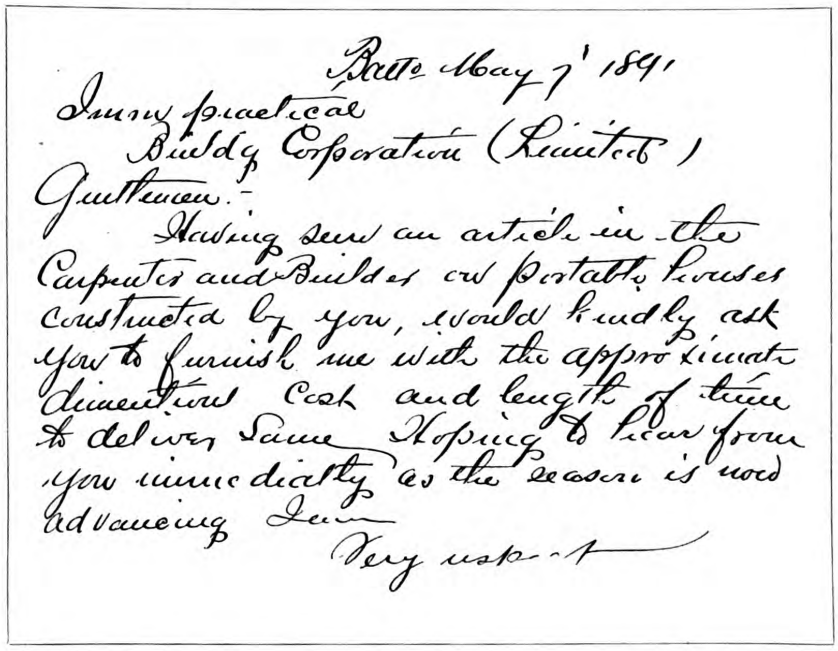

Baltimore May 7th 1891
Inmn practical
Buildg Corporation (Limited)
Gentlemen.-
Having seen an article in the Carpenter and Builder on portable houses constructed by you, would kindly ask you to furnish me with the approximate dimentions cost and length of time to deliver same Hoping to hear from you immediatly as the season is now advancing I am
Very respt

Fig. 2.—Fac Simile of the Letter Inclosed.

Stones Used by the Assyrians.

Among the stones used for building and ornamental purposes by the ancient Assyrians, alabaster seems to have been a very general favorite, presumably on account of its softness and color, though the fact that it was to be found in the near vicinity while all other stones had to be brought from a considerable distance may have been an important item. In excavating on the sites of Nineveh, Layard found the walls of the palaces from 5 to 15 feet in thickness and constructed of sun-baked brick, lined interiorly with panels of alabaster elaborately carved with figures illustrative of various historical matters. Before these slabs were put in place the name, title and descent of the king undertaking the work was cut on the back of each, after which it was fastened in place by clamps of copper, iron or wood. The outer surface, *i. e.*, that facing into the room, was then carved with various inscriptions illustrative of the life and habits of the people.

Nineveh is supposed to have been founded some 20 centuries before the time of Christ, and to have been totally destroyed some 1400 years later. At the time of its destruction many of the slabs were thrown face downward, and thus the carvings escaped destruction, while others were preserved by the drifting sand from the desert, which flowed over the ruins, and in time so thoroughly covered them that even at the Greek Xnophone—about 400 B.C.—the very site of the famous city was wholly unknown. Besides alabaster, yellow limestone, white, coarse marble, and a block basalt were used to some extent, particularly in making small ornaments. Such of these materials as were not found in the vicinity were transported down the Tigris and Euphrates rivers on rafts buoyed up by means of skins of animals blown full of air. The basalt used so extensively in Babylonia is believed to have been brought from Armenia by this method.

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The Builders' Exchange

CONDUCTED BY WM. H. SAYWARD, SECRETARY OF THE NATIONAL ASSOCIATION.

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2d Vice-President, IRA G. HERSEY, 164 Devonshire street, Boston, Mass.
Secretary, WILLIAM H. SAYWARD, 164 Devonshire street, Boston, Mass.
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Wilmington, Del.....A. L. JOHNSON.
Worcester, Mass.....H. W. EDDY.

"The 'Change Hour."

From time immemorial men have met together for the transaction of business. In times past some particular location and hour have been recognized by men of a common calling in a community for meeting each other for the purpose of transacting business. More often than otherwise these ancient places of meeting were in the open air, in some central and public square, where men might exchange their wares or carry on such transactions as were necessary to their business.

The importance of such daily meetings demonstrates itself, and the advantage of finding persons with whom business was being carried on at some stated place and hour in the day was the prime motive in the custom.

It is upon just this idea, this custom and this necessity that builders' exchanges have been formed, although in a large majority of cases this custom of daily meeting for the transaction of business, which is the foundation, the very essence of all benefits to be derived from an exchange, has been diverted into periodical meetings for the consideration of action to be taken on a given subject.

In many organizations there seems to be a kind of unexpressed antipathy to attending regular meetings appointed to be held at regular intervals. Those who have the welfare of the exchange at heart and see its capabilities for good come together, meeting after meeting, earnest and anxious to secure the establishment of customs which shall bring all reputable builders in the community together, in order that the possibilities and benefits that lie in concerted and uniform action may have an opportunity to be demonstrated.

In the event of a serious strike in the community, there is no difficulty in getting the builders together, for their common interests are openly menaced. At such time the value of the exchange is apparent as a means for bringing together men whose common success depends upon the concerted action of the whole.

After a strike is settled, or the consideration of any special subject ended, the exchange (where the change hour is not well established) relapses into a reading room, where members can find the current literature and a comfortable place to write letters, because the first principles of any real benefit from an exchange are not in operation. The exchange offers the very best facilities for the transaction of the builder's business, and as such is the strongest power in the community for the improvement of the conditions that surround that business.

In an exchange where the 'change hour is fully established, the members are certain of finding the men with whom they desire to transact their business at a fixed time. The contractor can find his subs, as well as the dealers in supplies who are furnishing him material, and *vice versa*.

The constant contact with each other, day after day, creates feelings of harmony, and the needs of the body become apparent and action thereon possible.

In a recent letter to the National Secretary, a certain member of an exchange, writing upon this subject, made the statement that a 'change hour had been fixed, and that he had attended regularly for over a month, finding only three or four persons present each day. He then concluded he would wait until the other members got into the habit of being in the 'change room during the stated hour.

He failed to realize that if the men who see the benefit of the practice do not carry it out more perfectly, those who do not see the benefit cannot be convinced of its importance?

Builders say: "Oh, I am too busy to get around during the 'change hour," when it is more than likely that they have been spending twice or three times the amount of time searching for other contractors on the same job or various material dealers than would have been occupied by visiting the exchange, where all the persons with whom he is doing business might be found together. The contractor is doing *himself* the greatest possible favor by regularly attending the 'change hour; much greater, in fact, than if he is in his office at a stated hour every day, for in the former case the people who want to see him can find others at the same time without seeking out the office of each.

If contractors form the habit of appearing daily in the exchange during the 'change hour, architects will always know where to find them. Messengers are always sure to find them, and the dealers in material will always be represented where their patrons are to be found.

The 'change hour is not a meeting of the exchange in the sense of the regularly monthly or quarterly meetings, and is not advocated as such, but is a recognized time when the members may be sure of finding each other for business purposes, and where the public may find builders whose presence in the exchange is a practical guarantee of their skill and character.

The Uniform Contract.

No better comment on the value of regular and persistent work in pushing the interests of the National Association can be made than is evidenced by the attention attracted to the uniform or standard form of contract by the editorial in Builders' Exchange department of the last issue of *Carpentry and Building*.

Continual applications for copies of the standard form have been received at the secretary's office ever since the issue mentioned, from all over the country, and demonstrates beyond question the value of the work being done.

It has been the constant effort of the National Association to bring the various filial bodies to recognize the fact that the use of a standard and familiar form of contract, that is based on principles of justice and equity, and represents the combinded consideration and thought of both parties thereto in its formation, is one of the most important steps that can be taken for the welfare of the builder.

The majority of the builders' exchanges in the National Association have either adopted the use of the standard form outright, or urgently recommended its use to the members, fully recognizing the value of the use of a contract that is uniform in all cases. Many of the exchanges, however, have not as yet established its use, and the National Association would urgently recommend that all such exchanges give the subject and the form mentioned full and thorough consideration.

It is a source of satisfaction, however, to note that with one or two exceptions requests for sample copies of the contract have come from cities which are not represented in the National Association, and it is also very satisfactory to note that if the requests for contracts have been received from widely divergent localities, as is the case, the recommendations of the National Association must

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also reach over a vast amount of territory, through the same valuable medium.

The voluminous correspondence received by the secretary, from all over the country, is a certain indication that the work of the National Association is being watched by builders everywhere who fully appreciate the fact that its recommendations represent the combined thought and consideration of the best minds in the United States gathered together in annual conference. The delegates come together in convention each year, fully impressed with the need for improvements in the methods of conducting their business in the various localities, and the result of full and free discussion is that the best method that can be devised, by these men of experience for improving any specific custom or practice, is recommended to the filial bodies for test. If the filial bodies simply ratify the action of their delegation to the convention or passively acquiesce in the recommendations of the National body nothing is accomplished, for no matter how good a thing may be, it is valueless until put to use.

So it is with the uniform contract, the form of arbitration or anything else advocated by the National Association; they are valueless unless tested by the persons who deal with conditions which the recommendations cover.

This thought applies with the same aptitude to a builders' exchange. Every desired reform must be worked for long and earnestly, and it is for those who do comprehend the importance of any special reform to persistently endeavor to demonstrate to those who do not the immense importance of establishing practices that are uniform and have been proven to be the best by actual experience.

The National Association, through the secretary, whose address will be found among the names of the officers of the association which appear at the beginning of this department of the journal, will be glad at all times to supply any persons who may so request with copies of any recommendations that have been made since the inception of the association.

O. P. Hatfield.

The death of O. P. Hatfield, at New York City, Friday, April 17, will be deeply regretted by the members of the National Association of Builders, who will remember him as one of the collaborators in the framing of the standard form of contract, being chairman of the committee from the American Institute of Architects.

Mr. Hatfield had been long and honorably connected with the American Institute, and always evinced an active and intelligent interest on all subjects affecting the relation between the architect and the builder. His address on the subject, delivered at the third convention of the National Association of Builders, is a valuable contribution that has had much weight in establishing more harmonious relations between the two. Mr. Hatfield was 72 years old at the time of his death.

Exchange News.

Louisville, Ky.

A letter from Secretary Kaufman states that at the last regular meeting of the Builders' and Traders' Exchange a committee was appointed to formulate a plan that will prove a radical innovation and report at the next meeting. In substance it is as follows: When any member furnishes an estimate to an architect or general contractor, he shall at the same time deposit a duplicate bid in a box with two locks of different combinations, one key in the possession of the president and the other in the hands of the secretary. These duplicate bids to be sealed and not to be opened until a specified time, such opening to be subsequent to the letting of the contract by the architect or general contractor. Another provision is that each bid deposited shall have the name of the job and the character of the work indorsed on the envelope. After the contract is awarded or withdrawn from the market the president and secretary will, at the request of any two bidders, specify the time for opening the duplicates for the purpose of determining who was the lowest bidder, such opening to be witnessed by two disinterested members of the Exchange. By this means the name of the lowest bidder can be ascertained, and he will be entitled to either the contract or compensation for his time and trouble in estimating, according to Code 1 of the Exchange, which has been approved by the Louisville Chapter of the American Institute of Architects. Bidders will thus be relieved of any suspense or uncertainty in regard to the work. The particular section of the code which this plan is designed to enforce is as follows:

For estimates under $2000, 1 per cent. of the amount of the bid.

From $2000 to $5000	$25
From 5000 to 20,000	35
From 20,000 to 35,000	43
From 35,000 to 50,000	50
Over 50,000	100

This rule to apply to all parties soliciting bids, whether with or without the services of an architect, and is intended to apply only in cases where contemplated work does not go on.

It is thought that this plan, though crude at present, will result in some good in enforcing exchange regulations which have been violated, or rather which have not been enforced, on account of architects refusing to announce the name of the lowest bidder. The courts have decided that this rule is a custom and any person dealing with members of the Exchange must accept all regulations connected with the letting of work.

Architects are beginning to recognize the Exchange as no small power and influence, and requests for co-operation and assistance are common occurrences, which is a very desirable change in their attitude, as compared with that of the past.

The stonecutters went out on a strike and lockout in the early part of March, and there are no present indications of their returning to work. The contractors proposed certain concessions to the workmen, which were refused. They wanted to pay a man according to his proficiency, with the agreement that all first-class men should receive wages in conformity; also the privilledge of employing not more than four apprentices in each yard, and to apply the arbitration code or principle advocated by the National Association of Builders, which is that all differences shall be referred to a joint committee composed of an equal number of members from the employers' association and from the union, the joint committee, in case of a tie vote, to select an umpire whose decision shall be binding to both parties, work to continue pending the decision of the committee.

After several conference meetings the journeymen decided not to accept the foregoing conditions, alleging as a reason therefor that the same conflicted with the constitution and by-laws of their organization. Other concessions offered by the contractors were favorably considered by the workmen, but as the employers have been powerless in the hands of the union for the past four or five years, they have determined to establish a more just and equitable relationship between themselves and journeymen, and are standing firmly together for the enforcement of the conditions above stated.

The remnant of striking carpenters who struck at the time of the cyclone last year, have issued their ultimatum, demanding eight hours and a minimum scale of 30 cents an hour.

Building prospects are brightening as warm weather approaches; members are constantly bringing in plans of new work and the long faces are expanding at the prospect of a fair season's business.

Boston.

The alterations in the building owned and occupied by the Master Builders' Association are rapidly approaching completion, and it is anticipated that the workmen will be nearly all out of the building by the end of the first week in June. The next month's issue of this journal will contain a full description of the changes and its present condition.

New York City.

At the last quarterly meeting of the Mechanics' and Traders' Exchange the secretary and treasurer presented their reports, which showed the Exchange to be in a prosperous and healthy condition.

The Committee on Convention made a full report of work done in entertaining the delegates and visitors to the fifth annual meeting of the National Association. The report covered the entire work done by the committee, which extended over nearly a year and which resulted in such signal success in every particular. The committee were enabled to return to the subscribers to the convention fund a very considerable portion of their generous subscriptions. The report was received favorably and a vote of thanks to the committee was passed.

The Committee on Legislation reported that their visit to the State capital was successful, and that the bill in the Senate seeking to restrict the area of sidewalk that may be used by builders during the construction of buildings was defeated.

The Building Committee reported that the act to amend the charter of the Exchange so that its real estate holding may be increased to $1,500,000 had been approved by the Governor, and that the committee is busily engaged in formulating plans, to be submitted to the Exchange, for the erection of a building that shall give the New York Association a home that will be fully up to the requirements of an Exchange in such a city as the metropolis.

The delegates and visitors to the recent convention will be pleased to learn that the Building Trades Club is at present engaged in making extensive alterations and improvements in their building, which, when completed, will make the club more delightful and homelike than ever.

The reports of the secretary and treasurer were received at the annual meeting, which was held in the Fifth Avenue Hotel, on account of the alterations mentioned, and showed that the club was in excellent condition in every way.

Although Mr. Eidlitz expressed a strong desire to retire from the presidency, the following officers were unanimously re-elected for the ensuing year: President, Marc Eidlitz; vice-presidents, John J. Tucker and Andrew J. Campbell; treasurer, Stephen M. Wright; secretary, Henry W. Redfield; managers, Robert L. Darragh, Chas. A. Cowen, Henry A. Maurer, John J. Roberts, Warren A. Conover, Nathan Peck, Henry A. Tostevin, James B. Mulry and Charles Andruss.

During the two years of the existence of the club it has accomplished wonders in creating more harmonious relations among the builders of the city, besides having been the headquarters for the National Association, both at the mid-year meeting and during the fifth convention. The valuable work of the club in developing and fostering social harmony in the members of the building fraternity in a city like New York, so vast and diversified in its interests, cannot be overestimated.

Wilmington, Del.

The Builders' Exchange is in a prosperous condition, and the outlook for the season's business is good, although just at present the builders are not very busy.

The mason builders of the Exchange have recently formed an organization for the better protection of their interests and for the purpose of securing more concerted action on matters of importance.

Detroit, Mich.

The Detroit Exchange has been incorporated and is now taking active steps for the readjustment of some of the conditions which have previously existed in the organization.

Among the first things that the Exchange will endeavor to accomplish will be to secure a building of its own fully adequate to the needs of an association in so important a city as Detroit.

Milwaukee, Wis.

The building business is somewhat disturbed by strikes and the Exchange has been endeavoring to straighten matters out.

At the last regular meeting of the Exchange the matter of strikes and the present condition in the labor field was given to the Arbitration Committee for consideration. Committees for conference were invited from the master masons, plasterers, stone cutters, carpenters, painters, plumbers, steam fitters, tinners and galvanized iron associations, and on April 14 the following resolutions were adopted:

Resolved, That we, the representatives of the various building trades of the city of Milwaukee hereby agree that

We will not discriminate between union and non-union labor, or hire or keep any man or men who refuse to work with men in our employ or in the employment of others, and will not submit to dictation from any source in the management of our business.

This resolution was submitted to the various organizations, and at a meeting of the Exchange, held on April 18, the committees reported that the same had been received and

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adopted by every association, and it was decided to strictly enforce the measure.

Contracts in the hands of architects have been held back from competition until such time as the labor troubles shall have been definitely adjusted.

The building project is in a very satisfactory condition, with signs of progress showing that the work in hand is fully appreciated by the Exchange.

The following letter has since been received from Secretary Vogel:

The present standing of the Exchange is higher and more influential than ever before, and it has never been more successful than it is to-day, both in financial and other matters. It has been found to be a great help to the builders in the present labor troubles, as all reports have been made in the Exchange, where have also been held all meetings for the consideration of the disturbance.

A committee composed of contractors from all the various branches of the business has been appointed to meet once each week for the purpose of considering steps which seem best to be taken in relation to labor troubles, and to consult with the members on subjects of interest in this connection.

The signers of the resolution in the foregoing have all lived up to the intent of the move, and all union men in the various trades are still out, with the exception of laborers, tinners and galvanized-iron workers, whose unions have disbanded. The men are being employed individually by the contractors, without reference to whether they are union men or not.

The cut-stone contractors have effected a settlement with their men, with the understanding that all non-union men in their employ shall be retained, the wages to be 50 cents per hour and eight hours to constitute a day's work.

There are only about 100 union painters left in the city, the others having returned to work, conforming to the shop rules of the master painters.

The master masons recently presented a set of rules to the workmen, in which they state that 40 cents per hour and upward will be paid, and specify that the men shall work where they are placed by the employer, and shall use such material as is presented for use, regardless of where and by whom it is manufactured; also that an arbitration committee be appointed from both sides. The workmen refused to consider all the conditions except the one in relation to an arbitration committee, and the result is that the men are still out, and the contractors are doing the best they can with their own men.

The master carpenters are using non-union labor.

The strike is being felt throughout the city by all business men, as all large building contracts from the market, and architects are not offering any plans for competition until everything is settled.

A committee has been appointed to report on the plans for the new exchange building which have been submitted in competition, and it is expected that the matter will be settled in the early part of this month.

Grand Rapids, Mich.

The recent labor trouble, with the exception of that among the carpenters, has been satisfactorily settled both to employers and workmen. The workmen have been granted their scale of wages, and the contractors have secured desired conditions which materially benefit their business.

No serious disturbance is anticipated from the carpenters, and the labor field generally is in good condition.

The building outlook is improving daily; business blocks and residences both seem to be having a boom, and the members of the exchange are receiving plans and requests for estimates faster than they can be taken care of. Many of the property owners are responding to demands for better accommodations, and repair jobs are almost as numerous as new work. Fireproof construction is receiving much needed attention

The membership is steadily increasing, and the exchange is being recognized by the architects and public in a way that is very flattering to the management. Attendance at the 'change hour is growing to very fair proportions, and such subjects as sub contracting, relationships between architects and builders, general rules of management, &c., are being earnestly considered.

Portland, Maine.

The hod carriers have struck for an increase in pay, but owing to the unorganized condition of the strike it will probably prove not serious.

Aside from this strike affairs in the building business are in about a normal condition, with a fair prospect for the season's work.

Omaha, Neb.

Secretary Collins writes that affairs in the Builders' and Traders' Exchange are moving along about as usual, with new members being slowly added. Building has not been quite as active as usual this spring, and the excessive competition in consequence tends to make the interest in the exchange temporarily less keen than usual.

The secretary is compiling a list of practical statistics relating to the building trades, particularly to the mason part of it, which will be very valuable as a source of information regarding the methods that obtain in other localities. Every exchange should be able to inform its members of practices and customs existing in all other prominent cities in the United States in relation to the building business.

Indianapolis, Ind.

The Supreme Court of Indiana has sustained the new law limiting a day's work to eight hours. The complainant in the case, John Griswell, testified that he had worked for the Noel Flour and Feed Company 10 months for the agreed sum of $1.25 a day; that during that time he was kept busy 11 hours a day. When he was discharged he demanded pay for extra hours. Under the court's decision he recovered the amount claimed. The court holds that unless there was an expressed agreement to the contrary, employees who are required to work more than eight hours a day must be paid extra.

Buffalo, N. Y.

The plans for the new building to be erected by the Builders' Exchange are being prepared by Architect Cyrus K. Porter, and it is expected that the structure will be begun very soon.

Over $40,000 has been already subscribed and further subscriptions are coming in in a very satisfactory manner.

The building project has already proved the wisdom of the undertaking by bringing the Exchange into more favorable prominence in the community, and establishing it on a firmer and more influential basis. New members are being elected rapidly, and there are at present a large number of applications awaiting the action of the trustees.

Timber in the Tropics; the Teredo Navalis and White Ant.

THE FOLLOWING extracts from a paper on the above subject, read by John William James before the British Institution of Civil Engineers, may prove of interest to our readers:

There appears to be some misconception with regard to the ability of certain Australian timbers to resist the attacks of the teredo navalis and the white ant, and the author desires to put on record his experience with these and other descriptions of timber during a residence of about six years at Port Darwin, where he was superintending engineer for the South Australian Government. He had under his control the construction of a line of railway from the port to a distance of 146 miles inland, and of a jetty in connection with the railway 1120 feet in length, which extended into the water 38 feet below low water of ordinary spring tides. This jetty was constructed of West Australian timber, the piles (of which there were over 22,000 lineal feet) being karri.

In October, 1884, some jarrah piles, which had been put in as an experiment, were found, after an immersion of six months, to have been so seriously attacked by the teredo that it was at once decided to sheath, all the timber in the jetty up to the high-water line with Muntz metal. During ordinary spring tides the water at Port Darwin rises 25 feet, thus necessitating the use of piles over 80 feet in length. They were driven to the rock—a soft mica slate—with a monkey weighing 2½ tons, and falling 10 feet. Karri was found to be capable of withstanding this heavy driving better than jarrah, being larger in the fiber and more elastic; but experience has shown that for durability it is far inferior to the jarrah.

In order to protect the sheathing metal on the fender piles of the jetty from the chafing of vessels lying alongside, it was found necessary to bolt timbers vertically on their outer sides, and the only material available at the time being karri, it was used as a temporary expedient, while an endeavor was made to obtain a sufficient quantity of a wood called "billian" (North Borneo ironwood), which had the reputation of being able to resist the teredo in the tropics. After some delay a log of billian was procured, and a piece of it bolted to the jetty at the low-water line on November 2, 1886. This remained intact until it was examined in December, 1889, when no trace of the teredo could be found on it. Another piece of this timber was put in the ground in a place where white ants were numerous, and it was found, after a year had elapsed, to have been eaten in a few places, but without being materially damaged.

The temporary chafing pieces of karri wood, which extended from the low-water line nearly to the deck of the jetty, were soon attacked, and after about three years completely destroyed at their lower ends by the teredo, the ravages of which extended to about half way between the low and high-water marks, there being very little damage higher up. They have since been replaced by billian timber. It is generally believed that the teredo dies after the wood in which it is concealed has been for about 48 hours out of water and exposed to the sun, but experience at Port Darwin proves that this is not so. When the temporary chafing timbers were removed portions of them were placed on the deck of the jetty, and the author was present when, after about two months' exposure to the tropical sun, one of them was split up for the purpose of getting specimens of the teredo, several of which were taken out still living, although very weak. They appear to have the faculty of retaining the sea water around them in their cells.

The white ants of Northern Australia are larger and much more destructive than those in the southern parts of Australia, or even in India. They attack growing timber, working through the heart of the trees from the root to the top, the only kind that effectually resists them being the cypress pine, which is on that account generally used for building purposes. It is, however, short grained, and is not suitable for girders or for resisting heavy shocks, and as it is frequently found growing spirally, is not well adapted for planks or scantling. There is also an ironwood—locally called ironbark, although it is not one of the eucalypti—which resists the white ant almost as well as billian, but seldom grows in such a shape as to be of commercial value. It seems to be more liable to injury by lightning than the trees among which it is found, so that little use is made of this timber, except for fence posts or stumps, on which the galvanized-iron and cypress-pine houses and stores of the Northern Territory are erected.

There are also two of the eucalypti, locally known as bloodwood and paperbark, which withstand the white ant to some extent. The former is durable, but, having large gum veins, will not make good sleepers, planking or scantling, and the latter is not durable when subjected to the alternate action of the sun and atmospheric changes. The author has also tested well-seasoned jarrah and sugargum sleepers; but in the course of a few

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months about a fourth of the timber had been eaten away by the white ants. A liquid named Carbolineum Avenarius having been recommended as a sure remedy, two sleepers, one jarrah, the other sugar-gum, were treated with it in accordance with the printed instructions, and were buried with two other untreated sleepers of the same kind in a place where these insects had free access to them. In about two months the two untreated sleepers were badly eaten, whereas the two treated with carbolineum were almost intact. These latter were again placed in the ground and left undisturbed for several months, and when they were taken up it was found that the white ants had eaten away a quantity of the wood and were making their way right through it. Another compound named anti-termite was tried with similar results, so that it would seem that though such remedies may check the destruction of the wood for a time, they soon lose their efficacy in a tropical climate. New South Wales ironbark, which is considered one of the finest timbers of the country, and Western Australian karri, are incapable of resisting the attacks of the Northern Territory white ants. Jarrah sleepers have been much used on the South Australian railways, and have the highest reputation for their ability to withstand the termites of that colony; but in the Northern Territory jarrah is as readily attacked as any of those timbers that are considered inferior in that respect in the South. It may be inferred that the teredo navalis also is less aggressive in colder places than in the warm waters of the tropics, and that it is owing to this that jarrah has gained its reputation, but that karri is not likely to resist sea borers anywhere.

The question of sleepers for the railway from Port Darwin—the Palmerston and Pine Creek Railway—being undecided, the author applied to the Java Public Works Department, and through the courtesy of the engineer-in-chief of the Java State Railways was informed that a timber known as tatti-wood, a sort of teak growing in that island, was the only wood used there for railway sleepers; that it gave great satisfaction, was very durable, and that the white ants never attacked it when in use on the railway lines, the disturbance caused by passing trains being a sufficient protection; but that sleepers in stock were liable to destruction unless precautions were taken, and for this reason they were so stacked that a man might go underneath to examine them, and clean out the ground, which was done about once a week. But as a suggestion was made at the same time that jarrah or any timber that had been found capable of resisting the white ant in other parts of Australia, would be suitable for the Northern Territory, it may be inferred that the white ant is not so destructive in Java as in North Australia.

In 1886 Captain Maclear, commanding H. M. S. Flying Fish, brought to Port Darwin four logs of timber from the Celebes Islands and handed them over to the author, in order that their powers of resisting the teredo and the white ant might be tested. These logs were described as follows by the late Rev. J. E. Tenison Wood, who at the time was visiting Port Darwin:

"1. Kajoe Bessi (*Erythroxylon*), or ironwood. Very hard and lasts long; much used by the government for building bridges, piers, houses, &c. Can be procured up to 60 feet long and 1 foot thick.

"2. Kariskes (*Mimusops*). A very hard wood, which resists the action of water and can be procured up to 90 feet long and 1 foot thick.

"3. Possi Possi (*Sonnerata Acida*), or Malay River willow, though not a true willow. Can be procured up to 60 feet long and 1 foot thick.

"4. Tring. Two mangrove trees are called by this name (*Bruguvera* and *Rhizopora*). Both are found in Australia, and can be procured up to 120 feet long and 9 inches thick. The three latter are very good long-lasting kinds, much used for waterworks."

On July 21, 1886, a piece of each of these Celebes timbers was sunk in the harbor, and four other pieces were placed on the surface of ground infested by white ants, and covered with the refuse of timber that had been already destroyed by these insects. The first were brought ashore on November 26, when they had been over 18 weeks in the water, and from notes taken at that time the author finds that the teredo had bored into the kajoe bessi and the kariskes from the sides where the sapwood remained; the possi possi was intact, except at the heart, where decay had commenced; the tring was also attacked in the heart, which showed symptoms of decay, and was perforated at the sides, but not to such an extent as the kajoe bessi and kariskes, all four timbers appearing to resist the teredo better than either jarrah or karri. The four pieces placed on the ground were examined on November 3, having been 15 weeks undisturbed. The kajoe bessi was intact; but the white ants had made some progress in the destruction of the other three. They were then buried in the earth, and were allowed to remain undisturbed for 25 weeks, at the end of which time it was found that all of them had been attacked, the possi possi and tring having offered less resistance to these insects than the kariskes, though this latter was much eaten. The kajoe bessi was altogether the best of the four, as, although the white ants had penetrated it, they had made very little progress with its destruction.

So far as the author's experience has extended, the only native timber brought under his notice that is really suitable for buildings and public works in the Northern Territory of Australia is the cypress pine, which resists the attacks of the teredo and white ant, though the latter will strip the sapwood from it. As already stated, it will not stand heavy shocks or severe transverse strains.

Chimney Climbing.

In chimney climbing, as in most other things, the old order changes. Time was when the dexterous flying of kites was the initial step in the ascent of a chimney or a church steeple. In addition to the cord by which it was flown, the kite was furnished with a second cord, which hung down vertically. The manipulators of the kite having, to the best of their judgment, got it directly over the apex of the chimney, both cords were steadily hauled upon, and in that way a thin line of communication was established. To one end of that line a rope was fastened, and this in turn was drawn over the steeple. Then to the rope was attached a light chain with a pulley block and tackle affixed. The block was hauled up to the top, and by means of the pulley and tackle the steeplejack, seated in a "bo'sun's chair," made his perilous ascent. Between this time-honored method and that by which Vauxhall chimney, in Liverpool, has recently been climbed, there is a wide gulf fixed, the difference representing an immeasurable increase both of security and of facility for carrying on what repairing work may have to be done. By a system equally ingenious and simple a ladder is run up outside the chimney at a uniform distance of 2 feet 6 inches from its face, to which it is pinned at regular intervals of 6 feet by firm iron brackets. The climber, mounting the inner side of the ladder, thus makes his ascent within a kind of skeleton cage. While, therefore, the element of risk is not removed, it is greatly lessened. A false step would precipitate him to the earth, but he is less likely to make it, in that the liability to become dazed is greatly diminished by the sense of security afforded. What is to be guarded against in chimney climbing is a failure of nerve, and this end is clearly to be attained in proportion as the conditions of the ascent are rendered to the eye less fearful.

Vauxhall chimney—a giant among its neighbors—extends aloft to a hight of 310 feet. The elevation of its site above the Old Dock sill is 70 feet. The total hight of the chimney, therefore, above that well-known datum is 380 feet. Everton Church—the highest point of Liverpool—is 250 feet above the Old Dock sill. The elevation of the monument in London is only 202 feet. Sightseers privileged to ascend the Vauxhall chimney would have the advantage of an additional 108 feet.

The apparatus has been fixed by W. J. Whitehead of Red Rock street, a man young in years, but of ample experience as a "steeple jack," and in conversation with him some interesting facts concerning chimney and steeple climbing may be gathered. The system he adopts has now been employed on many occasions, and is probably, says the Liverpool *Post*, taken all round, the best yet invented. Each ladder is 12 feet in length, and is furnished with four iron arms for attachment to the wall. The process of fixing is extraordinarily rapid. The whole hight of Vauxhall chimney was scaled in something less than six hours, although two separate days were taken for the purpose, inasmuch as after a considerable elevation had been attained the first day the wind became so strong as to render further work dangerous. The process of fixing is after this fashion: Four iron sockets are driven into the base of the chimney and to these the first ladder is attached by means of its arms. Mounting the ladder so fixed, the operator places a plank across the upper pair of arms, and thus provides himself with a small platform upon which he can stand. He then drives in the sockets for the next ladder, hoists it up and fits it in its position. This ladder, being in its turn made secure, becomes the base of operations for the next, and so the work is carried to the top, the whole, when completed, being a structure of remarkable rigidity. Its qualities, indeed, in this regard are said to be phenomenal. It is claimed that each ladder of itself is pinned so securely to the wall that in case of need—that is, in the event of tackling an exceptionally high chimney, or of a dearth of plant—the ladders can be successively detached from below and used to continue the ascent above.

The prime reason for climbing Vauxhall chimney on the present occasion is to repair the lightning conductor. A steeple jack, however, is frequently called upon to perform much more difficult work. Chimneys are frequently increased in hight. Huge blocks of stone and iron have to be manipulated. Scaffolds have to be constructed for the purpose, and herein lies, perhaps, the most risky portion of the undertaking. It is easy to build a scaffold springing from the solid basis of mother earth; a vastly different undertaking is it to play topsy-turvy with the laws of gravity, and construct one from the top downward. The task demands not only nerve, but a knowledge of mechanics and engineering. It is accomplished, however, despite all obstacles, not forgetting the primary one, that every batten, plank and pole employed has to be hauled up to the summit and handled with most gingerly care. Mr. Whitehead's highest climb hitherto has been a chimney at the Runcorn Soap and Alkali Company's works, at Weston, the hight of which is 330 feet. Mr. Whitehead confesses to a full sense of the dangers that are run, but is thankful that hitherto his nerve has never failed him, and he has met with no accident. They are odd experiences that he has up in the clouds. A high wind, it appears, will cause a tall chimney like Vauxhall not merely to vibrate at the top, but actually to swing over a space of 6 or 8 inches, and this without any impairing of its stability. Of course at such times remaining at the top is out of the question. Wind is an invariable danger. A calm day is a *sine quâ non* for the work; and meteorologists may, perhaps, be interested to know that if they suppose the wind at an elevation of 300 feet to be steadier than at the surface level, they are mistaken. It is both more gusty in its character and more variable in its direction.

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CARPENTRY AND BUILDING.

A MONTHLY JOURNAL FOR THE BUILDING TRADES.

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Industrial Training.

Commissioner of Labor Carroll D. Wright has about perfected plans for an inquiry, through his department, regarding the results of industrial and manual training in trade schools and industrial institutions. We understand that the inquiry will relate mainly to schools of general manual training and to those giving expert training in special lines of mechanical and scientific business. The schools of design will also be included in the present investigation, though they are not considered strictly a branch of manual training. Some of the questions which will be considered in the proposed inquiry are the proportion of graduates of training and trade schools who obtain positions in shops and factories, their degree of superiority over workmen without such training, the rapidity of their advancement in comparison with those without training, their advantage in salary, and the benefits resulting to the establishment by the skill and training of such graduates. Colonel Wright has obtained the suggestions of prominent manufacturers and institutions regarding his inquiries, and has prepared a series of questions to be put to the graduates of training schools. These questions relate to the economy shown by graduates in the use of materials, their facility in handling tools, their faculty for managing men, and whether in employing new help the manufacturer gives preference to graduates of the schools. The inquiry will be prosecuted in Europe as well as in this country, and the success of the modern technical schools there compared with our own. It will probably require some little time to secure all the data desired, but when obtained the results will be embodied in a separate report.

ART DOES NOT IMITATE, BUT INTERPRET. —*Mazzini.*

Arbitration.

In another part of this issue we print an article on the subject of arbitration, which we commend to the careful consideration of all interested in the settlement of the differences arising between employer and employed. The question discussed is one which presents ample food for thought on the part of both classes in every community, as, when rightly considered, the interests involved are mutual. At the present day differences are constantly arising in all departments of trade between employers and workmen, but a speedy settlement of such troubles is hardly possible without the rights of both sides being recognized. When the rights of both are conceded arbitration naturally follows. To attempt to force an adjustment of differences between those employed and those giving employment is not calculated to meet with favor upon the part of the serious thinkers in either class, nor does it generally insure success, while with the rights of both sides recognized, arbitration offers an easy solution of the difficulty, whatever it may be. In order, however, that this form of settlement may obtain, it is necessary that there be mutual respect among the individuals in each class, and to secure this, more intimate relations between the men in given lines of trade must be established. This can and is being done in the building business through the instrumentality of builders' exchanges scattered all over the country. In these exchanges those engaged in building operations congregate from day to day for the discussion and consideration of all questions which concern different departments of their business. Such intercourse tends to bring about a more intimate relationship, one with another, than would otherwise be possible, and puts them in shape for resorting to arbitration when differences are to be settled. It is manifestly absurd at this day to establish organizations in the building trades simply for the sake of fighting trade unions in the hope of crushing them. The spirit of the times is organization for the promotion of mutual interests broadly. The same principle applies to the employee in his union and with the same force that it does to those who conduct large enterprises. With trade unions on the one side and builders' exchanges on the other, with frequent councils between the two and arbitration whenever disputes arise, the building trades should for the future be free from much that has had a depressing influence in the past.

BEAUTY IS AT ONCE THE ULTIMATE PRINCIPLE AND THE HIGHEST AIM OF ART.—*Goethe.*

The Chicago Fair Buildings.

An event for which all Chicago had been rather impatiently waiting occurred in that city on May 23, when the award of the contract for erecting the first large exposition building was made. The structure is to be known as the Mines and Mining Building, and the work was competed for by contractors in Minneapolis, Cleveland, St. Louis and Chicago. The exposition authorities divided the work and awarded various parts to the lowest bidders. Other buildings are being placed in the hands of contractors as rapidly as circumstances will permit, and it is expected that by midsummer the work of construction will be well under way on all the structures contemplated by the exposition management. The greatest immediate benefit of this important enterprise will, of course, be received by Chicago, and its business men are justified in expecting an expansion in many lines of trade. Other parts of the country will, of necessity, be drawn upon for other materials, so that the effect of the great work now in hand at the Lake City will be widespread. Those who have but sentimental interest in the exposition cannot fail to be gratified at the announcement that the buildings are at last under construction, and according to plans which surpass in extent and splendor any previous achievements by international expositions. By this fact enthusiasm will be kindled afresh in every direction and hosts of doubters will be silenced.

NOVELTY SERVES US FOR A KIND OF REFRESHMENT, AND TAKES OFF FROM THAT SATIETY WE ARE APT TO COMPLAIN OF IN OUR USUAL AND ORDINARY ENTERTAINMENTS.—*Addison.*

The Hampton Institute.

Among the institutions which are doing good work in the industrial education of the youth of the country is the Hampton Normal and Agricultural Institute, Hampton, Va., which was opened in April, 1868, and chartered in 1870. It is designed for the education of boys and girls, and in January of the present year had an attendance of 650, representing 24 States and Territories. The young men are instructed in carpentering, blacksmithing, mechanical drawing and bricklaying, separate shops being devoted to these purposes. The industries, while primarily for training mechanics, also furnish articles of commerce, which are sent to different parts of the country. An interesting feature of the schools is the Huntington Industrial Works, endowed by the well-known railroad magnate, C. P. Huntington. In these works are manufactured lumber, moldings, brackets, window frames, flooring, ceiling, sash, blinds, doors, wood mantels, stairways, handrails, balusters, newel posts, pews, pulpits, store fronts, &c. The course of study covers a period of four years, and all shops and industries are under the direction of skilled foremen and assistants. The school is open the entire year, but from June 15 to October 1 the attendance is reduced in number by about one-half, when Normal work ceases. The attendants at the school consist of negro young men and Indians, there being at present 518 of the former and 132 of the latter.

NOVELTIES PLEASE LESS THAN THEY IMPRESS.—*Dickens.*

The Coming Method of Heating.

In the course of an address on the "Possibilities of Applied Science," delivered by Oberlin Smith before the Franklin Institute, the speaker touched upon the future house-heating methods, as in his imagination they may come about. He stated very truly that the present methods of heating, and also, for that matter, of cooling by lumps of ice, are crude and wasteful, as well as extremely irregular and uncomfortable. This statement, however, must not be misinterpreted. Undoubtedly, at present, we are better off in these particulars than our grandfathers were, but it takes no great power of observation to realize that the perfection of winter warming and summer

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cooling has not yet been reached. Mr. Smith holds it probable that in the near future, at least in the cities, some system of gas heating will displace coal and wood to a large extent. He also remarks that there seems to be a tendency among inventors in recent years to attempt some kind of artificial cooling by distributing cold air or freezing mixtures through pipes; also to contrive cheap ice-making machines for use in individual buildings. The small and economical ice-making machine is undoubtedly a most desirable apparatus, and the need was never felt so much as last year during the ice famine.

NOVELTY IS BOTH DELIGHTFUL AND DECEPTIVE.—*Balzac.*

Electric Heating.

These are the innovations that the lecturer expected to see adopted in the comparatively near future. Later on, as science advances further, he anticipates that we shall depend upon the electric current, brought into each building by a single wire, not only for lighting and power, but for heating and cooling also. In support of this he reasons by analogy from the fact that the burning of coal in a furnace can be made to produce heat or cold at will, by which, we presume, he refers to the direct production of heat and to the indirect refrigeration accomplished by the application of power to freezing machines. It is admitted that electric heating as yet has not proved practicable, because of too great expense. The fault, however, does not lie so much in the application of its energy as in the waste in its production, for a steam engine will only utilize from 10 to 15 per cent. of the energy stored in the coal, while the dynamo, on the other hand, reaches an efficiency of about 90 per cent. when comparison is made between the energy applied to it and the energy of the electric current generated. The dream of all inventors in this line, and a dream, furthermore, that is likely to become a reality, is the production of electricity direct from the coal or other fuel. Assuming that 90 per cent. of the energy of the coal can be transmitted direct into an electric current, it will be seen what an enormous saving is effected as compared with the interposition of a steam engine, that wastes from 85 to 90 per cent. of the heat stored within the coal. It is always pleasant to speculate upon the possibilities of science, and it is especially interesting to be led along by a person like Oberlin Smith, who is no novice in this department of knowledge.

THE OBJECT OF SCIENCE IS KNOWLEDGE; THE OBJECTS OF ART ARE WORKS. IN ART, TRUTH IS THE MEANS TO AN END; IN SCIENCE, IT IS THE ONLY END. HENCE THE PRACTICAL ARTS ARE NOT TO BE CLASSED AMONG THE SCIENCES.—*Whewell.*

BUILDING WAYS AND MEANS.

THE LINE WHICH MARKS the point where economy or cheapness ceases to be a virtue is something in which builders in general are interested. Unless the builder be a man of unusual sagacity the tendency would be for him to carry cheapness or economy to a point far beyond what prudence or proper reference to his own best interests would suggest. Builders who put up structures simply to sell and who expect to unload as soon as the houses are finished, get into the habit of cheapening things, which renders their buildings very unsatisfactory to the user or occupant, and which would make them poor investments if they were held for renting purposes. A case in point is an apartment house in Brooklyn which we inspected not long since. We might instance a number of particulars illustrating the point which we have in mind to make, but one example will suffice. There is an elevator in the building running from the main hall to the roof. It is driven by an engine in the cellar, steam for which is supplied by a boiler of the portable type. There is a long list of particulars in this specification showing wherein real economy was sacrificed. In the first place, the boiler has scant capacity in the way of steaming power to supply the engine. It must be driven to the utmost in order to enable the elevator to be run. In the next place, the elevator was bought at the lowest possible price, and is something out of keeping with other parts of the house. The sliding doors, with which the elevator shaft is protected at each floor, were first put up without rollers, it being intended to run the doors in a track on the floor. They were fastened with two large brass hooks. They had not been in use six months before their condition made overhead rollers an imperative necessity and the hooks were replaced by the regular elevator catches. The engine is constantly giving out, the boiler has had one or two mishaps, and the whole arrangement is a source of perpetual nuisance to both landlord, who, in this case, was the builder, and all the tenants. Knowing what the apparatus originally cost and having a conception of the repairs that are demanded the first year, we risk nothing in saying the original cost, with the sum expended for repairs on it the first 12 months, would have been sufficient to have put it in larger and better apparatus and that which would have been a credit to the builder and satisfactory to the tenants. In this case the builder failed to see where the line should be drawn.

A NOVEL METHOD OF CONSTRUCTING a foundation for a wall is that employed in connection with the rebuilding of the Fifth Avenue Theater, Twenty-eighth street near Broadway, New York City. Owing to the fact that the owner of the adjacent property objected to the walls of his building being shored, Architect Francis H. Kimball is introducing a system of wall support which, it is asserted, has not before been used in this city. Several iron cylinders from 11 to 14 feet in length and 3 feet in diameter are being sunk parallel to the side wall of the adjacent property, the cylinders extending from the solid rock to the cellar level. The earth will then be removed from within them and they will be filled with brick and cement. On their tops iron girders will be placed to serve as a basis for the wall, which will be in the rear of the stage of the new theater. It is expected that in this way the new wall can be built without interfering in the least with the property immediately adjoining the site on which the new theater will stand.

WE ASSUME THAT OUR READERS will be interested in the following newspaper account of "rushers" in the building business. We do not attempt to vouch for the accuracy of the statements made, but we do submit the article as a curiosity, while also as containing a suggestion that, perhaps, may be advantageously acted upon under various circumstances. We hardly think it possible to go to the extreme here indicated in a majority of the cases, but something a little less radical might make a difference in the profit account at the end of a year's business. The article referred to is as follows:

It was some time in 1882, not to be too particular or precise, that a contractor who had a row of flats to build hired his entire forces of mortar men and hod carriers from a big Italian contractor, who supplied any number of men up to 1000 at the shortest possible notice. A great many of the Italians were green hands, who didn't know much about the art of carrying a loaded hod up a four-story ladder, and the result was that the work fairly dragged along, because the bricklayers couldn't get enough material to work with. From morning to night there was a constant cry for more mortar and more bricks. The contractor saw himself losing money, and he also saw that the flats wouldn't be finished within weeks of the specified time. He was paying the Italians at the rate of $1 50 a day, a reduction of from 75 cents to $1 from the regular wages of good hod carriers, who can climb a six-story ladder from morning till night and sing a new song every time they go up. He was in despair, so he went around among the men to see if his presence wouldn't make them hurry.

"What's the matter with you fellows?" he called out to a gang. "Why don't you get a move on you?"

One of the Italians hung back. He knew they were getting less than the market price, and he saw a chance to put in a word.

"Youa wanta da men to hurry?" he said. "Gooda. Den youa paya dem twenty-fiva, fifty centa more, en dey worka harda, ha."

Of course the contractor wouldn't do anything of the kind and said so, but the Italian came up smiling for the second round, and said if the great boss would pay him a little more every day he would make the men work like sixty.

"How?" asked the boss.

"How?" Easy enough. If the good boss would give him more money he would work very hard, and he would tell all of his countrymen that if they didn't work as hard as he did they would all be discharged. The boss didn't say anything, but walked away deep in thought. That same afternoon he hired a couple of the best Irish hod carriers in the business, men who could carry hods up a ladder as if they were walking in to dinner, and who could come down like a brick dropped from the top floor. He paid them $3.50 a day. The next morning there was a decided change at the buildings, and the first rushers the business ever knew started in to run the Italians up and down the ladders. It was a chase which lasted until 6 o'clock at night, and when the work was stopped for the day half of the men sat down and rested for an hour before they started for home. The worst of it all was that the poor Italian who had given away the one brilliant idea of his life was in the gang that had to play the game of follow the leader. The thing worked to perfection. Other builders heard of it and put on rushers or made their best man a rusher. It soon got to be known what a rusher was, and it was understood that the man who couldn't keep up with the parade would be out of a job before he knew it. That the rushers were employed was an open secret, and it was known that they received anywhere from 25 cents to 75 cents a day more than the others. That not only paid them for working hard and setting the pace for a day's work, but it paid them for incurring the enmity of the gangs who followed after them.

There was a lot of bad feeling, but the rushers had the protection of the bosses, and the men realized they could accomplish nothing by scowling and saying hard things about the rushers. If they couldn't do the work they were out of a job, and that settled it. Nowadays a big contractor wouldn't think of putting a gang to work without a couple of rushers, and from out of the ranks of the Italian laborers there have come some very good rushers, who can keep the rungs of a ladder pretty warm, even if the day is cool. Besides, there isn't any hod carrier in the city to-day who would think of going ahead of the rusher up a ladder. It is a bit of hod-carrier etiquette that would not be trespassed upon by even the most ambitious carrier. In small groups, where the men get along well together, each carrier takes a position, when he holds to the end of the job, so that they fall into line as naturally as possible. From hod-carrying rushers the scheme was advanced to the bricklayers. The man who works on the corner of a building is a rusher, and is usually the best and fastest bricklayer of the lot. His line is generally from one to three bricks higher than the rest, and the others have to keep within a reasonable distance of him. It isn't at all likely that any of the contractors will admit that such a story as this is true, but if any one will stop in front of a building where work is going on he will be able to satisfy himself.

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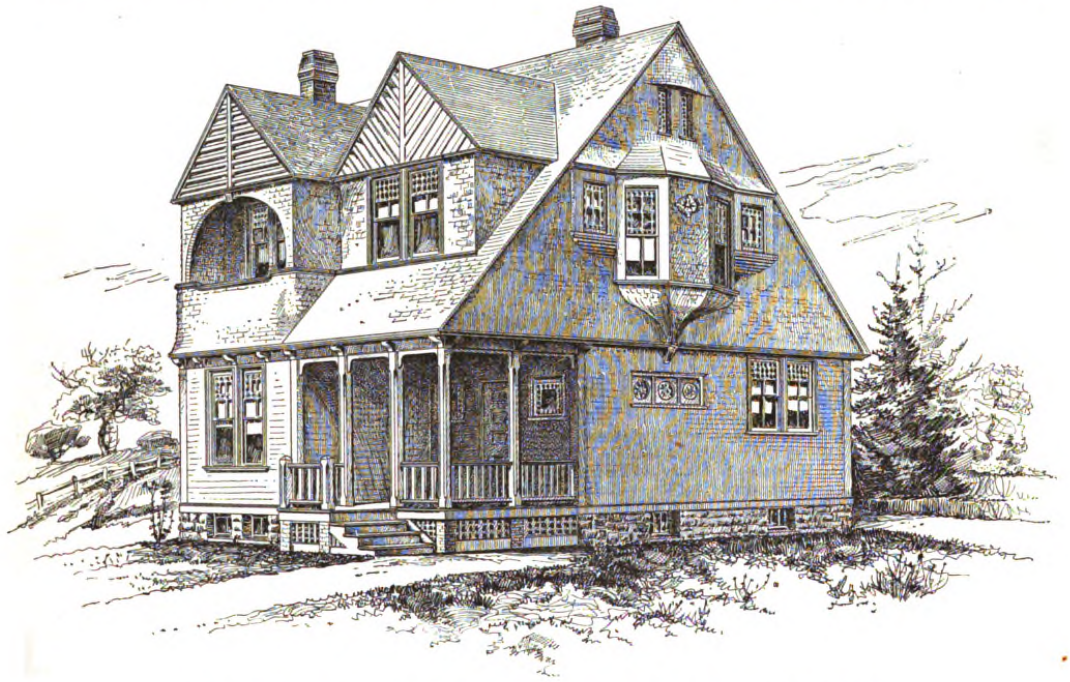
A KANSAS CITY DWELLING.

THE DWELLING which we illustrate upon this and the following pages was erected in Kansas City, Mo., some time since, from drawings prepared by Manly N. Cutter, architect, of No. 18 Broadway, New York City. As will be seen from an inspection of the floor plans, provision is made for seven rooms and a bathroom. The arrangement upon the first floor is convenient, and permits the front door to be reached from the kitchen without the necessity of passing through other rooms. The hall is of good size, and from it rises the main stairway. The parlor and dining room are connected by means of folding doors, while communication between the dining room and the kitchen is through a commodious pantry. Access to the dining room may be had from the main hall and also from the veranda at the rear of the house.

The arrangement of rooms upon the second floor is such as to require but little space for hallway purposes. The top of the main stairs is practically in the center of the house, and within a few steps of three of the four sleeping rooms upon that floor. The bathroom is toward the rear of the house, and opening from it is a storeroom. Each sleeping apartment, which is of good size, is provided with ample closet room. The page of details presented in this connection clearly indicates the construction of some of the more important features of interior finish. The house complete is said to have cost between $5000 and $6000.



A Kansas City Dwelling.—Perspective View.—Manly N. Cutter, Architect, New York City.

CLEVELAND, the Lake City, is growing at a steady rate, if one may judge by the buildings erected each year. The records of the building inspector's office show that permits were taken out in May for buildings, the cost of which was estimated at $331,000 more than the sum so invested in the corresponding month of last year, the figures being $857,005, against $526,393. The increase alone is at the rate of nearly $4,000,000 a year, and although it will not, of course, be maintained, the indications are that Cleveland will be enriched and beautified by the investment of at least $1,500,000 more in improvements on real estate than the handsome total of about $5,000,000 so expended in 1890.

Healthy Homes.

Dr. Samuel H. Durgin of the Boston Board of Health recently inaugurated at Norcross Hall in the Young Men's Christian Union Building a series of lectures upon the laws of health by a talk on "Healthy Homes," which is of no little interest to many of our readers. Among other things the speaker said:

There are several things to be especially avoided in selecting a site for your dwellings. Do not select them near swamps, millponds and stagnant water. Another thing to be avoided is the proximity to manufactories which are liable to give off noxious odors and drainage from which smells arise.

Having selected a site, the next thing to do is to select your material. The two most popular materials are brick and wood. Wood is dryer, fully as warm, and I know of no reason why it is not one of the best materials, although it cannot be used in cities in certain limits because it does not resist fire, as does brick.

Don't neglect to select a southern exposure, as a northern exposure always makes a cold, damp house. The most important part of the house is the cellar. A damp, unhealthy cellar means a house of that sort. There should be no part of the cellar that cannot easily be lighted and ventilated. Too much stress cannot be laid upon these points. When you have heat in your house, you form a draft that draws into the house the air of the cellar; therefore, it is necessary to keep that air pure.

Then your rooms should be so arranged as to be easily ventilated and flooded with sunlight. Your windows should be large and ample, reaching near the ceiling and also near the floor. This gives you ventilation and sunlight with no extra expense, as windows cost no more large than small. Windows are as warm as walls.

I would advise smooth walls, frescoed or painted; the painted are the most easily cleaned.

The floors may be either hard or soft wood, but carpets are what I consider an abomination. They are receptacles of dust containing organic germs, which get into the eyes and throat, causing many serious troubles. I think it is not generally understood how much danger we encounter in the dust which we meet everywhere. Many times diseases are not communicated directly from person to person, but the affected person gives off the disease germs which are dried and form dust, which are breathed in and which, gathering upon the mucous membrane or alimentary canal, cause disease.

The furnace is perhaps the most common, and perhaps also the cheapest, method of heating. But a furnace requires intelligent care. It must be supplied with fresh air, with the mouth of the air shaft as far as possible from the garbage barrel and cesspool. The evaporating process should be used in every case, and the damper air is much more healthful. Steam heat is very convenient, and not very expensive, but there is seldom any method of supplying fresh air.

The last consideration in the building of a house is ventilation, but it is not by any means the least. Few houses are built with any regard to this necessity. The old-fashioned fireplace is one of the best means of ventilating homes, even though it is not needed for heating. The transom should not be lost sight of.

Wells are an important feature of homes in the country, and should never be near cesspools, barnyards or any other possible contaminating influence. Driven wells are better than wells which are dug and walled up. Rain water is rarely in the country, and never in the city, fit for domestic use.

While I cannot enter into the subject of plumbing, let me say that the best plumbing is none too good, and the most expen-

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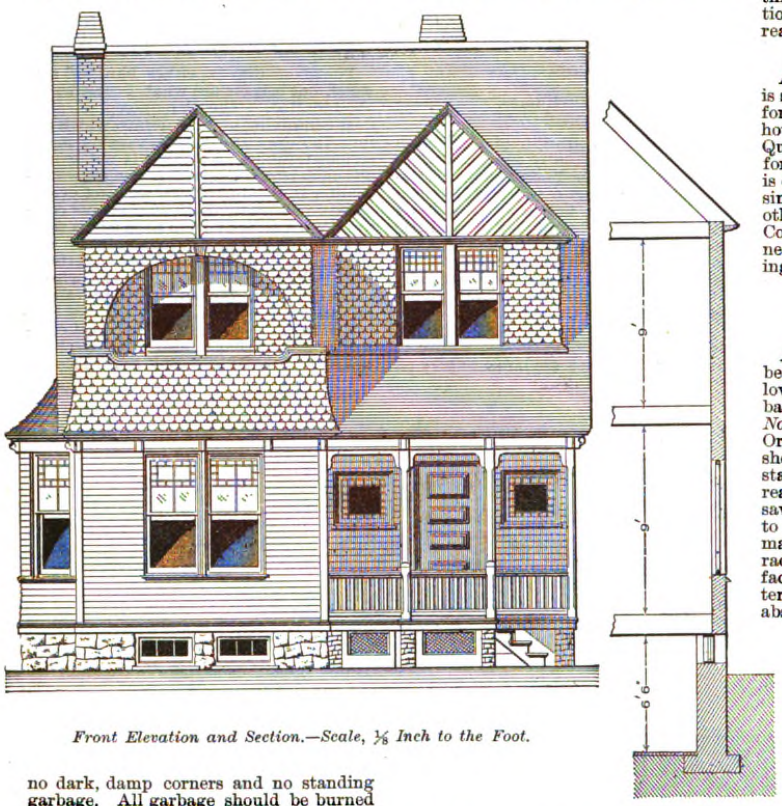
sive thing you can have in your house is poor plumbing. You never know when it will give out; you never know when health will be jeopardized.

When your home is started, the wastes begin. Never let them accumulate. Have no dark, damp corners and no standing garbage. All garbage should be burned at once. Not directly on the fire, for this makes a noxious smell, but in a receptacle at the side of the stove or on the top of the stove, where it is dried down to a sweet, harmless charcoal, without smell and useful as fuel. This disposal of garbage would save the city of Boston over $100,000 yearly, and I leave it to you if it is not worth consideration.



Front Elevation and Section.—Scale, ⅛ Inch to the Foot.

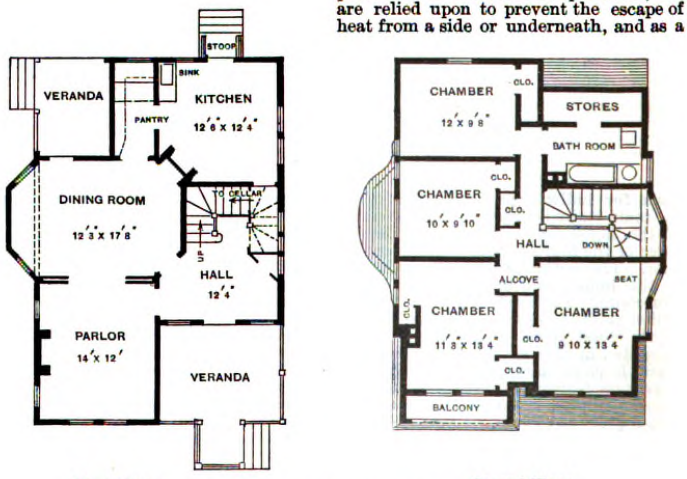
NEW PUBLICATIONS.

ARTISTIC HOMES. By Albert W. Fuller and William Arthur Wheeler, architects. Fifth revised edition; 70 full-page illustrations; large quarto oblong volume; bound in cloth. Published by Ticknor & Company. Price $6.

This is the fifth revised edition of a work which has become familiar to the trade, and, as its title indicates, gives attention to artistic homes in the city and in the country, together with other examples of domestic architecture. In the preparation of it the authors have found it desirable to alter and improve the work, so as to make it, as far as possible, representative of the latest phases of American domestic architecture. To this end they have discarded the greater portion of the older illustrations, replacing them by those of later work, and adding a few miscellaneous examples of other buildings recently designed. The illustrations are from original drawings and photographs, and cover buildings erected for the most part in the State of New York, although there are examples from the New England States and Canada.

ARCHITECTURAL IRON AND STEEL. By William H. Birkmire. Profusely illustrated; 201 pages; bound in stiff board covers. Published by John Wiley & Sons. Price, $3.50.

This has been brought out as a reference book for architects, builders and architectural students, treating as it does of the various details of iron and steel as applied in the construction and finishing of buildings. Attention is given to the use of beams and girders in floor construction, rolled iron struts, wrought and cast iron columns, fire-proof columns, cast-iron lintels, column connections, roof truss, stairways, elevator inclosures, floor lights and sky lights, vault lights, window guards and grills and doors and shutters. An interesting feature of the volume is a specification of ironwork. Selected papers in relation to ironwork, in connection with the construction of buildings in New York City, are also included. In the chapters on construction are given a number of formulas and tables designed to enable the reader to calculate the strength of beams, girders, &c., subject to transverse strain and of vertical supports subject to compression. The work, as stated above, is profusely illustrated, this feature having received special attention with a view to making all points readily comprehensible.



First Floor. Second Floor.

Scale, 1-16 Inch to the Foot.

A Kansas City Dwelling.

A STOCK COMPANY with $125,000 capital is said to have been organized at Stuttgart for the purpose of erecting cheap model houses for workingmen. The King and Queen of Wurtemberg have subscribed for considerable amounts of stock, and it is due to their recommendation that other similar companies are being formed in other Wurtemberg cities. The Stuttgart Company have bougnt 15 acres of ground near the city limits, and will begin building in a few weeks.

Hollow Wooden Construction.

A deal of missionary work will have to be done in this country to reform the hollow wooden construction which is the bane of so much of our building, says the *Northwestern Architect*. Prof. John M. Ordway has prepared a valuable table showing the conductivity of many substances, and throws more real light on the real value of the use of air spaces as heat savers than anything which we remember to have seen. The experiments were made uniformly by collecting the heat radiated from 1 square foot of heating surface across or through 1 inch of the materials to be tested, and the heating and absorbing surfaces were maintained as nearly as possible at a difference of 100° F. The results were given in British heat units, the time of each test being one hour. The simple air spaces were tested in two ways—first, with the heating and absorbing surfaces vertical and separated by 1 inch of air; second, with the heating surface above and the absorbing surface 1 inch below it. It will be seen that in the latter case only radiation and conductivity would act, while in the former convection would come in place. As a consequence the heat units transmitted were in the first experiment 108 and in the second (without convection) 43. As the air spaces of buildings are rarely or never placed as in the second experiment, but are relied upon to prevent the escape of heat from a side or underneath, and as a greater thickness of air space would only leave a freer circulation, we may assume that under the conditions usual in building more than 100 heat units would probably be transmitted across an air space for each foot of surface per hour, when

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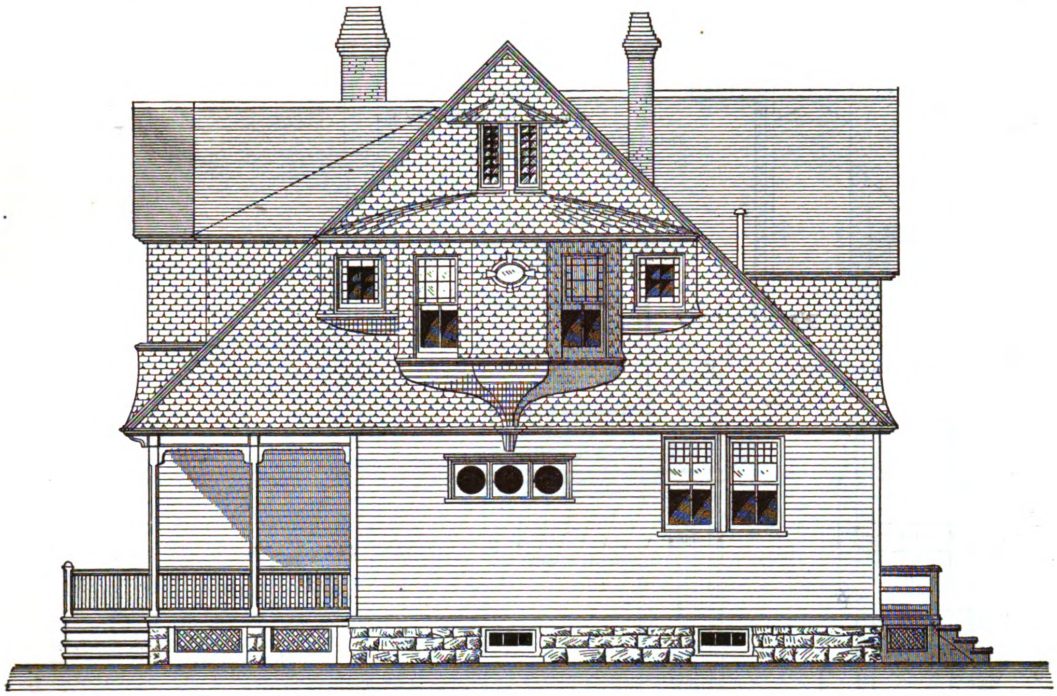
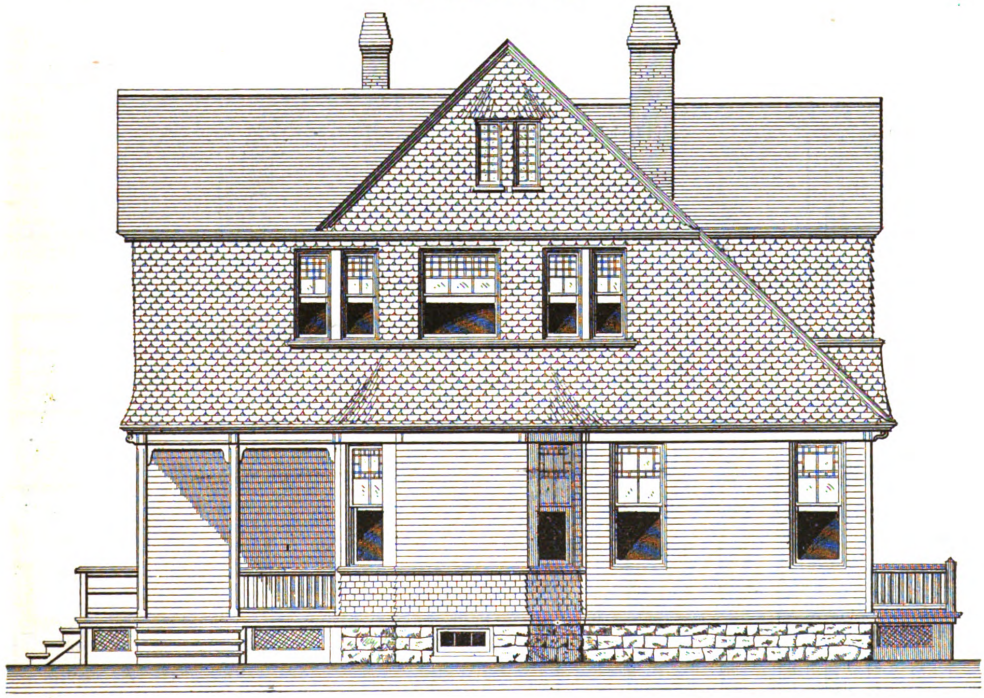
the different sides vary in temperature, as in Professor Ordway's experiments. It is worth while to know that under the same conditions of temperature 1 inch in thickness of soft woods (across the grain) or their sawdust will transmit about 75 units, the best slag wool, 50; wool, 36, and hair felt, 56. The list of substances given is a long one, very practical, and, we think, adds much to the exact knowledge hitherto available.

THE PALATIAL BUILDING for W. L. Elkins at Broad street and Girard avenue, Philadelphia, Pa., is nearing completion. It is the most extensive and elaborate private residence yet built in the central portion of the city, says a local exchange, containing nearly 50 rooms and halls, and occupying over one-half of the block on Broad street. The architect, Mr. Powell, has carried out his ideas to build unlike anything else within the city limits, though rigidly classic and without ornamentation, making a work that will attract attention and be especially pleasing to lovers of a style that comes from the past. The magnitude of the work is well illustrated in some figures of the plastering, in which 4500 square yards of fireproof metal lath were used for a foundation on which 1450 barrels of plaster were spread, varying from ¼ inch to 1½ inches in thickness.



Side (Right) Elevation.



Side (Left) Elevation.

A Kansas City Dwelling.—Elevations.—Scale, ⅛ Inch to the Foot.

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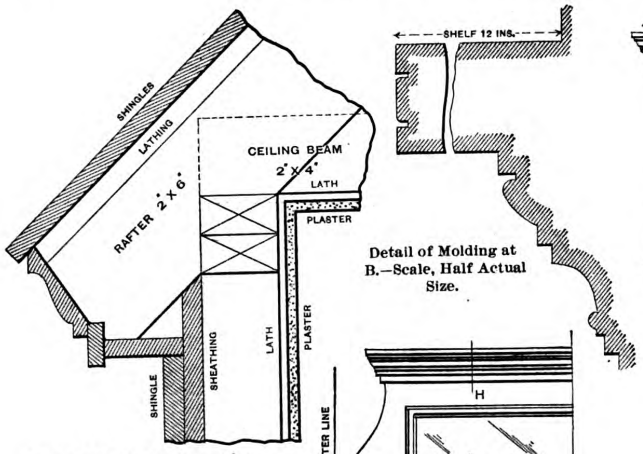
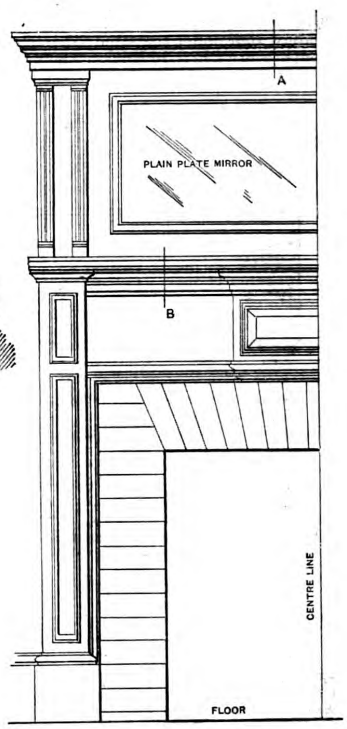
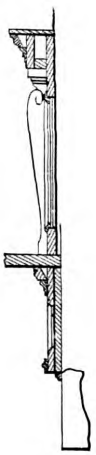


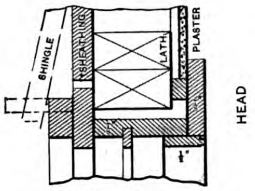
Detail of Front and Rear Gable Cornices.—Scale, 1½ Inches to the Foot.

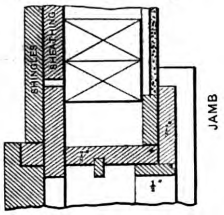
Detail of Molding at B.—Scale, Half Actual Size.

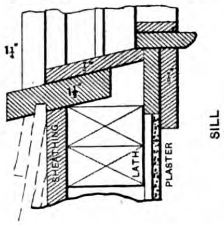


Section and Elevation of Parlor Mantel.—Scale, ¾ Inch to the Foot.

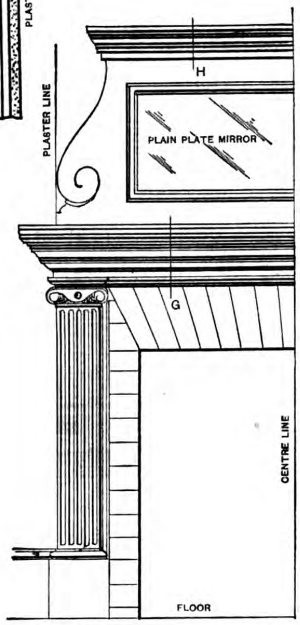




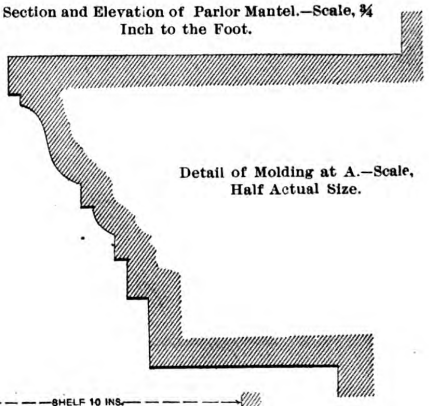




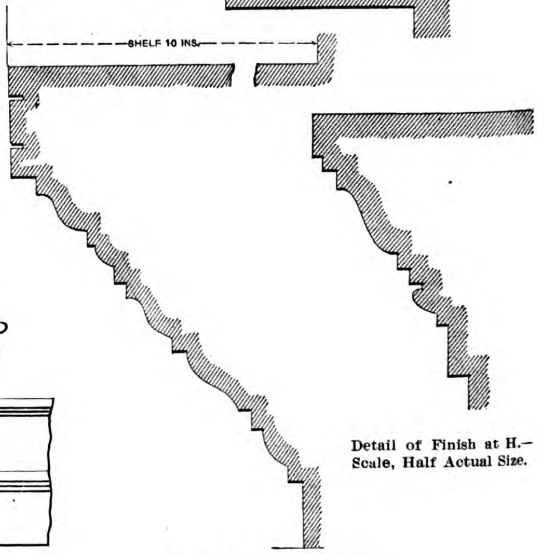
Detail of Window Frames.—Scale, 1½ Inches to the Foot.



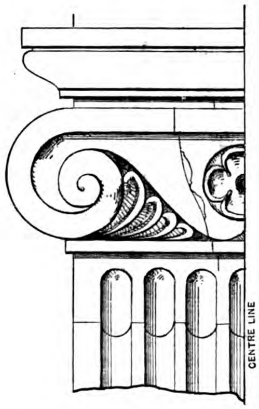
Elevation of Dining Room Mantel.—Scale, ¾ Inch to the Foot.



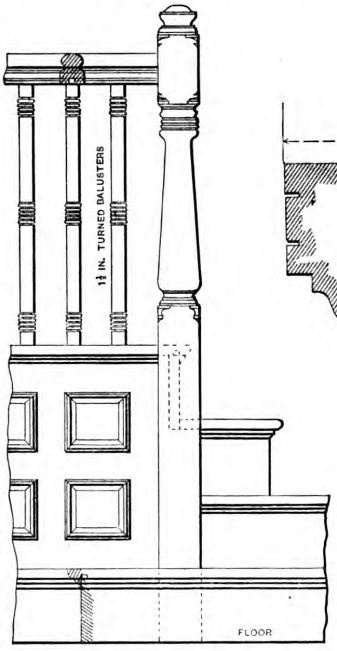
Detail of Molding at A.—Scale, Half Actual Size.



Detail of Finish at H.—Scale, Half Actual Size.



Cap on Pilaster of Dining Room Mantel.—Scale, Half Actual Size.



Detail of Stairs at First Story Platform.—Scale, ¾ Inch to the Foot.

Detail of Finish at G.—Scale, Half Actual Size.

A Kansas City Dwelling.—Miscellaneous Details.

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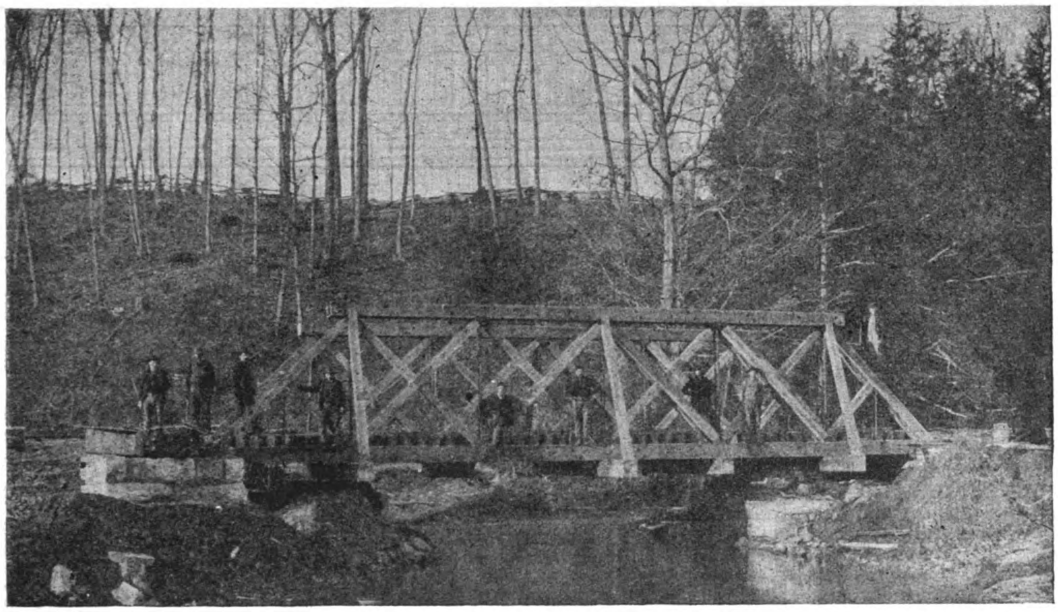
CORRESPONDENCE.

Design for Wooden Howe-Truss Bridge.

From H. M. SIMS, *Shenandoah, Va.*—Thinking the subject may be of interest to the readers of *Carpentry and Building*, I take pleasure in sending a photograph and sketches of a design of a wooden Howe truss bridge, having a span of 50 feet. This bridge was constructed by me for a narrow gauge railroad in Pennsylvania during the fall of 1889. It was designed for a live load of 3000 pounds per foot, with a dead load of 700 pounds per foot. In Fig. 1 of the illustrations is shown a general view of the bridge about as it appeared when completed. With the loads named the greatest stress on compression members is 795 pounds per square inch on the end braces. On the tension members it is 500 pounds per square inch in the center of the bottom chord, allowing an effective area of only two of the three 6 x 12 pieces, and 8500 pounds per square inch on the tension rods. In Fig. 2 of the illustrations is shown an elevation of the bridge, while at the left is indicated a better arrangement for the wall plate than that in the original sketch. Fig. 3 represents a plan of the bridge, Fig. 4 an isometric view of an angle block, Fig. 5 a sway-brace fastening. Fig. 6 a side view of end brace, while Fig. 7 represents a transverse section of the bridge. From an inspection of this cut it will be seen that there are two designs for the floor, the upper being the same as the lower except that the inside guard rails are omitted and the ties made thicker at one end than the other in order to give the necessary elevation for a three degree curve. It was the intention to have brought the inside guard rails together 60 or 70 feet beyond each end of the bridge and protect the point with heavy plate iron, the idea being that a derailed car less than half gauge to one side would be guided back close to the rail and pass the bridge safely on the ties. The latter are shown on the plan view, Fig. 8, spaced 4 inches in the clear. In the stress diagram indicated by Fig. 8 of the illustrations it will be seen that there are only two counter braces at the center of the bridge, while the elevation, Fig. 2, shows them in every panel. The two shown in Fig. 8 are all that are really necessary for the stability of the bridge. The others were put in as a precautionary measure in case of accidents, such as, for example, the breaking, for any cause, of the end braces, in which case the counters become main braces and would prevent the bridge from falling down if the load on it was not too great. Chords, braces, counters, wall plates and needle beams are of yellow pine, while the stringers, ties, guard rails, angle blocks and packing blocks are of oak. All points of contact between timbers were given a good coat of white lead and oil, and all exposed ends two coats of mineral paint. The angle blocks and packing blocks were let into the chords ½ inch. I think the balance of the structure is so clearly indicated by the drawings that further description is unnecessary. I do not present this as a perfect design, and would be much pleased to have other readers of the paper criticise it. I would only add in conclusion that the bridge has stood the test of one and a half years hard service, showing as yet no signs of failure.



Design for Wooden Howe-Truss Bridge.—Fig. 1.—General View of Bridge.

Slat vs. Solid Blinds.

From C. L. T. *and* J. M. W., *Washington, D. C.*—We would like very much to have an opinion regarding a little controversy relative to a matter in which builders generally may be interested. The point in dispute is, whether or not "slat" window blinds are used as extensively as heretofore, and also the part which the "solid" blind plays in modern house construction. We refer particularly to back buildings, as we are aware that most all kinds of blinds are done away with on the front of recently built houses. The point is, which of the two, the "slat" or the "solid" blind, has the greater demand?

Note.—The question raised by our correspondents is one which might be answered in a general way by stating it depends largely upon the locality. It is probable that in some sections the "solid" blind is used much more extensively than the "slat" blind, and that in other parts of the country the opposite is the case. We are impressed with the idea, however, that the observation of any one man is insufficient to determine the point raised by our correspondents, and we therefore refer the question to our readers, in order that a concensus of opinion may be obtained.

Problems in Roof Framing.

From J. D., *Peoria, Ill.*—In the issue of *Carpentry and Building* for January, 1891, I notice an article by I. P. Hicks of Omaha, Neb., in which I am much interested. I particularly admire the method by which he obtains the length of the various bevels of common, jack and hip rafters. I think he deserves great praise for the easy and simple manner of doing the work, for in my humble opinion it puts Messrs. Bell and Hodgson out of sight. I should be glad if Mr. Hicks would at some future time give a sketch of a valley rafter and the backing of a hip rafter, making it as plain and simple as in the article to which I refer. I am also inclined to think he could present a sketch showing the method of laying off an octagon in more ways than one, and which might be of interest to some of the correspondents of the paper who have submitted contributions touching these points.

Shrinkage in Frame Work.

From J. H. M.—Very few architects and a less number of builders take into consideration the amount of shrinkage in the material used in building a frame house of large size. The lack of attention on the part of builders to this important detail in house construction is one of the chief causes of fires which are often attributed to a defective flue. A case in point is that of a large fire not long since, the building being wholly of wood, and

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burnt like tinder. One cause of the conflagration was assigned to a defective flue. Commenting on the cause a prominent builder said: "It may be true that the shrinkage in timber employed. Very few people take any notice of the shrinkage in new buildings, but let them go into an old frame house, one built years ago, and something must break. In nearly every case it is a wall, including the flue. The break may be but small, so small as to be unnoticed by the inmates of the house,

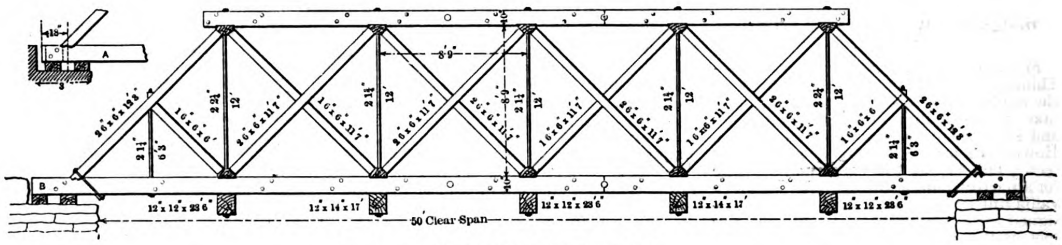

Fig. 2.—Elevation of Truss Bridge.

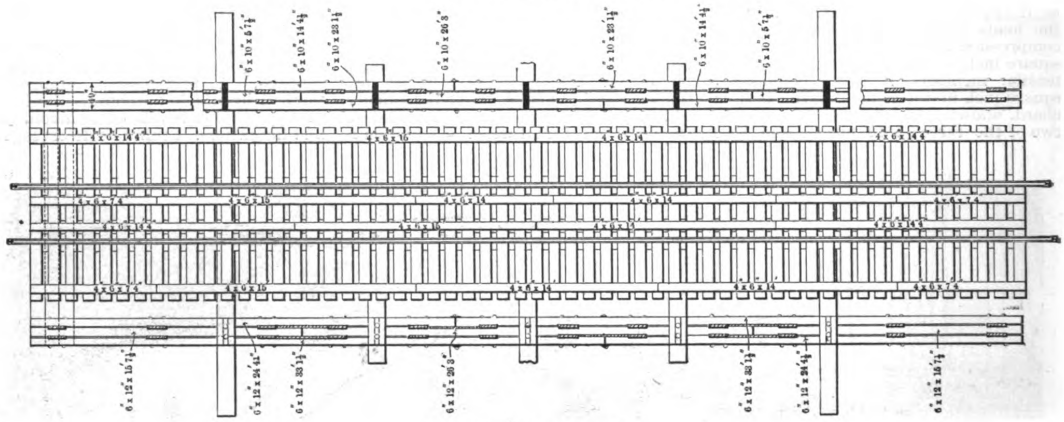

Fig. 3.—Plan View of Bridge.

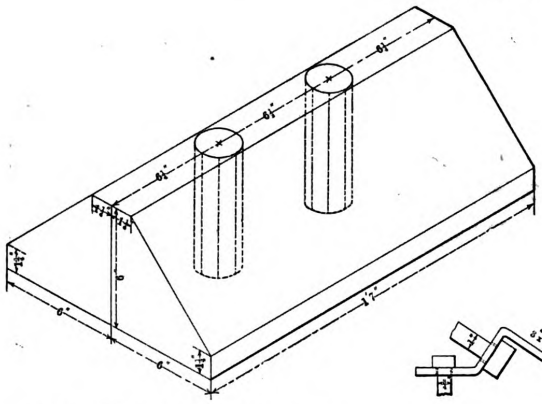

Fig. 4.—Isometric View of Angle Block.

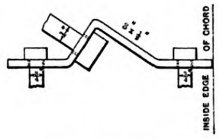

Fig. 5.—Sway Brace Fastening.

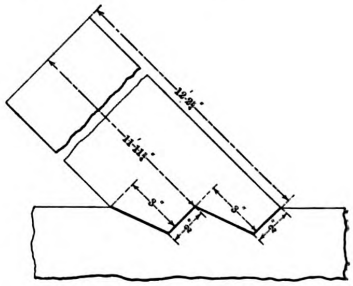

Fig. 6.—Side View of End Brace.

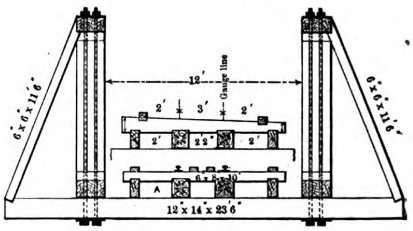

Fig. 7.—Transverse Section of Bridge.

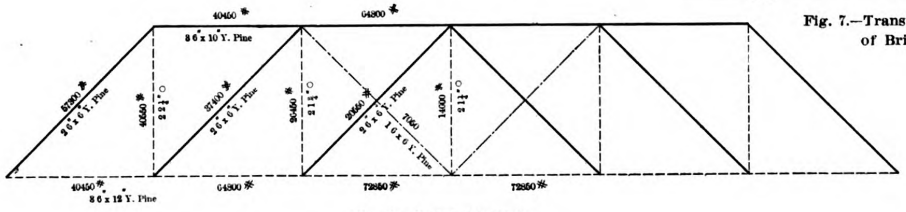

Fig. 8.—Stress Diagram.

Design for Wooden Howe-Truss Bridge.—Details of Construction.

cause was a defective flue. In nine cases out of ten, in frame structures, the cause is such: but go back to the prime cause. What is it that caused the defective flue? Why, it was nothing more or less than the they will see evidences of shrinkage on every side. The floors are uneven, the walls are not 'plumb,' and the ceilings 'slope.' Now, all this shrinkage exerts force, and when the woodwork sinks but the flue may be irretrievably damaged. One side is drawn over the opening for a few inches. A spark is caught in some of the exposed woodwork, and in an instant the flue is in flames. The building may

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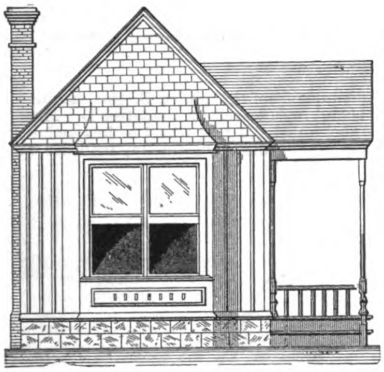
perhaps be burned to the ground and thousands of dollars damage result. The only relief from these defective flues is to take the shrinkage into account and allow for its power. This can easily be done, and its value will be easily apparent."

The amount of shrinkage to each foot is about ⅛ inch, and in a three-story frame house, allowing for a girder and other such woodwork, the shrinkage would be about 3¼ inches, the amount varying under different conditions. This settling of 3¼ inches would exert tremendous power, and would result in a defective flue or cracked walls.

Design for Outing Cottage.

From E. R. E., *Prano, Ill.*—I notice the November issue of *Carpentry and Building* contains a request for a correspond-



Design for Outing Cottage.—Fig. 1.—*Front Elevation.*

ent who desires plans for a summer cottage. In reply to this inquiry, I take pleasure in submitting a floor plan and front elevation of a building which I think is about what the correspondent wants, and which may be of interest to some other readers of the paper. I am an architectural student and would very much like to have the older heads criticise my design. Fig. 1 shows the front view and Fig. 2 the floor plan. I am impressed with the idea that if some of the practical draftsmen and architects would

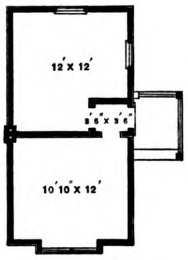


Fig. 2.—*Floor Plan.*

write more letters to the editor of the paper it would improve the Correspondence department.

Designs for Bookcases.

From J. A. M., *Washington.*—I have been reading *Carpentry and Building* for about three years, and have obtained much valuable information from its pages. I would now like to ask some of the readers if they will give me a design for a bookcase, something that will be neat, but not expensive.

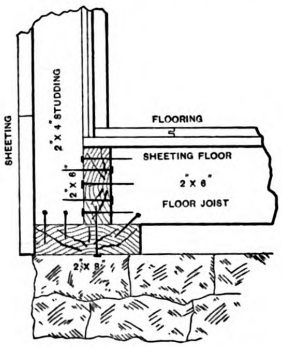
Note.—As being of possible interest to this correspondent, we would state that in the August number of *Carpentry and Building* for 1886 there were published a number of designs for bookcases, and that in the issue for November, 1889, there were several illustrations, with accompanying descriptive text. The subject, however, is one which admits of a great variety of designs, and we should be glad to hear from those of our readers who have made bookcases either for their own use or in the way of business.

Polish For Hard Wood.

From L. M. Y., *Lebanon, N. H.*—In answer to "W. W.," Philadelphia, Pa., who asks for a polish for hard wood, permit me to recommend a recipe, which I think will prove of interest to him. Dissolve 1½ ounces gum shellac, 1 dram sandarac and 3 drops of acetic acid in 3 ounces of alcohol, or in these proportions. This is the polish I use and it has given satisfactory results.

Framing Sills.

From W. J. S., *Parker, S. D.*—In the March number of *Carpentry and Building* I notice the method of framing sills suggested by "A. B. H.," and as I have a method which I think will prove of interest to the readers of the paper, I submit it herewith. It is a method of framing what I term a "box" sill, and I like it better than the one suggested by "A. B.



Framing Sills.—Fig. 1.—*View of Side Sill.*

H.," for the reason that it does not take up as much of the studding, while it brings the floor down to the top of the sill. The sketches which I send herewith show the method so clearly that further explanation does not appear to be necessary. It will readily be seen that the sill is ratproof, and also shuts off the draft. Fig. 1 of the sketches shows a view of the side sill, while Fig. 2 represents the end sill. Fig. 3 illustrates the way I was taught to frame a sill when I commenced to learn the trade, but I do not like this style as well as that previously referred to. I would like to hear from others on the sill framing question.

Size of Shingles and Method of Laying Them.

From F. K., *Kieler, Wis.*—I notice in the September number of *Carpentry and Building* that "C. J. G.," Lebanon Springs, N. Y., thinks it a waste of lumber to expose shingles less than 5 or 5½ inches to the weather. I also notice that he says something about 18-inch shingles. Now, I would like to know of the practical readers of *Carpentry and Building* what is mostly used by them, 16 or 18 inch shingles, and also which they consider the best? For my part I must say I have not used an 18-inch shingle in my life. I have used shingles from many States, including Wisconsin, Iowa, Minnesota, Michigan and Oregon, but all were 16-inch shingles, ⅜-inch thick below and ⅛ inch at the top. Now, I consider that a good 16-inch shingle should not be exposed any further to the weather than 4½ inches at the most. It appears to me people think nowadays that the cheapest way is the best, instead of the best way being the cheapest. This is why there is so much trouble with buildings sagging and leaking all over. There were some new churches built out here in my neighborhood, and one of them, after standing five years, leaked, and the roof had to be renewed and tin put on instead of shingles. In the case of another church the roof only lasted eight years, and in another case the roof leaked ever since it was built. All had been shingled with good shingles, the only fault having been with the workmanship. Now, I would like to ask the practical readers of the paper what they consider to be the best method—laying shingles 4 inches to the weather and have a roof that will last, or laying them 5 or 6

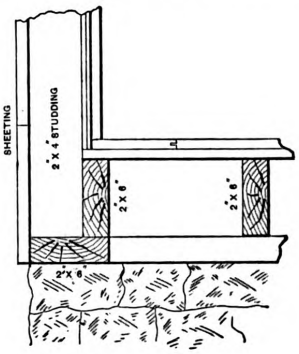


Fig. 2.—*View of End Sill.*

inches to the weather and have a roof to leak in a few years? I never had any trouble with roofs leaking, and I lay the shingles as follows: I use clear shingles and lay them 4 inches or 4¼ inches to the weather. I nail every shingle with two nails and split all shingles over 10 inches wide, nailing on each side of the split, using 4d wire nails. By laying the shingle 4 or 4¼ inches to the weather the nails do not go so far through the sheeting as when laid 5 inches to the weather.

Backing of Jack Rafters.

From H. T., *Holyoke, Mass.*—I would be pleased to have some of the correspondents of *Carpentry and Building* explain by draft how to obtain the back cut or bevel to hip and jack rafters. Obtaining the length of hip and jack rafters and the

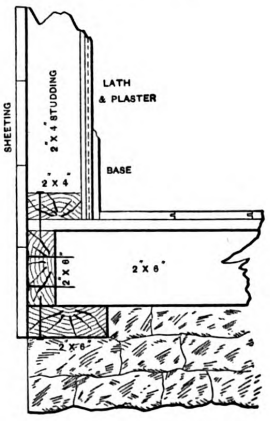


Fig. 3.—*Another Method of Framing Sills.*

down bevels have been well explained in the past, but I have not seen an explanation of the way to get the back cut, and as I am a beginner at the business and a new subscriber to the paper, I hope some

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one will undertake to give me this information.

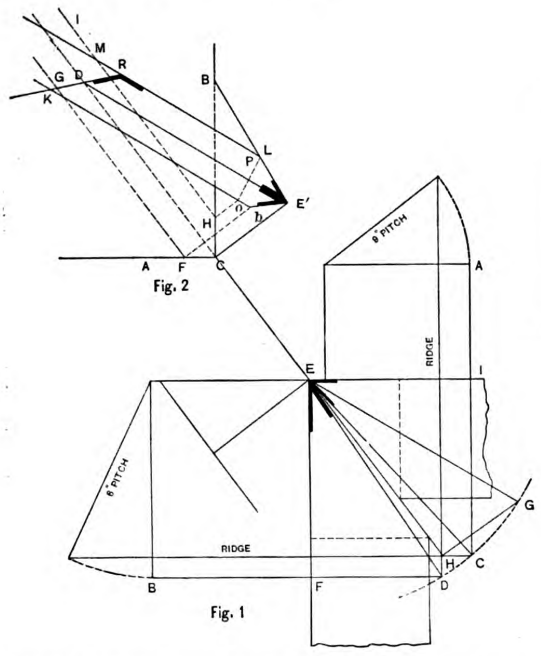
Note.—All that our correspondent mentions has been explained repeatedly in the past in these columns, and to our regular readers the subject is, no doubt, somewhat hackneyed. In the serial article now running in this journal relating to the general subject of framing these questions will likewise have answer. Nevertheless, if any of our readers are disposed to send special diagrams in reponse to this request we shall have pleasure in presenting them.

Dividing a Circle.

From E. H. G., *Sierre Madre, Cal.*—I would like to ask, through the columns of *Carpentry and Building*, how to divide a circle into any number of equal parts. For example, how is a circle divided into 360 degrees?

Meloy's System of Roofing.

From C. P. C., *Chestnut Hill, Philadelphia, Pa.*—In my opinion, "J. W." of Paterson is right when he says D. H. Meloy is incorrect in regard to his Fig. 13 in the article published in the January number of *Carpentry and Building*. If Mr. Meloy will take the length of rafter of the 9-inch pitch and extend it to A, as indicated in Fig. 1 of the engravings, then draw a line parallel with the ridge until it cuts the arc at C, drawing a line from C to E for that side of the valley, he will have the side bevel. Take the length of 6-inch pitch and extend it to B. Then draw a line parallel with the ridge until it cuts the arc at D. From D draw to E; then D E F will be the side bevel. E G is the length of the valley; so is E C and E D. That will give a different cut from the one obtained by Mr. Meloy. To find the side bevels of the valley rafter, let A and B of Fig. 2 represent the two ridges coming together at C. Let C D represent the seat of the valley; also the center. From C take the rise of the roof at right angles with C D, which will be at E'. From E' draw to D. This will give the pitch of rafter. Draw the line F G parallel with C D. Also draw H I parallel with C D and at equal distances from C D. Draw the lines *b* K and L M parallel with E D the same distance apart as are those previously mentioned to C D. From F draw a line at right angles to G F, which will stop at *b*. From H draw at right angles to H I, which will stop at *o* on the line *b* K. From E' draw a line to *b*. From *o* draw a line to P on right angles to K *b*. From P draw a line to E'. This will give the two side bevels required. Draw R parallel with *b* K and E' D. The side bevel at R will fit the plate and will make a cut for the valley different from the one shown by Mr. Meloy.

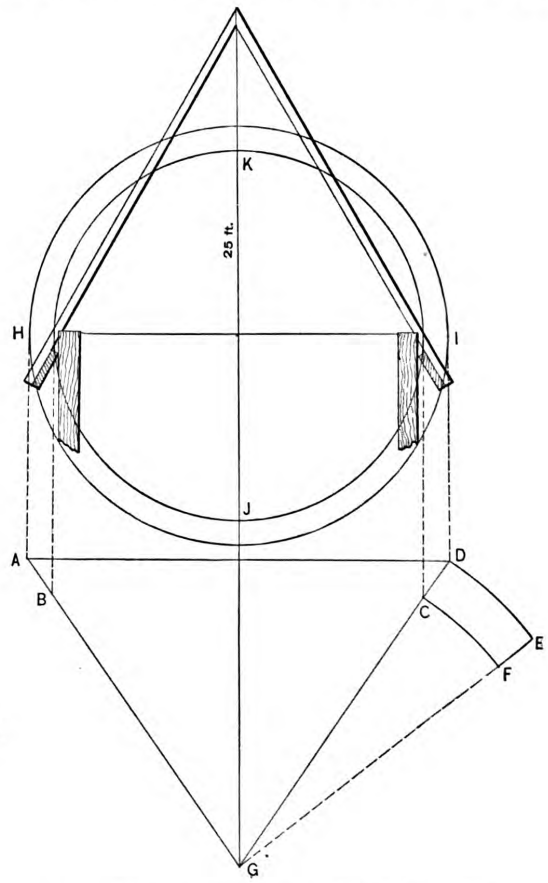


Meloy's System of Roofing.—Sketches Submitted by "C. P. C."

Question in Planceers.

From A. W., *Tiffin, Ohio.*—I inclose herewith a sketch in reply to the inquiry of "W. H. C.," which appeared in the January issue of *Carpentry and Building* for 1891. Referring to the sketch, let H O and J K represent the large and small diameters of the planceer when in position. Let D C represent the width of the planceer. A B C D represents a section through the tower. Prolong A B and C D until they meet at the point G. Then from G as center, with G C and G D as radii, describe the arcs D E and C F. This will give a section of planceer 8 feet long, and making it ½ inch thick, I am sure it can be bent in place on the tower of the size mentioned by the correspondent.

Note.—We also have, very similar to those which have already been published, answers from "J. G.," Bay Ridge, L. I., "J. L. H.," Pueblo, Col., "G. W. W.," Woodlawn, L. I., and others.



Question in Planceers.—Drawing Submitted by "A. W."

Problem in Gear Wheels.

From J. N. H., *New Orleans, La.*—To such of the readers of *Carpentry and Building* as may be mathematically inclined I would respectfully submit the following problem to be solved geometrically, arithmetically or trigonometrically, but not by any "rule of thumb" method. Referring to the accompanying sketch, suppose the gear wheel A is placed a short distance from the pinion B, the distance being represented by the letter D. How much must the gear wheel be lowered, or the pinion raised, vertically, in order to make the wheels mesh? The known data is the diameter of both wheels, the distance D, and also the distances *a* C and *b* C. The distance D refers, of course, to the space between the pitch line of cogs.

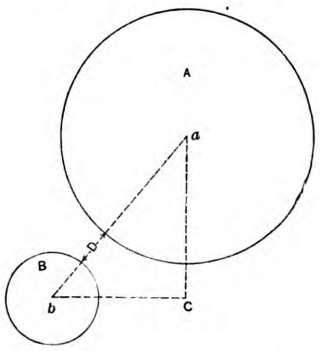


Diagram Accompanying Letter of "J. N. H."

Elliptical Arch.

From CONSTANT READER, *Denver, Col.*—I would like to ask the rule for obtaining by means of compasses an elliptical

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arch with the same perfection as with a trammel, if such a thing is possible.

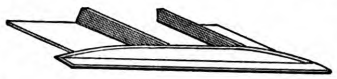
Note.—A close approximation is possible by a combination of arcs of circles. Several rules are in use, some of which perhaps our readers will be glad to explain, but the kind of a line specified is impossible with the instrument named.

Building a Skiff.

From T. C. S., *Vox Populi, Texas.*—Will some of the practical readers of *Carpentry and Building* give me a method for constructing a good skiff, 16 or 18 feet in length?

Fire Place Construction.

From H. C., *Providence, R. I.*—I notice in a recent issue of *Carpentry and Building* the letter of a correspondent relative to the proportions of a properly constructed fire place. What is there contained is exceedingly interesting, and no doubt represents good American practice. For the purpose, however, of giving the readers of the paper an idea of the manner in which those on the other side of



Fire Place Construction.—Fig. 1.—*Gibbs Fire Place Lintel.*

the water construct fire places in order to prevent chimneys smoking and give a proper direction to the flue, I take the liberty of submitting some sketches which were taken from an announcement of John Gibbs & Son, Liverpool, which I noticed in a recent issue of an English paper. The device is known as Gibbs' Fire-Place Lintel, and is shown in general view in Fig. 1 of the accompanying illustrations, while in Fig. 3 is shown the method of its application. The lintel is said to save the waste and labor of gathering the flue, as well as the cost of the

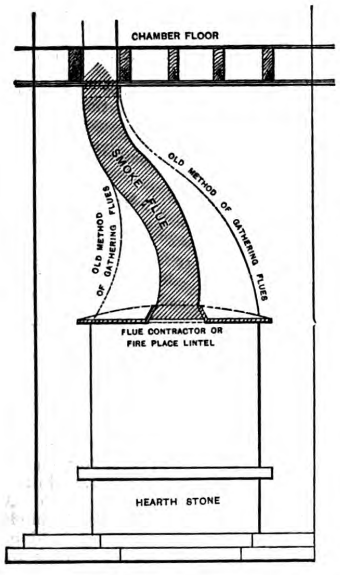


Fig. 2.—*Chimney Breast with Lintel in Position.*

wrought-iron arch bar, which it is designed to entirely supersede. In Fig. 2 of the cuts is indicated the chimney breast, showing the lintel in position. It is built in 3 feet, 3 inches above the level of the hearthstone, in order to be clear of the register lid of the fire grate, which may be used in connection with the open fire place. The illustrations which are presented herewith so clearly indicate the construction that further particulars would appear to be unnecessary.

Hollows and Rounds.

From C. H. P., *Waterbury.*—I would like to ask the readers of *Carpentry and*

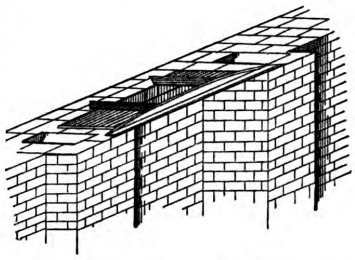


Fig. 3.—*Showing Method of Application.*

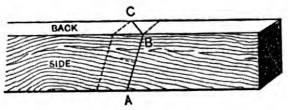
Building if they will tell me how to distinguish certain tools which are called "hollows" and "rounds." Is the tool which has the hollow face, and which makes the round face of a molding, called the "hollow" or the "round?"

Handrail for Pair of Stairs.

From C. A. McD., *Smith Falls.*—I would like to see a sketch published in *Carpentry and Building* of a handrail for a pair of stairs. The tread of the main stairs is 8½ inches, the rise $8\frac{5}{16}$ inches, and there are five winders. It is an ellipse on the level.

Obtaining Bevel Cuts of Jack Rafters.

From I. P. H., *Omaha, Neb.*—In answer to "T. S." of Toledo, Ohio, whose letter regarding methods for obtaining the bevel cuts of jack rafters appeared in the December number of the paper for 1890, I am inclined to think his plans are faulty and somewhat unreliable. This is particularly true with the second plan which he mentions. He says, "Take the valley cut and apply it on the jack and use the long miter." I presume he means the cut of the valley rafter, and the long miter, except in very steep roofs, would be the bottom bevel fitting the plate. One singular feature of this correspondent's plan is that it will work only on a half-pitch roof. It is apparent that "T. S." needs two ways of doing such work. I presume that when one plan fails he tries the other. Of the two plans described by him I am of the

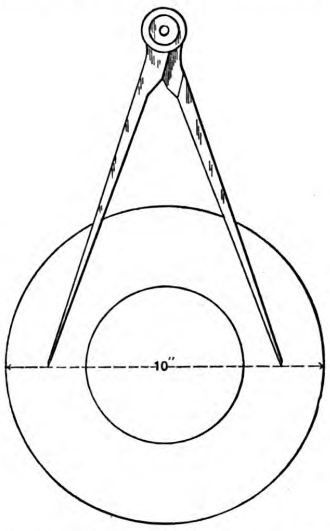


Obtaining Bevel Cuts of Jack Rafters.

opinion that the former is the more correct. As he says, "I find this works in many cases," it is natural to conclude that the plan, as he follows it, must be faulty, else it would work in all cases. It is possible I may not have the correct idea of the plan of "T. S.," but I will give a sketch showing the plan which I think he means to describe. If his plan is the same as the one shown it is correct, and will give the true bevel of a jack rafter on any pitch of roof. Referring to the sketch, mark the plumb cut on the side of the rafter the same as on any rafter A B. Draw parallel to this a line the thickness of the rafter, as shown by the dotted lines. Square across the back of the rafter from the pitch lines and mark the diagonal B C. Cut to the lines A B C. The correspondent "T. S." does not inform us how he finds the length of jack rafters. If he obtains them from proper diagrams I should think he would know whether his methods are correct or not, as in most cases the bevels can be taken directly from the diagrams.

Mitering a Circular Molding with a Straight Molding.

From A. H. McK., *Lincoln, Ill.*—In the April issue "M. B." of New Westminster, B. C., asks for the simplest method of mitering or intersecting a circular molding with a straight one. In reply to this inquiry let us assume that the circle from which the segment to be intersected is



Mitering a Circular Molding with a Straight Molding.—Fig. 1.—*Showing Position of Compasses.*

cut is 10 inches in diameter from out to out and the molding 2½ inches wide. Set one point of the dividers at the center of one side of the circular molding and the other point at the center opposite. This places the points of the dividers 7⅛ inches apart, which gives the radius to cut the intersecting joint. This method will apply to any size of circle. I inclose

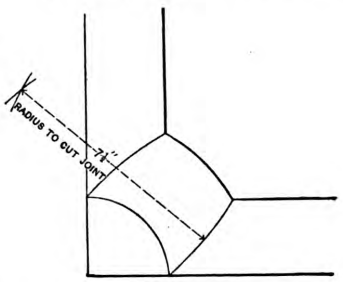


Fig. 2.—*The Radius for Cutting the Joint.*

sketches which I think will be readily understood by the readers. Fig. 1 shows the position of the compasses in order to obtain the radius for cutting the joint, while Fig. 2 shows the radius obtained.

Arrangement of Store Fronts.

From W. G., *Humboldt, Iowa.*—The new department of "Building Ways and Means," commenced in *Carpentry and Building* for January of the present year, strikes me as being very appropriate. It will give an opportunity for an interchange of ideas and methods, which cannot fail to be very beneficial to all mechanics and builders. Those of us who

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are slow to originate can learn something from those who are more apt, and most of us are pleased to help others or be helped ourselves with problems which have proven difficult.

The arrangement of store front, which was described in a recent issue by an Ithaca correspondent, is a good one, for I have followed nearly the same plan for a number of years past with satisfactory results. The only difference between my plan and the one described by the correspondent is that I put the entrance at one side of the front. This plan I find to be a good one, especially on narrow buildings. This last summer I built a meat market 24 feet wide, in which I adopted the same plan. I made a wide and deep recess with side light and single 3 feet 6 inch door in the angle beyond the recess leading to a flight of stairs to the upper floor. The front of the market has two large polished plate-glass lights in the lower half of the sash and four common lights in the upper half, this arrangement being very satisfactory. I think if builders would adopt this system occasionally they would be pleased with it, for the plan more than commends itself to buildings where stairs have to be put up at one side of the front, and more especially in narrow buildings where there is need of a show window. Then again, a single wide door is, in my opinion, preferable to two narrow double doors. A door 3 feet or 3 feet 6 inches wide and 8 feet high is usually sufficient for the purpose, and needs only to be tried to be appreciated. I refer, of course, to sash doors. In making these doors I use 2-inch stuff, 6-inch stiles and 12-inch bottom. I put the lock rail well up toward the center, say from 3 feet to 3 feet 6 inches to top of rail, with either one or two lights, as desired. I like *Carpentry and Building* in all its departments. The practical ideas are what we want. I have been much interested in roof problems, and they cannot fail to be of assistance to a great many readers. Now, what we want next is something about cornices. Let some practical man give us plans of cornices in detail for buildings 16, 18 and 20 feet high. They are just what we want, now that we have had so much about the roofs.

Correcting Bad Acoustics.

From T. F., *Mendota, Ill.*—Please inform me through the columns of *Carpentry and Building* with regard to the following points: 1. What arrangement of wires in an arched auditorium has been successful in breaking a bad echo? 2. What arrangement of sounding boards has proven useful for the same purpose? What would be the probable expense of fixing a church 40 feet wide, 76 feet long and 22 feet to the plates, with nearly a full arched ceiling, so that the acoustic properties would be satisfactory? There is in certain parts of the house an echo which makes it almost impossible to understand the speaker, and in all parts there is a continual ring which spoils the music and renders the house difficult in which to both speak and hear. We tried the pulpit at the side of the room, and, while that makes it possible for all to hear, the ring appears to be as bad as ever. We stretched lengthwise of the room, clear across the ceiling at the hight of the plates, fine wire placed 6 inches apart, but the ring is as bad as ever. Any suggestions concerning a method by which the house may be fixed without great expense will be of value to the writer and may be of interest to other readers of the paper.

Note.—Without attempting to go into an extended reply to the inquiries of our correspondent above, or to anticipate remarks from readers of the paper, we would say we know of no invariable rule whereby the acoustics of a building may be corrected. It is usually the custom in such cases to try first one plan, and if that does not succeed to resort to some other means until the exact nature of the defect is made plain. By reason of peculiar conditions existing a plan which would work well in one case might prove unsatisfactory in another, and we think our correspondent will find that it is only by trying successive suggestions that he will be able to approximate satisfactory results. The most experienced in such matters are liable to fail at times, and it is only by following some such course as that outlined above that bad acoustics are corrected. It would be exceedingly difficult to make, at the outset, an estimate of the cost of such a piece of work as our correspondent mentions, and not only would it be difficult, but probably unreliable as well. It is only those who have made a special study of the subject that are in a position to give intelligent advice. No doubt many of our readers have met with an experience similar to that of our correspondent, and would be willing to describe the various plans adopted before finding one answering the purpose. With this much said we refer the questions to them, in the hope that they will discuss them, to the end that an interesting record of experience may be presented.

The Falling Mold vs. the Tangent System.

From A. L., *Napa, Cal.*—I had a good laugh all by myself when I read "L. W. T.'s" letter in the December number of *Carpentry and Building*. I must say that I agree with the sentiment expressed in that article. I have no desire to censure Englishmen, but it pleases me when we get the laugh on some would-be smart "Alec." When a man presents a plan of stairs which a stairbuilder of any judgment would not entertain for a single moment, and sets it up as a sample of his superiority over a well-known author, then I say that "L. W. T.'s" article is fair in its treatment of him. A shopmate of mine had the candor to tell me that when he came to this country from England he had the conceit beautifully taken out of him. He thought there were no good mechanics in this country and that bosses would jump at the chance to get him to work for them. He had not worked very long, however, before he discovered the fact that there were better mechanics here than he was. He thought they must be old countrymen, but when he made inquiry he found they were American born. He also spoke about some superior American tools, notably the circular plane and the improved iron brace, but he said in England the mechanics were so bigoted they would not use them. Now, a word about "all one length balusters, all one width winders, lumps, humps and bumps on the rail." Did anyone ever joint up a board as straight as he could make it, dado it, bend it over a ¼-circle drum on the pitch of the stairs, and when he had the keys glued in take it off the drum, lay it on the floor and find that it only touched at two points, while being considerably off at other points? Now, the floor should represent the plane of plank from which a rail is worked by the tangent system. I think one cannot get a rail with fewer "humps, lumps and bumps" than one which is worked to the center line of plank. It is also a fact that if we take a quarter cylinder in connection with a piece of straight string, lay it out with steps of equal width and cover the cylinder with one piece, the tangents will not have the same pitch as the center line of straight rail. Also, if we cover the quarter with two pieces instead of one the pitch of tangents will be nearer that of the straight rail. I think the "one length baluster" disciples overlook the main point for the sake of gaining a minor one. I should think the bobbing up and down in the thickness of a plank to get the balusters all one length would be more likely to make lumps on the rail than by the tangent system. If Mr. Monckton's development to get the length of baluster does show a lump on the rail, my experience is that a rail worked out according to his plan will form a graceful curved line when in position. An old stairbuilder once said to me that the carpenters had built the stairs wrong and that he had to put short balusters on the landing. They had placed the last riser in the cylinder instead of at the spring. The difficulty was that he did not know how to handle the tangents for that kind of a wreath. The tangent system in the hands of an experienced man will get over any case that the falling line theory will, with perhaps an extra joint to offset a great deal of time and thick planks. I would like to hear from other readers on this subject and, also, if any of my brother stairbuilders have any special tools or appliances which they think of interest, I should be pleased to see explanations of them in the columns of the paper.

Building Felt versus Tar Paper.

From T. B., *Headingly, Man., Canada.*—In the April issue of *Carpentry and Building* I notice an inquiry from "W. A. P.," Burritts Rapids, Ont., with regard to the relative merits of building felt and tar paper. In reply to this inquiry I would say, so far as my experience goes, tar paper will last the longest and make the best job, for the reason that it forms an air-tight lining when put on between two thicknesses of boards, or under shingles. Here, in the cold climate of Manitoba it is very generally employed. When buildings are to be made very close and warm it is put on between two thicknesses of boards and lapped 2 or 3 inches. The joints thus formed will seal tightly, as the tar becomes a little sticky. Then, again, it is of an oily nature and will stand moisture better and turn more dampness and wind than the brown paper. Still another reason why, in my estimation, it is preferable is found in the fact that rats and mice will not touch it. So far as tar is concerned there is a kind which is clean to handle. It is called the "half tarred," as there is tar on both sides, but not clear through, and it is allowed to dry at the factory before being rolled up. This kind of paper will not soil the hands, nor does it smell so strongly of tar as the ordinary tar paper. In this connection I would say that brown paper is employed only for the interior of the cheapest buildings.

Meloy's System of Framing Roofs.

From D. H. MELOY, *Waterbury, Conn.*—In reply to "L. W. H.," Duryea, Pa., I would say that the length of hip rafters may be laid off on the side, as I have done, and it is at the point A of the figure referred to. They may, however, be laid off on the center of the back where the letters B J cross. The length is the same.

Framing Jack Rafters.

From J. W., *Paterson, N. J.*—I would like to ask "D. C.," Berkley, Cal., to give us a little more information concerning the method of finding the bevel for backing hip rafters. In his letter, which appeared in the January issue of *Carpentry and Building*, he says, "Draw the line S and inscribe a circle," but he does not tell us how to draw S. It may be that it makes no difference whether it is drawn from E to any point on the line E B, so long as it gives a center on E D. We might take a center on E D without the line and open the compasses to the nearest point, cutting the hip rafter, and draw a circle cutting the base line and hip. A line drawn from the point where the circle cuts the base line and the hip would be the backing with a bevel-set stock on E D and blade to S H.

Floor and Roof Truss.

From C. M. J., *Ontario, Ohio.*—Will some of the readers of *Carpentry and Building* tell me how to construct a floor and roof truss for a balloon framed hall 36 x 50 feet in size? The floor and roof are to be self supporting. The first story is to be 10 feet and the second story 12 feet in the clear. The building is to be covered with a one-third pitch saddle roof.

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COTTAGE OF CHARLES R. LEWIS, MIDDLETOWN, CONN.

J. D. SIBLEY, ARCHITECT.

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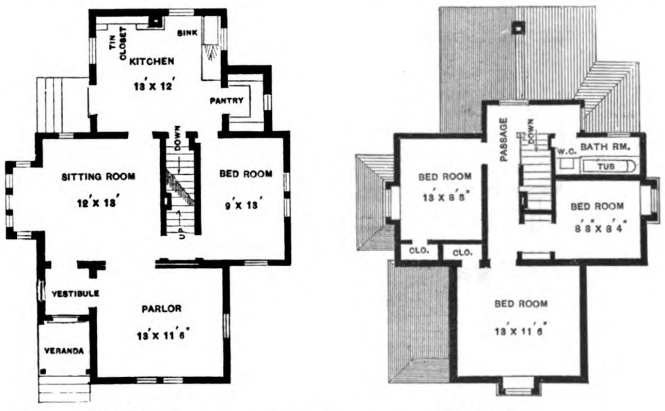
COTTAGE OF CHARLES R. LEWIS.

A CONVENIENTLY arranged cottage of moderate cost is shown by means of the elevations, floor plans and details presented upon this and the following pages. The cottage is that of Charles R. Lewis, erected about four years ago in Middletown, Conn., from plans prepared by J. D. Sibley, architect, of that place. The house stands on an elevated plot of ground, facing one of the pleasantest streets of Middletown, and is constructed in a manner to fully meet the requirements of a variable climate. A photographic reproduction of the cottage constitutes our supplement plate. The first floor is arranged with four rooms, one of which is designated as a sleeping room, measuring 9 x 13 feet. The house is entered through a vestibule, from which open the parlor and the sitting room, which in turn are connected together by sliding doors. A bay window jutting from the sitting room has a southern and eastern exposure, thus adding materially to the cheerfulness of the room. In this apartment a stove is placed in winter, so as to heat it as well as the parlor, while by opening the door at the foot of the stairs the chill is taken from the rooms on the second floor. The apartment on the first floor, marked "bedroom," is used for dining purposes, and is easily reached from the kitchen, which is in the rear of the house. The kitchen has a side entrance, and is provided with a fair-sized pantry, a closet for tinware and a sink with drain board. Opening directly from the kitchen are the cellar stairs.

The rooms on the second floor are three in number, exclusive of the bathroom. The portions next to the eaves are sufficiently high for a person to stand erect, while the projecting windows and the broad seats placed therein constitute attractive features. The interior of the house is finished in the principal rooms with clear white pine, painted in colors. The walls are papered. The kitchen is finished in North Carolina pine with Crockett's Preservative. The walls have three coats of paint stippled. The cost of the cottage at the time erected was $1800.



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



First Floor. Second Floor.

Scale, 1-16 Inch to the Foot.

Cottage of Charles R. Lewis.—J. D. Sibley, Architect, Middletown, Conn.

Nomenclature or Vernacular in Brick Making.

The following interesting paper on the subject indicated by the title above was read by S. K. Fletcher of Indianapolis, Ind., before the National Brick Manufacturers' Association at their fifth annual convention held in the city named in January last:

In getting into the subject I find that there is not a great deal that would make what might be termed an instructive paper, so I cannot promise that you will be any wiser or that you will know any more how to make good brick after I am through. I shall drop the word "nomenclature," as in reality the term can hardly be used in brick making, for that would mean names for the different parts of the business used by all brick makers in all parts of the country, whereas there is only a "vernacular," the terms used in different localities, but meaning the same thing; although many of the terms used are almost the same the country over, nearly every locality has many that are peculiarly their own.

I have not endeavored to confine myself to my subject as named, but have incorporated some items which seemed pertinent, having in view the rules of the convention that no paper shall be more than five minutes long, and that the "Children of Israel" are not to be mentioned. I will proceed and begin with our own locality here in Indianapolis: One of the first operations of the brick maker is to "dig" his clay, or "turn" his clay in the "field;" the term "field" is used, as we can only work the clay 18 to 24 inches deep, and it really requires a good sized farm to run a brick yard of any very great capacity, both terms digging and turning meaning the operation of spading over in the winter or early spring all the clay for the season's work, by first digging a trench, say 2½ feet wide, and as deep as it will work, then another strip of similar width, throwing the top into the bottom of the trench first dug; this brings the bottom clay of the second trench on top of the first, and thus the field is dug over. The work being paid for by the thousand, counting 64 cubic feet to 1000 brick. And no one in this locality would think of making brick without first preparing his clay in this manner.

MOLDING BY HAND.

For yards molding by hand the clay is "carted" to the pits by men called "clay carters" or "pit fillers," where it is "soaked," meaning that water is applied of sufficient quantity to thoroughly percolate through and dampen every part, after a sufficient length of time, when it goes through the "tempering" process, which is done with a "tempering" or "mud wheel," working on a shaft with a ratchet which causes it to travel in and out until the clay has been transformed into the perfect mud state. Then the pit is "smoothed" or "slicked" down with a board called a slicking board, hitched to the wheel shaft, on which the "driver" or "pit man" will ride around a few times until the surface is as smooth as a cement walk; this prevents the pit drying out. The mud is then taken to the table on a "mud barrow" by a "mud wheeler." The "molder" sands his table and then "rolls" his "walk," by which is meant he throws or sprinkles sand on the table to prevent the mud sticking, and with his hands he cuts from the mass in front of him a sufficient quantity for one brick, rolls it on the sanded table until he gets it into the proper compact form, and then with a quick, firm movement drives this mass into a mold with such force as to fill every corner. When all are filled he "caps" the mold with his "bow," which is a short, stout bowed piece of wood with a steel piano-wire string. The molds are then taken to the yard by the "off bearer," who "dumps" them. To give a smooth surface to his yard before dumping the brick upon it, he "lutes" it with a "scraper" of proper form, with a steel cutting edge, called a "lute." On the Hudson River all brick dumped on the yard have the rough edge caused by the vent in the mold pressed down smooth by a boy with a tool called a stamper, made for the purpose. They call it "patting" or "stamping" them. When sufficiently dry to touch without making finger marks they are "edged" in some localities and "turned" in others; this is turning them up on edge to facilitate drying.

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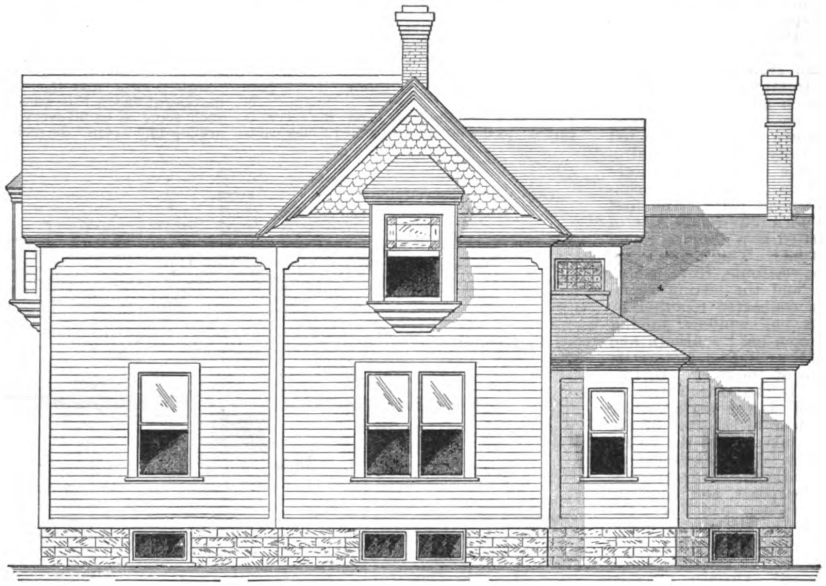
When dry enough they are "hacked" on "hacking" boards, which are 1½ to 2 inches thick; here the brick complete the drying, not already for the kiln; the hacks are protected from the weather by "splash boards" set up against the sides and "caps" on top.

A man conveying the brick to the kiln is a "brick wheeler," wheeling on a "brick barrow." On the Hudson River, where the brick are shipped to market by boat, there is a "green brick wheeler" and a "burnt brick wheeler." The man placing the brick in the kiln is a "setter" the country over, and the man passing the brick from the barrow to the setter in a "brick tosser." The men working in the kiln after burning are called "kiln shed" men in one place, "tossers out" in another and "brick pitchers" in others.



Side (Right) Elevation.



Side (Left) Elevation.

Cottage of Charles R. Lewis.—Elevations.—Scale, ⅛ Inch to the Foot.

THE KILN.

In kilns we have the "scoved" in one place and the "cased up" in others, they being one and the same. The kiln being first set under the kiln shed, so many "stretchers" wide—meaning the width is a given number of brick lengthwise—and so many brick high, meaning so many brick on edge. The setting is "benches" between the arches almost universally. The projecting courses to form the arches are "overhangers" in some places and "jets" in others. There are "two" brick benches and "three" brick benches. Above the arches the setting is generally three on three; when setting in this way every two brick is called a topping in some localities; in some places they are set diagonally across each other, called "skintling." The kiln is finished out on top with "platting" in most places, but in some it is called "flatting," and in others "splatting." It is generally double; the first course laid with green brick flat, but loose, and the second or top course of soft or salmon brick tight.

The "casing" or "scoving" which forms the outer wall of this class of kilns is laid up as the setting progresses, usually about 12 inches thick at the bottom and tapering to 4 inches at top. At the bottom the "eyes" are formed, which are the openings through which to fire the arches. Another small opening is formed through this casing just opposite the top of each arch called a "peep" hole, I think, in all localities.

"Daubing" the kiln is to plaster it all over with soft mud, making it air tight as near as possible. "Proping" the kiln is bracing it to prevent the expansion by the intense heat throwing it open.

The first thing in burning a kiln is to "water smoke" it in some sections, "drying off" in others, and "steaming" in others; all meaning to absorb thoroughly and dry out what moisture remains in the brick by slow and careful firing, which usually requires from three to four days. And right here let me say I consider this one of the most important parts of burning. I believe that more brick are ruined, more money lost, by improper "water smoking" or "drying off" than by anything

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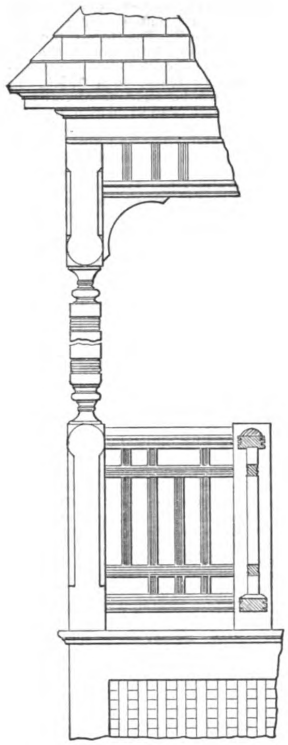
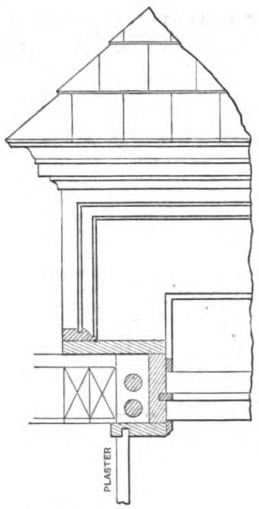
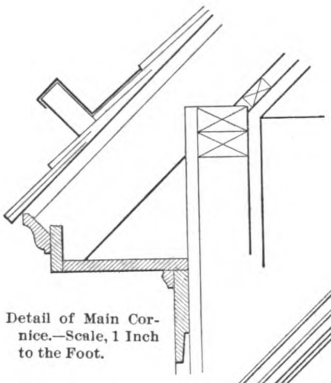


Detail of Veranda.—Scale, ½ Inch to the Foot.



Detail of Window in Front and Side Gables.—Scale, 1 Inch to the Foot.



Detail of Main Cornice.—Scale, 1 Inch to the Foot.

Elevation and Section of Gables.—Scale, ½ Inch to the Foot.

Details of Cottage of Charles R. Lewis.

else, and it is caused by too much haste. "Slow and steady" should be the motto from beginning to end in burning brick, and when the kiln is "blowed out," and every eye closed and daubed, and every crack that has opened in the casing by the heat is plastered over, let no man prevail upon you to give it air until it has sufficiently cooled to thoroughly anneal or temper the brick. Cold air at this time can do an immense amount of mischief.

Burning in the ordinary kilns with wood, firing for the heads is called "mouth" firing, and for the center "sliding." Firing with coal, baskets hung at the mouth of the eye are used, with short grate bars.

What are called "clamp" kilns or "clamps" are kilns built with permanent walls. Patent kilns are all built with clamps or permanent walls, with furnaces on the outside, and it is the manner of construction of these furnaces on which the patents are claimed. The old Wingard kiln was the first patent kiln that I know of in this country, and about all the others we now have are offshoots from it. The great beauty of kilns of this character is that the furnace being entirely outside it becomes a "caloric" kiln. Cold air cannot reach the arches, hot air only reaching the inside of the kiln, and with judgment and care there is no reason why good brick should not be the result of burning in any of them. In burning, the kiln is designated as "heads," "quarters," "middle" or "center."

MOLDING BY MACHINERY.

On yards running by machinery the terms vary. On one large yard down in Connecticut, where the clay is deep, it is thrown down by dynamite, discharged by electricity; and this yard of Merwin's is run with the system of a first n. bank. Here is one man called a "bank boss," or foreman of that department. The man who attends to the blowing up business is a "bank borer." And the men who cart the clay to the machi e are "Bank cartmen." The man at the pug mill is called "pug mill tender." On other yards he is "pug mill man," and at other places he is simply "pugger."

Where the clay is shoveled direct from the soak pit into the machine the hands are called "pit men," also "pit shovelers." Then there is the "sander" on yards making in sanded molds. The man who stands in front of the

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machine and receives the molds as they come out is called a "striker" in one place, a "striker-off" at another, also a "molder" and a "capper" at others.

The "pallet" boy is the boy who places pallets on the dump table. The "dumper" is the man who receives the molds from the striker and dumps the brick upon the pallets. The "truckers," also called "truckers-off" by some, wheel the pallets to the yard for hacking or to the "racks" for stacking.

"Hacking" pallets are usually conveyed to the kiln without the brick being removed, the pallets with the brick upon them being hacked on brick barrows arranged for the purpose or upon "mule trucks." Where the rack system is used the brick are generally taken off the pallets and hacked on the barrows or mule trucks to be conveyed to the kiln.

Down in New Orleans, where our friend Blaffer lives, the place where the water runs away from the river instead of running into it, which is also the home of the "manly art," bricks, too, are made in very great quantities, The Blaffer Brick and Lumber Company have a yard that is a model of neatness. This is a river yard, and the clay used by such yards is called "batture." It is the silt which floats down the river during high water and settles in pockets or eddies formed to catch it. When the water recedes this dries out, and is then carted outside the levees into great banks ready for use. A brick yard has been run at this same place for nearly 40 years. Each year the river is sure to rise and the silt to come down and the batture formed for another season's works. Back from the river the clay is what is called "buckshot," because when dug it breaks up in little hard, square pieces.

GRADING.

The brick at New Orleans are graded; first as "foundries," which are the softest and used for lining crucibles; then the "salmon" for chimneys. They call their best "bench brick," and all others "klinkers," which are used for foundations. On the old yards around New Orleans they use mud or tempering wheels that would be a curiosity to a Northern man. They are fully 12 feet or more in diameter, with a 6-inch broad solid tire and rim. The clay is only about 6 or 8 inches deep in the pit and is simply mashed in tempering it. The shaft on which this wheel runs has no ratchet, and the wheel is made to travel in or out by being thrown off of a center at its axes. On these yards they use three-brick molds, dumping on narrow pallets split out of hemlock. On one of these yards, run by an old French Creole, he told me that his pallets had been in use over 35 years.

Down in the Old Dominion at Norfolk, where our venerable friend Oldfield hails from, you will hear the ante-bellum vernacular used more than anywhere else in the South; and whenever I think of Norfolk it reminds me of the sign hanging out in front of a restaurant on one of the back streets in New York. It said, "This is the spot where good oysters is got;" however, it is fast changing, but to this day the work is carried on by song; each man or boy sings as he goes through with his work or task. After "de wah" the colored people did "task" work; now they take "stents." They used to "cut" clay by "tasks," so many "spits," now so many "yards." They "turned" a "walk" for the brick, but now that the machine has come in the "walk" is out of use except for the "old black Joes." In burning, the old colored man "glistered" his kiln if not settling to suit him; now he "rustles" it if he wants more heat. The old man "off bore" the brick, the young man "carries" or "trucks" them off. The old man "done finish" his day's work, the young man "gets in" the day. The old man was "done" on Saturday; the young man is "through" the week. The old man on Saturday evening received his rations and went away happy, singing a hymn; the young man presents himself as promptly for his pay as though his skin were white, and counts his money to see that he has not been cheated.

In most places brick that come from the machine imperfectly are called "muleys," and those that are left on the yard as unfit to go into the kiln are called "old hides." If some part of the kiln gets too hot you are apt to have "clinkers," or brick melted together or vitrified. Arch brick which are blackened on one end are called "niggerheads." On yards where coal dust is used if it is not properly distributed and mixed some brick will be swelled or puffed out; these are called "lammies" The terms for the different brick in the kiln almost the country over will run as arch or eye brick, bench brick, back stretches, face brick, pavers, select hard fronts, light fronts, ally fronts, salmon soft, and headers, which are the brick up the heads, one end hard, the other salmon. "Kiln run" and "merchantable" mean foundation, fronts and flue sufficient for the building, but in this locality does not mean the entire run of the kiln. Pavers do not belong under that head. In Cambridge, Mass., the term "up and down hard" means the whole kiln except the very soft at top. Where coal dust is used these headers are made especially with an extra quantity and burn hard but dark.

In Cambridge, Mass., there are six yards making over 60,000,000 sand-molded brick per year, and three other yards making over 8,000,000 "water struck" or "slop brick." The clay for making these slop brick is taken direct from the bank to a drying yard, torn to pieces by a harrow, when dry is rolled and harrowed again and then goes to a soak pit directly behind the machine. This is the only place I know of slop brick being made to any extent at the present day.

In burning with natural gas I have been unable to get hold of any new terms, expect in one locality they go through with a performance at the end of the operation, just before closing the kiln, they call "blasting." It is a sort of farewell. They turn on a full head of gas and shoot the flames 15 to 20 feet out through the top of the kiln, and a "blasted" performance I call it. In some localities they blast every hour. Another place where they make splendid burns, the flame is driven up until just before closing it comes through the top in little, long flames, say a foot high, called "candle sticks," and when the "candle sticks" are well through they close her up.

I had intended giving some account of brick making in Mexico, Old Spain and other Spanish-speaking countries where I am doing some business, but finding that I have already run far over the limit I will defer it for another time.

MASONRY AND STONE CUTTING.*

RAKING VAULT INTERSECTING HORIZONTAL BARREL VAULT.

A VAULT IS RAKING when its generators are inclined instead of level, as in the vaults which support flights of steps. Let, Fig. 155, A' L' M' B' be the face arch on the plane of the ground line A B; let A A' be the hight and A C the base of the raking springing line of the vault; the hypothenuse of the right-angle triangle constructed on these two lines will give the inclination of the generators of the vault. Draw these generators on a vertical plane, E G, parallel to the generators of the raking vault. The elevation on the plane E G is shown in Fig. 157. E' G'' will be the springing line of the vault, or the trace of the plane from which the vault springs. A' B' will be the trace of that plane on the wall face, and G H will be the trace of the same plane at the level of the ground line. The imposts which carry the vault are inclined planes projected on plan on the rectangles A C G E and B D H F. Lastly we draw on Fig. 157 the section G'' X'' of the horizontal barrel vault penetrated by the raking vault.

Now, having drawn the arch stones on the wall face, project, Fig. 157, in L'' L''', M'' M''' . . . . the joint lines parallel to the springing line E' G''. This gives their real length. In the same way we get the arrises P'' P''', Q'' Q''' of the extrados with their real length. There will then only remain to find the widths of the bed joints and of the soffits of each arch stone, and to do this the square section of the vault has to be drawn.

Square Section.—Take a plane Y'' E F perpendicular to the generator E' G'' of the vault; it will cut the joint lines in the points l'' m'' . . . . Fig. 157. When this plane of section is turned down round its horizontal trace, E F, the points of section will come in l, m . . . . Fig. 156. These points are found by taking A a = E e'', K l = E l'', V m = E m'' . . . . and through these points the square section is drawn. Similarly the points p, q . . . . of the arrises of the extrados are found, and then the lines l p, m q . . . . will measure the width of each bed joint.

Development of the Soffit and Bed Molds, Fig. 158.—To develop the cylindrical soffit, rectify the square section a l m b, Fig. 156, on an indefinite line, Fig. 158, on which carry the lengths a_2 l_2, l_2 m_2 . . . . equal to the lengths of the arcs a l, l m . . . . Fig. 156; then erect perpendiculars to that line, on which carry lengths equal to each part of the joint lines from the section plane, Fig. 157; take, therefore, a_2 A_2 = e'' E', l_2 L_2 = l'' L'', m_2 M_2 = m'' M'', and also a_2 A_3 = e'' G'', l_2 L_3 = l'' L''', m_2 M_3 = = m'' M'' . . . Then draw on the development the curves A_2 L_2 M_2 B_2, A_3 L_3 M_3 B_3 of the face arch and the intersection with the horizontal barrel vault. On the same diagram draw the molds of the bed joints, the widths of which are found in Fig. 156, taking q_2 Q_2 = q'' Q'', . . . ; on the face arch the end Q_2 M_2 will be a straight line; on the side of the vault Q_3 M_3 will be a curve which can be drawn with the help of an intermediate point.

Stone Cutting.—Let L' M' Q' R' S' P', Fig. 155, be the stone to be cut. We have two methods. By the first, work a prism of section l m q r s p, Fig. 156, and of a length at least equal to Q'' y'', Fig. 157. Then, on the faces of that prism apply the soffit and bed molds. This will give the arrises of the two ends of the stone. The end forming the face arch is a plane; the end forming the soffit of the horizontal barrel vault will be worked with a straight edge. The other method, Fig. 159, uses bevels cut to the angles l m q and m l p, Fig. 156. Starting from the operation plane l m of the soffit, the bed joints are worked by means of the bevels, and the molds are applied as in the first method. The soffit is worked by means of a template cut to the curve l ϕ m, Fig. 156.

As given in the former figure, the horizontal barrel vault is supposed to be in concrete. If it be in stone, the jointing would have to be connected, as we have seen in the case of the Welsh groin.

It is to be noticed that the bed joints, as drawn, are not normal to the intrados of the raking vault. They might be made so; but then they would no more be normal to the face arch.

If the raking vault be of some length, then it would not be advisable to let the stones rest on raking bed joints, for they would tend to slip down and exercise a great pressure on the horizontal vault below. To prevent this defect the arch stones should be cut as in Figs. 160, 161, 162, where the springers rest on horizontal planes, and each stone is made with elbows to hold the stone of the course above it. But, as shown on the plan of the soffit, Fig. 162, some stones, and especally the course of key stones, should be left plain without elbows.

A better way of finishing the bottom end of raking vault is to use a horizontal lunette as a transition from the raking vault to the horizontal barrel vault. The appearance is more elegant, and the thrust of the raking vault is thereby relieved, as in Fig. 163.

Concrete and Iron Beams.

An account of some recent tests of floor beams constructed of cement and iron is given in *Engineering* of London. The beams experimented on were constructed of Portland cement mixed with coke with a number of round iron rods imbedded in the cement so as to assist the beam in taking the tensile stresses arising on loading. These beams are more especially intended for floor joists, but the inventor also proposes to use them as railway sleepers. In order to allow of the floor planks being nailed to the joists, a tongue of soft concrete, consisting of one part cement to four of fine coke breeze, is inserted to take

* Continued from page 142, June issue.

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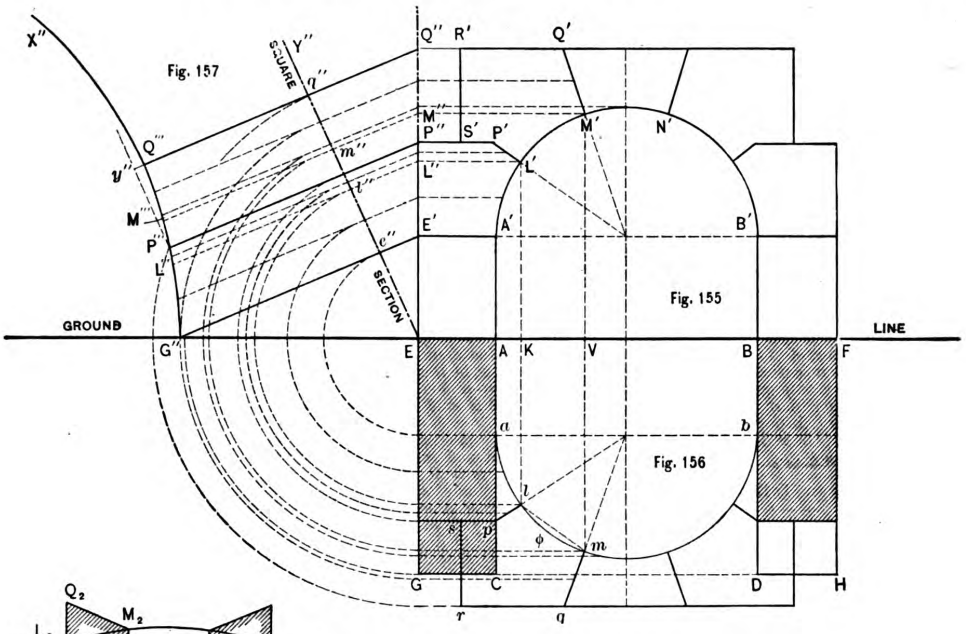


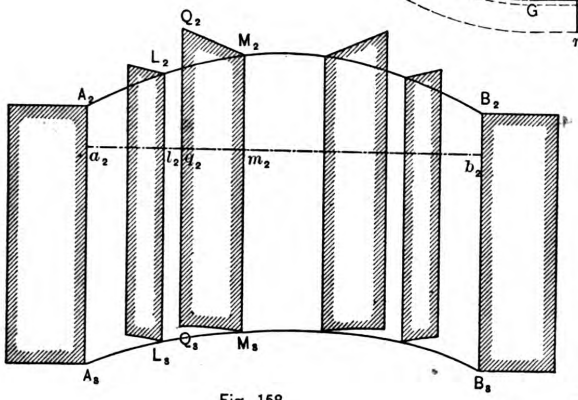


Fig. 158.

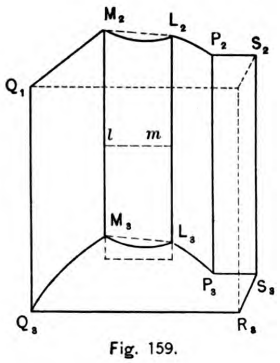
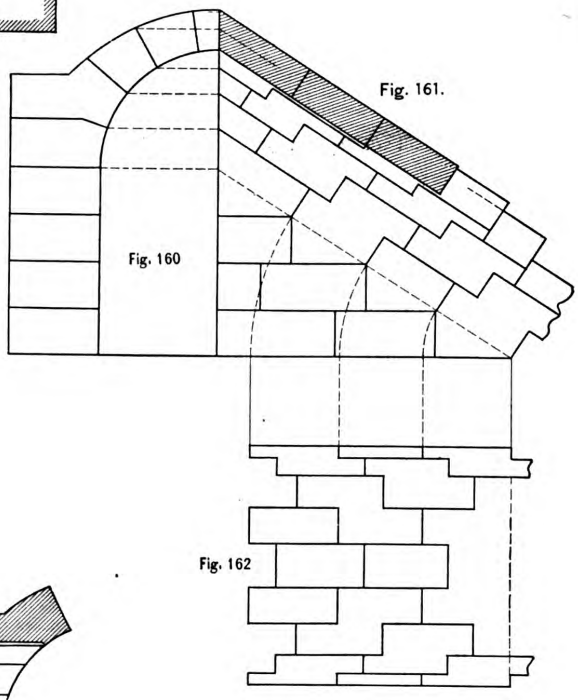


Fig. 159.



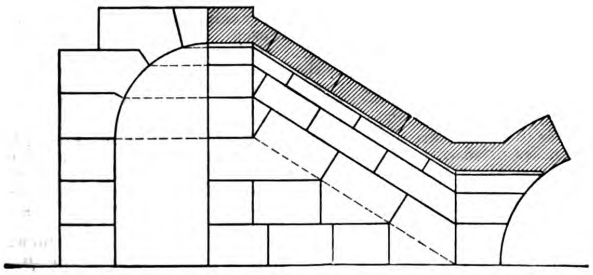


Fig. 163.

Masonry and Stone Cutting.—Figs. 155 *to* 163 *Inclusive.*

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the nails, which can be driven into it as easily as into wood, and have considerable holding power. The mass of the beam is composed of equal parts of Portland cement and breeze. In the specimens tested at the age of 21 days the breeze had been passed through a ¼-inch mesh, while for the seven-day beams the mesh was ½ inch. The experiments proved conclusively that the insertion of the iron rods, which were round and smooth, just as received from the rolls, considerably increased the strength of the cement beams. The average breaking load of two concrete and iron beams tested was about 2500 pounds, while an exactly similar beam, save that the iron rods were omitted, broke off short like a carrot under a load of but 431 pounds. The adhesion of the concrete to the iron seemed very good, as in no case did the rods draw out of their beds, though in certain instances the beams finally failed by horizontal shearing through the concrete along the line of the rods.

Repairing a Tall Chimney.

A very interesting method of climbing a tall chimney for the purpose of making repairs was that recently adopted in connection with a brick chimney in the rear of the iron foundry at the Charlestown Navy Yard. This is said to be one of the tallest chimneys in Boston, and was erected something like 30 years ago. It is 247 feet in hight, 13 feet square at the top, 20 feet square at the base and 7 feet in diameter in the interior, which is circular in form. On the outside three columns of brick, 2 feet wide, run up each side of the chimney as props to the main structure. The bricks in these columns near the top became loose and in several places large sections have fallen out. The chimney was considered safe, but if left alone it was thought the columns would steadily crumble away and in the course of time become dangerous. The work of repairing the chimney was awarded to P. F. O'Neil, a mason and a resident of the Bunker Hill district. One of the Boston papers in speaking of this piece of work states that at first Mr. O'Neil thought of sending a small balloon up the shaft with a small string attached in order to get a rope to the top of the chimney. His idea was to rig a simple contrivance on to the balloon in which he could place a ball of string. One end of the string would be fastened at the base inside the chimney, and as the balloon ascended the string would unroll. After the balloon cleared the mouth of the shaft a sharp pull of the string would clear the ball, allowing the balloon to go free. Mr. O'Neil thought that then the ball would fall to the ground on the outside. Then it would be an easy task to pull a rope into the position wanted.

But the daring climber gave up this scheme and built his way up. Standing a 30-foot ladder at the base of the chimney O'Neil mounted to the top rung while an assistant held the ladder steady. Here, with a chisel and hammer, he knocks out a few bricks, pulls up, by means of a rope, the first board and fits it snugly in position. Another follows in the same manner, and is laid opposite. Then he changes his position to the partial platform, and one of his assistants comes up the ladder to his side. The next board is hauled up and placed in position, and now the second assistant is alone on the remaining board. A boatswain's chair, rigged with a pulley, is lowered to him. Seating himself on the narrow plank, he takes the last board in his arms, and is pulled up by the others. The completed platform consists of four boards fitted across the interior of the chimney, so as to form a square, with a vacant space in the center. The manner of building the platform is a curious one, and the care and diligence used is not to be wondered at when one remembers that any slight carelessness on the part of the workmen might cause the death of one of their number. After the platform was finished the ladder was drawn up, mounted a second time and another platform built. In this way the perilous ascent to the top of the long shaft was made.

The Boston *Traveller* thus describes the descent on the outside of the chimney:

Bright and early O'Neil was at work, and after being hoisted to the platform, which was within 15 feet of the top, he climbed the ladder and at last stood on the very top of the huge brick structure, the world spread out beneath him. Charlestown Bridge and City square were crowded with spectators, who watched with much interest the actions of the man.

He first tied a large flag to the ladder and then turned his attention to the work of the day. Ascertaining that the iron capping was safe and that his footing was not dangerous, he lowered the boatswain's chair and two of his assistants were soon at work by his side laying beams across the top.

When all was in readiness the rope, securely fastened inside, was thrown to the ground outside the chimney. The boatswain's chair was then cautiously slipped over the edge to within 3 feet of the top. Mr. O'Niel was to follow.

The feet of the daring climber first appeared as he pushed them recklessly over the edge, and then, between a half jump and a slide, and he stood on the narrow board called the chair, waving his hand to the spectators below. There he stood, 247 feet above the ground, on an unstable board held by ¾-inch rope, the wind making the situation the more dangerous. A mistake, and this man, who risks his life as a business, would meet an awful death. He seats himself, and then commences to lower himself slowly, examining the wall to ascertain its condition. Giving the wall a sharp push he swings out and half way around the chimney, and this he examines.

He tried to get around to the other side, but at first lost his hold. He hung at that dizzy hight, struggling to get hold of one of the columns supporting the chimney.

At last he succeeded, and the rest of the descent was without incident. He arrived on the ground 12 minutes after the start was made, and after giving several orders to his men started up again.

Shortly afterward he came down on the east side, and his two assistants followed, sliding down the rope—a more dangerous undertaking.

Mr. O'Neil climbed his first church spire 15 years ago, when he painted the spire of St. Peter and St. Paul's Church, South Boston. Since then he has become quite noted in this line, and nine years ago pointed the Bunker Hill Monument.

Wood vs. Iron Beams.

In his recent lecture on fire prevention, Professor Goodman states that, generally speaking, wooden joists are better for buildings than steel or iron joists. The two latter materials, he explained, lose their strength at a not very high temperature, whereas wood would sustain a heavy strain for a much longer period when exposed to great heat. Besides, when wood has once been charred it does not burn so readily again. Iron and steel soon expand under the influence of heat. Brick and stone are objectionable; the former become fused under great heat and the latter is liable to crack or fly when suddenly cooled after heating. The drawback to tiles is that when fire plays upon the joists of floors fitted with them the joists expand and allow the fire to play upon the joists through the tiles. Portland cement is objectionable, as it flakes off when heated, but if wire netting or bars are imbedded in concrete this defect is remedied. A joist padded with silicate of cotton and incased in Salamander plaster (a mixture of silicate cotton and plaster of paris), the professor holds, is a splendid fire-proofing material. Such a material is not only a non-conductor, but it is elastic and would yield with the joist. In an experiment undertaken by Professor Goodman it was found that a joist of this kind withstood very fierce heat for eight to nine hours without sustaining any serious damage.

How to Draw Nails from Live Timber.

According to an exchange, when a nail or spike has been driven into a live tree, or into timber, after a year or more the fibers of the wood will have contracted so tightly about the metal that it will be exceedingly difficult to withdraw the iron. But strike a nail or spike a sharp blow with a hammer and drive it in a trifle, which serves to break the wood fibers around the metal, and then the nail can be withdrawn with only a little force. Iron gate hinges are frequently driven into a living tree. When one is not in possession of a large and strong claw bar, bore a hole close to the hinge, on the under side, and the hinge can be easily crowded down into the hole and withdrawn. When a large nail has been driven head and all beyond the surface of the timber, bore a hole close to the nail, and with a nail set crowd the nail into the hole. When nails have become rusty they will usually break in two, leaving a portion of the iron in the timber. But strike a rusty nail a sharp blow, and one can sometimes withdraw it with his fingers. In tearing down an old building, if it is desirable to take off the boards or casings without splitting them, place a nail set on the head of each nail, and with a hammer start it inward about ⅛ inch. One blow will break the whole nail so that the most of the nails will come out when the boards are driven off.

IN ORDER TO GIVE different woods the appearance of cherry, says an English paper, proceed as follows: Take common yellow ocher, getting the dark shade. Break it in water, add a little stale beer, and stain the wood with this for the first coat. Sandpaper lightly, to cut where the grain may have risen, then have some good red lake. ground in distemper for common work, but for better work in turpentine only, and add a few spoonfuls of drying japan, according to the quantity to be used, merely to bind it to the wood, and no more, wiping away all surplus, then shellac and varnish or oil. If you need something very fine, use a common grade of Munich lake. This will make the cherry now being used so extensively on furniture and house trimmings. Try it, and you will like its richness, especially when polished.

THE BUILDINGS intended for the Williamson Free School of the Mechanical Trades, for which the late Isaiah V. Williamson gave $2,000,000, are now in course of erection 10 miles from Philadelphia, and applications for admission are now being received. The superintendent's residence is built of granite and cedar wood. The main edifice is the administration building. This is constructed of brick and granite, and is of the Byzantine style of architecture. The shop for industrial trades is of brick. Next to this is the boiler house, engine and dynamo room and laundry, overtopped by a chimney stack more than 100 feet high. The three dormitory buildings will also be of brick. The architects of all the buildings are Furness, Evans & Co. In accordance with the stipulations in Mr. Williamson's gift, the sum of $425,000 of the $2,000,000 is to be used in the purchase of land, the construction of the buildings, &c. The price of the land was $47,000, and $250,000 will be expended on the buildings and the balance on improvements and extensions. The remaining amount, $1,700,000, is an endowment fund, and only the interest can be expended. The course for the mechanical trades will be from two to three years.

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The Builders' Exchange

CONDUCTED BY WM. H. SAYWARD, SECRETARY OF THE NATIONAL ASSOCIATION.

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Arbitration.

The time has come for the establishment of more harmonious relations between employers and workmen. The time for such action has been always present since the first man was employed, but to-day more than ever before is the necessity apparent, and the necessity will be greater to-morrow.

For years the trades have been organizing throughout the United States, strengthening themselves and gradually reducing each branch to a unit that is weak or strong as a factor for good, in so far as the union is weak or strong.

The first declaration of every trades union is the fact that the object of the organization is the betterment of the condition of its members, and by this premise the workmen have been drawn together until their combined strength is such that the accomplishment of desired ends is attempted by strength only, and out of the success gained by this strength have grown the arbitrary demands and untenable positions which have utterly defeated the first premise (the betterment of conditions) in so many instances.

The workmen have so often gained by force the desired changes in their condition, which, if just, should have been obtained in harmonious understanding, by combining against an individual employer, that force is the only means within their comprehension. A good example of the spirit which actuates the professional labor agitator occurred in the shop of a New York City carpenter shortly after May 1. A committee was appointed from the workmen in the shop to wait upon the employer and request that he grant them an increase of pay. The committee was received in the same friendly manner in which their request was made, and the employer, after a thorough canvass of the subject, granted the increase. The committee returned to the shop, made their report, and were about to resume work when one turbulent carpenter exclaimed: "What! No strike? Throw down your tools, you cowards, and walk out like men!"

It is when this spirit, advocated by the leaders, gains control of an organization that the value of union for good ceases.

The fault of the present condition of affairs lies mainly with the employers themselves. Employers, being competitors, are in an essentially different position from that of the workmen, and are actuated by much more complicated motives. The workmen have but one object in view, whatever it may be, and combine against an employer from a common standpoint, while the employer has not only his striking workmen and a boycott to contend with, but also his competitors, who take advantage of his embarrassed condition to secure work which he cannot accept or carry out.

The employers in the building trades have never yet taken the initiative, with certain recent notable exceptions, and until they do the best that can be hoped for is temporary settlement of troubles, at great disadvantage, or the disastrous results of individual effort to frustrate combination. The employers have been in the habit of dealing with the demands of trades unions on the defensive only. The energies of the employer, singly or collectively, as the case may be, have been used only to repel attack. The employer has, with full knowledge of existing conditions in his trade, stood back and waited for the union to collect its forces, mature its plans, take some initial step, or make some unjust demand, without making a single effort to avert a threatened disturbance, and his belated action only results in an effort at resistance with, perhaps, a final compromise for the sake of temporary settlement.

Just as long as the unions continue to fight for what it is fair to presume they think is their right, and employers take no steps to correct them, just so long will the present uncertain and unsatisfactory condition of affairs in the building trades continue to exist.

There is a true basis upon which the employer and the employee must stand, and each has rights that the other must recognize and respect. Each has a just and honorable position to fill, and the duties of these two positions will never be established until the employer and the employee come together for harmonious consideration under such conditions that a decision arrived at shall be binding upon both elements of the community.

HARMONIZING INTERESTS.

How shall the two be brought together?

The workmen have had the advantage over the employer of years of organization and thorough familiarity with the power of concerted action. The employer has heretofore dealt individually with the workmen, with unsatisfactory results and no permanent beneficial effect upon the relationship between the two.

The employers must organize and fraternize in order to be able to arrive at definite conclusions in regard to measures to be adopted to secure more perfect understanding of the duties of their position and the rights of the workmen.

Organizations of employers should not be created for the sole purpose of combatting a strike, as is too often the case, but rather, in this connection, for the purpose of teaching the trades union its errors by demonstration, and instructing it in the position that it may justly assume, and impressing upon it the fact that the time for the use of force as an agent in securing what is rightfully its own is past.

The best form of organization for employers is the builders' exchange, comprehending as it does in its membership the employers in every branch of the building trade.

Setting aside all the other advantages of a builder's exchange, which have been dilated so frequently in these columns, this form of organization is the best that has yet been found for bringing employers together, in order that they may think and act in unison. The opportunity for formulating plans of action for all employers in the building trades is offered by a builder's exchange, and out of the conditions created by an exchange a foundation principle of right and justice can be established for the government of the whole, with added facilities for perfecting the detail necessary for the application of the principle to each branch of the business.

ARBITRATION.

The method by which more just and harmonious relationships are to be established is arbitration. Employers must recognize the fact that it is their duty to take advantage of every honorable means that can be devised to correct the wrong conditions existing to-day in the field of labor, and which operate to the detriment of the community to such a disastrous extent.

The workmen have so long been in the habit of taking the initiative, entirely independent of the employer, that the latter has drifted into a condition of instinctive combativeness which creates and fosters the spirit of opposition in the former.

As a problem in human nature, the con-

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dition is simple enough. No man can or does expect to arrive at a harmonious and satisfactory determination with another for whom he has avowed opinions of enmity and distrust. The enmity and distrust must first be wiped out and the common ground of perfect understanding by each of the true position of the other must be reached before a satisfactory transaction can take place.

It is exactly the same in reference to the building trades to-day. The employer and the employee must get together upon the common ground of understanding of each other's true position before action can be taken upon subjects affecting their common welfare, and that will be mutually beneficial. Employers have allowed the condition of affairs to drift along, dealing individually with trades unions, until the weakness of their position has been clearly demonstrated; and after being forced into distasteful action by reason of failure to establish themselves in a position which should enable them to keep equity uppermost, they have been obliged to yield point after point until the main reason of their combining, in many instances, has been nothing more than exasperation.

No organization of employers formed for the purpo e of crushing trades unions can accomplish any good. This is said advisedly, for the reason that organization must exist on both sides before action can be taken to affect both sides as a class or whole. When any particular union is under the control of men who have not the welfare of the trade and community at heart, and the union assumes a false position that cannot be corrected by other means, employers are warranted in crushing it out of existence, but they should at the same time advocate the reunion of the workmen under principles of equity and co-operation for the benefit of the whole.

FORM OF ARBITRATION.

The form of arbitration adopted at the Fifth Annual Convention of the National Association of Builders represents the combined thought and consideration of the delegates from nearly all the principal cities of the country, and commends itself to every right-minded mechanic, whether he be employer or employee.

Builders who have passed through the annoyance of strikes and boycotts feel a natural antipathy to trades unions, and when the subject of arbitration is urged upon them say "We don't want dictation from the National Association any more than from the trades union, as to how we shall settle our labor difficulties." Herein, unwittingly, they harmonize perfectly with the desire of the National Association, for if in the independent settlement of their difficulties they can demonstrate a more just and honorable method than is advocated by the association, then the community and the building trades are the gainers, but if, on the other hand, their efforts fail to secure justice in the honorable and peaceful manner desired, the plan advocated by the National Association is the more firmly established as the best and most desirable for the purpose.

Those who oppose arbitration as a solution of the labor troubles are unfair to themselves and their fellows, no matter how honest they may be in their opinions, unless they suggest a better plan to bring about the harmony so greatly to be desired. No one should oppose a good plan for the accomplishment of an end that is to benefit both business and society universally and in so great a measure, without substituting something better, or at least equally as good, in its stead.

The form of arbitration adopted by the National Association demands the earnest attention and consideration of every individual in the building trades, if only from the fact that it expresses the opinions of a large majority of the delegations from the cities represented, which were composed of men of intelligence and experience. The fact alone that this form and plan of arbitration embodies the result of earnest consideration on the part of experienced men, representing 35 of the most prominent cities in the United States, is sufficient to commend it to every person affected by the conditions which it seeks to cover.

Employers should form their plans and perfect the details for applying arbitration as the means of securing peaceful adjustment of the differences between themselves and the workmen and then seek to establish the same by presenting the plan to the unions for their consideration.

Any union of workmen who are organized with the honest desire to improve the conditions surrounding their trade must at once see the advantage of working in harmony with the employers under a form of agreement as fair and honorable to both sides as that which is advocated by the National Association. In the event of the union refusing to accept so manifestly just a means for securing peaceful relationship with the employers, it is fair to presume that its motives are not pure and its demands unjust, in which case circumstances should govern the employers as to how a unity of the workmen can be secured, in order that permanent feelings of confidence, instead of distrust and antipathy, may be established.

One of the first thoughts in connection with arbitration is that there are certain things that cannot be arbitrated, that are the inalienable right of the employer or of the employee, as the case may be, and the same is true, but never until the two parties to the conditions come together for harmonious consultation can the things which are arbitrable and the things which are not be definitely fixed and decided.

The form of arbitration alluded to in this article will be found on page 79 of the official report of the Fifth Annual Convention of the National Association of Builders, and the secretary will gladly supply the same in separate form to any person who may desire a copy.

Philadelphia Master Builders' Mechanical Trade Schools.

The first year of the Master Builders' Mechanical Trade Schools of the City of Philadelphia closed on May 30, and the final exercises took place in the Exchange on June 17.

Sixty-three pupils were graduated from classes in plastering, painting, stone cutting, blacksmithing, carpentry, plumbing and bricklaying.

Addresses were made by President George Watson, James R. Gates of the Select Council, Lieutenant Crawford of the Williamson Free School of Mechanical Trades, Col. Alexander K. McClure and Wm. H. Sayward, secretary of the National Association of Builders.

In the course of the opening address, in which he complimented the pupils on the excellent showing they had made, President Watson referred to trade education in Philadelphia, saying: "In our educational institutions and public schools the pupils receive manual training which I hope to see extended throughout this great country. The late I. V. Williamson has placed millions in the hands of trustees for this purpose, and our honored citizen, A. J. Drexel, will expend $1,500,000 for erecting and endowing a school for manual training for boys and girls, showing it is the view of all earnest educators that to teach with the hand as well as with the brain is the only way to obtain a practical technical education.

"Our school is in a measure different from manual training. Our object is to teach American boys the rudiments of a trade, to be followed by a term of practice under an employer in actual work. We have instructed them in carpentry, bricklaying, plastering, stone cutting, blacksmith work, painting and plumbing. Their instructors are practical mechanics, under the direct supervision of three members of a committee of each particular trade.

"Our class just closed numbers 130 boys, and I think you will agree with me that the exhibit of their work, after only nine months' practice, in actual time 15 working days, is surely a success. If you consider it so, I can only say it has been attained by the earnest and untiring efforts of the members of the Master Builders' Exchange and by the generous endowment of that notable philanthropist, Col. Richard T. Auchmuty of New York, who is the pioneer in establishing the first trade school in this country, and whose pupils have been drawn from Maine to California. Many of these pupils are now practical mechanics and prosperous business men.

"His generous endowment of $3000 per year for three years encouraged us to follow his grand example with the success shown to-night. But the school is still in embryo. We have, with our own exertions, and the liberal contributions of our members, shown what we can do on a small scale. We must increase our plant. Instead of 130 pupils we want to have 500, but to do this we must have enlarged facilities, more room and extended means. Our charge for the pupils is only for the actual expense of instruction and tools; the rest must be obtained from other sources, and we feel, gentlemen and members of the City Councils, that we can fairly ask you to give us help in this noble work. Philadelphia has always been foremost in contributing to all worthy educational and benevolent enterprises. She has contributed to the Nautical School, in which young men can become competent sailors, and we feel that if we ask aid in teaching the youth of our city to become practical mechanics, she will not refuse. We intend to ask councils to grant us the use, at a nominal rent, of one of the school houses made practically useless by the Reading Terminal, paying therefor by scholarships from the public schools as may be designated by them, and we feel confident you will do all you can to commence a new era in which American boys can be taught a trade and become practical mechanics, instead of our having to depend, as we now do, on foreign labor for skilled workmen."

Appropriate remarks were made by the other gentlemen in the order named above, and each speaker seemed to thoroughly appreciate the immense importance of the work that has been undertaken and carried to such successful issue by the Master Builders' Exchange, not only for its own intrinsic merit, but for the valuable example set to all other organi-

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zations and communities of master builders throughout the world.

As was stated by secretary Sayward, the building trades are about the only ones that are not overcrowded with skilled workmen, and the value and benefit to the country of this practical demonstration of a plan that will open up the avenue of education to American youth is beyond computation.

The following are the names of students who were graduated; the names marked by a star are those of the pupils who received prizes of $20 for the highest average in their respective classes:

LIST OF PUPILS TO WHOM CERTIFICATES WERE ISSUED BY MASTER BUILDERS' EXCHANGE MECHANICAL TRADE SCHOOL, JUNE 16, 1891.

Plastering.

* Harry S. Burgess. George T. Crew, Jr.
Edward Pollak.

Painting.

* Harry A. Wimmel. William W. Collins.

Stone Cutting.

* Peter B. Larkin. Benjamin P. Embick.
John H. Foy.

Blacksmithing.

Clement R. H. Cunningham. * Albert M. Eagin.
* James Horobin. Paul Liedike, Jr.

Carpentry.

Shelby L. Kershner.	William B. Bradly.
Howard L. Lamborn.	Harry Donovan.
John S. Tomlinson.	William R. Matthews.
David McClelland.	James W. Jackson.
* Albert Schoell.	John E. Rapp.
John L. Steele.	Harry P. Young.
Michael P. J. McGeehan.	Jacob Rieben.

Plumbing.

* Thomas J. Barry.	John Dougherty.
John J. Daly.	Richard K. Scott.
Alexander V. Barclay.	Augustine R. Peale, Jr.
Charles A. McNabb.	George Schwamb.
Richard Ormrod.	Walter Marshall.
Herman Radermacher.	Robert E. Wallace.
Cornelius W. Woods.	William E. Farner.
J. Warren Hughes.	James R. Shaw.
Nicholas J. Connolly.	Otto J. Goebner.
Daniel P. Fagan.	Carl W. Bode.
James Mullady.	George T. Eyanson.
George E. Wilt.	Daniel Rice.
Ernest A. Wimmel.	George W. Groves.
Frederick Wenkenbach.	

Bricklaying.

James W. Cassidy.	William D. Lindsay.
* William F. Dettinger.	Cassius C. Pennel.
Harry Reinert.	J. Frank Ambler.
Edward D. Mitchell.	Harry C. Lamley.
Charles S. Solnek.	

The most satisfactory result of the year's existence and successful closing exercises of the trade schools, aside from an educational standpoint, is the fact that probably before this paper is off the press a conference will have been held between the Master Builders' Exchange, the Master Bricklayers' Company and the Journeymen Bricklayers' Protective Association, the object of which is the effecting of an agreement by which pupils graduated from the bricklaying class will acquire a recognized standing from these three organizations.

When the project of establishing a trade school under the supervision and control of the Master Builders' Exchange was under consideration there was a considerable amount of opposition expressed by the various trade unions to the undertaking, it being the impression that finished workmen were to be turned out in one year, and the workmen feared the flooding of the local labor market with boys who after a year's schooling were to compete with journeymen.

There was, however, no open demonstration of hostility to the schools, although the exact result of the graduating of the first class, and just what attitude of the workmen would assume toward these apprentices, it was impossible to anticipate.

The action of the Bricklayers Association is considered as a very favorable indication of the reception that the pupils of the school will meet with in other branches of the trade.

As soon as workmen come to recognize the true position of a pupil of the trade school and are made aware that the year's schooling is only a preparatory course for correctly grounding the student in the fundamentals of his chosen trade, and that he is taught such things as will insure his being a good mechanic after he has acquired the skill and judgment only to be obtained by actual work, the antipathy to the schools will vanish, for the good work being done appeals too strongly to the heart of every mechanic who has a son to ever be considered anything but a benefit to the community.

It is a most creditable fact that the initiative in this action was taken by the Bricklayers' Association, who addressed the Master Builders' Exchange and the Bricklayers' Company first on the subject, requesting a conference and suggesting the outlines of a plan for registering all pupils holding trade school certificates and preference to be given them as apprentices.

Under the protection of the Journeymen Bricklayers' Association, as well as of the two associations of employers, the boys will not only be encouraged but the whole structure of employment and labor will be newly cemented together in bonds of harmony.

The Bricklayers' Association being the most powerful labor organization in Philadelphia, its example, it is earnestly hoped, will be followed by organizations in other branches of the trade.

Exchange News.

The condition in the building trades throughout the United States has been more or less unsettled and disturbed for a number of years, and employers were much exercised during the latter part of 1890 and the first of the present year over the prospect of a general strike of employees that was announced, by the trades' unions, to have taken place on May 1. The principal cause for the proposed strike was the unconceded demands of the workmen for shorter hours (8 hours to constitute a day's work) with no reduction in the wages. An effort has been made to ascertain the effect of the proposed strike in the large centers of the country with a view of establishing, if possible, the position and attitude that employers and workmen, or organizations of each, bear toward each other.

Extended correspondence has been undertaken, and the result is given as applying to the cities in which the National Association has representation, showing the present condition of affairs between employers and workmen in the building trades.

Boston.

The situation in the building trades in Boston, so far as the labor market is concerned, seems to be generally satisfactory, with the prospect of harmony between employers and workmen throughout the season.

The strike that was advocated by the workmen to take place in all branches of the trade on May 1 in no way seriously affected building in Boston as, with one or two exceptions, affairs between employers and employees had been adjusted for the season, previous to that date, and no general strike occurred.

During the month of March the mason builders proposed the form of arbitration advocated by the National Association to their workmen, as the means of peacefully settling any questions that might arise between the two and it was adopted word for word. A joint committee was appointed and the scale of wages was determined for the present year and the number of hours constituting a day's work was fixed at nine, except on Saturday, when eight hours should be considered a full day. Payment to be made by the hour in all cases.

The wages were fixed at 42 cents per hour for brick and stone masons and 25 cents for laborers. Overtime to be paid for at the rate of time and a half and double time for Sundays, Labor Day, Christmas and the Fourth of July,

The master carpenters find no difficulty in securing workmen, although the strike of nearly a year ago has never been declared off by the union. The reason that the union still claims that a strike is in force is because the master carpenters refuse to treat with strikers.

The Master Carpenters' Association made overtures to the union previous to the strike looking to the adjustment of any possible difficulty, and the same were ignored by the union. The union then made a public statement of what they wanted and proposed to do, notifying the Master Carpenters' Association of their action, and then struck the next day.

The places of the strikers were filled by the employers as fast as possible, and after some considerable time the union requested that the old men be taken back and a formal recognition of the union be made. After thorough and careful consideration the master carpenters decided that they were unable to treat with men who were not in their employ.

The condition in the plumbing business has been harmonious and satisfactory for some time, and nothing was disturbed in this branch by the proposed strike.

The painters have recently been disturbed by a complicated strike that was the result of a clash between the Knights of Labor, the Federation of Labor and the desire of the workmen for increased pay.

The master painters, in most instances, were of the opinion that the request of the workmen was not exhorbitant and the increase was granted, and everything is placid, the difficulties between the two labor organizations being settled among themselves.

There has been no serious trouble among the plasterers during the present year.

The roofers and stone workers settled affairs in their respective trades last fall, and everything is satisfactory with them at present.

The building business in Boston and the immediate vicinity may be considered as being in a normal condition, with the prospect of more perfect understanding in the future between employers and workmen and more perfect and proper organization on both sides.

Worcester, Mass.

At Worcester everything in the building trades is in a satisfactory condition, without the least prospect of any disturbance. The only subject that has been brought to the notice of the employers during the year was a request from the carpenters for the readjustment of some matters that had been settled last fall. The master carpenters stated that they had considered the previous settlement as final and the same was satisfactory to the workmen, and the subject dropped.

Employees are working nine and ten hours, and no spirit of dissatisfaction is apparent among them. Everything points to a good season's work, and continued harmony among the trades.

The Builders' Exchange celebrated the fifth anniversary of its organization in a reception and banquet on the evening of June 9.

The affair was held in the Bay State House, which was appropriately decorated for the occasion, the banquet hall being particularly beautiful in its lavish and very artistic display of flowers.

A number of invited guests from outside the city were present, among them the secretary of the National Association of Builders, and about 100 in all were participants in the festivities.

President C. D. Morse occupied the head table with the invited guests, and Col. W. B. S. Hopkins as toastmaster. At the other tables were seated the members and their personal guests.

The *menu* was excellent and well served and thoroughly enjoyed by every person present, as was also the well-rendered music which accompanied it.

The after-dinner exercises were opened by President Morse by a brief address, in which he said:

"The Builders' Exchange has never been in a more prosperous condition than it is to-day. It has been our custom since the organization of this Exchange to have an annual banquet as near the commencement of the new fiscal year as practicable. Experience has taught us that the kindly feeling created by these meetings has worked to the financial benefit of all, and tended to do away with much of the jealousy that previously existed among the contractors. Those of you who are good, honest, faithful contractors can get a better letter of credit from your association than any banker on the face of the earth can give you. It is for the interest of every honest contractor to join our association and be one of the number who are in the front ranks of civilization. The builders represent the civilization of this country. The churches, schoolhouses, commercial buildings and homes mark the progress of civilization. The money expended in building operations in the year 1890 amounted to more than $450,000,000, equal to more than nine times the entire product of all the silver mines in the country. The builders of to-day are rearing monuments that will

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stand until time is no more. Let our record be spotless, our structures faultless and as enduring as the eternal hills."

Remarks were made by each of the guests of honor, and the final song was sung by the Glee Club about 12 o'clock.

The banquet was a pronounced success and keenly enjoyed by all present.

Lowell, Mass.

Everything is harmonious in Lowell between the employers and the workmen. There has been no disturbance of the peaceful relations between the two since the carpenters' strike of last year.

About May 1 the Laborers' Union made a requst for an increase of pay of 2 cents per hour, and a committee from the Master Builders' Exchange was appointed to confer with a committee from the union. The result of conference was that the laborers were granted an increase of pay of 1 cent per hour, and the same went into effect on June 1.

During the first week in June the brick masons requested that the master masons give them a conference for the consideration of their desire for an increase of wages from $3.51 per day (39 cents per hour) to $4 per day. A committee has been appointed from the Exchange to consider the subject, but as yet no decision has been arrived at.

The men made a request for $4 per day, which is more than masons are receiving in any other city in New England, in the hope it is presumed, of being able to secure an advance to some amount between 39 and 45 cents per hour.

Nothing aside from the request of the masons is pending and indications point to a very satisfactory season's work.

On June 11 the Master Builders' Exchange held its annual "outing" at Moutain Rock Grove, a charming spot near the city, situated on the banks of a beautiful lake.

Visitors from Boston and elsewhere were entertained in the most cordial manner, and the day was thoroughly enjoyed by every participant.

The party spent the day in playing baseball, bowling, boating and similar outdoor sports, and in the evening a banquet was spread in the dining room of a pavilion on the shore of the lake.

The dinner added very materially to the pleasure of the day, and the whole affair reflected the greatest credit upon the committee.

After dinner remarks were made President Conant, several of the guests, Colonel Bennett and Secretary Coggeshall. The secretary of the National Association touched upon the value and benefit of such occasions to the members of an exchange in fostering harmony and social relationships, and also briefly outlined the work and purpose of the national body.

The party broke up at a late hour, and all expressed themselves as distinctly in favor of the annual outings of the Lowell Exchange.

Portland, Maine.

The builders of Portland have been undisturbed by serious labor troubles for a long period, and the effect of the May 1 strike was only felt in a small strike of the hod carriers. About May 1 they made a demand for more pay, which was refused, and the men struck. After staying out about a week, they returned to work at the old wages, and have made no disturbance since.

The trade generally is in good condition, and no effect was felt of the strike, which, it was anticipated, might hinder operations to some extent.

Providence, R. I.

Providence has not felt any effect of the labor agitation of the early spring, and the relations between employers and workmen have been for the past year, and are at present, most amicable.

Building has been usually active and no contracts have been delayed by the prospect of trouble arising with the men.

The title of the Mechanics' Exchange has been changed to the Builders' and Traders' Exchange, for the purpose of securing a name that more correctly indicates the character of the organization.

Lynn, Mass.

The only disturbance that builders have felt in Lynn during the past year was a strike of masons on one job because of a difference between the employer and the men on the apprenticeship question.

The places of the strikers were filled with other men and no further trouble resulted.

As the result of the destruction of the majority of the business portion of the city by fire in the fall of 1889, building has been very active in Lynn for the last two years, and there is still much to be done to restore the city to where it stood before the fire.

Syracuse, N. Y.

The building business has not been quite as active as usual this spring, and no questions of difference between the employers and workmen have been brought up. The lack of activity in the building trades is purely from natural causes and is in no way attributable to any unsettled condition of the labor market.

Business of all kinds is quiet, and workmen are too desirous of securing employment to attempt to specify conditions.

Rochester, N. Y.

No strike of any kind occurred on May 1 in Rochester and everything is of a peaceful and harmonious character in the relationships between employers and workmen.

Arbitration has been successfully used as the means of satisfactory settlement of such questions as have arisen during the year between the contractors and their employees, and is fully recognized by both sides as the best possible method for adjusting their mutual concerns.

Buffalo, N. Y.

The situation in the building trades so far as the relationship between the employers and workmen is concerned has been most satisfactory for the past two years and no effect whatever was felt by the builders of Buffalo of the promised labor disturbance.

The builders generally are in a prosperous condition and are much encouraged by the prospect for the season as well as the continued peaceful relations with the unions.

The Exchange has been doing good work in the direction of establishing a feeling of greater confidence between employers and workmen, and in placing the building business in Buffalo on a firm foundation that tends greatly to prevent the unsettled condition so often found in communities where there exists a lack of confidence.

The project of the new building to be owned by the Exchange is being rapidly pushed ahead, and the building will be in actual existence in the near future.

Philadelphia, Pa.,

Has in no way felt the effect of the proposed strike. Everything in the labor market in the building trades is in excellent condition and perfect harmony prevails between employers and workmen in all branches of the business.

The master builders are affording every assistance in their power to their brethren in trouble in Pittsburgh by furnishing them all the workmen that can be spared from work in hand.

Baltimore, Md.

Builders in Baltimore and vicinity have felt no effect of a disturbing nature in the relations between employers and employees, and the only change that has been made in the conditions which existed last year was that of the stone masons and stone cutters, who were granted eight hours as a full day's work on May 1.

The business outlook is good, and the season promises to be fully as active as usual.

The Exchange is in a prosperous condition and the membership is constantly increasing, ten new members having been admitted on June 2.

The project to secure a building for the Exchange is progressing, and will be an assured success before another year.

Washington, D. C.

In a letter referring to the present condition of affairs in Washington Secretary Thomas J. King states that no strike or trouble of any kind occurred on May 1, and that everything has passed off quietly thus far this season, with no expectation of unfavorable change.

During the first week in June the bricklayers requested a reduction of hours from nine to eight, with corresponding reduction in pay from $4.50 to $4. The request was granted by most of the employers and all went along smoothly for one week, when the laborers demanded the old rate of wages, $2.25, or the resumption of the nine-hour day.

This demand necessitated the suspension of operations in that branch of the trade, but an early adjustment is expected, as the laborers hold the bricklayers responsible for the change, and it is presumed that the latter will assist the contractors in effecting a settlement.

There are no signs of discontent apparent in any of the other branches of the business.

The builders of Washington are having a busy season and all the large contracts have been secured by members of the Builders' Exchange, with the one exception of a $500,000 cable power house, which was awarded to one of the members of the Kansas City Exchange. Mr. King states that the Washington Exchange members are glad to welcome the stranger as a member of their Exchange and to accord him every privilege of the same in an effort to make him feel at home.

Wilmington, Del.

Affairs as connected with building are in a fairly satisfactory condition and nothing of a serious nature has occurred to disturb the harmonious relations between employers and workmen this season.

The only strike that has taken place this year was that of the bricklayers' and plasterers' laborers, who demanded an increase of pay. The plasterers granted half the demand and increased the wages to $2.25 per day of nine hours.

The demand of the bricklayers' tenders for an advance in pay equal to that of the mortar men was refused and the wages remain at $2.25 per day, while the mortar mixers receive $2.50.

Considering that the building business is hardly up to the mark this season, building operations having fallen off as compared with last year, everything may be considered as in fair condition.

The Exchange is in satisfactory shape and is increasing as a power and influence in the community as well as in membership.

Pittsburgh, Pa.

Pittsburgh has been the hot bed in which the trade unions have been trying to force the eight-hour day into existence, and at the same time the local unions have been endeavoring to secure advances in wages, working rules and other concessions from the employers, under cover of the general strike.

On the 1st of May a general strike occurred that included nearly every branch of the building trade, with eight hours to constitute a full day's work as the main cause for the action. The following trades are at present affected: The carpenters, eight hours and an advance in wages; planing mill men, eight hours; bricklayers, an advance from $4 to $4.50 for a day's work of nine hours; stone masons, plumbers and slaters, each with special demands and working rules of their own formulation.

The strikers have been exceedingly arbitrary in their demands, and have resorted to methods to secure their ends that have lost them much of the sympathy that is usually accorded them by the community.

The Builders' Exchange has made from the first of the trouble, and is still making, every effort for the settlement of the disturbance in a peaceful manner and upon lines of equity and fairness.

In the early part of the strike the Exchange took measures to secure united action of all employers in the building trades by reducing the initiation fee and sending out the following statement and invitation to join to all reputable contractors:

PITSSBURGH, PA.

This association affirms that absolute personal independence of the individual to work or not to work, to employ or not to employ, is a fundamental principle which should never be questioned or assailed; that upon it depends the security of our whole social fabric and business prosperity, and that employers and workmen should be equal.y interested in its defense and preservation. While upholding this principle as an essential safeguard for all concerned, this association would appeal to employers in the building trades to recognize that there are many opportunities for good in associations of workmen, and while condemning and opposing improper action upon their part, they should aid and assist them in all just and honorable purposes. That while upon fundamental principles it would be useless to confer or arbitrate, there are still many points upon which conferences and arbitration are perfectly right and proper, and that upon such points it is a manifest duty to take advantage of the opportunities afforded by associations to confer together, to the end that strikes, lockouts and other disturbances may be prevented. When such conferences are entered into care should be taken to state clearly, in advance, that this fundamental principle must be maintained, and that such conferences should only be competent to report results in the form of resolutions of recommendation to the individuals composing the various organizations participating, avoiding all forms of dictatorial authority.

Our association is composed of persons from the different branches of building, manufacturing and material men, whose interests are alike. The present membership is 820, and as the by-law relating to initiation fee has been suspended, so as to admit members to June 1 for $10, we take pleasure in inclosing you an application, which we hope you will fill out and return with the above fee.

Respectfully yours,
Signed by the committee.

The next step was the formation of the following set of working rules, which were communicated to the striking unions with the subjoined guarantee of protection to workmen:

WORKING RULES.

Nine hours shall constitute a day's work, and all overtime after 6 o'clock p.m., shall be time and half time.

Wages shall be classified according to skill and ability of the men.

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Foremen may be non-union men.

All employers shall pay at the places where men are at work, on their regular pay day, during working hours if possible, and no employer shall retain more than one day's wages.

All employers sending men to work any distance exceeding 2 miles from shop or office must pay car fare.

An employer may use laborers in or about the work to assist in carrying material on the premises or to place in the building.

No carpenter shall be permitted to stop work on account of non-union men in other branches of the building business that are employed on the same building or works.

At a meeting of the Builders' Exchange, held May 16, 1891, the following resolution was unanimously adopted:

Any person desiring to work under the rules adopted by their employer will be protected to the full extent of the law, and against all fines, intimidation or loss of situation, and will be retained at work at all hazards.

(Signed) H. R. BARNES, President.

Published by authority of the Board of Directors.

The master carpenters have issued the following rules as governing the apprenticeship question:

APPRENTICE RULES.

Any boy or person may engage himself to learn the trade of carpentry. He must be held by agreement, indenture or written contract, in accordance with the laws of Pennsylvania, and shall be required to serve an apprenticeship of four consecutive years, and shall not be considered a journeyman carpenter unless he has served the full term of apprenticeship.

Any boy or person who shall have contracted with an employer to serve a term of years shall on no pretense whatever leave said employer and contract with another without the full and free consent of the first employer, unless there is just cause, or that such change is made in consequence of death or relinquishment of business of the first employer, and any apprentice so leaving shall not be permitted to work under the jurisdiction of the master builders, but shall be required to return to his employer and serve out his time.

We employ as many apprentices as we require.

As a result of the invitation to join the Exchange, which appears in the foregoing, the membership has increased to over 950 from 150, and the contractors are determined to bring about a recognition by the unions of their (the unions') proper functions and establish a more equitable relations between the two.

Present indications (June 18) show a likelihood of a general lockout in the building trades.

The building business is completely ruined in Pittsburgh for this season, and the feeling is growing among the contractors that the time has come for the establishment of conditions that are more stable and less uncertain.

For many years the Pittsburgh builder has been at the mercy of the union, and has been continually uncertain of the condition of the labor market.

Later advices show that the carpenters' strike is virtually broken, and about 600 men are working on buildings and in the shops under the rules established by the employers.

The painters and plasterers refuse to work on buildings where carpenters are or have been working nine hours.

The bricklayers are still firm for $4.50 per day.

The stone masons are willing to work nine hours, but refuse to accept the working rules offered by the contractors. The plumbers are in about the same condition, except that the employers have secured nearly enough men from outside to carry on the work.

The effect of the strike is apparent in all branches of business and affairs in general are very unsettled throughout the city.

The last act of the unions is the forbidding of union men working for members of the Exchange under any conditions.

Cincinnati, Ohio.

Previous to May 1 there was some talk of the general strike affecting Cincinnati, but nothing came of it, and the present relations between employers and workmen are amicable.

The condition of affairs in this connection has recently become a little strained owing to the unions having refused to permit their members to work on the same job with any non-union men.

The only strike of the season was that of the plasterers in April, which was settled by arbitration.

Everything in connection with the Exchange is in a prosperous condition.

Cleveland, Ohio.

There have been no strikes in Cleveland this year of sufficient magnitude to do any damage and the contractors and workmen are on good terms with each other.

Building operations have been visibly affected by the proposed general strike, for many of the large contracts that were projected for this season have been postponed until next year, owing to the desire of the owners to see a settlement of the threatened disturbance before undertaking any extensive operations.

Labor is more plentiful in Cleveland than for years, which is undoubtedly the result of the talk of strikes which was indulged in early in the year.

The Exchange, which was reorganized shortly before the National Convention, is progressing and is steadily growing in numbers and influence. The volume of business being transacted by the members is increasing constantly and its affairs may be considered in a prosperous condition.

Detroit, Mich.

The general strike which was looked for on the 1st of May did not occur, and since that date everything in the building trades has been peaceful and quiet until the early part of June, when the stone cutters struck for $4 per day of eight hours instead of $3.60.

The employers offered to pay $3.75 per day of eight hours after August 1, but this proposal the union would not accept and a strike was ordered.

An offer was made to take the men back at the old wages and new cutters were secured as fast as possible to carry on the work under contract. Indications at present show an uneasiness in some of the other branches, and early in July some new developments may transpire. Generally, however, the trades are in fair condition, with plenty of work.

The Exchange has recently been reorganized and incorporated under the laws of Michigan, and the name changed to the Builders' and Traders' Exchange.

The following are the new officers: W. J. Stapleton, president; Alexander Chapoton, Jr., vice-president; George Hanley, treasurer; Joseph Myles, secretary.

Most of the old members have been retained and many new ones taken in. It is expected that the Exchange will soon be on a firm foundation and several plans for its improvement which have been held in abeyance put into operation. A building of its own will be one of the first moves of the Exchange.

Saginaw, Mich.

Building is somewhat quiet in the city and vicinity of Saginaw and nothing has happened so far this year to create any unpleasant feeling between the employers and workmen.

The Exchange is actively considering a plan for securing a building of its own, and is steadily pushing itself to the front.

Grand Rapids, Mich.

Employers in the building trades are somewhat disturbed at the unsettled condition of the trades in Grand Rapids.

A strike of street railroad employees has been in force for some time and is considered by employers in other branches as an effort on the part of organized labor to establish its supremacy and as a forerunner of a general strike of all organized labor.

On June 1 the carpenters notified their employers that unless the street-railway strike was settled by June 3 they would strike. However, as the masons refused to join with them, the carpenters are still at work, and no strike has occurred, although they are endeavoring to secure a nine-hour day, which the contractors cannot grant at present, as too many jobs are under contract to shorten the hours until the same are completed.

Plumbers are agitating the question of increased pay, but no definite action has yet been taken.

Hearty sympathy is expressed in the Exchange for Pittsburgh builders, and the result of the strikes will be watched for with interest.

Chicago, Ill.

There has been no strike in Chicago since May 1, with the exception of the unimportant strike of lathers for $3.50 per day, which was quickly adjusted.

The various labor organizations have been greatly disturbed at not being able to force the Directors of the World's Columbian Exposition to insert a clause in their contracts compelling builders to pay the minimum rate of wages which obtain in Chicago and vicinity. On account of the refusal of the directors to comply with their demands, the unions, rumor says, intend to make trouble before the work is done. Only one or two contracts have been let as yet, and no more have been commenced, so it is impossible to tell what form the trouble will take if any should occur.

The Builders and Traders' Exchange has been making strenuous efforts to amend the Lien law, but as the present session of the Legislature is nearly over, there is some fear that the work will not be completed.

The form of agreement for the establishment of arbitration as the means of settling the disastrous carpenters' strike, which took place last year, and for settling future differences is as follows, omitting the opening paragraphs:

Witnesseth, That the said parties, for and in consideration of the following articles having been adopted by the joint committees on arbitration March 21, 1891, agree to adopt and make the same, so far as applicable, an additional article of their constitutions, and agree that no regulations or by-laws to conflict therewith shall be passed.

The joint committees on arbitration shall hear all evidence of complaints and grievances of a member or members of the other, or of one association against the other association, referred to it by the president of either association, and shall finally decide all questions so submitted and certify such decision to the respective associations.

Work shall go on continuously, and all parties interested shall be governed by the award or decision rendered; provided, however, that work may be stopped by the joint order in writing of the presidents of the respective associations until the decision of the joint arbitration committees is obtained.

That the joint committees on arbitration shall continue in office for the adjustment and enforcement of the rules incorporated in this agreement, for the term of two years, beginning April 13, 1891, and ending April 13, 1893, or until their successors are elected.

And we further mutually agree that each association will, in the month of January, 1893, elect a standing committee, consisting of five members, to serve for the ensuing two years, or such period as the joint committees may agree upon, to establish a minimum rate of wages, and adjust all questions of interest to the respective associations.

The following working rules to be enforced during the continuance of this contract, unless otherwise ordered by the joint committees:

ARTICLE 1. That the working day shall be eight hours, commencing at 8 a.m. and ending at 5 p.m., but the noon hour may be curtailed by special agreement between the contractor or his representative and a majority of the employees, but not in such a manner as to permit more than eight hours work. But if two or more shifts of men are worked in one day, the same men shall not work on more than one shift, and such shifts shall not be considered overtime.

ART. 2. That the pay shall be by the hour.

ART. 3. That the minimum rate of wages shall be thirty-five (35) cents per hour from April 13, 1891, to April 1, 1893, inclusive.

ART. 4. That overtime shall be rated as time and one-half, and Sunday time shall be rated as double time.

ART. 5. That all journeymen carpenters shall receive their pay as often as once in two weeks; but when a journeyman is discharged, he shall be paid on the day of his discharge or on demand at the office.

ART. 6. That the apprentice system shall be governed by the State law.

ART. 7. No member of the Carpenters and Builders' Association shall during the term of this contract make a reduction in the rate of wages of a carpenter without giving him due notice previous to making said reduction. This article shall in no way be construed as conflicting with Article No. 3.

ART. 8. No member of the Carpenters and Builders' Association shall sublet or piece out their carpenter work. Neither shall any journeyman who is a member of any association represented in the United Carpenters' Council be permitted to take piece work in any shape or manner from any owner or contractor, whether he be a member of the Carpenters and Builders' Association or not.

ART. 9. Any journeyman carpenter being a member of any organization represented in the United Carpenters' Council, may work for any person who does not pay less than the minimum rate of wages.

ART. 10. Any member of the Carpenters and Builders' Association may at their discretion employ one helper to every five carpenters on each job, who shall be at liberty to use a saw, hammer and hatchet at any work on the job, and the rate of wages shall be as agreed between the employer and employee.

ART. 11. All apprentices now in the employ of any member of this association shall complete their apprenticeship with such member.

ART. 12. A complete list of all additions in the membership of either association shall be reported to the secretary of each association as often as once in every three months.

ART. 13. Any infraction of the provisions of this agreement by a member of either association parties to this contract shall be reported to the chairman of the respective arbitration committees, and to be by them investigated, and upon sufficient proof of the violation of any of the provisions of this contract, he or they shall be fined. The amount of the fine to be determined by the joint committee. Upon

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non-payment of the fine, he or they shall be suspended from the association of which he or they are members; and it is further agreed that no employer shall again employ said journeyman carpenter while such fine remains unpaid. And no journeyman carpenter shall work for any employer who has been fined and the same remains unpaid.

Signed by the Committee, Carpenters and Builders' Association, and by the Committe United Carpenters' Council.

Peoria, Ill.

About May 1 the carpenters struck for shorter hours and the plasterers went out on a sympathetic strike to help the carpenters.

The employers, who were paying more than the minimum rate of wages, did not feel that they could grant the demand for less hours, especially as there was no great difficulty in securing plenty of men.

On June 10 the men returned to work at the old time and everything is serene at present.

The Exchange is in a prosperous condition, having recently taken more roomy quarters in the same building, which they have occupied since they were burned out last year.

Business is quiet in Peoria, but promises to be better before fall.

Milwaukee, Wis.

Builders have been considerably disturbed by labor troubles this season, and although no general strike occurred on May 1, nearly all the trades have been affected sometime between March 15 and May 15, though at present everything is running smoothly.

The masons, hod carriers, stone cutters, plumbers, painters and tinners have returned to work during the past month under the rules established by the employers, and which were published in these columns in the June issue.

The carpenters are still out, although sufficient non-union men have been obtained to carry on present operations.

Building has been badly injured by the condition of the labor market, as owners and architects have up to now withheld all contracts from competition except such as necessity compelled them to begin at once. Since June 1, however, contractors have been kept busy figuring jobs, and present indications point to plenty of work for the balance of the year.

The Exchange is in an exceedingly satisfactory condition, and the building project is well in hand.

Minneapolis, Minn.

Everything is quiet in the city, with nothing to alarm the contractors in prospect. The plumbers have had a little trouble with their men, but it was adjusted without a strike.

The cornice makers are the only workmen who have struck so far this season, and their places were at once filled with non-union men.

Building operations are not as active as usual this season, although there is a fair amount of work being done.

St. Louis, Mo.

The building trades have settled down to very fair condition and the strikes are about over.

The galvanized iron and the tin workers are still out, demanding eight hours' work and ten hours' pay. The employers are hiring non-union men, and turning out work as fast as possible. The architectural iron founders are also having trouble with their workmen, and, like the other metal workers, are getting along as best they may with non-union men. The strikers want eight hours, and the adoption by the employers of very stringent working rules to which they (the employers) will not consent.

The carpenters struck shortly after May 1, but the difference is now settled, and the men are working eight hours at from 35 to 40 cents per hour.

There is no trouble in any of the other branches of the trade, and the relations between employers and workmen are generally peaceful and harmonious, with plenty of work in the market.

The contractors have not been seriously disturbed by the strikes, as precautionary measures had been adopted, and they were ready for any action that might be taken by the unions.

All trades connected with building are now working eight hours.

Kansas City, Mo.

Nothing unpleasant was experienced in Kansas City as the result of the proposed strike of May 1, and since the strike of 1887 the relations between employers and workmen have been most friendly and satisfactory.

There has been no attempt on the part of the workmen to secure shorter hours or increased pay, except upon work done by the city. The local industrial council recently made an effort to secure the passage of an ordinance establishing eight hours as a standard day's work, and to make it obligatory on the part of all contractors to work not more than eight hours under penalty of fine or imprisonment, or both. This ordinance failed to carry except as for work done directly for the city.

The hours generally worked in all branches of building, with the exception of city work, are nine, with payment by the hour, and the disposition of the workmen is in favor of more rather than less hours. The only trouble is the lack of sufficient work to keep all employed.

Building is quieter this year than it has been for some years past, and no favorable change is expected until next season.

St. Joseph, Mo.

Everything connected with the building trades is very quiet, and but very little work in the market.

The harmonious relations with the workmen have been undisturbed this year, and nothing has been heard in the shape of complaints from either side.

The building business is at present very dull.

Omaha, Neb.

The workmen in the building trades in Omaha seem to be satisfied with their present relations with the employers, and everything is in a harmonious condition.

There is a surplus of workmen in the market at present, which it is hoped can be employed later in the season.

The Builders' and Traders' Exchange is in good condition and affairs generally are about normal.

San Francisco, Cal.

The only trouble among employees affecting the building trades at present is that of the iron molders, which has been felt in the taking of contracts where much cast-iron work is required.

There are fewer large building operations being carried on at present than for several years past, and as a result of the inactive condition of the labor market no disturbance is felt by the employers.

The Exchange is in a healthy condition, and builders are looking for an increase of work in the near future.

It is distinctly evident that the present year marks the period of gradual but positive improvement in the relationships between builders and their workmen.

The general strike that was talked of by the unions for May 1 presented two very important aspects.

It forewarned, and hence forearmed, the employers, and entailed the most earnest discussion among the workmen as to the advisability of the step.

The employers, in being forewarned, were compelled to take action, to consider means, to perfect plans for intelligently and effectually forearming themselves, and in the consideration of the situation the merits and demerits of the position taken by the workmen became necessarily more apparent and distinctly outlined, and hence a comprehension of their motives more easily possible.

The earnest discussion of the proposed strike by the workmen developed the fact that a general strike was not advisable even under the advanced state of organization to which the workmen have attained.

Their own position has been more clearly demonstrated to themselves by this discussion, and it is evident from their action that they are growing more and more reluctant to use force in attempts to secure desired changes and are being less swayed by unprincipled agitators.

The condition of the labor market, as determined by the correspondence previously alluded to, may be considered as being very satisfactory, with the promise of a season of comparatively undisturbed tranquility in the building trades.

Such disturbances as are now causing trouble, with possibly the exception of Cleveland, are only felt locally and can in no sense be accepted as indicating general conditions.

Affairs in this connection in New England are unruffled and show no prospect of unfavorable change.

In New York State outside of the city everything is quiet, with arbitration acting as oil upon the troubled waters. In New York City the lumber handlers' strike and lockout is a complicated affair that has arisen from purely local conditions and has effected the building trades only so far as is natural from the restricted supply of lumber.

The territory embraced by Philadelphia, Baltimore, Washington, Wilmington and Pittsburgh is in a satisfactory condition, with pleasant relations existing in all branches of the building trades Philadelphia is helping her Pittsburgh brethren out as much as possible by sending such men as can be spared, which may be taken as a mark of confidence between employers and workmen of the former city. The building business being ruined for this year in Pittsburgh, the employers and workmen are both determined to make the contest at present going on a precedent that shall settle permanently (if possible) the position to be accepted and maintained by each. The effect of this struggle is being watched by builders all over the country and will doubtless be more widely felt than is at present anticipated.

Ohio builders are enjoying satisfactory conditions, so far as labor is concerned, and the employers of Cincinnati are endeavoring to establish arbitration as the means of settling future disputes.

Michigan is in an uncertain condition. The Detroit and Grand Rapids workmen are somewhat unsettled and unpleasantness may occur at any time. The organized labor in Grand Rapids is in sympathy with the street railway employees' strike and the other trades are inclined to help the stone cutters in Detroit.

The Northwest, taking Chicago as the southeast corner, is in a quiescent state, with only a few rumblings of discontent heard as the result of the failure to secure concessions from the directors of the World's Fair.

In Missouri, Nebraska and Iowa the building business is very quiet, with the exception of in St. Louis, where business is about the same as usual.

Throughout the far West the comparative inactivity in the building trades generally this season acts as a bar to the correct determination of the true condition of affairs, as any arbitrary action on the part of the unions would be a useless waste of energy at the present time.

It is evident, after two months have passed since the date for which the general strike was set, that the building trades are not in so bad a condition as might be supposed and that the unions are beginning to recognize the fact that organizations of employers are factors for good and that more can be accomplished by co-operation than by opposition.

The Growing Use of Brick for Building Purposes.

A writer in the Philadelphia *Ledger* notes the fact that brownstone has for years been the distinguishing feature of architecture in New York, just as brick has been in Philadelphia, but it is now going out of fashion. It has made miles of streets in New York almost as somber as Greenwood Cemetery. In fact, there is more variety of structure in Greenwood than there is on many of the streets of the city. But the day of the brownstone front has passed. The new dwellings going up are, for the most part, constructed of other material. Cheap flats still have a thin veneering of brownstone, but new private residences are beginning to show a variety and taste in architecture which, if continued for a number of years, will give to the metropolis a different appearance from what it had in the past. Brick is being used far more extensively than ever before, and the fashion this year has run in the direction of light and fancy colored brick, and even the high priced Philadelphia and Baltimore bricks have, to a certain extent, felt the effect of this demand for the light colored kinds. The growing popularity of brick is shown by the fact that the production at points from which this market draws its supplies was 1,200,000,000 in 1890, being 200,000,000 more than in 1889. Stone, other than brown, is also being used more largely than ever, and brick and stone are used effectively together in countless combinations of size and color. All this serves to give variety to the new architecture of the city, and in the quarters where the new building is going on most extensively the stranger no longer feels the depression which it imparted by unbroken blocks of brownstone houses built upon the same architectural formula—namely, three or four stories and basement, with a high stoop.

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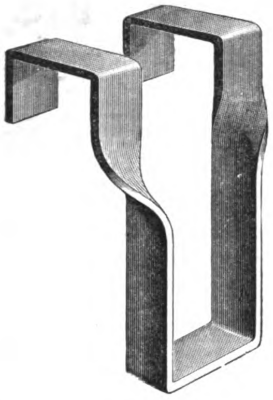

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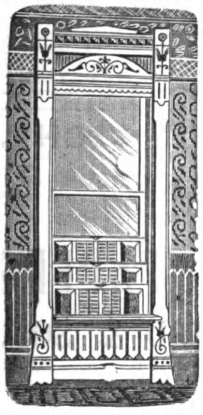

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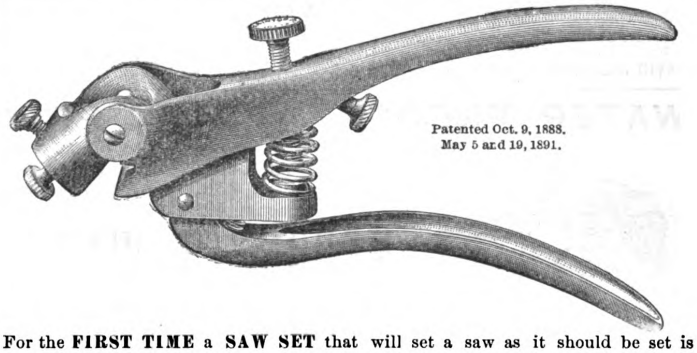

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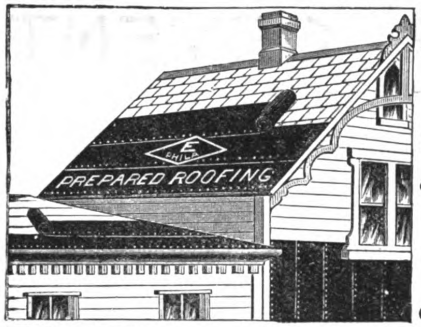

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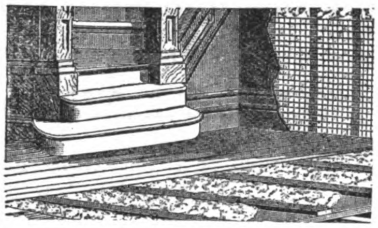

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CARPENTRY AND BUILDING.

A MONTHLY JOURNAL FOR THE BUILDING TRADES.

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AUGUST, 1891

Building in Brooklyn.

According to facts which have been recently brought to our notice, the builders in Brooklyn, N. Y., are soon to be confronted with a very peculiar set of conditions and circumstances. The official record shows that there only remain some 35,000 unoccupied building lots within the corporate limits of that city. On the other hand, for several years past the average number of buildings put up in the city named has been about 10,000 a year. On the face of it, then, it would seem that builders will run out of an opportunity to build, so far as new lots are concerned, in about three and a half years —that is, assuming that the present rate of building is to be maintained. These figures are, we believe, substantially correct, and to say that they were startling to the few real estate operators to whose attention they have been brought is only to give expression to a fact. It is not to be inferred, however, that the building business in Brooklyn will stop at so early a date as these figures alone would seem to indicate, for it must be remembered that in every year's building a large number of lots are used from which old buildings are removed. The number of new buildings does not by any means indicate the number of new lots which are occupied. This in itself would serve to lengthen the time if nothing else were done. Then the outskirts admit of annexation, so that the supply can be maintained in that way. However, the fact that we want to emphasize is, that Brooklyn is building much more rapidly than even her own citizens comprehend. Similar statistics, perhaps, could be shown with respect to New York City, but her citizens are so accustomed to big operations that they pay very little attention to what is going on. All these things point to the desirability of enlarged borders for both cities, if not amalgamation. Accordingly, the scheme for a "greater" New York, which has been more or less discussed in the political papers for some time past, becomes one of special interest to builders.

IT IS NOT THE DEFECTS BUT THE BEAUTIES WHICH SHOULD FORM OUR CRITERION OF JUDGMENT IN ALL MATTERS OF ART.—*Chapin.*

Manufacturing in the World's Fair.

The directors of the World's Fair, at Chicago, are reported to have decided that there shall be no manufacturing in the Manufactures Building. This structure will contain only the manufactured products. It was generally thought that the contrary would be true. But the plan now is that all manufacturing must be done in the buildings in which raw materials are displayed. For instance, while cotton goods will be exhibited in the Manufactures Building, the process of weaving the same must be looked for in the Agricultural Building. Diamonds and other precious stones will be exhibited in the Manufactures Building, but the arts of the lapidary will be shown in the Mines and Mining Building, since diamonds are a product of mining. The same is true of all other classes of exhibits. The idea at present is that there shall not be a single wheel turned in the Manufactures Building. This decision is not likely to be regarded with any great amount of favor by the general public. Many machines can, of course, be exhibited motionless and visitors will not expect to see them in operation. Farm machinery is a case in point. There are other machines, however, and perhaps they are in the great majority, which must be shown in motion to enable visitors to get a proper conception of their method of operation or of the principles involved in their construction. Under such a ruling as this the Manufactures Building would be apt to lose exhibits of a great deal of very interesting machinery, as exhibitors would not send two sets of machines—one for show in the Manufactures Building and one to be put in operation in some other building.

THE STUDY OF ART POSSESSES THIS GREAT AND PECULIAR CHARM, THAT IT IS ABSOLUTELY UNCONNECTED WITH THE STRUGGLES AND CONTESTS OF ORDINARY LIFE. BY PRIVATE INTERESTS, BY POLITICAL QUESTIONS, MEN ARE DEEPLY DIVIDED AND SET AT VARIANCE; BUT BEYOND AND ABOVE ALL SUCH PARTY STRIFES THEY ARE ATTRACTED AND UNITED BY A TASTE FOR THE BEAUTIFUL IN ART.—*Guizot.*

The New Tin-Plate Tariff.

The large quantities of tin plate used in the building trades gives added interest to the statement that at midnight of Tuesday, June 30, the new tariff went into effect, and hereafter every box of plates imported will have to pay 2.2 cents per pound, which is 1.2 cents per pound more than the tax levied under the old law. The 1st of July, therefore, may be said to mark the beginning of actual competition between the Welsh and American manufacturers of tin plates. Friends of the new tariff argued that a cent a pound was too small a margin to permit the profitable manufacture of tin plates in this country; but with the existing duty of 2.2 cents it is generally believed that plates can be made here in successful competition with the foreign product. No one doubts, however, that the importations in this line, when the present large speculative stocks are exhausted, will continue heavy for some time to come, for it is unreasonable to suppose that the enormous current demand for consumption will be immediately met with a domestic product. Already, however, some works are in operation in this country, others are building, and it is safe to say that very many more are in contemplation; and the product of these works, existing and prospective, will in due time largely, if not wholly, supplant the foreign plates. Users of tin plates are, of course, interested in prices, and the market is being closely watched by buyers. The extra cost due to the higher tax was, however, practically discounted last fall, and the impression prevails that there will be no very important change now that the new tariff has gone into effect.

THE ENORMOUS INFLUENCE OF NOVELTY —THE WAY IN WHICH IT QUICKENS OBSERVATION, SHARPENS SENSATION, AND EXALTS SENTIMENT—IS NOT HALF ENOUGH TAKEN NOTE OF BY US, AND IS TO ME A VERY SORROWFUL MATTER. AND YET, IF WE TRY TO OBTAIN PERPETUAL CHANGE, CHANGE ITSELF WILL BECOME MONOTONOUS.—*Ruskin.*

Electricity at the World's Fair.

It is the intention of the management to make the Chicago World's Fair site and the buildings one grand exemplification of the progress that has been made in electricity. The electrical exhibits will not be confined to a few of the buildings, but on every hand there will be a display of electricity. The grounds, including the waterways, the wooded island, the streets and avenues and boulevards approaching the World's Fair site, will all be lighted by electricity and in harmony with the general effect which it is desired to produce. According to Chairman Jeffery of the Committee on Grounds and Buildings, the great structures of the exposition will be turned into a panoramic view at night by the aid of powerful electric search lights. On the gilded dome of the Administration Building, on the center pavilion of the Casino, and at other suitable points these search lights will be placed. During the evenings on which the exposition is open, the lights will be turned on the several main buildings and waterways so as to flood them with a sudden burst of electric splendor.

WE MUST NOTE CAREFULLY WHAT DISTINCTION THERE IS BETWEEN A HEALTHY AND A DISEASED LOVE OF CHANGE; FOR AS IT WAS IN HEALTHY LOVE OF CHANGE THAT THE GOTHIC ARCHITECTURE ROSE, IT WAS PARTLY IN CONSEQUENCE OF DISEASED LOVE OF CHANGE THAT IT WAS DESTROYED.—*Ruskin.*

Car Lines in Cities.

The old description of a city was "A horse with some buildings set up around it." The idea was to emphasize the importance of the horse in the extreme development of modern civilization. For many years past the horse has been a prime necessity for transit in and through cities, but gradually his function in this respect is becoming of less importance. Some of the cities that we visit nowadays brag that they have few or no horse-car lines. Cable roads and electric roads have superseded the horse-car lines. The ad-

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vantages to the public of the cable road and the electric road are not to be gainsaid. With a horse-car line or a mule-car line, as it sometimes exists, the ultimate speed attainable is a comfortable jog for the animals. If they are hurried too much, wear and tear of animal flesh is so great as to interfere with the interests of the stockholders. When, on the other hand, the horses are allowed to proceed at a comfortable jog, the slowness of a long trip is an exasperation to the man of business. But with electric cars and cable cars there are opportunities for spurts and special speed runs which are impossible with horse cars. With a properly constructed cable line or electric line, the cars may go as slow as circumstances require through the crowded portions of a city, and then may be made to attain a speed even rivaling steam cars whenever a clear stretch of track is before them and there are no passengers to get on or off. The difference in time between distant points in a city, as between horse cars and electric or cable cars, is a very material saving to the busy man of affairs.

THE MOST VALUABLE THINGS, IF THEY HAVE FOR A LONG TIME APPEARED AMONG US, DO NOT MAKE ANY IMPRESSION AS THEY ARE GOOD, BUT GIVE US A DISTASTE AS THEY ARE OLD.—*Thackeray.*

Sharpening Planes.

In another part of this issue we present a somewhat extended article on the subject of sharpening planes by a mechanical engineer who has had long experience both in this country and in England. He has very carefully illustrated his ideas by means of numerous diagrams, and there are few among our readers who will not be profited by perusing this article very carefully. This said, however, we doubt if there are many who will fully agree with our contributor in all particulars. The object of this note is to suggest a comparison of ideas, and so we shall be glad to hear from any one, either in indorsement of the views of our contributor or in criticism of them. Our columns are always open for communications from practical men, and we trust that this subject will call forth a large number of letters.

THE ENEMY OF ART IS THE ENEMY OF NATURE. ART IS NOTHING BUT THE HIGHEST SAGACITY AND EXERTION OF HUMAN NATURE; AND WHAT NATURE WILL HE HONOR WHO HONORS NOT THE HUMAN?—*Lavater.*

Progress in Heating Buildings.

Those who do not make a specialty of heating have very little conception of the rapid changes which are occurring in the practice of heating at the present time. There is, perhaps, no other branch of domestic engineering in which changes are so constantly and rapidly taking place. It would seem that the practice of past years had been predicated upon an inadequate conception of principles, while the changes which are now being made are based upon a more intelligent interpretation of those principles. Whatever may be the reason, the art is advancing very rapidly. It is now cheaper to adequately heat a house than ever before, and results are more certain with the best forms of apparatus than at any previous date in the history of the trade. Little by little artificial gas is being brought into use, as is evidenced by an article that appears in another part of this issue. In this there is given an account of what a prominent engineer has done in the way of heating a conservatory using an artificial fuel. Our own offices the past season were heated likewise by artificial gas. A peculiar form of hot-water circulator was used, being located upon the office floor. The circulation was by means of coils, most of which were below the line of fire. Notwithstanding this disadvantage a space of nearly 65,000 cubic feet was kept to a temperature of about 70°, at a cost of less than $1 per day, with gas at regular rates, taking the average of the season through. We shall probably lay before our readers full details of this system of heating at an early date.

A Magnificent Country House.

The new country house of Whitelaw Reid, which is rapidly nearing completion, at White Plains, N. Y., is destined to rank among the largest, handsomest and most thoroughly appointed suburban residences in the vicinity of the metropolis. The main hall is a spacious apartment in which are three open fire places. The dining room is long and high, being almost sheathed in glass on the two sides and finished in polished oak. Probably the most enteresting room in the house is the library, with shelves for 25,000 volumes, and finished in old seasoned woods that look as if they had stood the storms and frosts of centuries. Open fire places are to be found in every room, while a steam plant supplies their deficiencies from the standpoint of actual warmth. It is said that nothing on an equally extensive scale has been attempted in a country house before. The guest chambers are numerous and finished in a manner in keeping with other portions of the dwelling. It will be remembered that the house formerly occupied by Mr. Reid was burned to the ground some time ago owing to the fact that there was not sufficient water at hand for extinguishing the fire. A new water-works plant is being put in that will be sufficient to supply water for a small village. The house will be lighted by electricity, and there is everything to make the dwelling not only convenient and comfortable in its appointments but luxurious in its *tout ensemble.* The cost of the house is estimated to approximate $1,000,000.

Non-Absorbent Mortar.

Prof. Ira O. Baker of Illinois says that "mortar may be made practically non-absorbent by the addition of alum and potash soap. One per cent., by weight, of powdered alum is added to the dry cement and sand, and thoroughly mixed, and about 1 per cent. of any potash soap (ordinary soft soap made from wood ashes is very good) is dissolved in the water used to mix the mortar. The alum and soap combine and form compounds of alumina and the fatty acids, which are insoluble in water. These compounds are not acted upon by the carbonic acid of the air, and add considerably to the early strength of the mortar. With lime mortar the alum and soap have a slight disadvantage, in that the compounds which render the mortar impervious to water also prevent the air from coming in contact with the lime and consequently prevent the setting of the mortar. On the other hand, the alum and soap compounds add considerably to both the early and ultimate strength of the mortar.

This mixture could be advantageously used in the mortar of outside walls, for masonry in wet places, for pointing mortar, for the plastering of cellar and basement walls, for lining cisterns, &c. The efficiency of the alum and soap compounds is shown by the fact that the walls of the Croton reservoir in Central Park, New York City, were rendered impervious by simply washing them four times alternately with the alum and the soap solutions. Before being coated the walls allowed the water to pass freely. Four coatings—two pairs—made a common brick absolutely impervious under a 40-foot head of water. The use of the alum any soap as above would in all cases diminish, and in most cases entirely prevent, efflorescence or whitewash, which so frequently disfigures brick walls.

The Age of Trees.

It is generally admitted that European trees have rarely exceeded the very respectable age of 800 years. Thus, recent information gathered by the German Forestry Commission assigns to the pine 500 and 700 years as a maximum, 425 years to the silver fir, 275 years to the larch, 245 years to the red beech, 210 years to the aspen, 200 years to the birch, 170 years to the ash, 145 years to the alder and 130 years to the elm. The heart of the oak begins to rot at about the age of 300 years. The holly oak alone escapes this law, and there is a specimen of this aged 410 years in existence near Afshafenburg in Germany.

At the Edinburg Forestry Exhibition, some years ago, there were exhibited two transverse sections of a couple of Scotch firs. One of these, which was 7¼ feet in diameter, was 517 years of age; the other, which was about 5¾ feet in diameter, was older, and exhibited 270 annual rings. A sequoia gigantea, felled in Calaveras County, Cal., measured 387 feet in hight 25 feet in diameter at the base, 15 feet at 125 feet above the earth, and had attained the age of 3000 years. At Caphyoe (Arcadia) may be seen a plane tree which for a long time was regarded as the one that the historian Pausanias spoke of in the second century.

There is a cypress in the vicinity of Padua which is regarded as having been a contemporary of Julius Cæsar, and according to another and more plausible legend, it was against the trunk of this tree that Francis I, seeing "all lost save honor," endeavored to break his sword. The oak of Swilcar Lawn in the forest of Needwood was still robust in 1822 at the age of 600 years, and at the same epoch there might have been seen at Chupstead Place, County of Kent, a large elm, around which a fair was annually held during the reign of Henry V, in the fifteenth century.

The age of the Braburn yew, in this same County of Kent, was estimated by De Candolle to be 3000 years, and he attributed the same age to another yew, that of Fortingal, in Scotland. The English historian Evelyn, in the seventeenth century, cited a linden of the environs of Neustadt (Wurtemberg) then aged more than 1000 years.

THE HOLLAND HOUSE, just completed, on the corner of Fifth avenue and Thirtieth street, cost $2,000,000. It is ten stories high and built entirely of white Indiana limestone.

THE GROWTH of the Patent Office Bureau illustrates the wonderful advance of the nation in science and useful arts. In 1790 three patents were issued; 100 years later the number was 20,292, and the applications for patents were 41,048. The total number of patents granted during the hundred years is 453,944, an average of nearly 13 patents for every day in the year.

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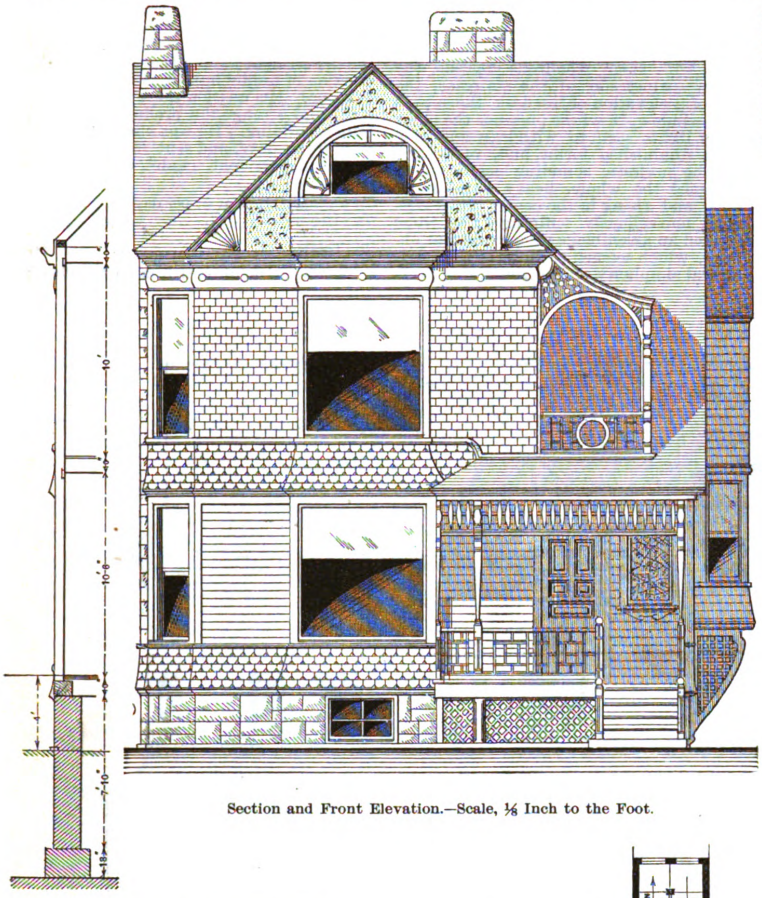
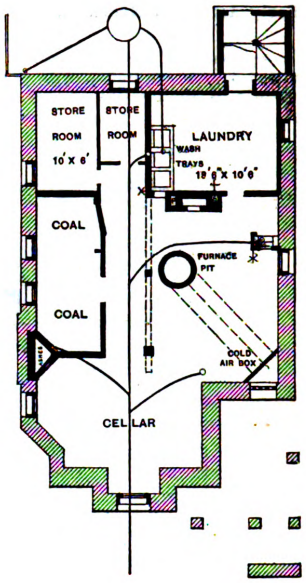
COTTAGE IN A CHICAGO SUBURB.

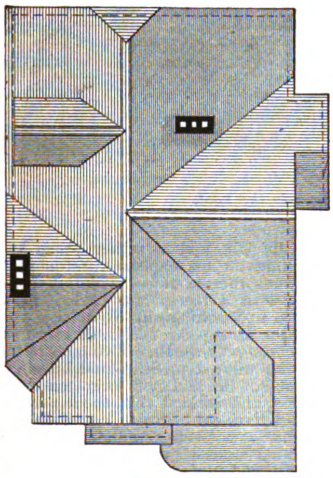
THE ATTRACTIVE and conveniently arranged cottage which forms the basis of our supplement plate this month was erected not long since on Webster avenue, Eggleston, a suburb of Chicago, Ill., for George G. Spencer from plans prepared by Rae & Wheelock, architects, of that city. The elevations, floor plans and a selection of details presented upon this and the following pages will enable the reader to gather a very good idea of the construction and general arrangement. The plans show five rooms upon the first floor, one being a reception hall measuring 10 x 12 feet. This is entered through a vestibule from the porch and from it open the parlor and library. It is fitted with an open grate and a cosy seat in the corner. The connection between the hall and the two rooms named is so managed as to give much the appearance of one large apartment when the sliding doors are open. An interesting feature of the parlor and library are the seats placed under the windows. In the rear of the library, and communicating with it by means of folding doors, is the dining room, 14½ x 12 feet in size. Opening from it, toward the rear, is the china closet and at the right of this the kitchen, which is provided with all the modern conveniences. The arrangement of the various rooms is such that the front door may be reached from the kitchen without passing through any of the living rooms—a feature which cannot be too highly commended. The main stairway rises from the reception hall and reaches the second story near the center of the house, thus economizing hall space



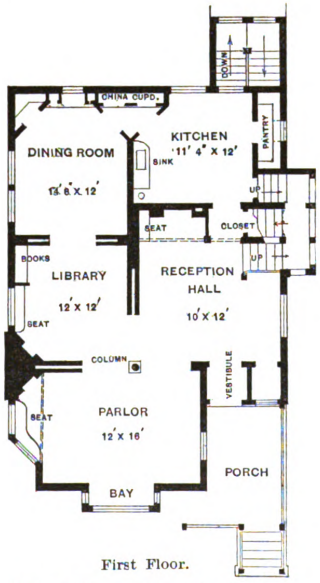
Section and Front Elevation.—Scale, ⅛ Inch to the Foot.



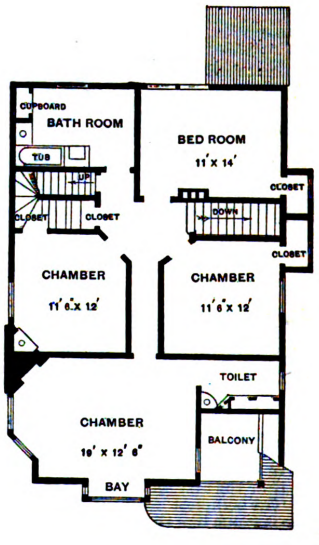
Basement Plan.



Roof Plan.



First Floor.



Second Floor.

Scale of Plans, 1-16 Inch to the Foot.

Cottage in a Chicago Suburb.—Rae & Wheelock, Architects, Chicago, Ill.

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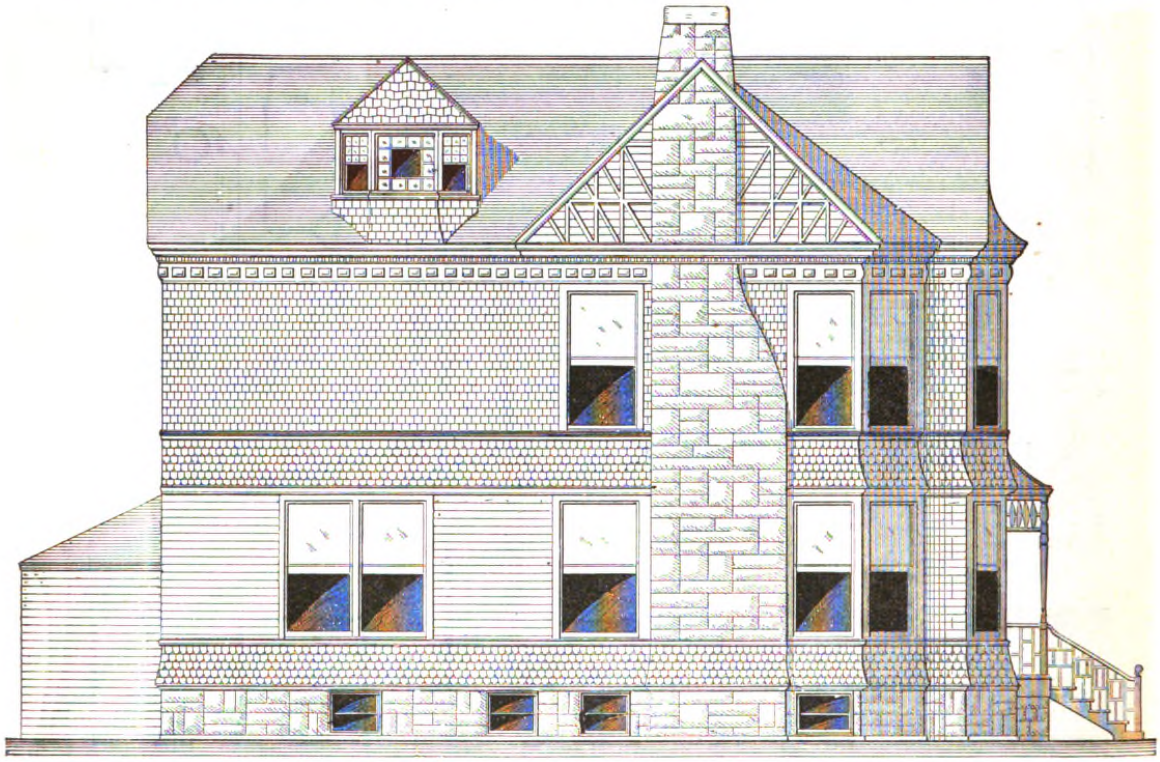
on that floor. The rear stairs open from the kitchen and terminate on the first landing where they join the main stairs, this arrangement enabling persons to ascend to the second story from the kitchen without passing to the front of the house and also doing away with the necessity of a separate rear stairway leading to the upper rooms. On the second floor are four sleeping rooms and a large bathroom. Opening from the front chamber is a dressing room, while from the other sleeping rooms open commodious closets. The house is heated by a furnace. The laundry is in the basement, as are also several storerooms. The house is handsomely finished throughout and is said to have cost complete, exclusive of the ground, $7000.

Early American Meeting Houses.

The settlement of New England was the result of a deep sentiment, with which the hearts of the pilgrim fathers were filled, the stern spirit of Puritanism. This displayed itself in every possible form, says an exchange, but in none more strikingly than in the architecture. Houses of worship, which they disdained to call churches, were erected almost before the first rude dwellings were completed, and the style of architecture, if, indeed, it deserves that appellation, arrived at its perfection in less than a century after the first settlement of the country. The simplest form of the meeting house is much like that of a large barn, with gable ends. There are doors on three sides, each one having a small porch, or square tower, rising as high as the eaves of the building, to contain a flight of stairs conducting to the gallery. No cornice or ornament of any sort graces the exterior; but the uniformity of the sides and extremities of the building is broken by the unaccountable number of windows with which our ancestors saw fit to adorn the sacred edifice. We speak within bounds when we say that the number of windows in an old-fashioned meeting house of 70 x 50 feet is never less than 40. Around three sides of the interior runs a gallery, supported upon columns of an unknown order. The ceiling is plastered; but the huge rafters, which project from the walls about 6 feet below the eaves, and help to support the roof, are not concealed. On the fourth side, and directly opposite the middle of the long gallery, stands the pulpit, upon which the whole magnificence of architecture that the age could boast of was lavished. The fluted pilasters, with their wondrous capitals, the heavy balustrade of the staircase, the graceful elevation of the desk, the superb bow window, in whose presence the other lesser lights seem to withdraw and hide their diminished forms, and, more than all, the majestic sounding board, which canopied the whole, heavy with moldings, and rising in the center into a boss most marvellously sculptured; all these formed an assemblage of magnificent objects, which seemed to mock at the Puritanical simplicity of the remaining parts of the edifice. If the ambition of the builders was lofty enough for a steeple, one of the gable porches was made to rise considerably above the ridge pole. Upon this was erected the belfry, a structure which strongly resembles the top of an urn, standing upon six or eight legs. From the belfry a slender spire shoots up, terminated with a gilt vane. There was, however, another form of the steepled meeting house, which, we believe, is of earlier date than the one last described. This sort of edifice, of which very few now remain, is square; the four sides of the roof meet in a point over the center of the building, and from this point springs the steeple, consisting of a belfry and spire. We must not forget one remarkable contrivance in those early churches, the arrangement of the pew seats. These were made with hinges, so that in prayer time they might be raised up and allow the occupants to lean against the back of the pew; at the close of the prayer they were slammed down with a noise like the broadside of a frigate, and served as a warning to all the backsliders in the village who were remiss in their attendance at meeting.



Cottage in a Chicago Suburb.—Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.

An Architect's Bill of Expenses.

There are few men more keenly alive to the merits of a good joke than E. P. Bassford, St. Paul's well-known architect, says the *Pioneer Press* of that city. Some time ago he was sent out by the head of the department having the matter of the erection of public buildings in charge to Winona. His mission there was to select a site and arrange the preliminaries for a public building. He was absent from St. Paul four days, and sent in his account to the department made up of these items:

To four days' time at $7 per day	$28
To expenses	19
Total	$47

The department sent him back a check for the $28 and a rather sharp letter touching on his expenses, refusing the payment thereof unless a detailed statement with a receipt for each item was sent in to Washington. To do this would entail more expense on Mr. Bassford than the claim was worth. Two months later he was ordered to St. Cloud on similar business. He had not forgotten the $19 matter, and decided that the department should have no cause to complain again of him for not being explicit enough. He provided himself with a sufficiency of pencils and paper before departing for St. Cloud. After perhaps a week's absence, during which time Mr. Bassford completed his business, he returned to St. Paul and prepared his report. It read something after the following vein:

To the Hon. —— ——, Goverment Supervisor of Public Buildings, &c., &c., Washington D. C.:

DEAR SIR.—Pursuant to your instructions, I beg leave to submit the following report:

In accordance with instructions from your

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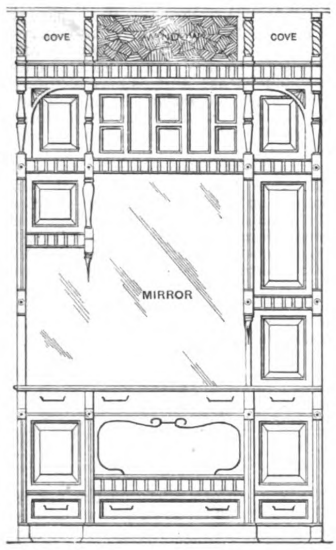
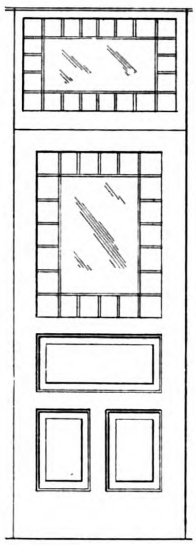
department, on the morning of May 10, 188—, I started to fulfill the mission intrusted to my care, the selection of a site and arrangements preliminary to the construction of a post office building in the city of St. Cloud, State of Minnesota, United States of North America. The morning was fair, temperature 62° F., humidity 86.01. Arrived at the Union Depot, St. Paul, at 7.24 a. m. At 7.25 I negotiated for and purchased a railway ticket to St. Cloud. The ticket office is located at about the center of said depot and on the right-hand side. The ticket seller was a medium-sized gentleman of dark complexion. I paid for said ticket the sum of $5.82, the receipt for which is hereunto attached, marked "Exhibit A," and made a part of this report. The trip to St Cloud was a pleasant one in most respects, though rendered somewhat monotonous by the monstrous talk of a prohibition crank and the further annoyance of the woman who would keep the window open. On arriving at St. Cloud, aforementioned, I secured a hack. Said hack was somewhat old, but fairly comfortable. It was drawn by two horses. The near horse was a sorrel, slightly lame in one hind leg. The off horse was a bay with a star in the forehead and three white feet. The driver was apparently 35 years old, of sandy complexion, freckled and evidently of Irish nationality. I paid him 25 cents for the use of his vehicle, the receipt whereof is hereunto attached, marked "Exhibit B," and made a part of this report. On my arrival at the hotel I registered in a book kept for that purpose. My dinner consisted of corned beef boiled (rather salty), potatoes, four kinds of fruit, bread, butter, pickled beets, fried ham, pie and beans. The dinner was not very palatable. I paid for said dinner the sum of 40 cents, the receipt for which is hereunto attached, marked "Exhibit C," and made a part of this report.

Mr. Bassford made up his report in about this way, going through with the several items of cigars, meals, hack hire, the employment of a local surveyor, railway fare back to St. Paul, &c., each item of which was most minutely detailed. The entire expense account was not over $25, but his report covered a quire of foolscap paper closely printed on a typewriter. Its various exhibits went clear through the alphabet to Z, and then came a second series of "exhibits" beginning with "A A." When the report had been received at Washington the official to whom it was addressed got a little mad over it. It leaked out finally and produced no end of amusement. Mr. Bassford was finally officially informed that in future he need not be quite so explicit in his reports, and was told that, in consideration of the fullness of his last report, the brevity of his former report would be overlooked. He received a check not only for the St. Cloud expense account, but also one for the $19 in expenses incurred at Winona. Afterward, when he chanced to be in Chicago, he called on the Government Architect. The other *attachés* of the office dropped in to see him, desirous of viewing the man who was not afraid to "sass" the United States Government.



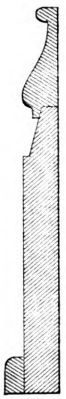
Side Board.—Scale, ⅜ Inch to the Foot.



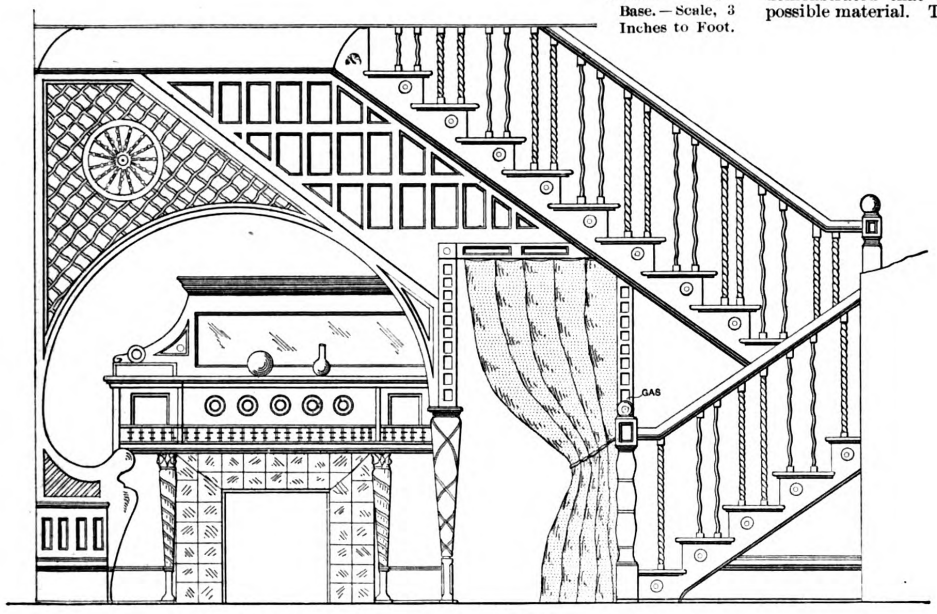
Detail of Doors.—Scale, ⅜ Inch to the Foot



Section Through Casing.—Scale, 3 Inches to the Foot.



Section Through Base.—Scale, 3 Inches to Foot.



Mantel Under the Stairs.—Scale, ⅜ Inch to the Foot.

Miscellaneous Details of Cottage in a Chicago Suburb.

From a Trade to an Art.

The following interesting remarks appeared in a late issue of the *Clay Worker*, bearing the title given above:

The great size and hight of modern buildings in our large cities has compelled more attention than ever to fire-proof construction. Twenty years ago iron was the preferred material, taken presumably for its fire-resisting quality. But conflagrations like those of Chicago and Boston demonstrated that iron was the worst possible material. Then followed a general use of stone. Brick was not preferred from its then lack of artistic appearance and want of capacity for effect and expression. Stone, however, proved unreliable as a fire-resisting material, and some of them, in fact all except the sandstones, were found to easily disintegrate with the heat of a common, not to say great, conflagration. But

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brickmaking has developed from a common mechanical occupation into an art. Forms have altered from the stiff 4 x 8 formula to suit artistic situations in fronts, pilasters and cornices, and finally the crowning development is reached in the rapid and cheap production of the most elegant art forms and expressions in terra cotta, until now clay workers produce the best material for the most pretentious or elaborate structures while retaining, and, in fact, increasing, the well-known fire resisting qualities.

Only one thing is yet desired in order to render the fire-proof condition absolute, and that is a fire-proof mortar The brick itself is practically indestructible by any heat possible in a conflagation. The mortar will crumble, with its lime base, and weaken the wall. A mortar has recently been invented by a German chemist that answers perfectly, 'tis said, but its great cost precludes its use, except, perhaps, for some particular purpose, as fire-proof vault construction, where expense would be no object. There is not a single field for invention that would reward the one better who can discover a mortar that would be both fire proof and sufficiently cheap to be available.

But, however, brick and terra cotta is being generally preferred, and never has there been such general preference shown for this material as is foreshadowed for the coming season. Safety and durability are beginning to usurp all other conditions in the erection of large buildings—a usurpation that has been rendered permanent to brick and terra cotta by their becoming thoroughly artistic.

Sculpture in Buildings.

In the application of sculpture, particularly of statues, the Romans were prodigal, says one of our foreign exchanges, but they employed the latter chiefly as architectural accessories, frequently placing them over columns or on the summits of their edifices as acroteria to pediments, by way of giving variety to the outline of their buildings, and also of indicating at first sight their particular appropriation—a practice almost unknown to the Greeks, there being only one instance of it. In Italian buildings, on the contrary, the practice has been frequently carried to a preposterous extent, rows of statues being placed on the pedestals of balustrades, so as almost to look like pinnacles, and to produce rather a stiff and formal effect than one of richness; whereas, when they are introduced on the angles and apex of a pediment, or when there is merely one in the latter situation, such monotony does not take place, and additional importance and loftiness may be given to that portion of the edifice by such decoration. The abundant use of statues led to the adoption of the niche—a feature unknown in Greek architecture—as a convenient mode of inserting them within the surface of walls, and thereby decorating them; at the same time space was gained in interiors, where, if otherwise placed, they would have taken up room. Niches frequently occur in Roman temples and baths; and, as may be inferred from the accounts given of the temple of Venus and Roma, were occasionally decorated with a frontispiece of small columns, with their entablatures and pediments, but were generally left plain, and were for the most part semicircular in plan, in which case they usually terminated in an arch and semi-dome, after the manner of a tribune or large recess, of which the niche was, in fact, a miniature copy. Niches, however, were very frequently rectangular in plan, as were also exhedræ or recesses, in which case the latter formed arches vaulted hemicylindrically.

BUILDING A ROW BOAT.

THE FOLLOWING illustrated description of a 17-foot row boat, by Henry J. Gielow, which we reprint from the *American Machinist*, will prove interesting to those correspondents who have recently inquired concerning the best method of performing similar work, as well as to many other readers of the paper: The object in this design has been to secure a safe, comfortable and easy rowing boat for a party of six or eight persons. The principal dimensions are: Length, 17 feet; beam, 4 feet 6 inches; depth amidships, 18 inches, 25 inches at bow and 20 inches at stern; draft with moderate load, about 9 inches. The cost of materials is about $18.

The form of the boat is shown in elevation, Fig. 1; plan, Fig. 2; and end view or section, Fig. 3; and these are technically known as sheer plan, half-breadth plan, and body plan, and are collectively known as the lines of the boat.

The first operation is to enlarge the body plan, Fig. 3, to its full size—*i. e.*, the actual size of the boat. This plan shows the cross section of the boat at every frame, being on outside of frame and inside of planking, the right side of the figure showing the forward frames on one side of boat, and the left side showing the after frames on one side of boat. A portion of each end of the sheer plan should also be drawn full size, to show proper location and form of rabbet on stern and after deadwood.

In order to enlarge Fig. 3, first draw on a floor the horizontal lines (or water lines, as they are generally called) *a*, *b*, *c*, *d* and *e*. According to the scale, these lines are 3 inches apart; hence in laying out the body plan on the floor the distance between these lines must be 3 inches (full size). Also draw the vertical center line *x x*. Measure, with the given scale, on the water line *a*, the distance from the center line *x x* to the point *a*, in which the water line intersects the frame 11. Lay off the distance full size on the corresponding line on the floor. In a similar way measure with the given scale all the distances from the center line *x x* to the points in which the water lines intersect frame 11, and lay off corresponding distances full size on the floor from the vertical center line. The highest point of this frame above the line *e* is obtained by a vertical measurement from the same line, and a horizontal measurement from the center line *x x*, and the lowest point of the same frame can be obtained by measuring from the water line *a* downward. Now bend a flexible batten to the points laid off and draw frame 11. In a similar way lay off points for frame 12 by measuring the distances from the center line *x x* to the points in which the water lines intersect this frame. In the same way points are found for all the frames and curves drawn through them. If a fair curve cannot be drawn through a set of points, then a mistake has been made somewhere which must be rectified.

The next step will be to lay off the curves in Fig. 2. To do so, first draw the horizontal center line *x x* and the frame lines perpendicular to *x x*. It must now be understood that the curve *a*, in Fig. 2, is the intersection of inside of planking, and a horizontal plane through the lower water line; and the curves *b*, *c*, *d* and *e* are intersections of the inside of planking, with horizontal planes, through corresponding water lines. If this is understood there will be no difficulty in obtaining points in these curves. For instance, take the curve *a*, in Fig. 2. On frame 11 lay off a point a_1. The distance from this point to the center line *x x* must be equal to the distance from *x x* in Fig. 3 to the point *a* in which the lower water line cuts frame 11. In a similar way we find another point in the same curve in Fig. 2 by laying off on frame 12, from the center line, a distance equal to that from the center line, Fig. 3, to the point in which the water line *a* cuts frame 12. In the same way we find points on all the frames in Fig. 2, and through these points draw the curve *a*. If a fair curve cannot be drawn through the points, there is an inaccuracy somewhere which must be corrected. To draw the curve *b*, we must first find points in this curve as we did for the curve *a*, Fig. 2, by laying off distances on all the frames equal to the distances from *x x*, in Fig. 3, to the points of intersections of the water line *b* with corresponding frames. After the curve *b* has been drawn, find points in the curves *c*, *d* and *e*, and draw these curves also. The principal object of these curves in Fig. 2 is to make sure that the frame lines in Fig. 3 have been drawn correctly. If these are correct, the curves in Fig. 2 will be fair curves, otherwise a fair curve cannot be drawn through the points laid off in Fig. 2.

The curves *f*, *g*, *h*, *i*, in Fig. 1, are intersections of the inside of planking and vertical planes, through the lines *f*, *g*, *h*, *i*, in Fig. 3. Although it is not absolutely necessary to draw these curves, yet it is advisable to do so, as they serve as a further check on the accuracy of the work. Points in these curves are easily found. We shall explain how to find two points only, as this will be sufficient for a guide in finding other points. Take, for instance, the line *f* in Fig. 3. It will be noticed that this line cuts frame 19 in the point *l* at a certain distance above the water line *c*; consequently on frame 19, in Fig. 1, we must lay off the same distance above the water line *c*; the point thus obtained will be a point in the curve *f*, Fig. 1. Again, notice that the vertical line *f*, in Fig. 3, cuts frame 18 in the point *m*, a short distance above the water line *b*; therefore, in Fig. 1 we must lay off on frame 18 the same distance above the same water line. The point thus obtained will be another point in the curve *f*.

To a trained eye these curves will indicate the form of the boat, and are useful for a comparison of the forms of other boats.

MATERIAL AND CONSTRUCTION.

The keel should be of white oak, 1¼ inches wide and 2 inches deep, and joined to stem and stern post, as shown on drawing. Stem should be formed from a natural crook of white oak, black locust or hackmatack—according to locality where boat is built. Stern post and after deadwood should be of white oak, 1¼ inches thick, and secured with galvanized iron nails, as shown. Transom to be of white oak, 1 inch in thickness.

With this part of the work completed, we are ready to prepare our stocks and commence to erect our boat. The stocks in this case are composed of a plank about 12 inches wide, 1½ to 2 inches in thickness, and at least as long as the boat. It should be placed on edge and firmly secured to floor of shed or building in which boat is to be built, and held in position with suitable brackets or braces. The keel, stern, stern post, after deadwood and transom, should now be assembled and fastened together, after which they should be set up on the stocks, nailing the keel thereto and securing the stem and stern post in a vertical position by suitable braces or stays.

The frames are each composed of three pieces—two ribs and a flooror bottom piece—all to be of white oak. The ribs will be ⅝ inch wide and ¾ inch thick, steamed and bent to proper shape, and extending from gunwale to keel, where they butt together. The floors, one to each pair of

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ribs, extend across the keel with arm on each side about 15 inches long, amidships, gradually shortening toward the ends. They should be ¾ inch wide, 1¼ inches deep in throat and tapering to ¾ inch in depth at end of arms, and will be fastened to each rib with two galvanized nails. The floors will box ¼ inch into keel, and each floor will be secured to keel with a small galvanized iron bolt. The floors amidships may be cut from straight-grained wood, but toward the ends, where the angles become more acute, they must be cut from knees or roots. The frames will be 10 inches apart between centers; in the fore-body the after edge of the ribs touching the frame stations, shown on drawing, and in the after-body the forward edges of ribs touching the frame stations. Limber holes about ⅛ inch deep should be cut in floors near the keel to allow water to flow to lowest point in boat. The ribs should be slightly longer than required, and should not be cut off until the boat is planked and ready for the gunwales. The upper ends of ribs composing each frame must be connected by a lath or batten and secured thereto at the proper width.

Planking should be of cedar, except top or sheer strake, which should be of white oak, all to extend in one length from bow to stern, and to have a uniform thickness of ½ inch. There should be eight strakes on each side, arranged in widths amidships, as shown on drawing. The best fastenings are copper rivets, clinched over burrs on the inside, but galvanized iron nails with countersunk heads may be used where cheapness is an object.

It is best to put the strakes on in pairs—one to each side—and the first pair to go on should be the sheer strakes, the garboards next, and the others may follow by alternating from sheer to garboards. The boards intended for the sheer strakes should be of sufficient width to allow for the curve of the sheer.

The frames may now be cut off at an angle of about 45°, so that the bevel end will be flush with top of sheer strake, and the gunwales will be notched so as to house the heads of frames. The gunwales will be of white oak, 1¼ inches deep and 1 inch wide, one on each side, on inside of sheer strake and flush at top of same, extending in one length from stem to stern, and fastened to sheer strake with galvanized nails driven from outside near each frame (no nails through frames), the ends will be secured with three white oak knees, one at stem and two at stern, as shown on drawing.

Thwarts or cross-seats may be made of cedar or white pine, 9 inches wide and ⅝ inch thick, located as shown on drawing, and 7 inches below top of gunwales. They will be supported at each end by a white oak strip or batten, 1½ inches wide and ⅓ inch thick, extending along each side of boat and fastened to each frame. This batten is technically known as a "rising." A knee will be worked between gunwale and ends of thwarts.

The ceiling is laid in strips, about 4 inches wide and ⅝ inch in thickness, with a 1-inch space between them.

At the points where the rabbet crosses the joint between stem and keel, the after deadwood and keel, and stern post and after deadwood, a ½-inch auger hole is bored through the joint and a plug driven in to prevent leaking. Calk seams with waste cotton and putty.

Other minor details are so clearly shown on drawing that they seem to require no further comment.

A sprit sail may be fitted and used for sailing with a free wind; the draught of boat is too light for effective windward work, and a center-board is not desirable on account of taking up too much room. A deeper keel would improve her sailing qualities, but would make her harder to row.

The sail should have about 9 feet 6 inches hoist on mast; the peak 6 feet higher on a vertical line; length on boom, 15 feet, with a rise of about 3 feet from the horizontal.

The mast should be 12 feet 6 inches long, 3 inches diameter at keel, and 1⅝ inches at head. Length of boom, 15 feet 9 inches; ends, 1⅜ inches; middle, 1⅞ inches; sprit, 12 feet 3 inches long, and 1⅛ inches in diameter at middle. Braided sash cord makes a very good sheet.

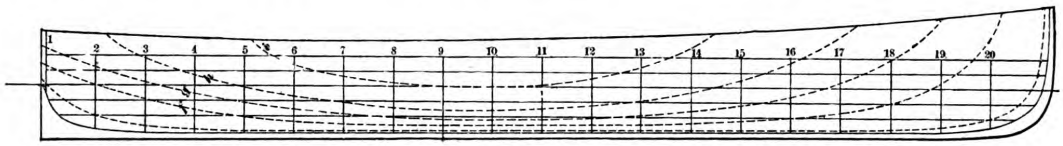

Fig. 1.—Sheer Plan.

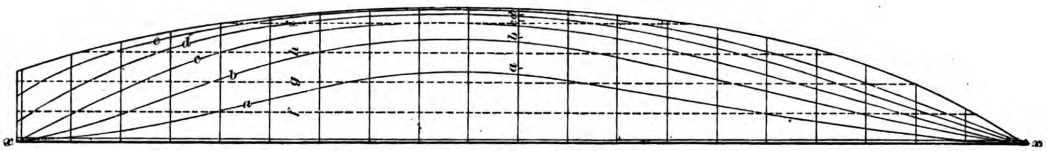

Fig. 2.—Half Breadth Plan.

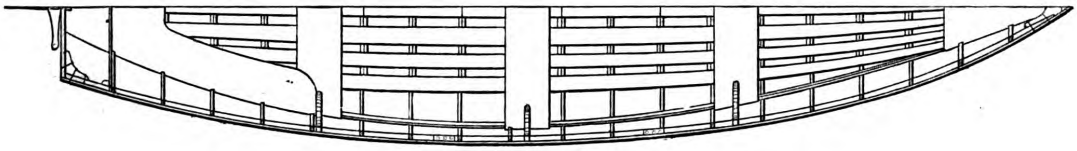

Fig. 4.—Interior View of Half the Boat.

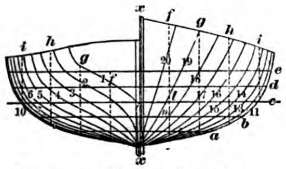

Fig. 3.—End View or Body Plan.

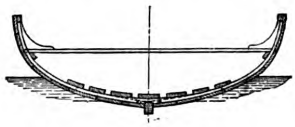

Fig. 6.—Cross Section at Frame 10.

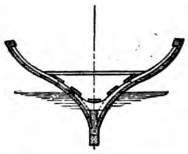

Fig. 7.—Cross Section at Frame 2.

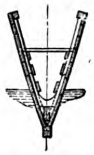

Fig. 8.—Cross Section at Frame 20.

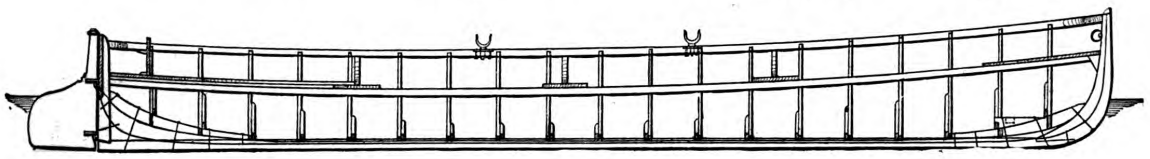

Fig. 5.—Longitudinal Section through Boat.

Building a Row Boat.—Scale, ⅜ Inch to the Foot.

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ARCHITECTURAL PERSPECTIVE.

By F. JERMAN.

APPLICATION OF CIRCLE IN PRACTICE.

IN FIG. 6 was explained how the circle is obtained in perspective. Fig. 7 shows the application of this rule as seen in the semicircular arches of a market-like building, with three arches on each side and two larger ones in the ends.

Its long side is 30° to the P. P., and it is 5 feet to the left of spectator, who stands 36 feet off. The vertical measuring line is A B, where the corner of the step touches the picture plane. The hights differs greatly from the foregoing method, as will be seen by comparing the drawings.

Fig 10 is a cube 4 feet square, nearest corner touching the ground line at 2 feet to the left of the spectator; sides at 45° with it, and with the station point 16 feet from object.

First draw the G. L. and the H. L. 5 feet above it. Put point of compass at the P. S. and measure 16 feet for line of direction. Describe arc of a circle, and where it touches the H. L. are the two V. P.'s.

inches into the picture plane. Its sides 60° and end 30° to the G. L.

Put station point 16 feet away, and draw lines at 30° and 60° to touch the H. L., which will form the V. P.'s. From these describe arcs to the S. P. and H. L. to form the M. P.'s.

Measure off 8 feet to left on the G. L., mark the point A, and vanish to V. P. 2; 2 feet 6 inches to the right of A at B, and vanish to V. P. 1, will give the bottom line of the end of the prism. Where these lines meet will be the nearest corner

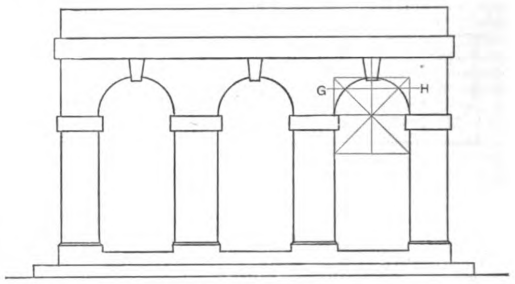

Fig. 8.—Side Elevation of Building Shown in Preceding Figure.

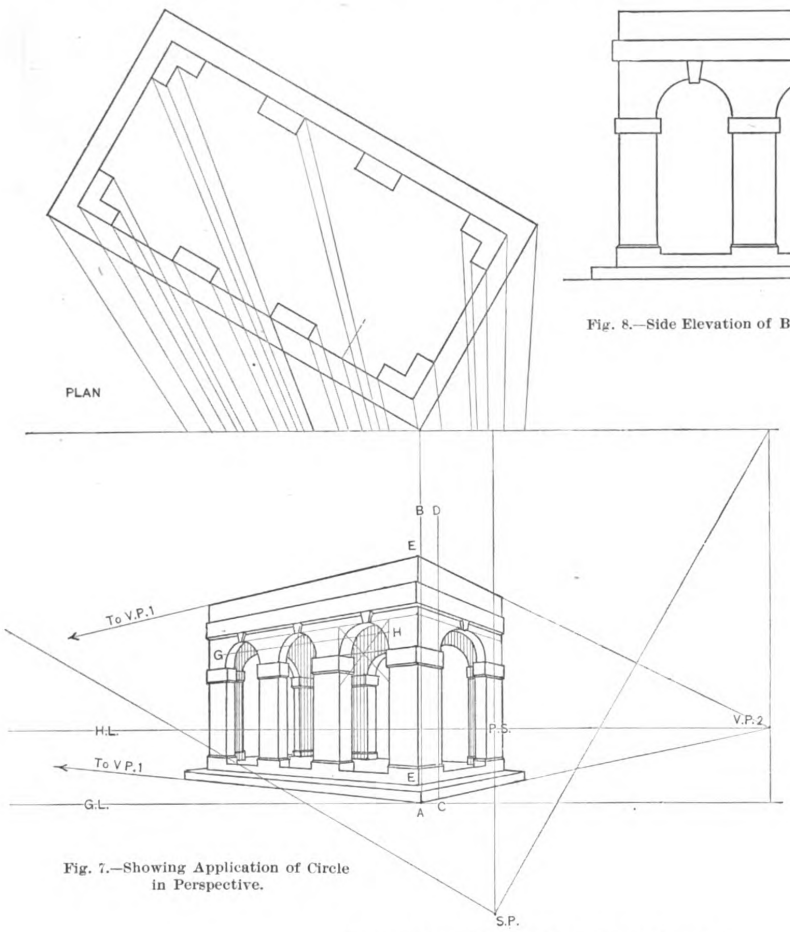

Fig. 7.—Showing Application of Circle in Perspective.

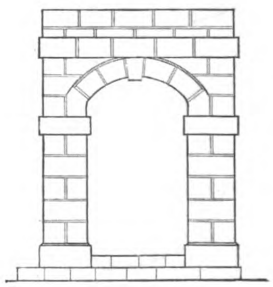

Fig. 9.—End Elevation.

Diagrams Illustrating Architectural Perspective.

are then transferred to C D, and the horizontal lines on the left vanished to V. P. 1. Those on the right are first measured on A B C D, and then E F, and vanished from thence to V. P. 2.

The semicircular arches shown in the side elevation, Fig. 8, are inclosed in squares with the diameters drawn across the springing lines and diagonals from the top courses of the square through the center. The line G H is put in, and all transferred to the perspective, as explained before. Reference to the drawing will make this clear to the reader. After he has put in all the main lines, with the sight of the interior walls as shown, the beginner could draw the joints of the stonework in the perspective, as shown in the end elevation, Fig. 9, or in any other manner to suit his taste.

SCHOOL OF ART PERSPECTIVE.

The next three diagrams, Figs. 10, 11 and 12, show the method of drawing perspectives as taught in schools of art, which

Instead of using a plan and drawing lines to S. P., as in the last example, two measuring points are used. They are obtained by describing arcs from the S. P. to the H. L., with centers at the V. P.'s; where they touch the H. L. will be the measuring points.

Measure off 2 feet on the ground line to the left, and draw two lines from thence to the V. P.'s, which will become the bottom lines of the cube. Measure 4 feet on the upright line, which touches the ground line, and vanish to the V. P.'s. Measure 4 feet on each side of it, and draw from thence to the V. P.'s furthest away. Where they touch the base line of cube erect perpendiculars to touch the top edges, and the figures will be complete.

The measuring points are only used for measuring by. No lines must ever vanish to them.

Fig. 11 shows a square prism 8 x 4 x 4 inches, 6 feet to the left and 2 feet 6

of the prism. Measure off 4 feet from B to C, to give width of end, by drawing to M. P. 2; 8 feet from B or the right at D, and draw line to M. P., will give the long side. At B erect the line of vertical hight, and measure off 4 feet and vanish to V. P. 1.

The remainder of the lines will be easily understood by referring to the drawing.

In Fig. 12 is represented the same building as shown in the first three figures put in perspective by this method. It is in almost the same position, but reversed, with the other end visible.

From what the reader has already learned by Figs. 10 and 11, he will have no difficulty in putting this in perspective without the aid of the drawing given, taking care that no lines are vanished to the M. P.'s, but only measured off by them.

He will soon find that the method first explained is the best for architectural drawing. It is almost impossible to draw

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an elaborate building in perspective by the method generally taught in schools, because of the confusion of the lines which must ensue, as the measuring and vanishing points are so near each other. The ground line soon becomes crowded, so that one point cannot be distinguished from another, and mistakes thus frequently occur.

Metallic Slag Cements.

The industry of manufacturing cement from slag, the use of which is becoming more and more general, was started from the desirability of utilizing the great quantity of residuary products that result from the refining of crude ore. As is well known, says *La Semaine des Constructeurs*, the metals in general, such as iron, for example, exist in the ore in more or less simple combinations (odides, carbonates, &c.), but also mixed in variable proportions with earth or stone, which constitutes what is technically known as gangue. By itself this is infusible at the temperature reached in the treatment of the ore; but in order to get rid of it, it is mixed with certain calcareous substances, when it easily fuses, and this result is the slag.

It is evident that all slags have not the same composition, since the stone and the minerals added to it are not always the same. They may be divided, in fact, into three groups, according to their composition, but in a general way, the only ones that can be successfully employed in the making of cement are the double silicates of lime and aluminum. In a recent paper read before the Society of Architects of Berlin, some details of the manufacture and employment of the cements were given by Dr. Pinkinburg.

It appears that Germany possesses a dozen factories where these cements are made, and that they produce about 600,000 barrels per annum; these barrels, weighing about 320 pounds, are sold at $1.25 at Berlin.

The two characteristic properties of the slag cement are, 1, its slowness of setting; 2, its small specific gravity.

The time required for setting is about 15 hours, but this slowness has the advantage of allowing the use of slag cement without all the precautions necessary with cement that sets very rapidly. It has, however, one drawback to its employment in countries where the winters are very cold—namely, it must not be frozen before it has set. Experiments made at the Government laboratories at Berlin gave unfavorable results in this respect. The samples exposed to a very low temperature during the setting showed (28 days after) a very inferior strength to those that had set where the temperature was normal.

The small specific gravity is an objection in cases where the cement is to be run in a liquid or semi-liquid state into molds, since, being lighter than sand, the various compounds of the cement separate more or less, according to their density, and the mass is no longer homogeneous when the setting takes place. Experiments at several pieces of work at Berlin leave no doubt in this respect.

Beyond the cases mentioned the slag cement has been extremely satisfactory in all cases where it has been properly used. In fineness of grain, strength, &c., these cements fulfill all the requirements demanded by the Government of Portland cement employed on the Government work, and they possess the excellent quality of never shrinking in volume. This slag cement has been successfully used in the construction of a sandstone bridge at Berlin; in this case the mortar was composed of fine sand and cement in equal parts.

The chemical reaction which takes place during the hardening is not the same in slag cement as in Portland cement. According to M. Tetmajer, the slag cement requires more than almost any other cement the presence of water during the first period of its hardening (hardening not to be confounded with setting.) Its hardening differs from that of the cements in which lime and the other constituents are chemically combined during their burning; in this case the action of the lime upon the silicate is effected by the intermediary of water. If, the cement having set, a quantity of water is not furnished sufficient to dissolve the lime, and form hydrosilicate of lime, or if the excess of water in the mortar has been absorbed, the process of hardening is stopped, and the maximum strength of the mortar is that which it acquired in a relatively short time. This is what happens when the mortar is allowed to dry without continuing to wet it down from time to time.

This explanation by the learned professor of Zurich shows the method that should be used in the employment of slag cement. The stone should be wet until saturated, so that the water required for the setting of the mortar will not be absorbed by them. During the setting the wall should be left alone, but as soon as this process has taken place the work should be regularly and abundantly wet down, so that the ulterior hardening is not stopped.

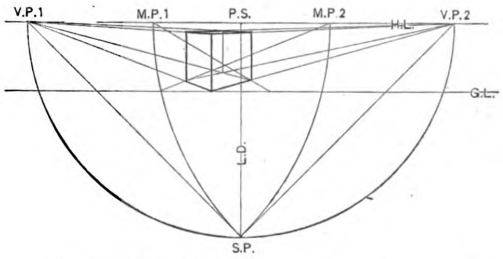

Fig. 10.—Cube in Perspective.

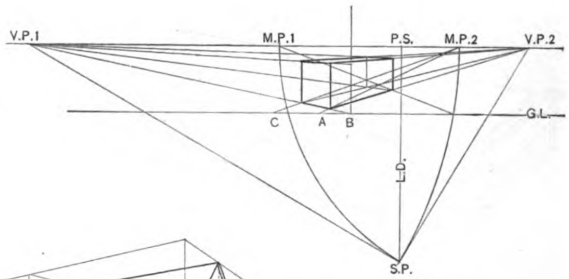

Fig. 11.—Square Prism.

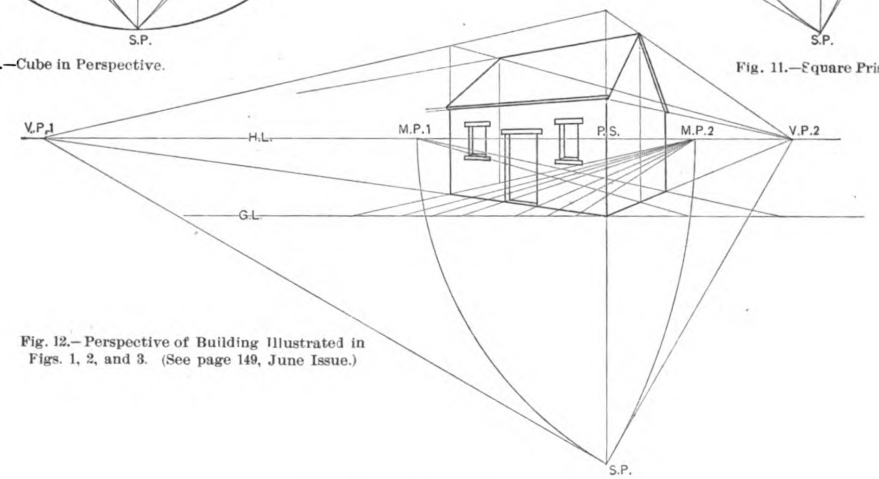

Fig. 12.—Perspective of Building Illustrated in Figs. 1, 2, and 3. (See page 149, June Issue.)

Diagrams Illustrating Architectural Perspective.

Strong Walls.

A writer in the *Clay Worker* says: "It is a well-established principle in all engineering that, however strong a building or superstructure may be, a single piece or pin of inferior strength in proportion to its size makes the entire structure correspondingly weak. How forcibly, then, are we reminded of this in the erection of brick structures, for no matter how good the material, or how well the brick—no matter how careful that everything be square and plumb, in the use of mortar, if not made and laid in accordance with an established rule to preclude the possibility of cracking, if a single course be laid in poor cement, a crack ensues. That entire wall must be weak in proportion, and, as is often the case, a corresponding crack follows the companion wall; these walls will be nearly as easy to collapse and much more easy to blow down than if laid one brick upon another, joints well broken, without a trowelful of mortar.

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SHARPENING A PLANE.

By JAMES FRANCIS.

A GREAT MANY men who use as common a tool as a plane cannot do a good job in keeping the tool in order. It is quite a knack to sharpen a plane in good shape, especially to set an edge on the plane iron with an oil stone. Figs. 1 and 2 show how to do it, and how not to do it. Supposing the plane iron has just been ground; it is placed upon the oil stone in the position shown in Fig. 1. The bevel of the tool is brought to bear flat upon top of the stone, then the back of the bevel is slightly raised, perhaps two or three one-hundredths of an inch, and shown in Fig. 6, which represents the type of plane iron known too commonly among careless workmen.

Fig. 7 shows a plane iron that has just been ground, the bevel being sharp and clean from *c* to *d*. When the tool is placed on an oil stone it should be held in the position shown in Fig. 1, and in larger view in Fig 8. In the latter cut *a* represents the plane iron and *b* the stone. It will be seen that there is very little difference between the heel of the plane iron *c* and the stone. As the tool is used and the sharpening must be repeated it is a picture of the slight bevel left after the tool is ground; it is less than the width of one of the lines used in the drawing. When looked at with the eye it appears to be a mere line extending along the edge of the tool. It is so narrow that one or two rubs on the oil stone will remove it entirely and give a keen edge to the tool.

The careless grinder is apt to grind a tool more than this, and raise what is called feather edge. This is somewhat imperfectly represented by Fig. 12, where what should be the cutting edge of the tool looks like a mess of iron filings stuck in a

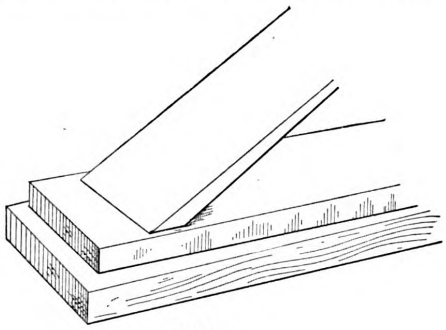

Fig. 1.

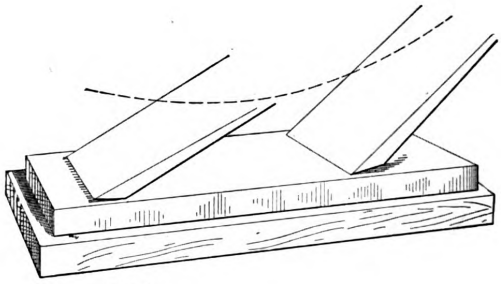

Fig. 3.

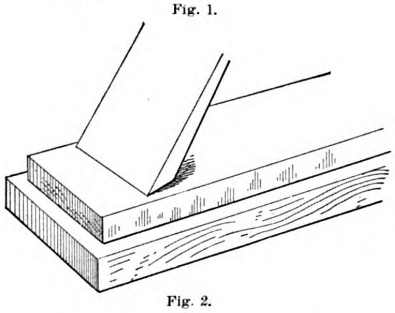

Fig. 2.

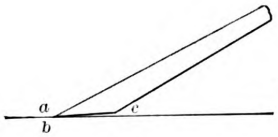

Fig. 8.

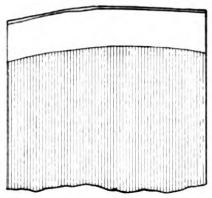

Fig. 11.

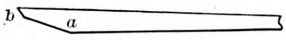

Fig. 4.

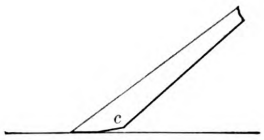

Fig. 9.

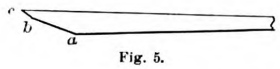

Fig. 5.



Fig. 6.

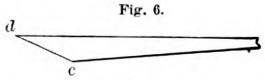

Fig. 7.

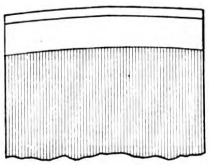

Fig. 10.

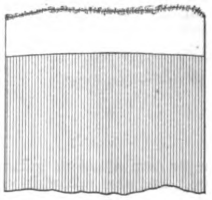

Fig. 12.

Sharpening A Plane.—By James Francis.

while in that position the plane iron is carefully moved along the stone from end to end. The required pressure is applied by the finger, care being taken not to give the plane iron too rocking a motion.

Some mechanics fall into the habit of moving the tool as shown in Fig. 3. This motion is fatal to good work, and makes the bevel of the tool as shown in Fig. 4. The bevel is supposed to commence at *a* and should run nearly flat to *b*. Instead of this it is rounded, and as a good mechanic would term it, "is as crooked as a dog's hind leg." Fig. 5 shows a tool that has been whetted many times upon an oil stone and is ready for grinding. The bevel proper extends from *a* to *c*. The effect of the oil stone is shown from *b* to *c*, where the secondary bevel has been formed. This is the correct way to whet a plane iron. It should not be done as necessary to raise the heel of the bevel more and more each time the whetting is repeated. After the tool has been sharpened a dozen times it will occupy a position on the stone shown in Fig. 9. Here it is seen the actual cutting bevel of the tool has become more stunt and the heel *e* is raised considerably further from the stone. When a tool gets whetted down as stunt as shown in Fig. 9, it should be taken to the grindstone and given a dose.

Fig. 10 gives a view of a plane iron that needs grinding. It will be seen that the oil stone has extended only one-third of the way up the grinding bevel. Trying to whet a tool like this on an oil stone is a mere waste of time and elbow grease. A tool should be ground until it looks like Fig. 11. It will be seen that there is the least possible bevel to be distinguished. In fact it is impossible to draw row on the cutting edge. It is to avoid such an occurrence that the slight bevel shown in Fig. 11 is left after grinding.

When the edge shown in Fig. 12 appears, either from carelessness—and that is the cause nine times out of ten—or otherwise, the edge of the tool should be drawn over one corner of a board. Usually the grindstone suffers from this business, and the writer has seen several frames which looked as if the rats had gnawed them. Fig. 13 shows how a feather edge is removed; indeed, it is about as well when such an edge appears to touch the tool square upon the face of the stone for an instant, as shown in Fig. 14, thus removing the edge entirely and leaving the end of the tool blunt, as shown in Fig. 15.

The bevel must now be carried up to the dotted lines *a b*, making it necessary to

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remove enough of the metal to have lasted many weeks with careful use. This shows how careless grinding will wear out a tool much more than ordinary use.

Sometimes the apprentice boy has had luck with a plane, running it on to a bench hook or a nail, and giving the tool the appearance shown in Fig. 16. This means a grind right off. If a tool in this condition is to be ground the metal must be removed to the letters *c d* of Fig. 17. In doing this nine times out of ten the man who grinds will place the tool on the stone in the usual way, and the first thing he knows one corner of the iron is ground off too much, as shown in Fig. 18 at *c*. The only remedy is to keep grinding, but it is much better before attempting to carry the bevel up to the line *c d* in Fig. 17 to square off the front end of the plane iron, as shown in Fig. 14. Grind boldly the whole edge of the tool up the line *g* of Fig. 19, which will remove all the nicks and broken places, and goes about up to the line *c x*, shown in Fig. 16.

With the tool in the condition shown by Fig. 20 it can be ground to an edge very quickly without the possibility of grinding off the corners, as shown in Fig. 18. A man who uses planes a great deal finds that he must grind them differently for different kinds of wood. For pine he will grind them about as shown in Fig. 21, leaving a long, thin bevel. If oak or walnut is to be cut the bevel is more like Fig. 22. The latter would not cut pine worth a cent. The one shown in Fig. 21 would cut hard wood all right as long as it remained sharp, but the edge would be gone by the time the first shaving had been made. For soft straight-grained wood the plane iron may lay very flat, as shown in Fig. 23; but for cross-grained and hard wood it should stand at a greater angle, as shown in Fig. 24, and also have a cap fastened to the upper side of the plane iron, as represented by *a* in this cut. The action of the cap is to break off the chip and prevent slivering up the wood that is being planed. For finishing curly maple and other very cross grained wood the iron should be very stunt, as shown in Fig. 25; while for planing the ends of wood for fitting the ends of clapboards, for example, the iron lays very flat and is turned upside down, as shown in Fig. 26.

These last few engravings will be a useful guide to the man who has planes to grind. He will in all cases adjust the angle of bevel so that it will just clear the work after the tool has been whetted several times. This is shown more particularly in Figs. 23 and 24. They also show that if he whets a plane too stunt or lets it get too round, the false bevel given by the oil stone will strike the work before the edge of the tool touches it, and the poor planer man will make more "cuss words" than shavings.

There is one thing that should not be done when whetting the plane iron, and that is rubbing the face of the iron over the stone as shown in Fig. 27. This is often done by mechanics and some good ones at that, but if a good mechanic will do it, he is sure to lay the iron perfectly flat upon the stone, not raising the back end a particle. By doing this he brightens up the edge close to the end and greatly assists in sharpening the tool. A plane iron, however, can be sharpened without it, but it is a great test of proficiency in setting an edge on a plane iron to be able to whet up a cap plane iron in the manner shown in Fig. 28, and to stop whetting when an edge has been brought up sharp, so that it will not be necessary to remove the cap and rub the feather edge off the plane iron.

This trick is done by a number of first-class mechanics of the writer's acquaintance, but there are not more than three in a hundred carpenters who can do it. It requires an accurate eye and a steady hand, and the man who can successfully perform the operation is a first-class mechanic.

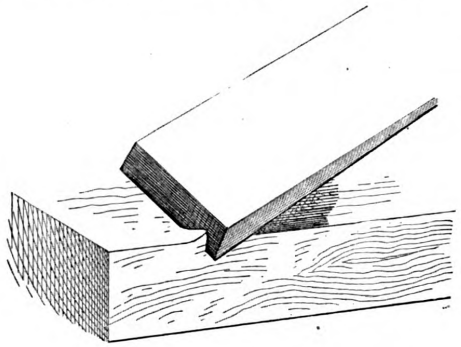
Fig. 13.



Fig. 17.

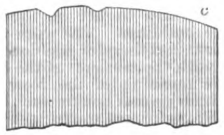

Fig. 18.

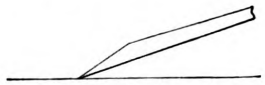
Fig. 26.

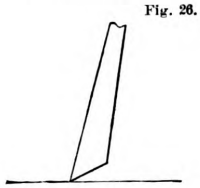
Fig. 25.

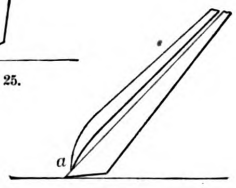

Fig. 24.

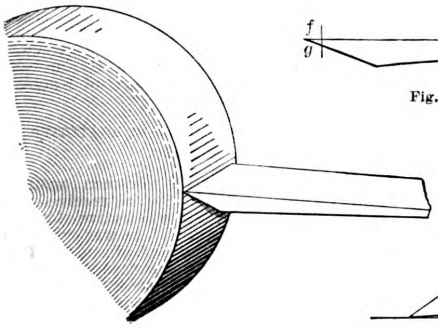
Fig. 14.



Fig. 19.

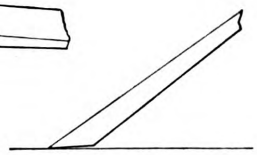
Fig. 23.

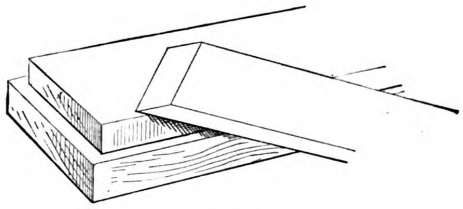
Fig. 27.

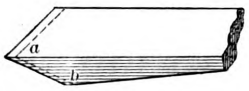

Fig. 15.

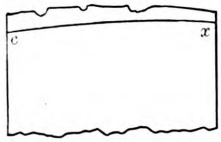

Fig. 16.


Fig. 20.


Fig. 21.


Fig. 22.

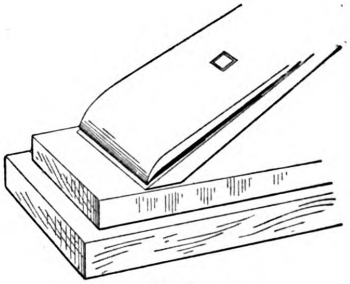
Fig. 28.

Sharpening a Plane.—By James Francis.

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LAW IN THE BUILDING TRADES.*

REFUSAL OF ARCHITECT TO ISSUE CERTIFICATE.

WHERE THE CONTRACT of a builder provides that he shall only be entitled to payment on account of the work thereunder upon the certificate of the architect that the work so far as completed has been done in accordance with the provisions of the contract, the right of the contractor to earn payments cannot be defeated by the mere arbitrary refusal of the architect to issue such certificates. The contractor may recover upon showing that he has so complied with the contract that the architect should have issued the certificates, as the certificates are only intended as an evidence of compliance.—Michaelis *vs.* Wolf, Supreme Court of Illinois, 26 N. E. Rep., 384.

LIABILITY FOR SAFETY OF PREMISES.

When the owner of premises which are under his control employs an independent contractor to do work upon them which from its nature is likely to render the premises dangerous to persons who may come upon them by invitation of the owner, the owner, by reason of the contract, is not relieved from the obligation of seeing that due care is used by the contractor to protect such persons. The owner cannot continue to hold out the invitation without being bound to exercise due care in keeping the premises reasonably safe for use according to the invitation. A landlord who contracts with a plumber to perform work requiring excavations about the premises is liable for injuries sustained by a visitor to one of the tenants from falling into an excavation negligently left unguarded by the contractor.—Curtis *vs.* Kiley, Supreme Judicial Court of Massachusetts, 26 N. E. Rep , 421.

LIABILITY OF SUB-CONTRACTOR FOR DEFECTIVE WORK.

The owners of a piece of land contracted with a builder to erect a building according to plans and specifications prepared by an architect, and to provide all the materials therefor. They sub-contracted with a mason for the mason work and materials. The builder sued them on their contract to recover damages for defective work and materials, including defects in the mason work. They gave the mason notice in writing of the pendency and object of the suit, and requested him to come in and help defend. He did not unite in the defense of this suit and plaintiffs defended alone. At the trial, by direction of the court, the jury, by their verdict, specified how much of the damages awarded was for the defects in the mason work and how much for other work. The builder entered his judgment for the gross amount of damages awarded him, ignoring the special findings of the jury apportioning the damages. The owners not having paid the builder's judgment, bring an action against the mason on his sub-contract, in which it is held by the court (1) that the verdict was competent evidence of the special finding of the jury of the amount of damages awarded against the owners for defects in the mason work; (2) that the plaintiffs might maintain this suit and have damages awarded to them for damages recovered of them for defects in the mason work in builder's suit, without paying the judgment he recovered against them; (3) that the defendant, having notice of that suit, was concluded by the record in that suit with respect to the fact that the mason work was done in compliance with the plans and specifications, and that, in consequence thereof, the damages as found by the jury accrued therefrom, and as to all matters of defense against the demands of the builder that might have been presented in that suit, but (4) that the mason might insist and prove that his contract with the owners did not, in that respect, embrace the liability the plaintiffs incurred under their contract with the builder, and that the defective workmanship or materials used in the mason work were occasioned by the owner's own acts.—Hoppaugh *vs.* McGrath, Supreme Court of New Jersey, 21 At. Rep., 106.

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LIEN ON LAND UNDER CONTRACT FOR SALE.

A husband contracted for the sale of his wife's land, it being provided that the purchaser should build certain houses on the land, and that the seller would advance money from time to time, and the title should not pass until the completion of the buildings. The contract was made in the husband's name but for the wife's benefit, and she shortly afterward took an assignment of it and advanced all the moneys and stipulated for the execution of mortgages to her on the completion of the buildings. The work and materials furnished therefor was done and furnished "with the consent of the owner," within the meaning of the New York statute, which gives a lien for such labor and materials performed and furnished with the consent of the owner, and provides that in cases in which the owner has made an agreement to sell, . . . such owner shall be deemed to be the owner within the intent and meaning of this act until the deed had been actually delivered and recorded. In such case the liens cannot be limited to such sums as the owner was bound to advance under the contract.—Schmalz *vs.* Mead, Court of Appeals of New York, 26 N. E. Rep., 251.

CONSTRUCTION OF PENALTY CLAUSE.

A building contract provided that, in case of non-completion by a certain time, the builder should pay a certain sum as liquidated damages. After default the parties entered into another contract, providing that, if the buildings were not completed by a certain day, the "sum of penalty" due under the former contract should be a stipulated amount "by way of liquidated damages." After a second default the parties entered into a third contract, which recited that the builder claimed that the "penalty" should not be exacted for a certain reason, and settled all questions between the parties, "except the one question of penalty." Under these circumstances the amount agreed to be paid in case of default was not a penalty but liquidated damages, from which the builder could not be relieved on the ground that performance was prevented by act of God.—Ward *vs.* Hudson River Building Company, Court of Appeals of New York, 26 N. E. Rep., 256.

DELAY OF BUILDING CONTRACT BY OWNER.

Where a building contract provides for a penalty to be enforced against the contractor for failure to complete the building within a specified time, before the owner can enforce the penalty he must establish the fault of the contractor, and where it appears that something was to be done by the owner which he failed to do, the delay resulting from his failure, he cannot assert the penalty, as he and not the contractor is in fault. Courts look with distrust on penalty clauses and will avoid them whenever possible.—Huckenstein *vs.* Kelly & Jones Company, Supreme Court of Pennsylvania, 21 At. Rep., 78.

ACTION ON MECHANIC'S INDEMNITY BOND IN NEW YORK.

The provision in the laws of New York for the discharge of a mechanic's lien upon the filing of a bond securing the payment of any judgment rendered against the property does not require that in an action on such a bond the owner of the premises should be made a party, but only that the claimant shall show that he is entitled to a lien which would have been enforced against the property but for the filing of the bond. The filing by a contractor of a bond for twice the amount of the claim in suit does not relieve the owner of the property from a lien, where the law requires that the bond against liens shall be of an amount to be fixed by the court, and the court shall approve the bond and discharge the lien before the owner shall be relieved.—Copley *vs.* Hay, Common Pleas of New York, 12 N. Y. Supp., 277.

SUBSTANTIAL COMPLIANCE WITH CONTRACT —ACQUIESCENCE OF OWNER IN BUILDING.

In a suit to foreclose a mechanic's lien for painting and graining a house under a contract with defendant, a finding that the contractor substantially performed the contract does not conflict with one that some small places were left unfinished which would cost about $5 to finish properly. Such findings are sufficient to support a judgment for plaintiff for the contract price, less $5. The California statute provides that the owner's interest in land shall be subject to mechanic's liens for the erection of a building thereon under the contract with the lessee, where the owner knows of the erection of such building and fails to give notice that he will not be responsible for it. The owner's interest may be sold on foreclosure of such mechanic's lien where he knew of the erection of the building, and, after its completion, made a payment to the contractor on account of his work.—Harlan *vs.* Stufflebeen, Supreme Court of Kansas, 25 Pac. Rep., 686.

INJURY OF WORKMAN BY DEFECTIVE STAGING.

Several actions by workmen against their employer for injuries received by them from the fall of a defective staging were tried together. There was evidence that one of the plaintiffs had said that the fall of the staging was caused by a stone let fall by him and another. This declaration was admissable against him alone, and an instruction that plaintiffs could not recover if the accident was so caused was properly refused. Where the staging itself was defective through defendant's negligence, the fact that the fall of the stone was a contributing cause of the accident will not defeat the workman's recovery.—Dronimie *vs.* Hogan, Supreme Judicial Court of Massachusetts, 26 N. E. Rep., 237.

NEW PUBLICATIONS.

BITS OF CANTERBURY CATHEDRAL. Drawn by Walter Tallent Owen. Size, 9¼ x 6 inches. Published by William T. Comstock, 1891. Price, $1.

To begin with, this book is gotten up very artistically, and among the points in its favor is the pleasing color on the outside of the covers and its neat, substantial binding. The publication consists of a series of sketches of different portions, large and small, of Canterbury Cathedral. There are a dozen full-page sketches, while accompanying each is a page telling what the succeeding sketch is, these title pages, if we may so call them, being embellished with vignettes showing some detail or other. The first plate shows Canterbury Cathedral itself, and among the other sketches are the towers, cloisters, baptistery, turret, Norman stairway and the Prior's gateway. There is no text beyond the names of the sketches, and the prints are on but one side of the leaves. The architect, or whoever interests himself in this noblest of arts, will be pleased with this book and gather not a little instruction from it.

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HEATING A SMALL CONSERVATORY.

WE PRESENT herewith two engravings illustrating a hot water heating apparatus recently designed and put in place by John A. Scollay of 76 Myrtle avenue, Brooklyn, N. Y. The purpose was to heat a bay window extension used as a conservatory and opening from the dining room of a Brooklyn residence. Fig. 1 of the accompanying cuts shows a plan view of the bay window and of the heating apparatus.

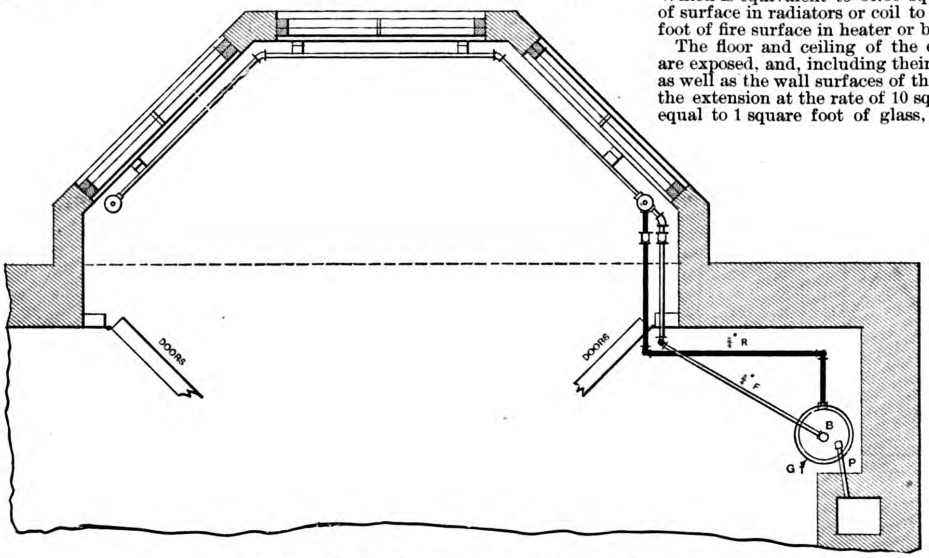

Fig. 1.—Plan View of Bay Window and of Heating Apparatus

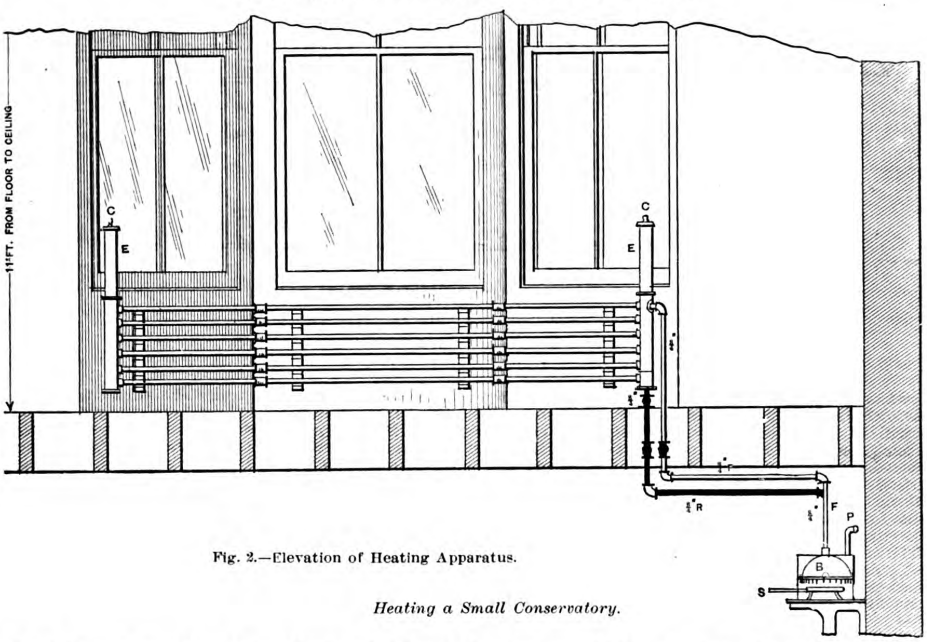

Fig. 2.—Elevation of Heating Apparatus.

Heating a Small Conservatory.

The fuel used is city gas, taken from one of the ⅜-inch illuminating pipes. The heating or radiating surface is composed of a 1-inch pipe coil, six rows high, with 45° elbows and manifolds at each end tapped with left threads. Each manifold receives a vertical pipe, E E, shown in Fig. 2, of the same diameter as the run and about 15 inches long, the upper ends of which have no threads, but are each finished with ornamental brass covers, C C, fitting loosely in ends of pipes. These serve as expansion tanks, and two are used in order to give uniformity to the appearance of the coil. Through these stand pipes or tanks the apparatus is filled with water and replenished when necessary. The flow and return pipes between the heater or boiler and coil are ¾ inch in diameter. The boiler is located in the kitchen beneath the dining room near the range flue, as shown in Fig. 2, about 10 feet of pipe being between it and the coil. The flow and return pipes pass from the coil through the floor of the extension outside of the main wall of building, where they are covered, and then pass through the wall into kitchen to boiler. The boiler, which is supported on a neat set of brackets, is made of copper with a semi-circular top and flat bottom on under side. It is 10½ inches in diameter by 4½ inches high, and is incased in a sheet-iron drum, from the top of which a pipe leads to the chimney. Beneath the boiler is placed an ordinary gas cooking burner. To assist combustion and to prevent "sweating," the flat under side of the boiler has 149 pins or extensions ⅛ inch in diameter by ½ inch long.

The particulars of this small heating apparatus may be thus summarized:

Radiating surface in coil.....	25 square feet.
Fire surface in boiler on under side:	
Plane surface....	83.77 sq. in.
Extended surface (pins)...	31.17 sq. in.
Total.....	114.94 sq. in. = 0.798 sq. ft.

Which is equivalent to 31.33 square feet of surface in radiators or coil to 1 square foot of fire surface in heater or boiler.

The floor and ceiling of the extension are exposed, and, including their surfaces as well as the wall surfaces of the sides of the extension at the rate of 10 square feet equal to 1 square foot of glass, the total exposure of glass is 96 square feet, which gives 3.84 square feet of glass to 1 square foot of surface in coil. The contents of the extension when the doors are closed is equal to 375 cubic feet, which, with 25 square feet of surface in coil, is equal to 15 cubic feet of space to 1 square foot of surface in coil. The whole apparatus contains about 20½ quarts of water. With a consumption, it is stated, of about 7 feet of gas per hour at starting, the water is raised to a temperature of 170°, and this temperature is maintained by burning about 4 feet of gas per hour

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CORRESPONDENCE.

Design for a Hen House.

From H. H. H., *Riverside, Me.*—In the December number of *Carpentry and Building* for 1890 "R. R.," Lachine, asks if some of the readers will give him a plan of an improved hen house. As yet I have seen but one contribution on the subject, and that was from "W. B.," Washington. I take the liberty, therefore, of presenting my idea of an improved house, as indicated by the sketches inclosed. "W. B.'s" house is 8 x 16 feet, and he says "is of sufficient capacity to accommadate from 75 to 125 hens." I think he cannot have had much, if any, experience in the hen business, because all poultry keepers know that hens will give the best returns when kept in small flocks, while if 125 are kept in a house of that size, there will be only a fraction over 1 squre foot of floor space per hen. If the smaller number are kept there will be not quite 1⅓ square feet, while each hen should have at least 4 square feet. The best results will be obtained if there are not more than 25 or 30 in one flock. Still I presume that in Maryland the fowls could run out of doors most of the tume, which would make quite a difference.

The good points about the house of which I send sketches are that there are rooms for five flocks of 25 to 35 hens each, all under one roof, resulting in a saving of time and steps in caring for them, as well as affording an opportunity for the use of a heating apparatus, which in our cold North climate, where the mercury goes down to 20° and sometimes lower many days during the winter, will be found to pay. Especially is this the case if eggs are produced during the cold season, when prices are high, as a little heat in the coldest weather will make the difference between a profit and a loss. Fig. 1 of the sketches represents a ground plan of the hen house, while Fig. 2 shows the plan of the floor timbers and also of the roof timbers. Fig. 3 is a cross section through the house on the line A B of Fig. 2. A convenient size for the house is 15 feet on a side, with the feed room measuring 4 feet on a side. The largest diameter of the house is 30 feet. Small-sized timber is used in the construction, the sills being 6 x 6; the flooring 2 x 6; the studding 2 x 4; the plates 2 x 4 doubled; center posts 5 x 5, girders framed into them, and taking upper ends of rafters 5 x 5, and rafters 2 x 5. The hip rafters are framed into the center posts. The partitions should be of boards 3 feet high and 2-inch mesh wire netting above. The perches should be placed next to the partitions between the pens, not over 3 feet from the floor, with a shelf to catch the droppings 12 or 15 inches below them. The nests, consisting of movable boxes, are hung on the partition on the opposite side of the pen. Referring to the sketches, A of Fig. 1 represents a brick furnace for heating, while B B represent floor spaces which may be utilized for boxes or barrels for grain, &c. The half of Fig. 2 at the left of the line A B represents the floor timbers, while the half at the right of the line indicates the roof timbers, the rafters running down over the main plate and forming the roof to the covered entrance.

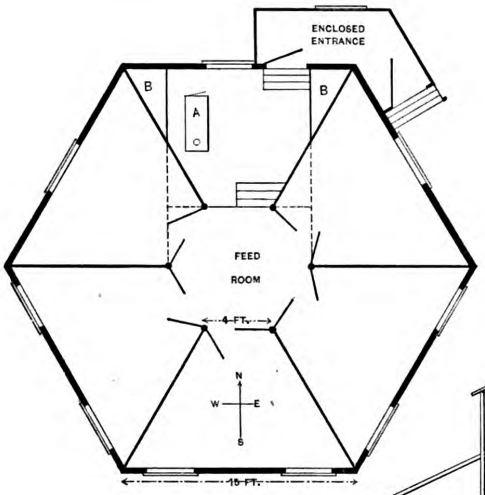

Fig. 1.—Plan View.

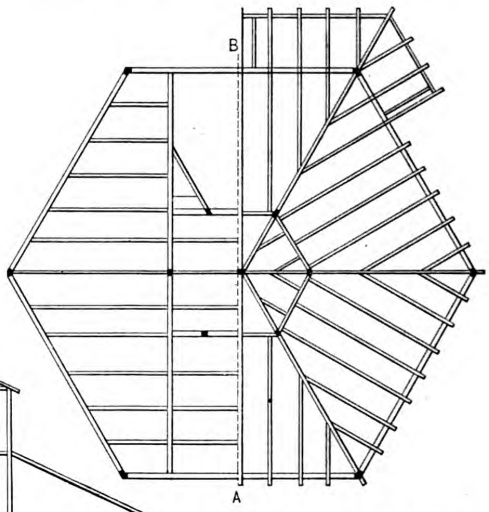

Fig. 2.—Floor and Roof Timbers.

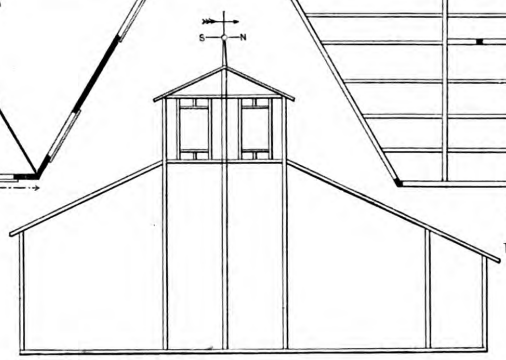

Fig. 3.—Cross Section at A B, Fig. 2.

Design for a Hen House.—Sketches Submitted by "H. H. H."

Development of a Raking Molding.

From L. V. V., *San Francisco, Cal.*—I would like to say a word to "J. H. P." in regard to rake moldings. The diagram published in the April issue of the paper for last year is all right, as I have tried it; but what does he think of this? Take a piece of the level mold and cut a miter on it. Now it may not be generally known that if a level molding be cut to a miter the extreme parts of the miter will instantly give the exact form of a rake molding up to one-half pitch. It will also intersect and miter correctly with a level molding. To do this lay the mitered mold on its flat side on the drawing. Take a marker and prick square down any number of points; connect the points and the result is a correct pattern by which to work the rake mold. Above half pitch the rake mold becomes narrower than the level. It is pretty hard on "J. H. P." to have a "cub" haul him over the coals, is it not?

Use of the Words "& Company."

From E. L., *Ruthven, Iowa.*—Will the Editor kindly inform me through the columns of *Carpentry and Building* if it is lawful, or the custom, to use "& Company" where there is no one in company with the person engaged in a business? For example, a business is carried on under the name of "Smith & Jones." The firm dissolves by mutual consent and the fact is duly advertised. The business, however, is afterward carried on by Smith & Co., although Smith had no partner.

Note.—It is possible that there may be a law in some of the States bearing upon this question, but if so, we do not at the moment recall it. As a general rule it may be stated that firms and individuals in matters of this kind do very much as they please. Custom seems to sanction almost any style of firm name, and instances are not uncommon where two persons have entered into a partnership and carried on business under a title, or style, in which the name of neither appears. For example, Brown & Smith may form a partnership under the name of "King & Company," there being no person in the firm by the name of King, that being simply the style which Brown & Smith have chosen to designate their firm. Commercial agencies and, in fact, all who have occasion to inquire into the standing and credit of firms, pay comparatively little attention to the name under which the business is transacted. They use the firm name about as they would the street

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number of the premises in which the firm conducts its business. It is merely something to designate the concern and nothing more. As a consequence, we find in commercial reports that "King & Company," for example, "is a firm composed of John Smith and James Brown, doing business under the style given above." Then follows such a statement of their assets and business condition as circumstances may warrant. Such instances, however, are not numerous, although they are to be found in every large city, and occasionally in the country. We know of a number of cases where an individual has conducted business in the way mentioned by our correspondent above, simple adding to his own name the words "& Company," although there was no one associated with him. In some cases this is pleasantly explained by saying, "It is an empty plate at the table for the guest who may arrive before the feast is over."

As stated at the outset, we are not aware of any law bearing upon the case cited by our correspondent, but the common law would certainly fall heavily upon any individual or firm who made use of a style or title similar to that being discussed at this time to deceive, or who pretended to have a partner when there was none solely for the sake of obtaining a credit to which otherwise the individual or firm would not be entitled, or for the purpose of defrauding the public. It is largely a question of the intention of the use to be made of the style of the firm that determines such points as our correspondent cites.

Splicing in Framing.

From H. B. M., *Lincolnia, Va.*—Will some one please tell me of a simple but effective method of splicing in ordinary framing without the use of iron bolts and clamps?

A Question in Planceers.

From YANK, *San Francisco, Cal.*—I should be very glad to have some of the readers show in the columns of *Carpentry and Building* how to obtain from the solid without saw kerfing or bending on a form the planceers for a conical roof. What is the same thing—how to get out a church seat circular in plan, with inclined back. Owing to the ignorance of a foreman having charge of such work I have seen a large number of seats spoiled.

Raising Large Barn Frames.

From O. H. SMITH, *Ellicottville, N. Y.*—I notice an inquiry in *Carpentry and Building*, page 117, from "J. M. B., Jr.," Burlington, Pa., for a device or apparatus for raising large barn frames. I have a device which I patented some time since that answers the purpose admirably. I have raised over 75 large barns with it. The work is done by means of chains and levers, and all the help required to raise the heaviest barn is enough men to handle the girts and braces. The main plates and the purlin bents and plates are raised with the same device. From three to six men with sufficient leverage can raise the heaviest barn bents, and there is no necessity for any one to be near the bent while it is being raised. A portion of the device holds the feet of the posts, while the men and implement furnishing the lifting power are from 30 to 50 feet distant from the bent which is being raised. I claim that the device is perfectly safe, that it requires no large army of men, no following poles, no shores and no pike poles. All the chains and other portions of the raiser are made of the best material and are sufficiently heavy and strong to answer the purpose. The leverage can be worked with horses or men, as may be most convenient. Referring to the illustrations which are presented herewith, Fig. 1 clearly represents the general method of raising barn bents. Fig. 2 represents the leverage beam, which is a stick of timber 4 feet long, 8 inches wide and 4 inches thick, provided at each end with tapering slots in the timber, *a a*, 2 x 4 inches at the inner ends and 4 x 4 inches at the outer ends. These are for the insertion of the levers marked *d d*. The timber is thoroughly ironed with plates, bolts and bands to keep it from tearing apart, and is provided with several holes, 1 or more inches in diameter, for the insertion of the clevis bolts. The center clevis is designed to connect with the anchor chain, marked *g* in Fig. 1, which is a $\frac{5}{8}$ cable chain 20 feet long. The opposite clevises are connected to the draw chains *c c*, which are 2 feet in length. The chains are made of $\frac{5}{8}$-inch Norway iron, and the hooks from a bar of iron 2 x $\frac{5}{8}$ inches. In Fig. 3 of the cuts is shown the post, which is a stick of timber 18 feet long and 8 inches square. This is of sufficient length for a barn with 24 to 30 feet posts. A crane post 14 feet is long enough for 20 feet posts. The crane post is banded at the top and has a gudgeon and cap, with a ring each side of the top of the post. One ring is to connect one end each of the four draw-brace chains, marked *e e e e*, Fig. 1 of the illustrations, which are $\frac{7}{8}$ cable chains. The two outside chains are each 30 feet long, while the two inside chains are each 23 feet in length. The other ring in the crane posts is to connect with the main chain *d*, which is 35 feet long and made of $\frac{5}{8}$-inch Norway iron. The links are 5 inches long to receive the draw hooks. The bottom of the crane post has a foot piece plated with heavy iron, so constructed as to allow the post to make a half revolution on the sill.

Fig. 4 of the engravings represents a grapple chain with three spike hooks. The middle portion is a ring with one or two links and a spiked hook. The other portions are chains $1\frac{1}{2}$ feet long with a spiked hook at the end. As many sets of these grapple chains are used as there are posts to hold in the barn bent. In case there is nothing better for an anchor, a strong pole or log may be placed on the ground, with six or eight frame stakes or fence posts driven forward of it and slanting backward from the leverage. Two or more stakes slanting forward may be driven for making the chains tight. In Fig. 5 of the cuts is represented the method of raising a barn plate into position. The engravings so clearly indicate the method of operation that further ex-

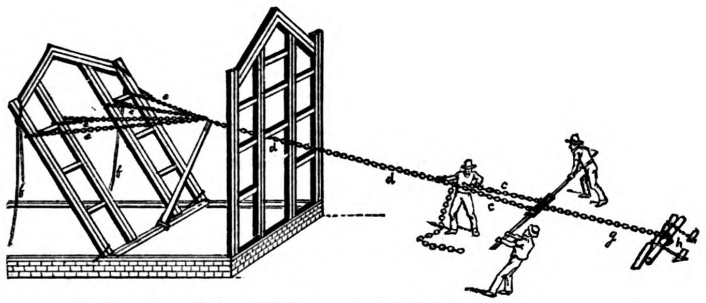

Fig. 1.—Method of Raising Barn Bents.



Fig. 4.—Grapple Chain.

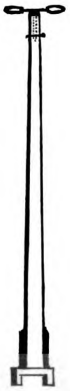

Fig. 3.—The Post.

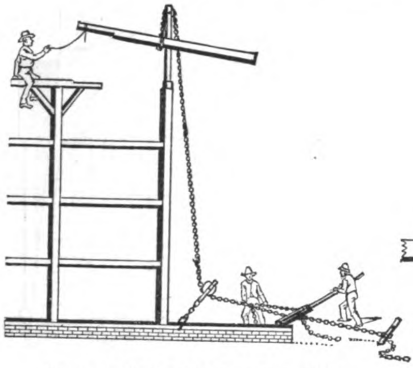

Fig. 5.—Method of Raising a Barn Plate.

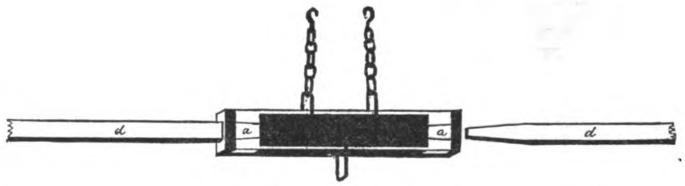

Fig. 2.—The Leverage Beam.

Raising Large Barn Frames.—Method Adopted by O. H. Smith.

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planation would seem to be unnecessary. One good draft horse and wagon is sufficient to transport the whole device to any point desired.

Designs for Barn Ventilator.

From H. J. C., *Volante, Pa.*—I recently saw an inquiry from a correspondent for a design of a barn ventilator and I will endeavor to reply. To this end I inclose sketches showing two designs for barn ventilators, which I trust may be of interest to the correspondent. Fig. 1 of the illustrations shows a ventilator for a barn, on which there should be three like the one shown. Fig. 3 of the sketches shows the manner of securing the ventilator to the roof. In Fig. 4 is shown another design of ventilator, the framing being indicated in Fig. 2. This ventilator is designed for medium-sized barns, and instead of slats or shutters, as employed in the case of the one shown in Fig. 1, sash are used. They are so arranged that they can be raised or lowered from the inside. Some prefer the sash made in one piece, so arranged as to open outward, but I prefer it to slide up and down. The framing is so clearly indicated that no further explanation would seem to be necessary.

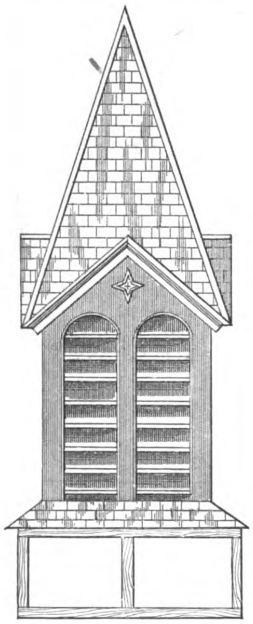

Fig. 1.—Ventilator for a Barn.

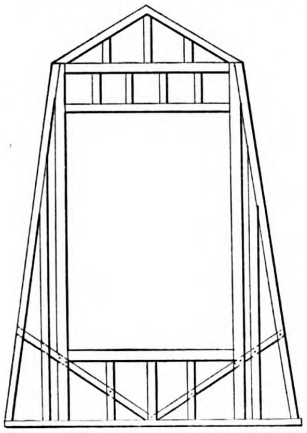

Fig. 2.—Framing of Ventilator, shown in Fig. 4.

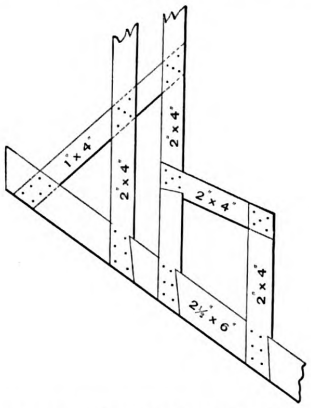

Fig. 3.—Showing Manner of Securing Ventilator to Roof.

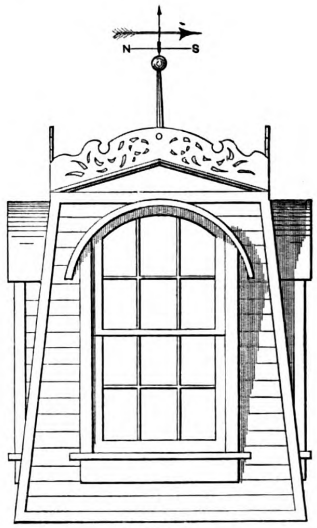

Fig. 4.—Another Design of Ventilator.

Designs For Barn Ventilator.—Sketches Submitted by "H. J. C."

From H. B. M., *Lincolnia, Va.*—In reply to "J. C. W.," Pine Hill, Pa., whose letter appeared in the April issue of *Carpentry and Building*, I would say that I built a cupola last season from plans taken from the issue of the paper for October, 1880. The cupola was for a barn 36 x 50 feet with 16-foot posts. It was made from a sketch contributed by "A. M." of Baltimore, Md., but I did not make it as large as described by the correspondent mentioned. I took the form for the windows or slot casings from another sketch contributed to the same issue of the paper by "H. C. L." of Fredonia, N. Y. The base of the ventilator which I built was 6 feet 6 inches square. Above the first cornice or window sills the size was 4 feet, 10 inches square. The high of the cupola from the foot of the base to the top was 11 feet. The roof was third pitch, with 10-inch projection. The frame was Virginia pine covered with cyprus boards and shingles. The cost of material in Alexandria, Va., was about $18. The details for the ventilator will be found in *Carpentry and Building*, as referred to above. I think that cupolas with four gables to the roof look very well, especially if of good proportions. The above cupola was used on a hip roof.

Hints on Boat Building.

From H. W., *Sacramento, Cal.*—I would be very glad if some of the readers of *Carpentry and Building* would give me a few suggestions on the subject of building row boats.

Note.—The subject of boat building is not by any means exhausted by the article of Henry J. Gielow, published in another part of this issue, and we trust our readers who are interested will contribute in answering the question raised by our correspondent above.

Estimating Roof Surfaces.

From L. V. V., *San Francisco, Cal.*—In the October issue of *Carpentry and Building* for 1890 "A. P.V." gives the roof plan of a house which he says he "framed last summer." I cannot make anything out of it and would very much like to see the balance of the rafters laid down.

Hanging Glass Doors.

From E. S. R., *Oshkosh, Wis.*—Answering "R. A. G.," Menlo, Iowa, in the June number of *Carpentry and Building*, I would state that it is the intention of manufacturers of sash doors and blinds that sash doors shall be hung with the putty showing inside. The correspondent will observe this by examining any of the cottage front doors now so extensively used.

Making Blue Prints.

From C. R. P., *Georgiana, Ala.*—Will some one kindly tell me how to make blue prints? I understand all but the printing and inking.

Answer—In making a blue print the first thing is to secure a supply of ferro prussiate paper, which may be obtained from any large dealer in photographic or artists' materials. If our correspondent is unable to conveniently obtain the paper he can make it with comparatively little trouble. Almost any white paper of good quality may be employed for the purpose. This paper may be prepared by subjecting it to a sensitizing solution, made by taking 1 ounce of citrate of iron and ammonia and 4 ounces of water and mixing it with 1 ounce of red prussiate of potassium and 4 ounces of water. The two solutions are mixed in equal quantities and to an amount sufficient to sensitize the paper required for immediate use. The solution may be applied to the paper with a sponge or flat brush, or, if convenient, the paper may be floated in the solution, the latter plan being generally considered the better way. After this has been done the paper should be dried in a weak light. The paper prints better when fresh, and it would be well, therefore, for our correspondent to prepare his paper only as required for use. In this connection we would recommend that the citrate of iron and ammonia be kept in a dark bottle from air and light. The paper should be stored in a dry place and be entirely shielded from daylight before being used and while putting it into the printing frame.

After the paper is ready for use and a print is desired the printing frame is placed upon the table and the backboard removed. A negative, with the film side up, is then placed upon it and a piece of ferro prussiate paper with its colored side toward the film put in. The back part is then placed in position in the printing frame and fastened by slipping the springs attached to it under the buttons screwed on to the frame. The printing frame is then exposed in a place where the sunlight will fall directly upon every

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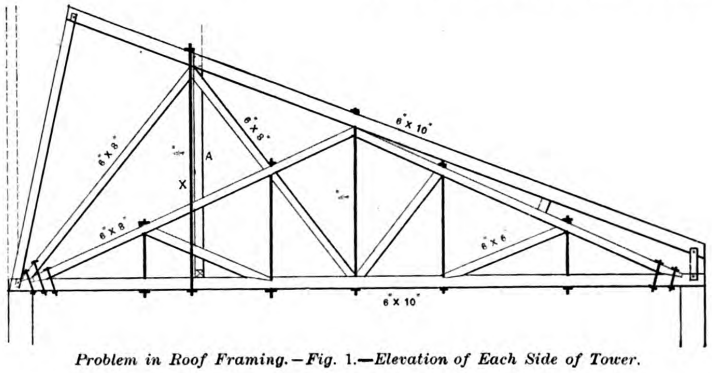
part of the front. It is thus placed in order to make the print equally intense in every portion and is left for from 15 to 30 minutes, or longer, according to the strength of light and the intensity of the negative. In order to ascertain if the exposure is sufficient the frame may be removed to a place where the light is weak or subdued, one-half of the back part opened and the paper bent back in order that the print upon its surface may be seen. If it is clear and distinct the paper may be taken out and placed in a pan of clear water, where it should be left until the whites of the print are clearly brought out. The paper being no longer sensitive may be dried wherever most convenient. The paper should soak from 15 to 30 minutes, when it may be taken out of the pan and washed a few seconds in water. After the print is dry it may be neatly trimmed and mounted upon cardboard if desired. If the printing frame containing the paper is not exposed long enough the picture will very likely have a pale blue instead of the indigo hue desired. If what should be white in the picture has a blue tint it indicates over printing, or that the picture was exposed to a bright light before the paper was washed.

The blue print can be conveniently written on by using a solution of common soda thickened with gum arabic. Adding the soda to red ink will give a fluid by means of which a brilliant red line may be made on the print. From these suggestions we think our correspondent will be able to make blue prints which will serve his purpose.

A "Horseshoe" Truss.

From G. R. H., *St. Paul, Minn.*—I have been looking over copies of *Carpentry and Building* which I have bound for the past four years with a view to finding barn plans, but I failed to discover any which suited me. I inclose a clipping from a paper describing a barn of Thomas Brown, of Scottsville, N. Y., which is of interest to me. It states that the barn is 100 feet long, 60 feet wide, with 28-foot posts, and a drive floor running the entire length, with bays on either side. The roof is supported by an ingenious system of bracing described as a "horseshoe" truss. This peculiar truss is said to be used in all the barns of Mr. Brown, and is so cheaply and conveniently constructed as to become a prominent feature in modern barn building, and expected to supplant in time purlin posts, plates and tie girts. It is stated that this form of construction is capable of carrying very heavy loads. I would like very much to have some of your readers tell me what the horseshoe truss is and how it is constructed.



Problem in Roof Framing.—Fig. 1.—Elevation of Each Side of Tower.

Note.—For the purpose of learning the form of construction referred to by our correspondent we addressed a letter to Mr. Brown and in reply received a sketch showing the form of roof truss employed, from which we have prepared the engraving shown in this connection. The figures show the size of material employed and the general manner in which the different parts are arranged. The arch is constructed of any wood that will bend, and which will hold nails, red elm being recommended as very satisfactory for the purpose. The arch or truss in the barn referred to by our correspondent was built of hemlock. The brackets employed are said to save shingles, while presenting a neat appearance. The cornice is finished as indicated in the engraving. We understand that this form of truss is covered by letters patent. We do not know why it should be called a "horseshoe" truss—unless the horses in the section of country named have different shaped hoofs from those in this part of the world. We use the name, however, as we find it, with all due apologies to the horses if a mistake has been made.

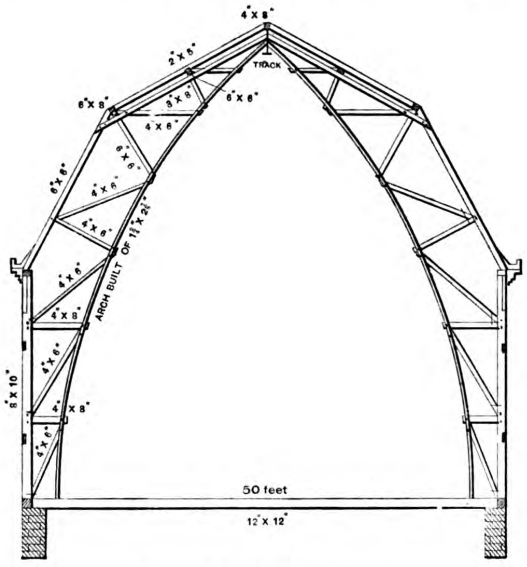


Diagram of a "Horseshoe" Truss.

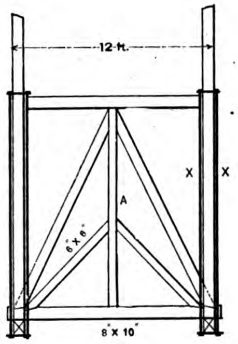


Fig. 3.—End View of Fig. 2.

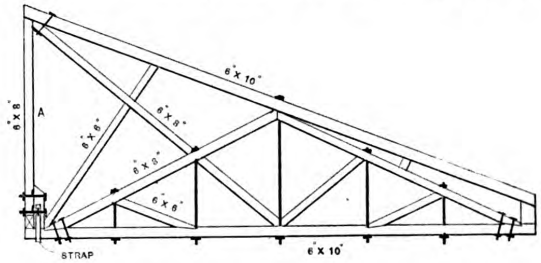


Fig. 2.—Rear of the Tower.

Problem in Roof Framing.

From A. S., *Columbus, Ohio.*—I send a number of diagrams in answer to the inquiry of "H. L. W.," Macon, Ga., published in the issue of *Carpentry and Building* for November, 1890. In his letter he submits a diagram of an irregular form of roof, and asks for suggestions as to the best method of constructing the roof. The diagrams which I send are self explanatory. In order to put on the roof the correspondent can either frame purlins in between or lay them on top of the truss, or he may lay the joists across the top from truss to truss and board up and down the roof. Fig. 1 of the sketches which I send is an elevation representing

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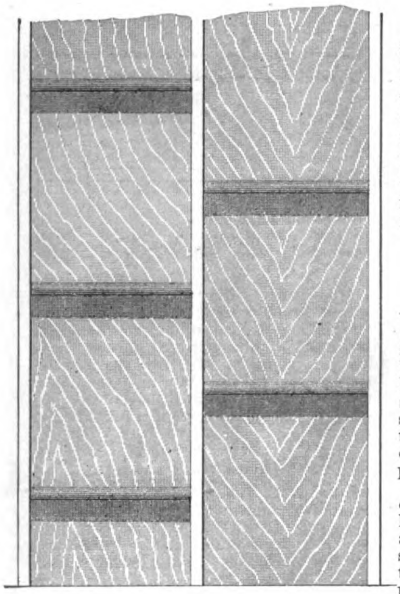
each side of the tower, while Fig. 2 represents the back of the tower. Fig. 3 of the sketches is an end view of the rear of the tower.

Making "Quick Stairs."

From W. J. S., *Parker, S. D.*—I have made some stairs which I think will interest many of the readers of *Carpentry and Building*, and I therefore submit



Making "Quick Stairs."—Fig. 1.—Front Elevation.

sketches of them for publication. They are what I call "quick stairs." There are many people who desire stairs which are easy to go up and which at the same time will occupy small space. With the stairs illustrated by means of my sketches one can go up in 55° and still have 7 inches rise and 10 inches tread. The stairs are made with a middle stringer, as will be seen from an inspection of Fig. 1 of the cuts. Fig. 2 of the engravings represents a side elevation of the stairs. A carpenter is often called upon to erect an outside cellar door on a porch and provide stairs to go up in 5 or 6 feet without danger of any one hitting his head on the sill.

Inside Sliding Barn Doors.

From H. B. M., *Lincolnia, Va.*—I would like some of the readers of *Carpentry and Building* to tell me through its columns the proper way to arrange large barn doors 14 x 14, or approximating that size. They are to be hung on rollers to slide back of the vertical siding or inside of the barn.

Length of Jack Rafters.

From L. V. V., *San Francisco, Cal.*—In the words of the correspondent signing himself "H. W.," "I am a reader of *Carpentry and Building* and find it very useful for young chaps like myself, as it shows me how little I know." It also shows me how little some other people know. In the August number of the paper for last year "J. H. P.," gives the size of building 28 x 32 feet and the rise of roof 8 feet and says it is a third pitch. Perhaps that is a third pitch in Iowa, but not in the "wild and woolly West." He also complains that there is no demonstration of "G. W.'s" plan in the April issue for 1891. I do not see as it requires demonstration. It is simple enough even for "young chaps" like "H. W.," and myself. He says, "I do not split hairs in framing," but if he cuts side bevels for jack rafters as shown in his plan and as he describes, he will have sufficient room in the joint for a Chinaman's queue. He also finds Mr. Hicks' common rafter too short by 1 inch. Come to "'Frisco" "J. H. P." and you will find another way to get the length of a rafter without adding the difference in the length of jack rafters.

Trouble with a Ceiling.

From T. B., *Headingly, Manitoba, Can.*—Some time ago I purchased a small house which now requires repairing. The part that bothers me most is the ceiling. This is of wood and is painted a dark slate color. I desire to have a white or light-colored ceiling and to do the work myself. I have tried painting it, but somehow it does not produce the desired results. I would therefore ask some of the practical readers of *Carpentry and Building* to suggest a plan for overcoming the difficulty.

Designs for Town Hall and Business Block.

From C. A. W., *Cleveland Ohio.*—I would like to have some of the readers of *Carpentry and Building* contribute plans and elevations of a two or three story brick building, arranged with stores on the lower floor and hall or theater on the second floor. I should also be pleased to see published designs for a town hall. I think drawings of this character would be of interest to a great many readers of the paper.

Note.—The suggestion of our correspondent is a good one, and we shall be glad to have those of our readers who have given attention to designs of this character send us tracings accompanied by descriptive particulars, to the end that we may publish them for the benefit of this as well as other correspondents.

Width of Siding.

From J. M. B., JR., *Burlington, Pa.*—In reply to "F. K.," Keiler, Wis., I would say that 6-inch siding in this part of the country is 6 inches wide and not 5½ inches, as seems to be case in his section. I believe that I did not claim it was better than narrow siding, but simply stated the fact that it was of the width named. I quite agree with "F. K." that 5-inch siding is better and consider 4 inches still better. Working in the country, however, one has to use materials which do not alway appeal to his judgment and of which he does not always approve. I am still of the opinion that the clapboard guage to which I referred could have been used on wider siding without imparing its usefulness on narrow siding and with no more expense.

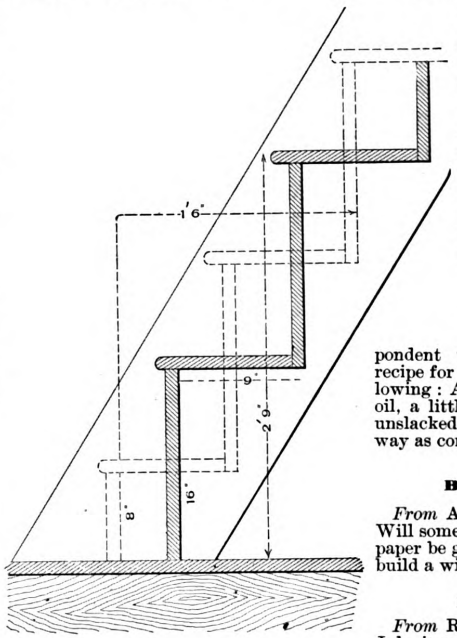
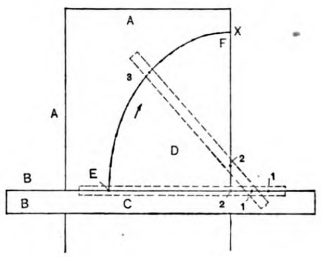


Fig. 2.—Side Elevation of Stairs.

Laying Out an Ellipse.

From H. B., *Colorado Springs, Col.*—I notice in the January number of *Carpentry and Building* an inquiry from "A. C. H.," Farley, Iowa, as to the manner of laying out an elliptic. As my method is very simple I will give it for the benefit of this correspondent and others who may be interested. If any one has a better method than mine, I should very much like to learn of it through the columns of the paper. Referring to the sketch which I send, the portion inclosed by A A represents the board from which to cut the circle. The straightedge held square with the edge of the board A is represented by B B. The dotted lines C represent the trammel rod on its way in inscribing the required circle. The figures 1 and 2 represent small wire nails driven through the rod, and 3 is the trammel point or pencil. From 2 to 3 is half the short diameter of the required elliptic, and from 1 to 3 is half the long diameter. Start the pencil 3 in the direction of the dotted line from E toward F, being sure to keep the point 1 close against the edge of the straightedge and the point 2 against the edge of the board A. Continue the point 3 toward F, and the result will be one-quarter of the elliptic. By reversing the straight edge the balance of the circle may be drawn.



Method of Laying out an Ellipse, Suggested by "H. B."

Water-Proof Glue.

From H. G. C., *Volante, Pa.*—In reply to the correspondent who recently inquired for a recipe for water-proof glue I send the following: Add to cattle glue some flaxseed oil, a little sugar and a small quantity of unslacked lime. Prepare in the same way as common glue.

Building a Windmill.

From APPRENTICE, *Sacramento, Cal.*—Will some one of the many readers of the paper be good enough to tell me how to build a windmill?

Dividing the Circle.

From R. D. C., *Delavan, Ill.*—In the July issue "E. H. G." of Sierre Madre, Cal., asks how to divide a circle into any number of equal parts, and, in reply, I offer the following rule: Divide 360 by the number representing the parts into which the circle is to be divided. By the use of a protractor or scale of chords, draw an angle, the degrees of which are equal in number to those in the quotient

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and the sides of which are equal to the radius of the circle that is to be divided. Take the distance on a compass between the extremities of the sides of the angle and lay off this distance on the circumference of the circle that is to be divided. The points made will be the points of division.

Correcting Bad Acoustics.

From W. O'B., *Latrobe, Pa.*—With regard to the inquiry of "T. F." of Mandota, about the difficulty which has been experienced in connection with the acoustic properties of a church, I would say that if he will put a sheet iron or steel ceiling in the church he will have no further trouble with the sound of which he speaks. It will cost from $18 to $25 per square, but I never knew it to fail.

Laying Out an Octagon Bay Window.

From D. R. B., *Lowville, Pa.*—In reply to the correspondent who asked for a method of laying out an octagon bay window, I would say, multiply the square of the window by five and divide the product by 12. For example, suppose the window is 8 feet. This multiplied by five and divided by 12 would give 3 feet 4 inches for the length of each side.

Rule for Making Kerfs.

From A. B. McD., *Harrison, Tenn.*—Will some of the many correspondents of *Carpentry and Building* kindly inform me of the best rule for making kerfs in bending a stoop or other finish to fit in a circle?

A Curious Rule.

From FRED. T. HODGSON, *Collingwood, Ont.*—The sketch which was submitted by "Rule" in the May issue of *Carpentry and Building* does not represent a rule as the term is generally understood. The article there represented is called a sector, and is used by draftsmen, engineers and surveyors in laying out work and plotting. It is seldom used now by architectural draftsmen, though it is one of the most useful instruments at their command, and nearly all English draftsmen are supposed to thoroughly understand its qualities. In a description of the sector given in "A Treatise on a Box of Instruments," by Thomas Kentish, the author says: "A sector is a foot long, divided into equal portions, movable upon a brass joint or axis, from the center of which various lines radiate through the whole length of the instrument. The legs represent the radii of a circle and the middle of the joint expresses the center. The lines upon the sector are of two sorts—single and double; the single lines run along the margin and the edges; the double lines radiate from the center to the extremities of the legs and are marked twice upon the same face of the instrument in order that distances may be taken from them crosswise when they are open to an angular position."

It would occupy too much space to describe the uses of the sector, but if the correspondent who signs himself "Rule" wishes to pursue the subject, I will take pleasure in giving him the title of a number of works on the subject if he will send me his address in full.

From F. C. P., *Petoskey, Mich.*—In the May number of *Carpentry and Building* "Rule" of Red Wing, Minn., presents a sketch of an article, the name and use of which he wishes to have explained. The instrument is a sector and its use will be readily understood by the following examples selected from Pike's catalogue:

The scales or lines graduated upon the faces of the instrument and which are used as sectoral lines are, 1, two scales of equal parts, called the line of lines, and marked L; 2, two scales of chords marked C; 3, two scales of secants marked S; 4, a line of polygons marked POL; upon the other face, 5, are two lines of sines marked S; 6, two lines of tangents marked T; and, 7, another line of tangents extending from 45° to 75°, the first only extending to 50.

In the Line of Equal Parts.—Having three numbers given, to find a fourth proportionally: To do this take in the compasses the lateral extent of 16 divisions on the line of lines and apply it by the proper opening of the sector from 7 to 7 in the compasses, with the same opening of the sector, and apply 1 foot of the compasses to the commencement of these lines and the other will fall on 28, the number required, for as 4 is to 7 so is 16 to 28.

In the Line of Chords.—Suppose it is required to lay off an angle equal to 25° with any convenient opening of the sector. Take the extent in the lines marked C from 60 to 60 and with it describe an arc indefinitely; then with the same opening of the sector take the parallel distance from 25 to 25 and set it in the arc described. Lines drawn from these points in the arc to its center will give the angle required.

Polygons.—If we open the sector to any convenient distance and take with the compasses the distance 6 and 6 on these lines and describe a circle, the whole circumference will be divided by it into six parts. Then, if you take the distance 4 and 4 on the same lines, it will be divided into four parts, and we have a square inscribed in the circle. If 7 and 7 are taken, we have a heptagon, or a seven-sided figure, and so on with all the divisions of these scales.

A large number of problems of much interest may be solved by these and the other lines of the sector.

From "O. LY," *Dallas, Texas.*—In reply to "Rule," whose letter appears in the May number of *Carpentry and Building*, I will say I never saw the instrument to which he refers and therefore cannot give the name of it. I will, however, venture the following remarks for his consideration: The marks on the outer edge of the instrument are inches and $\frac{1}{10}$ inches. The scale on the inner edge marked POL is for polygons; as, for example, if an octagon is wanted, first describe a circle with the radius to 6 on the scale, measuring from the hinge or inner end of the scale. Use this because one side of a hexagon is equal to the radius of a circumscribed circle. Then take in the compasses the distance from the end to the figure 8 on the scale and it will divide the circle into eight equal parts. Connecting these gives an octagon.

The scale marked C is a scale of chords employed to set out and measure angles. Suppose, for example, it is desired to set out an angle of 45°. With the compasses take 60 divisions of the scale representing 60°, the distance always equaling the radius, and in this case is the full length of the scale. Describe an arc indefinitely. With 45 divisions in the compasses step it off on the arc connecting these points with the center and the desired angle is obtained. The scale marked L is a scale of equal parts for lines. Its uses are varied. Suppose, for example, it is desired to divide a line which is $2\frac{1}{2}$ inches long into 40 equal parts. As both legs of the rule are graduated alike, open the rule until the $2\frac{1}{2}$ inch will reach from 40 to 40 scale on each side of the rule. Then the first divisions will represent $\frac{1}{40}$, the second $\frac{2}{40}$, the third $\frac{3}{40}$, and so on. The scale marked S represents secants. To describe a circle with a diameter equal to 60 of the scale, we first erect from one extremity of the diameter a perpendicular which represents a tangent. Then, if an angle say 70 degrees is required, take 70 divisions of the scale in the compasses and from the center of the circle describe an arc cutting the tangent. Connect this point and the center of the circle and the desired angle is formed; also the tangent.

From E. P., *Hanover, Mich.*—The instrument concerning which "Rule" of Red Wing, Minn., inquired in the May issue is known as a sector. It is not much used at the present day by carpenters, it being intended more particularly for engineers and draftsmen. I will not attempt any description of its lines and uses, but would refer the correspondent signing himself "Rule" to "Gould's Carpenter's Assistant" for a full description.

Setting Corner Blocks.

From G. D. I., *West Philadelphia, Pa.*—In reply to the inquiry of "I. H. S., Huntsville, Ala., for a method of setting corner blocks, I would say that it is always the custom to place the block in such a way as to hide the end of the grain as much as possible. It is well to bear in mind that there is a joint either way, and if the finish on the walls is damp the blocks will materially shrink. I think the proper way to set corner blocks is to have the grain run the same way as that of the jamb and brail on to the head casing. I think this will not make a bad joint. The nails should be driven in the outside edge and not through the face.

Miter for an Octagon Joint.

From F. C. P., *Petoskey, Mich.*—In the May number of *Carpentry and Building* "A. B. McD.," Harrison, Tenn., desires to know what points on the steel square will give the miter for an octagon joint. In reply I would say to the correspondent, take 5 inches on the tongue of the square and $12\frac{1}{16}$ inches on the blade. The tongue gives the cut. I obtain it in the following manner: The angle of an octagon is 135°. The miter to make a joint would have to be one-half of that, or $67\frac{1}{2}$°. The natural tangent of $67\frac{1}{2}$°, according to the table, is 2.1412; hence taking the figures 1 and 2.1412 on the square gives the cut. This, reduced to more convenient form, equals 5 and $12\frac{1}{16}$.

From W. M. F., *Hendersonville, N. C.*—In reply to the correspondent signing himself "A. B. McD.," Harrison, Tenn., I would say, take 7 inches on the tongue of the square and 17 inches on the blade. Mark by the tongue for an octagonal cut.

From E. P., *Hanover, Mich.*—In reply to "A. B. McD.," Harrison, Tenn., who inquires in the May issue of the paper, I would say take 18 inches on the blade and $7\frac{1}{2}$ inches on the tongue, which will give the octagon bevel desired.

From L. A., *Cornwall, Ont.*—I notice in *Carpentry and Building* for May of the present year that "A. B. McD.," Harrison, Tenn., asks what points on the steel square will give the cuts for an octagon joint. I suggest that he try figures 7 and 17. I think these will give it every time.

From A. T., *New York.*—In the May number of the paper "A. B. McD." of Tennessee asks what are the figures of the octagon on the steel square. In reply I would say they are 7 and 17.

Hanging Transoms.

From J. A. C., *Gallatin, Mo.*—I have been a reader of your journal for the past four years, and I would like to ask some of my brother Chips to tell me through its columns how to hang transoms. When transoms are used over inside doors, should the putty side or the molded ogee side be put in the hall when the transom is hung? There has been quite a difference of opinion here touching this point, and no doubt a discussion of the subject will prove interesting to many of the readers.

Quartered and Comb-Grained Lumber.

From J. H. S., *Wilkes-Barre, Pa.*—I would like to ask some of the practical readers of *Carpentry and Building* to show by means of illustrations how quartered and comb-grained lumber is manufactured.

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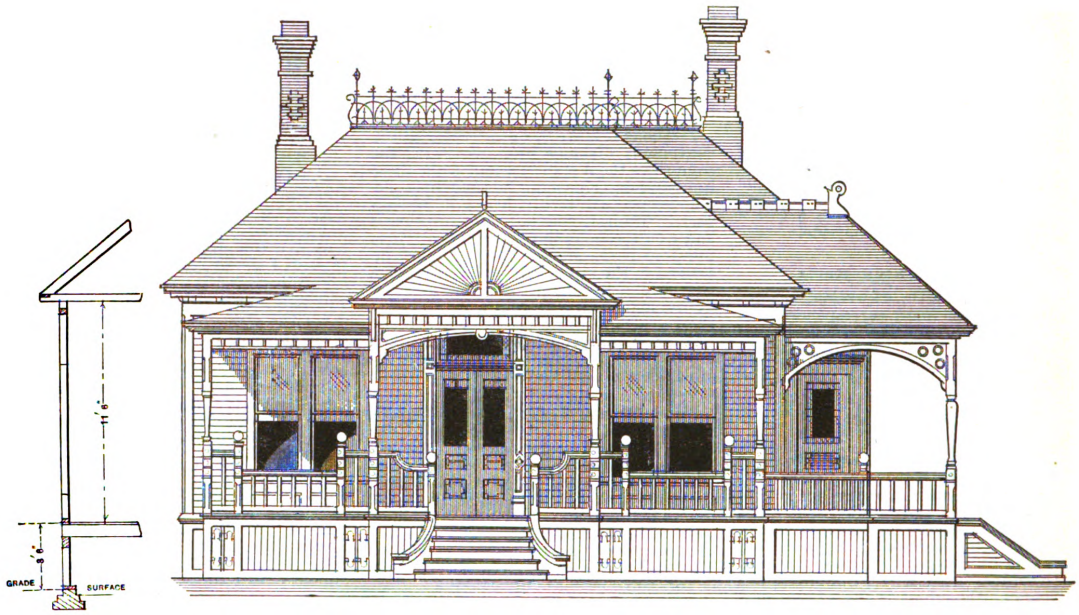
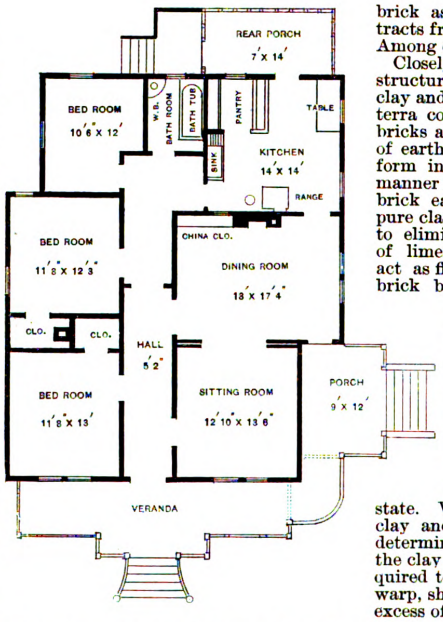
COTTAGE IN SOUTHERN CALIFORNIA.

WE PRESENT upon this and the following pages the floor plans and elevations of a house erected in Santa Anna, Southern California, for Thomas McKeever from designs furnished by C. B. Bradshaw, architect, of Orange, Cal. The dwelling is pleasantly located on a corner lot, facing the west and south, and is raised well up from the ground, care being taken in the arrangement of the rooms and hall so that they will receive the benefit of the mild southwest trade winds, which blow across from the ocean 10 miles distant. The house is typical of the moderate cost dwellings in that section of the country, there being sitting room, dining room, kitchen and three sleeping rooms, together with a bathroom, upon the ground floor. Entrance to the main hall, which extends nearly the length of the house, is made from a broad veranda, the latter being an ever-present feature of dwellings in that locality. The arrangement of rooms is such that any one may be reached from the hall without the necessity of passing through another. The bathroom is located in the rear at the end of the main hall and between the kitchen and a sleeping room. The sitting and dining rooms are connected by means of sliding doors, although *portieres* may be employed if preferred. In the dining room is an open grate, also a china closet fitted with glass doors. A feature of the house is the rear porch, which is made of light frame and measures 7 x 14 feet in size. It is inclosed with screen wire, which allows the free circulation of air and at the same time serves as a screen to those within. This room is universally used when the climate is mild, as a great deal of the work usually done in the kitchen is performed in the screen porch. It is also used as a place for the more bulky kitchen utensils.

The building shown is a frame construction resting upon a foundation consisting of four courses of hard brick, a style of underpinning commonly employed in that section of the country for frame structures, as cellars are rarely built. The outside of the frame foundation is covered with matched and beaded stuff placed vertically and paneled. In the foundation of the front and side porch are small latticed panels for the purpose of ventilation. The outside walls from the water table to the cornice are covered with 10-inch rustic, placed horizontally. The roof is shingled, while the deck is tinned and finished with iron cresting. The inside trim is of redwood with hard oil finish. The cost of the house complete is said to have been $2000.



Cottage in Southern California.—C. B. Bradshaw, Architect, Orange, Cal.—Front Elevation.—Scale, ⅛ Inch to the Foot.



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

Brick as a Building Material.

At a late meeting of the Toronto Architectural Sketch Club N. B. Gordon read a paper on the subject of the use of brick as a building material, some extracts from which may prove of interest. Among other things he said :

Closely allied with stone in most of our structures are the artificial products of clay and sand in the shape of bricks and terra cott ι. In order to secure the best bricks attention must be paid to the kind of earth, the method of working it, the form into which it is molded, and the manner in which it is burned. The best brick earth is composed of a mixture of pure clay and sand. Care should be taken to eliminate all pebbles, especially those of limestone formation. These pebbles act as fluxes in burning, and weaken the brick by leaving cavities or causing cracks. If limestone, the burning reduces them to lime and the action of water will afterward destroy the brick. If, however, small grains of pyrites or other metallic substances be present in small quantities and equally distributed throughout the earth, they assist the vitrification of the brick and are an advantage. Good brick earth is frequently found in a natural state. When it is necessary to mix the clay and sand, experiment alone will determine their relative proportion. If the clay is in excess the temperature required to semi-vitrify it will cause it to warp, shrink and crack. If there be an excess of sand too strong vitrification may ensue.

The quality of a brick depends quite as much on the skill used in its manufacture as on the quality of the earth. After the particles are fully disintegrated, and they have been sifted so as to remove pebbles,

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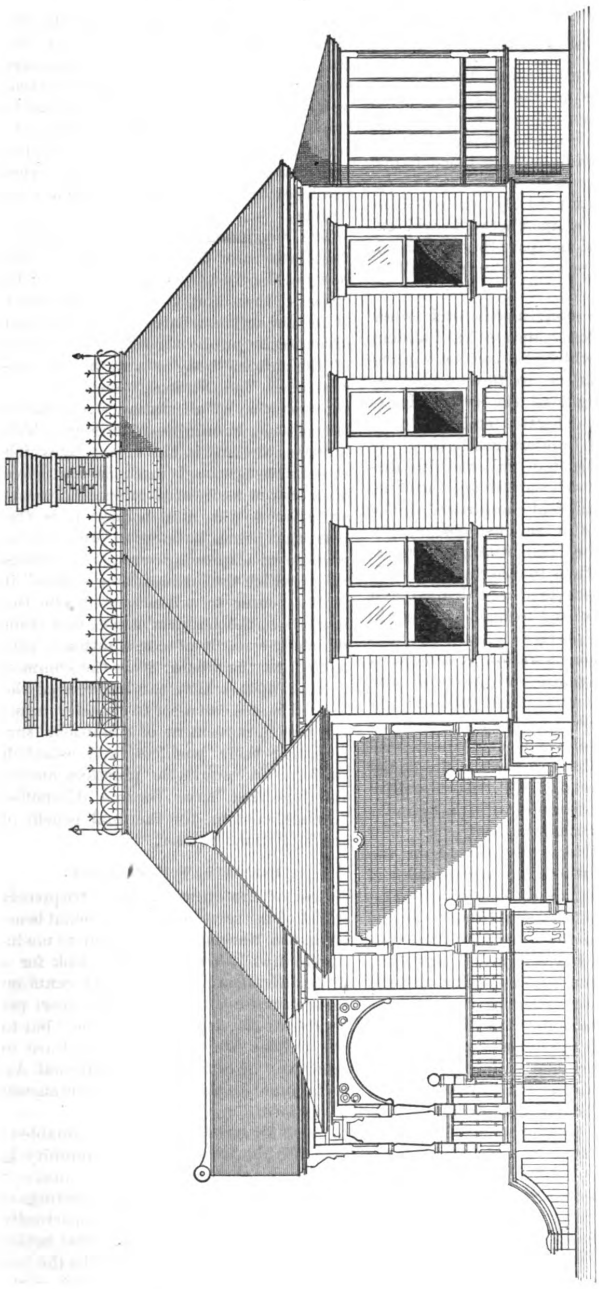
they may be either moistened for ordinary brick making or passed on the press for dry press work. The quantity required for tempering will depend on the quality of the earth. The general rule is the less used the better, or just enough to make it so plastic as to be easily shaped. If too much water be used the brick will not only be very slow in drying, but it will in most cases crack, owning to the surface becoming completely dry before the moisture of the interior has had time to escape.

Too little attention is paid in Canada to the drying of our common brick before burning. Placed as they are in the open air, exposed to the full action of the wind, and to some extent also exposed to the sun, one part dries quicker than the other and the bricks are full of checks and unequal shrinkage. Here, too, the presence of too much clay will cause cracking, while if there be too much sand the brittle nature of the brick will cause the arrises to suffer. Plastic bricks should be slowly dried in a shed so protected that the action of wind and sun may not affect one part to the detriment of the whole. It is in this process that the superiority of the dry-pressed brick is very apparent. As no water is used, save the moisture contained in the disintegrated earth, no preliminary drying process is needed, the bricks are immediately placed in the kiln, their arrises are not subjected to two handlings nor their surfaces distorted by unequal drying.

In the burning of our ordinary bricks greater care might well be observed in many instances. Whether wood or coal is the better fuel is not so important a matter, although no doubt the sulphurous fumes of coal may produce after results in the color of the brick. The great question is how the heat is applied. My impression is that in many cases it is at once too strong and too short. Were several days added to the time of burning and cooling, and the process not so intense, we would have stronger and better formed bricks. Another matter that might well receive the attention of architects and brick makers is the form of bricks. Heretofore the brick have been made to suit the quick handling of them by the bricklayers when laying, without considering specially the best form to obtain a strong and durable brick. Those of us who have seen the thin square bricks of the ancient Roman buildings that have stood the exposure to wind and rain for 2000 years have perhaps been set thinking whether after all our form of brick is the correct one. Roman bricks are from $1\frac{1}{2}$ to $1\frac{7}{8}$ inches in thickness, and from $7\frac{1}{2}$ to 12 inches square. The squareness would possibly be an objection to the efficient bonding of our comparatively narrow walls, but surely the question of thickness is one that should receive consideration. The German and Flemish bricks are about 2 inches thick, and no better bricks are made anywhere.

Good bricks ring with a metallic sound when struck, and will bear a smart blow without breaking. Generally speaking, the denser and heavier a brick is for its size, the stronger it is for general use. Also the less water a brick will absorb, the better it is.



Cottage in Southern California.—Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.

Pavements of Broken Glass.

A firm in Paris, says a recent issue of The *Manufacturer*, has discovered a new use for waste glass. Any fragments of broken glass of various colors are mixed together, after having been broken to a suitable size. Then they are placed in mortars lined with silica, talc or some other fire-resisting material, and fired. A coherent mass is the result, which can be dressed and cut into blocks. These blocks are, of course, irregularly colored and may be used as artificial marble. The blocks are usually rough on one side, owing, perhaps, to incomplete fusion; this gives a surface which is admirably adapted for causing them, especially if they are slablike in form, to adhere to walls with the addition of a little mortar. Fine decorative effects can thus be produced. Designs in relief can be obtained by pressure while the block or slab is still plastic.

If a suitable mold be prepared with movable partitions, then pieces of glass can be arranged in such a way that upon firing a very effective "stained glass" window is produced, the necessity of using "leading," as in the ordinary way, being thus obviated. This idea will enable many manufacturers who have heaps of "waste" glass lying about useless to turn them with very little expenditure to profitable account

THERE IS NO CLASS of workmen having such authentic influence on the building trade as the carpenters, says a recent issue of the *Southern Lumberman*, and a building, while under construction, is absolutely under their control. The architect, the owner, the brick mason and all others must advise with and submit their plans to the carpenters. Walls can only be built to a certain point when the carpenters must be consulted as to when they will complete the wood work and permit the wall to be finished. From basement to roof the carpenters are advised with continuously. On frame buildings the carpenters are a law unto themselves, and according to their views the many frame cottages are built. Carpenters, more than any other of the building class, should be intelligent and fully informed in every detail of their work. A botch carpenter is a disgrace to the calling, and brings his fellow workmen into disfavor. Nothing is so prominent and lasting as botch wood work in a building.

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The Builders' Exchange

CONDUCTED BY WM. H. SAYWARD, SECRETARY OF THE NATIONAL ASSOCIATION.

Officers for 1891.

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1st Vice-President, ANTHONY ITTNER, 9 North Seventh street, St. Louis, Mo.
2d Vice-President, IRA G. HERSEY, 164 Devonshire street, Boston, Mass.
Secretary, WILLIAM H. SAYWARD, 164 Devonshire street, Boston, Mass.
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Peoria, Ill.....FRED. F. MEINTZ.
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Providence, R. I.....FRED C. MARKHAM.
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Saginaw, Mich.....GEORGE C. ZWERK.
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St. Joseph, Mo.....JOHN DE CLUE.
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Sioux City, Iowa.....FRANK CLARK.
Syracuse, N. Y.....HENRY F. CRAWFORD.
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Wilmington, Del.....A. L. JOHNSON.
Worcester, Mass,.....H. W. EDDY.

The National Association of Builders.

The fact is being continually developed that the true nature and functions of the National Association are not comprehended by builders generally. Correspondence from the secretary's office is constantly demonstrating the fact that builders, even in affiliated exchanges, are under a misconception of the functions of the national body.

The prevalent idea is that the National Association is similar in its nature to a local exchange and capable of controlling the action of its members in a similar manner. Frequent inquiries are made by organizations of builders desirous of becoming connected with the National Association, regarding charter, character of membership and other information which indicates that the nature of the association is not fully understood.

The National Association is composed of organizations of builders located throughout the United States that are affiliated for the purpose of fostering and protecting the interests of contractors, manual workmen and all others concerned in the erection and construction of buildings; the acquirement, preservation and dissemination of valuable information connected with the building trades, and for the purpose of devising and suggesting plans for the preservation of mechanical skill, and to establish uniformity and harmony of action among builders throughout the country. The association is purely recommendatory in its nature.

ANNUAL CONVENTIONS.

As a means for arriving at what shall be recommended to the various constituent bodies, an annual meeting is held in which each filial exchange has representation. Each exchange is entitled to one delegate-at-large, who is to act as a director of the national body, and one delegate for each 50 members of said exchange or fractional part thereof. Each of these delegates may be represented by an alternate.

The annual conventions and other meetings of this congress of builders are sessions at which the various aspects of any given subject are thoroughly considered in the light of the practical experience of the delegates and the desire of the bodies of builders which they represent. It is through full and free discussion by men who are doing the same business in different localities of the country, under different customs and conditions, that the true principles underlying their relations to others and to each other can be discovered and defined and the practability and benefit of certain action in the premises clearly demonstrated. The consideration of any given subject in convention brings out all the various phases within that subject; and if the subject be a custom or condition under which builders of a certain locality have been conducting their business, the justice and equity in the custom will be made plain to others doing business under less favorable conditions, and every community of builders (represented in the convention) to whom an improvement in methods is thus clearly demonstrated receives a direct and lasting benefit. In the same discussion the fallacy of other conditions which have been permitted to grow into custom are emphasized and the injustice of their existence made, by intelligent comparison, more distinctly apparent. The results of a convention are good. Thinking men cannot go on with their business from year to year without finding many things that need improvement, and the consideration of kindred subjects with men who are working for the same ends evokes new ideas, and strengthens, by corroboration, opinions and plans for improvement that have required the touch of other minds to attain the perfection necessary to practical application. The opposition, by the unconvinced, to what seems to be too radical action results in thorough ventilation of a measure in a manner that is productive of most good, for the reason that each delegate is arguing from a standpoint based upon the conditions which exist in the community which he represents. Each delegate has some good point to present regarding existing practices in his locality, and each desires to learn the method by which his brother builder has corrected an evil.

FUNCTIONS OF THE ASSOCIATION.

Thus it is that the functions of the National Association are established, the jurisdiction that the filial exchanges should exercise over themselves is fixed, and the opportunity secured for giving to the builders of the United States the composite opinion of the best minds in the trade, which has been evolved in varied localities and under widely different conditions.

The recommendations of the National Association are the united voices of the best builders of 35 of the most prominent cities in the country, raised in advocacy of certain action, whatever it may be, and given to the public through the medium of the national body as a matter of convenience. The National Association is the repository of all statistics relating to the various communities of builders which it represents, and is the means by which these statistics, and methods that have been proven successful in specific cases, are given to the filial bodies; it is the bond that brings builders together for the purpose of improving wrong conditions under which the business now suffers; it is the center to which are drawn the workers in the builders' cause, and from which the result of consultation is submitted to the whole; it is the common ground upon which the builders of the United States can meet to consider means for the improvement of conditions surrounding their business, and establish uniform and equitable practices among interests that have become diversified through custom, for the final benefit of the individual builder.

BENEFITS OF MEMBERSHIP.

One of the questions most frequently asked of the secretary is, "Of what benefit is the National Association to me individually?" To persons who look for a direct dividend in dollars and cents on their investment of the $3 (this year) per capita tax the answer is, "None," but to the builder who is anxious to learn in what way he can make the National Association of benefit to himself, the answer is obvious.

The National Association is valuable to the individuals of a given community in proportion to their efforts to make it valuable. It is in the annual meetings of the national body that the opportunity is afforded to ascertain just what action on any particular subject will be the best calculated to succeed, in the light of the experience of builders of other communities, and it is in the application of the principles of wisdom that have been sifted out of experiments in many localities that the benefit lies, and it is only through such means that final benefit to the individual can be secured.

For example, an instance occurs in the application by the Mason Builders' Association of Boston (of which an account appears in this issue) of the principle and

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form of arbitration advocated by the National Association. The direct individual benefit in this case is the adoption of a method for securing honorable and harmonious adjustment of differences between employers and workmen, which had been evolved by the National Association from experience under widely different conditions only obtained by bringing representatives of these varied conditions together for conference. It may be said with partial truth that these conditions which have resulted in benefit to the individual might have been evolved from bodies composed of builders in a single community, but how much more perfect and conclusive the system if it be defined and recommended by many minds, from wide and varied experience, and how much greater and broader the result, how much more comprehensive and substantial the benefit conferred, if all are given full knowledge of a plan that meets the approval of the large majority of builders, and offers a solution of so vital a question of individual as well as public interest. Every man owes himself and the community at large the duty of making public every plan or device within his knowledge for the improvement of the condition and practices which obtain in any line of business, and no builder can contribute more to his own dignity and benefit than by using every means in his power to raise the standard of his calling whether by means advocated by the National Association or not, and every effort he makes in the direction of having better customs prevail will result in greater security for himself.

NO ATTEMPTS TO MAKE MEMBERSHIP BENEFICIAL.

The question as to the benefit of the National Association most frequently comes from localities where no attempt is made to make it beneficial by testing the plans that are advocated to cover points of need. Exchanges send their delegations to the conventions, where they have a voice in the formulation of plans for the general welfare and where the convincing evidence of the unity of many minds from many cities establishes the importance of a plan or method advocated, and then take no further action in the premises, take no advantage of the experience of others, and as a natural result wonder why they can detect no benefit from their affiliation. An exchange that neglects to apply remedies offered by the National Association can no more receive benefit from it than the sick man can be cured by simply calling upon a doctor without taking his precription.

Certain exchanges may say that their delegation voted against a particular recommendation of the National Association. Very well, they need not apply it, though they may eventually see that the wisdom of the many would have been wisdom for them, but certainly every exchange that did vote for that particular measure, in justice to themselves should apply it and either demonstrate its feasability to those who voted against it or prove the negative voters to have had the better judgment. That which is best for the builder collectively is what the National Association is striving to discover and establish.

WHY BENEFITS ARE NOT BETTER UNDERSTOOD.

One of the principal reasons why the benefit of the National Association is not better understood is because builders generally have drifted along with the current of circumstances for so many years, and have been doing business in old ruts, that have been constantly growing deeper, that action on their part has only been taken in the form of abrupt changes such as result from strikes or lockouts or other radical causes. Under this condition of affairs builders have become so accustomed to arbitrary action that many fail to comprehend the value of an association that is not arbitrary in its nature. This fact, coupled with the habit of letting things slide which has been formed by long years of inactivity in the direction of the general improvement of the practices and methods under which their business is conducted, has made it difficult for many to comprehend the value of action that is only recommendatory and not absolutely binding upon any one. Builders who fail to realize benefit because they can see no result do so because they have made no effort to produce a result, and while conscious possibly of the practical value of any particular recommendation of the National Association, have taken no steps to derive any benefit by helping to put that recommendation into practice.

It is the purpose of the National Association—in other words, the thinkers and workers in each exchange—to do the greatest good for the greatest number, and out of this purpose have grown its present methods for accomplishing that result.

It has been clearly proven that the constant and persistent recommendation of principles that are just and honorable, and also thoroughly practical and applicable to the business of every builder, has brought about the correction of many evils and the improvement of the whole tone of the trade. The National Association acts as the digester of all that transpires in the building world, and distributes that which is valuable to the filial bodies. One of its most important efforts is to combine builders in such bonds of harmony that their common interests may be developed and may become apparent to themselves, and to persist in advocating the adoption of plans for mutual benefit that they themselves may make. Some source must be provided through which these plans and devices for improvement may be disseminated, and that source is the National Association.

Practical Arbitration.

The Mason Builders' Association of Boston have been the first to make direct and practical application of the form of arbitration as adopted and recommended by the fifth convention of the National Association.

Within a month after the close of the convention a meeting of the Mason Builders' Association was held for the purpose of considering the advisability of adopting the form of arbitration mentioned and establishing a Joint Committee under the rules suggested by the National Association. It was unanimously decided that the plan proposed offered the best possible solution to the complications which are continually arising between employers and workmen, and a Committee of Conference was appointed. A request was then extended to the Bricklayers' Union, the Stone Masons' Union and the Building Laborers' Union to appoint similar committees to consider the establishment of a Joint Committee of Arbitration.

The unions mentioned at once took the matter up favorably and meetings of conference were separately held, with the committees from each union, which resulted in the appointment of a delegation of five members from each union to act with a delegation of like number from the Mason Builders' Association as a Joint Committee of Arbitration.

The result of the action of the Joint Committee is best indicated by the following letter, which was issued to members of the employers' association about July 1:

THE MASON BUILDERS' ASSOCIATION OF BOSTON AND VICINITY.
166 DEVONSHIRE ST., BOSTON, MASS.

To all Members of the Mason Builders' Association:

GENTLEMEN.—The Joint Committee appointed by the association in conjunction with the Bricklayers' Union, the Stone Masons' Union and the Building Laborers' Union, has completed its labors, and in behalf of the associations named, has agreed to the following working rules for the year 1891.

All members will be expected to govern themselves in accordance with these rules and it is suggested that members take particular pains to inform their foremen and other employees who have any charge or direction of work, or who are authorized to employ workmen, of all details of this agreement, and caution them to observe the same.

WORKING RULES.

With Bricklayers' Union:

1. Hours of labor shall be nine for Monday, Tuesday, Wednesday, Thursday and Friday, and eight on Saturday. Working hours shall be from seven o'clock a.m. to 12 o'clock m., and from one o'clock p.m. to 5 o'clock p.m.
2. The rate of wages shall be (42) forty-two cents per hour.
3. Any time worked before seven o'clock a.m. or after five o'clock p.m. to be considered as overtime, and paid for as time-and-one-half.
4. Work upon Sundays, Christmas, July 4, or Labor Day, to be paid for as double time.

With Stone Masons' Union:

1. Hours of labor same as bricklayers—namely, nine hours.
2. Rate of wages (42) forty-two cents per hour.
3. Overtime same as bricklayers.
4. Holiday time same as bricklayers.

With Building Laborers' Union:

1. Hours of labor same as bricklayers and stone masons—namely, nine hours.
2. Rate of wages (25) twenty-five cents per hour.
3. Overtime same as bricklayers and stone masons.
4. Holiday time same as bricklayers and stone masons.

Particular pains should be taken by all members of this association to see that the agreements entered into are faithfully observed, as it is very important that the effort that is being made to peacefully settle all questions of mutual concern between ourselves and our workmen be conscientiously supported.

Per order of the president.

J. ARTHUR JACOBS,
Secretary.

P. S.—The inclosed cards, with working rules briefly stated thereon, are to be supplied to foreman and others for handy reference.

The cards referred to in the postscript contained the working rules as they appear in the body of the letter, and were issued in separate form for more convenient distribution among the members of the unions.

The entire plan of arbitration (which follows), as advocated by the National Association of Builders, was adopted without the change of a single letter, and the form of agreement mentioned for securing the establishment of arbitration committees, with plan of organization of the same, for the use of associations of employers and associations of workmen in all branches of the building trade.

AGREEMENT.

For the purpose of establishing a method of peacefully settling all questions of mutual concern.....(name of organization of employers) and.....(name of organization of employees) severally and jointly

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agree that no such question shall be conclusively acted upon by either body independently, but shall be referred for settlement to a joint committee, which committee shall consist of an equal number of representatives from each association, *and also agree that all such questions shall be settled by our own trade, without intervention of any other trade whatsoever.*

The parties hereto agree to abide by the findings of this committee on all matters of mutual concern referred to it by either party. It is understood and agreed by both parties that in no event shall strikes and lockouts be permitted, but all differences shall be submitted to the joint committee, and work shall proceed without stoppage or embarrassment.

The parties hereto also agree that they will incorporate with their respective constitutions and by-laws such clauses as will make recognition of this joint agreement a part of the organic law of their respective associations. The Joint Committee above referred to is hereby created and established, and the following rules adopted for its guidance :

ORGANIZATION OF JOINT COMMITTEE AND RULES FOR ITS GOVERNMENT.

1. This committee shall consist of not less than six members, equally divided between the associations represented, and an umpire, to be chosen by the committee at their annual meeting, and as the first item of their business after organization. The umpire must be neither a journeyman craftsman nor an employer of journeymen. He shall preside at meetings of the committee when necessary.

2. The members of this committee shall be elected annually by their respective associations at their regular meetings for the election of officers.

3. The duty of this committee shall be to consider such matters of mutual interest and concern to the employers and the workmen as may be regularly referred to it by either of the parties to this agreement, transmitting its conclusions thereon to each association for its government.

4. A regular annual meeting of the committee shall be held during the month of January, at which meeting the special business shall be the establishment of "working rules" for the ensuing year ; these rules to guide and govern employers and workmen, and to comprehend such particulars as rate of wages per hour, number of hours to be worked, payment for overtime, payment for Sunday work, government of apprentices, and similar questions of joint concern.

5. Special meetings shall be held when either of the parties hereto desire to submit any question to the committee for settlement.

6. For the proper conduct of business a chairman shall be chosen at each meeting, but he shall preside only for the meeting at which he is so chosen. The duty of the chairman shall be that usually incumbent on a presiding officer.

7. A clerk shall be chosen at the annual meeting to serve duting the year. His duty shall be to call all regular meetings, and to call special meetings when officially requested so to do by either body party hereto. He shall keep true and accurate record of the meetings, transmit all findings to the associations interested, and attend to the usual duties of the office.

8. A majority vote shall decide all questions. In case of the absence of any member the president of the association by which he was appointed shall have the right to vote for him. The umpire shall have casting vote in case of tie.

The following clauses, as recommended by the National Association to be incorporated into the by-laws of parties to joint agreement, have been adopted by the Mason Builders' Association and each of the three Unions mentioned.

A. All members of this association do by virtue of their membership recognize and assent to the establishment of a Joint Committe of Arbitration (under a regular form of agreement and governing rules), by and between this body and the..... for the peaceful settlement of all matters of mutual concern to the two bodies and the members thereof.

B. This organization shall elect at its annual meeting.. ..... delegates to the said Joint Committee, of which the president of this association shall be one, officially notifying within three days thereafter the said..... .....of the said action and of the names of the delegates elected.

C. The duty of the delegates thus elected shall be to attend all meetings of the said Joint Committee, and they must be governed in this action by the rules jointly adopted by this association and the said.....

D. No amendments shall be made to these special clauses, A, B, C and D, of these by-laws except by concurrent vote of this association with the said..... ....and only after six months' notice of proposal to so amend.

During the meetings of the Joint Committee the apprenticeship question was brought up for consideration, and the subject is at present under advisement. Much that needed careful and thorough consideration has been submitted by both sides in regard to the subject, and the outcome of the consideration will be given in these columns in the next issue.

These various meetings between the master masons and the journeymen have been conducted with the utmost harmony and good feeling, and the conservative action of the unions is deserving of the highest commendation.

The names of the delegates to the Joint Committee are :

Mason Builders' Association.—I. H. Woodbury, Augustus Lothrop, M. C. Grant, Parker F. Soule and W. H. Sayward.

Bricklayers' Union.—Jeremiah Harrington, Augustine Devine, Thos. Garrity, L. J. McKenzie and Edw. Cullen.

Stone Masons' Union.—L. D. Cullen, James Jay and P. J. Walsh.

Building Laborers' Union.—M. C. Sullivan, John Keohane, Jeremiah Sullivan, John J. Sullivan, Robt. White and James Casey.

The Building Trades Club of New York City.

The new rooms of the Building Trades Club, at 117 East Twenty-third street, were formally opened on June 25. The occasion was most enjoyable, and was as thoroughly successful as is every undertaking of that hospitable club. Many guests were present from exchanges outside the city, as well as many prominent persons more or less connected with the building interests of the city.

Marc Eidlitz was the first speaker of the evening, and was very warmly received. He touched upon the wonderful success of the club in developing more intimate social relations among the builders, and spoke strongly upon the value of builders meeting each other more frequently and becoming better acquainted with each other.

The other speakers were John J. Tucker, vice-president, also ex-president of the National Association; President Wm. C. Smith, president of the Mechanics' and Traders' Exchange ; Mr. O. J. Campbell, Rev. Waldo Messaros, George Watson, president of the Philadelphia Exchange, and others.

Refreshments were served in the usual charming New York builder's style, which will be so pleasantly remembered by those in attendance at the convention and at the last mid-year meeting.

The Schumann Quartette and an excellent orchestra added pleasure to the occcasion by their rendering of delightful music, and the affair passed off in such a completely successful manner that the wisdom of the establishment of the club was demonstrated more clearly than ever. The floral decorations were very artistic.

The new quarters are much more advantageously located than those formerly occupied and the building much better adapted to the uses of a club. The building is one of the old-style English dwelling houses, and was originally built with elaborate interior decoration. The carved work on the mantels was done by Italian sculptors and other ornamentation was of a similar character. The house is four stories high and extra wide, and admirably suited to its present purpose. It has been thoroughly renovated by the club, and some alterations have been made in the interior that were considered necessary.

The first floor contains the library, and is supplied with current literature, newspapers, &c., and will be used between the hours of 8 o'clock a. m. and 5 p. m. as a business room for the use of the members. After 5 o'clock it will be used in part as a dining room. Immediately in the rear, and connected with the business room by folding doors, is a smaller apartment fitted up for the use of members desiring to estimate plans, &c., which is known as the plan room, and near at hand are the telephones and messenger service.

The second story is furnished as a suite of parlors with exceedingly tasty decoration. The third floor is devoted to billiard rooms, two sleeping rooms, for members from out of the city, and bathrooms.

The work of fitting up the rooms has been carried on by Messrs. Stephen M. Wright, Chas. A. Cowan and Henry A. Maurer, the House Committee, and their work has not only reflected the greatest credit upon themselves, but has also resulted in the possession by the club of a home in which the members can feel the greatest pride.

The club, the primal object of whose organization was the entertainment of the National Association of Builders during the fifth convention, has demonstrated beyond any question and to the entire satisfaction of its members the fact that builders are quite as clubable as any other class of men. The idea is entirely new, and builders have never before considered it possible that social relationships could be established and maintained with such encouraging results. Every large city in the country should have a club of similar nature, and builders would feel the benefit of its existence in a thousand different ways.

It is not likely that any radical change would immediately occur upon the organization of such a club, but the harmonious contact of the members one with another brings about conditions of fellowship and friendliness that is of the greatest benefit to the business as a whole.

The effect is shown in the present instance by the more satisfactory attitude toward each other among builders who are members of the club, and whose interests are recognized as identical in this one direction. The identity of their general interests is developed more and more as they meet together free from the spirit of competition.

John J. Weaver.

Mr. John J. Weaver of Philadelphia died July 14, 1891. In the death of Mr. Weaver the Master Builders' Exchange lost one of its best members and Philadelphia one of her best citizens. Every person who attended the third convention of the National Association will remember Mr. Weaver and every person who has ever partaken of the hospitality of the Master Builders' Exchange will recall his many acts of kindness. He was an earnest and indefatigable worker in all that pertained to the welfare of the builder, and particularly in that most important branch, the trade education of young men. His death is most keenly felt by all who knew him.

The following brief sketch of his life appeared editorially in the Philadelphia *Ledger* on the day following his death :

John J. Weaver, whose death was announced yesterday, was a public spirited citizen, who for 30 years has devoted his leisure time to promoting educational and other enterprises for the benefit of the city. From the time that he graduated from the Boys' Central High School, in 1860, he was inspired by gratitude for the opportunities for improvement he had been given, and labored zealously in various fields to extend educational advantages to other young men. As a member and at various times one of the managers of the Franklin and the Spring Garden institutes he was a zealous advocate of schools for young men. He was chairman of the committee of the Spring Garden Institute that established there, in 1879, the first mechanical handiwork schools in the city, and, we believe, the first manual training schools proper in the country. From these, during Mr. Weaver's active service, were developed the similar schools of Girard College and the City's Manual Training School. Mr. Weaver also helped to establish the trade school for plumbers, now merged in the trade schools of the Builders' Exchange, of which Mr. Weaver was an active organizer and director. These were his chief enterprises, but he was active

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also in performing the general duties of good citizenship, and always took an active part in political reform movements. His main characteristic was zeal and energy in the prosecution of any undertaking he essayed, and it was this quality that made him a leader in school organizations He passes away in the prime of life, but with the institutions he helped to start or rejuvenate firmly established and fitted for many years to come to bring honor to his memory.

Exchange News.

Following the line of information published in the July number relating to the existing conditions in the various exchanges, as regards labor and its relationship to employers, it is proposed to give in this issue the wages that are paid to workmen in the various branches of the business directly connected with building.

The wages as they appear in the following are not a fair comparison of the amount of profit there is in the different cities to the workman upon his labor. An attempt at any comparative showing must, in the nature of things, be more or less unsatisfactory for many reasons, and while the cost of the commodities known as the necessities of life, the interest on investments which establish the rates of house rent and contingent facts are within reach, it is absolutely impossible to fix the standard of what the workmen consider as necessities, for certain families live much cheaper than others of equal numbers and surrounded by the same conditions

It is pertinent to state, however, that variation in the scale of wages in the different localities does not represent any disparity in the condition of the workmen, for where the wages are the highest there also is the cost of living the highest.

Boston, Mass.

All trades except freestone cutters work nine hours and are mostly paid by the hour. Masons receive 42 cents per hour; overtime, 63 cents. Carpenters from 28 to 33 cents; overtime, time and one-half. Plasterers, 40 cents; overtime, double. Plumbers, $3.50 per day. Painters, 30 to 33 cents per hour. Roofers, copper and iron workers are paid by the day and receive from $2.50 to $3.50. Granite workers work nine hours, 31 cents. Freestone workers, eight hours at 50 cents per hour.

Buffalo, N. Y.

Workmen are paid by the hour and also by the day, nine hours being worked in the majority of the trades. The wages are: Masons, nine hours, 36 cents; overtime, 54 cents. Carpenters, nine hours, 25 cents; overtime, 37½ cents. Plasterers, nine hours, 33⅓ cents; overtime, 50 cents. Plumbers, nine hours, $3 per day; holidays, $4.50. Painters, nine hours, $2.25 per day; holidays, $3.38. Roofers, ten hours, $2.25 per day. Iron workers, nine hours, $3 per day. Copper workers, ten hours, $2.25 per day. Granite workers, nine hours, $3 per day. Freestone workers, eight hours, 44 cents per hour.

On July 10 thirteen of the contracts for the new building to be erected by the Builders' Association Exchange were awarded, those for elevators, wire work and sidewalk being postponed. Work has already been begun and is to be completed before August 1, 1892.

The cost of the building when finished is to be $115,000, which, added to the $45,000 paid for the ground, will make the total cost to the Exchange $160,000.

The building is to be seven stories high and practically fire proof. The architectural design is to be somewhat novel and will comprehend several distinct styles of architecture, but combined in such a manner as to present a most pleasing and harmonious effect.

The first story is to be of Tuscan design, the second and third Doric, the fourth and fifth Ionic and the remaining upper section will be Corinthian. The architects have produced a very clever combination in the treatment of the idea and the building will undoubtedly be one of the handsomest in the city.

The outside walls of the first story and the caps, pillar pedestals and dressing will be of smooth, hard Medina stone, and the balance of Buffalo pressed brick.

The first floor is adapted for office or store purposes, and will probably be occupied by a bank or some institution of a kindred nature. The second floor will be devoted to Exchange purposes and will be divided into two large rooms, beside the secretary's office, cloak rooms, lobby and necessary business apartments.

The floors above will be divided into 40 offices for the use of builders and people interested in building materials. All offices will have outside light and will be large, airy and second to none in the city. The elevator shaft and stairway will be lighted by a large skylight and will be placed against the wall that adjoins the next building, thus permitting all the offices to have windows on the street.

There will be no wood work in the building except the floors and door casings, and the different stories will be supported by Z-bar steel columns of special design.

The structure, when completed, will be one that the builders of Buffalo can point to with pride, and it will also be the source of revenue to the Exchange.

The effect of this step is already being felt by the Exchange in the increased interest in its affairs by the members and the unusual number of applications for membership. Nothing will give an association of builders standing and influence in a community quicker than the erection of a building of its own. Its stability and financial standing is at once demonstrated and in such a manner as to attract the most favorable notice.

Chicago, Ill.

Masons work eight hours, 50 to 60 cents per hour; overtime, 75 cents; holidays, double time. Carpenters, eight hours; 35 to 40 cents per hour; overtime, 52 cents. Plasterers, eight hours, 50 cents; overtime, 75 cents; holidays, double time. Plumbers are paid all the way from 20 to 35 cents per hour and work eight hours, and the painters are in the same condition. Roofers work ten hours, and are paid from 20 to 35 cents per hour. Iron workers are now striking for a minimum rate of 30 cents per hour; 30 to 35 cents per hour has heretofore prevailed and eight hours is a day's work. Cut stone workers, eight hours, 50 cents per hour.

The Builders' and Traders' Exchange of Chicago have just issued a handbook of something like 260 pages, bound in flexible covers with gilt side title, which contains a great deal of valuable information. This includes the by-laws and business classification of members of the Builders' and Traders' Exchange of Chicago, rules of measurement of mason work, building, fire and sanitary ordinances of Chicago, lien laws of the State of Illinois and a list of architects, together with catalogue and rules of the library of the Chicago Builders' and Traders' Exchange A comprehensive index is a feature of no little convenience. The work has been compiled by James John, the efficient secretary, and is a volume which cannot fail to interest builders, especially in the section of the country referred to.

Detroit, Mich.

Masons work nine hours and are paid both by the day and by the hour, $3.50 per day and 40 cents per hour; carpenters, nine hours, 25 cents per hour, overtime after 6 o'clock p.m., 37½ cents per hour; plasterers, eight hours, 40 cents per hour, overtime 60 cents per hour; plumbers, nine hours, $2.75 per day; painters, nine hours, 25 to 27 cents per hour; roofers, nine hours, $2.50 per day; iron workers, nine hours, $2.25 per day, overtime, 38 cents per hour; granite workers, $3.60 per day, and freestone workers the same at present.

The strike of stone cutters, which it was thought was settled just previous to July 1, is still on.

The committees appointed from the employers' association and the union met on June 27 and an agreement was made under which work was to be resumed. The men went back to work on Monday morning, June 29, but on Tuesday the union refused to ratify the action of their committee, and the workmen were called out again.

The following is the agreement mentioned:

Articles of agreement made and entered into by and between the Cut Stone Contractors' Association of Detroit and the Journeymen Stone Cutters' Association, these articles to remain in full force until February 1, 1892.

Article 1. Competent stone cutters to be paid 45 cents per hour up to July 15, 1891; after that date 47 cents per hour. Men who are not first-class stone cutters to be paid what they can earn; bosses to be the sole judge.

Art. 2. Setters to work nine hours when it is necessary

Art. 3. Flag layers, curbing cutters and apprentices to be under control of the bosses.

Art. 4. The union stone cutters are not to interfere with the men now working or with men now on their way here.

The present condition of the trade is very much unsettled, and the employers are doing all in their power to secure workmen from outside the city.

Other trades are somewhat uneasy, but no definite action on their part is anticipated.

The Builders' Exchange is in excellent condition, and the recent change of quarters and election of new officers will work greatly to its benefit.

Grand Rapids, Mich.

Masons work nine hours, and receive 45 cents per hour, overtime 67½ cents; carpenters, ten hours, 20 cents per hour; plasterers, nine hours, 40 cents per hour; plumbers, ten hours, 27½ cents per hour, overtime 40 cents per hour; painters, nine hours, $2 per day, holidays $3; roofers, ten hours, 27½ cents per hour; iron workers, ten hours, 25 cents per hour, overtime 37½ cents per hour; copper workers, nine hours, 30 cents; granite workers, ten hours, $3 per day; freestone workers, nine hours, 40 cents per hour and will not work overtime.

Indianapolis, Ind.

All trades work eight hours per day and are paid by the hour, and are paid double time for Sundays and other holidays. Masons receive 50 cents per hour, 75 cents for overtime; carpenters, 27½ to 30 cents, overtime 45 cents per hour; plasterers, 40 cents, overtime 60 cents per hour; plumbers, 60 cents, overtime 90 cents per hour; painters, 35 cents, overtime 52½ cents per hour; roofers, 45 cents per hour, overtime same as painters; iron and copper workers, 25 cents, overtime same as painters; granite and freestone workers, 40 cents, overtime same as painters.

Milwaukee, Wis.

The trades in Milwaukee are now working under the hour system and are all paid at the rate of time and a half for overtime work. The scale here given is the minimum, and workmen receive more than rates given in many cases: Masons, eight hours, receive 40 cents; carpenters, eight hours, 25 cents; plasterers, eight hours, 40 cents; plumbers, eight hours, 25 cents, painters, ten hours, 22½ cents; roofers, ten hours; 20 cents; iron workers, ten hours, 25 cents; copper workers, ten hours, 30 cents; granite workers, ten hours, 35 cents; freestone workers, eight hours, 45 cents.

The value and importance to an exchange of the project for securing a building of its own has been again proven by the Builders' and Traders' Exchange even before the building has been begun. The interest of the members has unquestionably been increased, and builders who have hitherto given but little attention to the subject are being awakened to a knowledge of the benefits of association. This newly-aroused interest has been particulary beneficial just at the present time, as it has drawn the builders together, and permitted greater unity of action in dealing with the strike which has been in progress during the past month.

The actual beginning of building operations has been somewhat delayed by the strike, but ground will be broken immediately for the erection of a structure that will be a credit to the builders and to the city.

The plans submitted by Ferry & Clas have been accepted, and provide for a six-story building 50 x 100 feet in area. Some minor changes may be made in the design, but the plans as they exist at present are very satisfactory.

The whole building has been arranged in such a manner as to furnish excellent offices and yield the greatest money return upon the investment. The basement will be divided into three rooms, one in the rear containing heating plant, engine, &c., and two in front that have already been taken. The main floor will be divided into two stores, one large corner store, and one fronting on Fifth street. The second, third and fourth floors will be devoted to offices with special reference to the needs of builders.

The fifth and sixth floors will be distinctly adapted to the uses of the Exchange itself; the Exchange room being on the sixth floor and a permanent exhibit of building material being located on the fifth. The sixth floor will contain, besides the Exchange room, which is to be 34 x 73 feet in size, the secretary's office, committee and directors' rooms and other necessary apartments.

The building will be provided with every modern appliance for the convenience of members and tenants. A tier of fire-proof vaults will be so placed as to be easy of access to occupants and two rapid-running elevators will be supplied.

The question of the importance to builders of an exchange is long past the experimental period, and every organization of builders will find the ownership of a building of their own a most important possession that will contribute to their influence in an ever-increasing manner. Such a possession gives the organization, and hence its members, dignity and standing in the community, and the personal pride thus awakened will yield beneficial results more quickly in this manner than in any other. The prime object—existence of an exchange—is best fostered by some cause which shall bring the builders constantly together under the impulse of mutual interest. It has been difficult in many

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cities to secure among members of the exchange a recognition of the value to themselves of the establishment and maintenance of the exchange hour, and nothing will develop its importance quicker and more effectually than the existence of a common interest among the builders which has a tendency to draw them together daily.

That the mutual possessorship of a building does produce such a result is no longer an undecided question. Its effect has been demonstrated in Boston, Philadelphia, Washington and Kansas City, and is being proven again in Buffalo and Milwaukee.

Various methods have been adopted in order to secure a building by the exchanges mentioned, and the national secretary would be very glad to supply any exchange or organization of builders with a full description of any of the plans. The possession of a building cannot be too strongly urged upon every exchange. The result has amply proved the value of the step.

New York.

Masons work eight hours per day, and are paid 50 cents per hour; overtime work is paid for at twice the regular scale. Carpenters, eight hours, $3.50 per day; overtime, double pay. Plasterers, eight hours, $4 per day; overtime, double. Plumbers, eight hours, $3.75 per day; overtime, double. Painters, eight hours, $3.50 per day; overtime, double. Roofers, eight hours, $3.50 per day; overtime, double. Iron workers, nine hours, 22 to 37 cents per hour; overtime, 50 per cent. additional. Copper workers, nine hours, $3 per day; overtime, double. Freestone workers, eight hours, $4.50 per day; no overtime worked. Blue stone, nine hours, $4; overtime, double.

Philadelphia, Pa.,

Masons work nine hours and are paid 45 cents per hour; overtime, 67½ cents. Carpenters, nine hours, 33 cents per hour; overtime, 50 cents. Plasterers, eight hours, 40 cents; overtime, 60 cents. Plumbers, nine hours, 40 cents per hour; overtime, 60 cents. Painters, nine hours, 30 cents per hour; overtime, 45 cents. Roofers, nine hours, $3 per day; overtime, 50 cents per hour. Iron workers, nine hours, average 30 cents per hour; overtime, 45 cents. Granite workers, nine hours, $3.25 per day; overtime, 55 cents per hour. Freestone workers, nine hours, $3.50 per day; overtime, 60 cents per hour. Granite and freestone workers work eight hours on Saturday, with full pay.

Pittsburgh, Pa.

The general strike in the building trades is virtually over. The strike has been a very serious one to the building interests of Pittsburgh, and was participated in by almost every trade in any way connected with the building business. Shorter hours, more pay, the recognition of the unions and the adoption by the employers of union working rules were the objects of the strike. The employers were willing to concede the hours and wages, but refused to adopt the working rules proposed by the workmen and the strike finally hinged in most of the trades upon the rules under which the men should work.

The carpenters have returned to work under the rules of the employers and are working nine hours per day. The rules advocated by the men were as follows:

RULE 1. Eight hours shall constitute a day's work, and all overtime shall be time and half time. Sundays, Christmas, Washington's Birthday, Fourth of July, Thanksgiving and the first Monday in September (Labor Day) shall be double time.

RULE 2. The compensation shall not be less than 35 cents per hour, and no member of the U. B. shall be allowed to work for less, while working in the district, without permission from the L. U. of which he is a member, subject to the approval of the district council.

RULE 3. No member of the U. B. will be allowed to act as foreman for less than 40 cents per hour.

RULE 4. No member of the U. B. will be allowed to work for other than a *bona fide* contractor for less than 50 cents advance per day over the minimum rate of wages.

RULE 5. All employers shall be required to pay up in full at the places where the men are at work, on their regular pay day, on or before the hour of quitting work; and for each hour the men are detained they shall be paid according to the regular rate of wages; and if the men fail to receive their pay on said day no member of the U. B. shall be allowed to work for said employer until the men are paid, and no employer shall retain more than one day's wages.

RULE 6. All employers sending men to work any distance exceeding 2 miles from shop or office shall be required to pay all car fare in addition to regular day's wages.

RULE 7. No member shall be allowed to work with a non-union man or for an employer employing non-union men, nor shall any member be allowed to work any material coming from any non-union mill working more than eight hours.

The rules under which they returned to work were the ones formulated by the employers and are as follows:

BOSSES' RULES.

RULE 1. Nine hours shall constitute a day's work, and all overtime, after 6 o'clock p.m. shall be time and half time.

RULE 2. Wages shall be classified according to skill and ability of the men.

RULE 3. Foremen may be non-union men.

RULE 4. All employers shall pay at the places where men are at work, on their regular pay day, during working hours, if possible, and no employer shall retain more than one day's wages.

RULE 5. All employers sending men to work any distance exceeding 2 miles from shop or office must pay car fare.

RULE 6. An employer may use laborers in or about the work to assist in carrying material on the premises or to place in the building.

RULE 7. No carpenter shall be permitted to stop work on account of non-union men in other branches of the building business that are employed on the same building or works.

The stone masons and plumbers have also returned to work under rules established by the employers. The bricklayers are still out and demanding $4.50 for nine hours' work, while the employers refuse to pay over $4. Some few bricklayers have returned to work under employers' rules and $4 per day. Where men have gone back there is no distinction made between union and non-union men, both working together without friction.

Although the Pittsburgh builders were given due notice by the workmen that the strike would occur on May 1, many were unable to finish contracts in operation previous to that time, which, together with the fact that proposed contracts were withheld from competition pending the settlement of the strike, has made the season a very disastrous one.

The value and importance of a builders' exchange in time of trouble has been again clearly proven in the present instance. The builders generally came into the Exchange, and all combined for the purpose of bringing about a more equitable condition of affairs between themselves and their workmen. The unions have been very strong in Pittsburgh for many years, and have become exceedingly arbitrary in their demands; and it is to be hoped that the present strike and its result will bring about a better condition of affairs.

Providence, R. I.

Workmen in all branches of the building trades work and are paid by the day, and are given double time for Sundays and other holidays. Masons work ten hours, and are paid $3.50 per day; overtime, 52 cents per hour. Carpenters, ten hours, $2.50 per day; overtime, 37½ cents per hour. Plasterers, nine hours, $3.50 per day; overtime, 52 cents per hour. Plumbers, nine hours, $3.25 per day; overtime, 63 cents per hour. Painters, ten hours, $2.50 per day; overtime, 37½ cents per hour. Roofers, ten hours, $2.50 per day; overtime, 37½ cents per hour. Iron workers, ten hours, $3 per day; overtime, 45 cents per hour. Copper workers, ten hours, $3.25 per day; overtime, 45 cents per hour. Granite workers, nine hours, $3 50 per day; overtime, 52 cents per hour. Freestone workers, nine hours, $4 per day; overtime, 60 cents per hour.

Pueblo, Col.

All trades in Pueblo work eight hours. Masons are paid $4 by the day; overtime, $1 per hour; carpenters, 35 cents per hour; overtime, 52 cents. Plasterers, $4; plumbers, $4; overtime, double pay. Overtime in the other trades is paid for at the rate of time and one-half. Painters, roofers, iron and copper workers receive 37½ cents per hour; freestone workers, $4 per day, and bricklayers are paid 62½ cents per hour.

Rochester, N. Y.

Workmen in the building trades work nine hours in all branches, partly paid by the day and partly by the hour. The masons are paid 35 cents per hour, overtime 52½ cents; carpenters, 28 cents, overtime 42 cents; plasterers 35 cents, overtime 52½ cents per hour; plumbers, $3 per day, overtime 42 cents per hour; painters, 25 cents per hour, overtime 37½ cents; roofers, $2.25 per day, overtime 37½ cents per hour; iron and copper workers, $2.50 per day, overtime 42 cents per hour; granite and freestone workers, $3.25 per day, overtime 54 cents per hour.

The masons of Rochester have established an Arbitration Committee between the Employers' Association and the Bricklayers', Plasterers' and Stonemasons' Union, to which all questions of difference are referred. The committee consists of six members of the Masons' Association and five from the union.

About July 1 the apprenticeship question came up for settlement, and the following rules were formulated and adopted by both organizations.

Each contractor shall carry on business as a builder 12 months before taking an apprentice. Before a contractor shall take an apprentice he shall file a sworn statement with the Arbitration Committee, showing the number of days masons he has worked between April 1 and December 1 of the year previous.

The Arbitration Committee on receiving such statement shall give to such contractor a license signed by the president and secretary, to take the number of apprentices he is entitled to as follows: To a contractor working on an average two masons one apprentice; to a contractor working on an average five masons, two apprentices, and for every ten additional masons one additional apprentice.

Building interests are in a normal condition, with a fair amount of work in progress.

San Francisco, Cal.

All branches of the trade work eight hours, except the masons, who work nine, and all are paid by the day. Masons are paid $6 per day, overtime $1.12½ per hour; carpenters, $3.50 to $4, overtime 75 cents per hour; plasterers, $5, overtime 93 cents per hour; plumbers, $3.50; painters, $3; roofers, $3.50; granite and freestone workers, $4. Painters, granite and freestone workers are paid at the rate of time and one-half for overtime.

St. Louis, Mo.

With the exception of the iron and copper workers, who work ten hours, all the building trades in St. Louis work eight hours per day. Stone masons receive 50 cents per hour, overtime $1; bricklayers, 55 to 65 cents per hour, overtime double pay; carpenters, 40 cents per hour, overtime 80 cents; plasterers, 50 cents per hour, overtime $1; plumbers, $4 per day, overtime double pay; painters, 30 cents per hour, overtime 60 cents; roofers, $3 per day, overtime double pay; iron and copper workers (ten hours), $3 per day, overtime double pay; granite and freestone workers, 50 cents per hour, overtime $1.

St. Paul, Minn.

The hours worked in the building trades in St. Paul are very much broken, workmen in the same branches of the business working different hours. Stone masons work ten hours and are paid 25 cents per hour, nine hours on Saturday with full pay. Bricklayers work nine and ten hours for 40 cents an hour and the union men work nine hours on Saturday and receive full pay. Carpenters work ten hours per day and are paid 25 cents per hour; plasterers, ten hours, 35 cents per hour; plumbers, nine hours, $3.50 per day; painters, ten hours, 25 cents per hour; roofers and copper workers, nine and ten hours, 27½ cents per hour, overtime, 41¼ cents per hour; iron workers, nine and ten hours, 25 cents per hour, overtime 37½ cents per hour; granite workers, ten hours, 35 cents per hour, and freestone workers, eight hours, 50 cents per hour.

St. Joseph, Mo.

Masons work nine hours and receive 50 cents per hour. Carpenters, nine hours, 25 cents per hour. Plasterers, ten hours, 35 cents per hour. Plumbers, nine hours, $4.50 per day; overtime, 60 cents per hour. Painters, ten hours, 25 cents per hour. Roofers, iron and copper workers, ten hours, $2.50 per day. Freestone workers, eight hours, 45 cents per hour.

Syracuse, N. Y.

Masons and plasterers work nine hours per day and are paid 40 cents per hour; overtime, 60 cents. Carpenters, ten hours, $2 to $2.50 per day. Plumbers, ten hours, $3 per day; overtime, 45 cents per hour, Painters, ten hours, $1.75 to $2.50 per day. Roofers, ten hours, $2.25 per day. Freestone workers, nine hours, 30 cents per hour.

Washington, D. C.

Masons work eight hours and are paid 50 cents per hour; overtime, 75 cents per hour. Carpenters, $3 per day; overtime, 50 cents per hour. Plasterers and plumbers, nine hours, $3 50 per day; overtime, 60 cents per hour. Painters, copper workers and roofers all work nine hours, $3 per day; overtime, 50 cents per hour. Iron workers, nine hours, $2.50 per day; overtime, 37½ cents per hour. Granite workers, eight hours, 40 cents per hour. Freestone workers, eight hours, 45 cents per hour.

Wilmington, Del.

All trades, except carpenters, who work nine hours and are paid 25 cents per hour, are paid by the day. Masons work nine hours and receive $3.50. Plasterers, nine hours, $3. Plumbers, nine and ten hours, $3. Painters, nine hours, $2 50. Roofers, ten hours, $2.75. Iron workers, ten hours, $2.25. Copper workers, ten hours, $2.50. Granite workers, nine hours, $3. Freestone workers, ten hours, $3.

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CARPENTRY AND BUILDING.

A MONTHLY JOURNAL FOR THE BUILDING TRADES.

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SEPEMTBER, 1891

A Suburban Building Operation.

We devote considerable space in this issue to a description of a novel building operation, and one in which we feel sure a large number of our readers will be interested. It is notable because it is a suburban operation, most operations of this character being restricted to towns and cities. It is interesting because in addition to the mere erection of buildings, there has been included in the enterprise features of hydraulic and steam engineering, electric lighting, landscape gardening, &c. What the enterprising builders have done in this case to their own profit and in a way to greatly increase the comfort of those who desire moderate priced suburban homes in the neighborhood of Philadelphia is only what hundreds of other builders have the opportunity of doing in the neighborhood of other large cities. We present the description as a study of modern building operations which is well worth the careful attention of builders everywhere, with a view to undertaking something of the same sort. Incidentally we should remark that there has been excellent business management, good financiering, and last, but not least, good advertising connected with this enterprise, features which should not be overlooked by those who undertake anything of this sort. A combination of good elements clear through has made this operation a great financial success, and the same combination will work equally well in other cases.

METHOD WILL TEACH YOU TO WIN TIME.—*Goethe.*

A High Building.

Just as we go to press two building instances in striking contrast are brought to the attention of the public and to the consideration of New Yorkers in particular. Some of the daily papers of Sunday, August 23, presented the front elevation of what is said to be the tallest building in the world, and which it is proposed to erect on a plot of ground near the lower end of Broadway. To give the reader a faint conception of what this building is we will say that if the New York *World* building were to be taken bodily and set upon the top of the Equitable Life Assurance building, the top of the flag staff above the dome of the *World* would still be many feet below the top of the tower of the proposed building. It is to have some 26 stories, with a tower running far above the roof. According to the architect's specifications the building is to be constructed with a steel frame work, making it rigid from top to bottom and able to stand any stress of storm, and also earthquake shocks. The brick and stone that are to be employed in the lower stories and throughout the exterior shell are merely incidental trimmings, and could all be taken away without the building in itself being the least disturbed. The assertion is made that it could be toppled over bodily if enough force could be brought to bear to do it, but even then it would not be broken. It is a question yet whether the amount of capital necessary to the erection of such a building can be secured for the purpose. In this case some $4,000,000 are wanted, but that such a study in building construction has been made at the hands of competent men and that such a business proposition is before the public at the present time is an important fact in itself.

EVERY ARTIST WAS FIRST AN AMATEUR.—*Emerson.*

Broken-Down Buildings.

The other incident is the sudden collapsing of an overloaded building in Park place, New York. Without a moment's warning, at the noon hour, Saturday, August 22, the building referred to fell with an awful crash, burying over 75 people in the ruins. At first reports were circulated that some kind of an explosion had caused this accident. A naphtha explosion, a steam explosion, a gas explosion and other similar theories were advanced. Perhaps it is too soon yet to say what the immediate cause of the accident was, but enough has appeared to justify the statement that the building was altogether insufficient in its construction, and that it was greatly overloaded. It was being used for purposes for which it was never intended when built, and, perhaps owing to the continued jar of the machinery located in it, became year by year weaker and weaker, until finally the disaster ended all. Here, then, are contrasted the building practice of a generation ago and the building ideas of the present day. In the latter case it is proposed to put up a building which shall rival the highest structures of the world, and yet make it so strong that it might be toppled over bodily without breaking apart, while, on the other hand, a business block representing the construction of 20 years ago comes tumbling down upon the heads of its occupants because it was too weak to stand up under the load that modern business has imposed. We are not fixing responsibility, nor shall we stop to point out the inherent weakness of old-time construction. We merely want to contrast the two incidents in building and let the reader frame his own moral.

A PICTURE IS A POEM WITHOUT WORDS.—*Horace.*

Builders of the City Hall, New York.

The men who supervised the erection of the old City Hall in New York City have left their names engraved in marble for the inspection of future generations. The slabs that bear the record, however, are the cope stones of the front and center, and antiquarians who care to decipher them must climb to the roof of the building, and while so doing must be careful of their steps. On one stone are the names of the Building Committee: "Aldermen Morss, Fish, Douglass; Messrs. Waldron and Lawrence." On another stone these names are inscribed: John Le Maire, sculptor; John McComb, Jr., architect; Abraham Labagh, master stonecutter; Arthur Steenbach, Arthur Smith, master masons; Joseph Newton, master carpenter; James Hopson, clerk.

I AM OF OPINION THAT THERE IS NO PROVERB WHICH IS NOT TRUE, BECAUSE THEY ARE ALL SENTENCES DRAWN FROM EXPERIENCE ITSELF, THE MOTHER OF ALL THE SCIENCES.—*Cervantes.*

Designs for the Cathedral.

After long study and deliberation, the trustees of the new Episcopal Cathedral of St. John the Divine have appointed Heins & Lafarge of Temple Court, New York City, as their architects, selecting them from nearly 60 applicants. Much of the work submitted to the trustees was of a superior character, comprising designs from well-known architects in this country and Europe. It is understood that, in general, the plans submitted by the firm of architects named will be followed, although large modifications are likely to be made, as both the trustees and the architects consider that so great a subject demands extended study. Following the instructions of the trustees, the plan is Byzantine in character, patterned in some features of treatment after the famous St. Mark's of Venice, but comprising also an individual and modern adaptation of that style. The nave, choir and transepts meet in a central space of great length and width under a spacious dome. Towers rise from the nave end of the structure. There is ample room for ornamentation, both over the central dome and at the towers of the nave. One of the conspicuous merits of the design, indeed, is its ready adaptability to changes calculated to add dignity to the structure or to increase its beauty of outline.

ART NEEDS NO SPUR BEYOND ITSELF.—*Victor Hugo.*

A Philadelphia Office Building.

John F. Betz is erecting at the corner of Broad street and South Penn square, Philadelphia, Pa., a 13-story office building, which is estimated to cost, when completed, $1,500,000. It has a frontage of 104 feet 2 inches on Broad street and 100 feet 2 inches on South Penn square. It is 220 feet from the bottom of the foundation to the top of the cornice, and 194 feet from the pavement to that point. The building will have 304 offices finished in oak, with oak floors, while the corridors will have floors of mosaic marble tile. In the cellar will be the boiler and dynamo rooms, while the basement will

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be used for offices, having easy access from each street. The first story will have two large offices, the one on the south side of the corridor being two stories in hight, with a balcony around the room at the level of the second floor. Over the center of this office will be a large iron-domed illuminated tile skylight. The second floor and those above will be devoted to offices. Three high-speed hydraulic elevators will be located in the center of the building adjoining the main corridors. The entire building will be heated by steam and lighted by electricity and gas. The street fronts of the basement, the first and second story to the top of the second-story cornice will be of Eastern granite, while above the second story the building will be faced with Green River limestone. The style of architecture is known as the Modern Romanesque, elaborately ornamented. At the corner above the first story will be placed a cast bronze group of figures symbolizing Columbia encouraging the arts and trades. On a line with the eighth floor is to be placed a cast bronze statue of William Penn, standing on a corner column under a carved canopy. In suitable locations are to be placed heads representing different nationalities. The building will be as nearly fire proof as it is possible to make it, no wood work being employed in the construction of any part of the edifice. The architect is W. H. Decker of Philadelphia, and the contractor, Allen D. Rorke. It is expected that the building will be ready for occupancy some time in June, 1893.

A WORK OF ART SHOULD BE MORE IDEAL THAN REAL.—*Francois Delsarte.*

A New York Hotel.

A notable hotel building which has just been completed in New York City is the Holland House, located on the southwest corner of Fifth avenue and Thirtieth street. It was designed by Architect George Edward Harding, and is among the largest and handsomest hotels in the city. It stands 100 feet on Fifth avenue and 150 feet on Thirtieth street, rising 10 stories above the sidewalk and extending three stories below. It is built entirely of white Indiana limestone in the French Renaissance style of architecture and is highly ornamented with beautiful carving. The ground floor is devoted to business offices, *café*, bar, restaurant and dining rooms, and is fitted up in Numidian and Etruscan marbles, Florentine mosaic tile and wood work of red and white mahogany. On the second, third and fourth floors are spacious public parlors, dining rooms and private apartments *en suite*. The remaining six floors are devoted to guest chambers, all finished in white mahogany and quartered oak. The house contains 350 rooms for guests. It is lighted by electricity and heated by steam. The hotel completed and furnished is estimated to cost not less than $2,000,000.

BUILDING WAYS AND MEANS.

IT IS USUALLY THE CASE when a large office building is being erected that the structure cannot be utilized in a business way until the entire work is practically completed. This results in a great loss of time and money to the owner, as no portion of the structure brings any return on the investment until the entire building is ready for occupancy. Even where the question of time only is involved this loss is a serious matter. A way, however, has been found by which the lower stories of a building may be used for business purposes and thus bring the owner some return on his investment before the upper stories are completed. In a ten-story edifice in process of erection in Chicago, the first four floors are being used while the remaining six are in process of construction. As each story was finished a temporary tar roof was put over it, under which the plasterers, gas fitters, electricians, cabinetmakers and painters put the finishing touches on the lower floors of the building while the structural iron workers were setting the columns and beams for the upper stories. The experiment is said to have proven a success and it is thought will be followed elsewhere, especially when time is an important factor in the problem.

IN PUTTING UP LOFTY BUILDINGS, as well as those covering a large area, one of the principal obstacles to be overcome is in connection with the foundation. In order to prevent settling and consequent cracking and breaking of the walls, it is necessary to go deep enough in the ground to secure a perfectly solid base to support the building. In many sections of the country cities are located upon ground which does not offer the best conditions in this respect. A case in point is a prominent Western city where the architect has to contend with swampy ground, and where it is often necessary to go down 50 feet below the surface in order to reach a suitable foundation for lofty and massive structures. In many instances piling is used for the building to rest upon, in others a base of cement is put down and in still others a combination of steel and cement has been adopted. The latter style of foundation consists, in many instances, of a bed of square timbers, usually oak, upon which is laid a thickness of imported Portland cement. Upon this in turn is laid crossed tiers of steel rails or steel beams, the spaces between being filled in with cement. Upon this again are placed a number of steel columns by which the greater portion of the weight of the building is supported. Mr. Dankman Adler, however, a well-known architect of Chicago, has found that pile-driven foundations have proven capable of sustaining constantly varying weights without any appreciable settling, even where the pressure per square foot of surface was greatly in excess of 30 0 pounds. In connection with the 17-story German Theater Building, which he is putting up on Randolph street, of the city named, he is using piling as a foundation. The piles are driven 50 feet down until their points touch a stratum of hard blue clay through which they cannot be forced. They are placed as closely together as it is possible to get them and are driven over the entire area on which the building is to rest. When the driving has been completed the tops will be cut off and a bed of cement with crossed tiers of steel rails placed upon them as the immediate foundation upon which the steel columns supporting the building shall rest. With this foundation Mr. Adler expresses confidence that a 40-story structure can be built with perfect safety, at least so far as the foundation is concerned.

IT IS OFTEN A QUESTION how to put a commodious house on a small plot of ground. Various expedients are resorted to. There is scarcely a city in the country in which there is not one or more buildings erected under the conditions suggested, and which, accordingly, are veritable curiosities. What has recently been done in Washington is perhaps the most peculiar of all. An architect and a builder are concerned in the details, although we believe it was a woman's whim that caused the unique building to be put up. The lot on which the structure stands is three cornered. So limited was the space before it was covered with a building that no one could imagine how a dwelling could be built upon it, but the public was astonished by seeing two houses built on the ground. Taking advantage of the law of the district which permits 3-foot extensions over sidewalks, the available space was added to by extending the structure above the ground floor by three-story bay windows, which continue all around, save on the side adjacent to the next building. In this way the number of square feet on each of the floors has been nearly doubled, and one of the houses is made a fairly commodious structure The other one, which stands at the apex of the angle, is quite a curiosity. A reporter on one of the daily papers describes the ground space as "just about big enough to accommodate a small furnace and a ton of coal." This space, however, has been extended in the stories above the ground floor by the means already referred to so as to include nine fairly comfortable and spacious apartments, besides a bathroom. The walls are scarcely more than frames for the bay windows, so that the whole floor may be likened to a great bay window itself. Of course in a house of this kind various things are impossible upon a single floor, and therefore several innovations upon the usual way of planning have been resorted to. The kitchen, for example, is on the fourth floor, and above it, on the roof, are conveniences for drying clothes, the latter taking the place of the conventional back yard. On the outside of the house a dumb waiter runs up the four stories from the ground to the kitchen, serving the purpose of the ordinary dumb waiter in flat and apartment buildings. By means of it the grocer and the baker can stop in the alley, put their goods aboard and deliver them to the kitchen above. The projecting feature of these buildings, by which a greater space is obtained on floors above the ground than the original size of the lot, has given rise to the term "Japanese style." Whether this is a correct appellation or not, under the circumstances named, the reader can judge for himself.

THE MOVING OF LARGE BUILDINGS from one site to another has become quite common, and any one who is familiar with the scenes in a large city, says the *Railway Review*, has seen some pretty clever work done by those who have become expert in the moving business. Recently a job of this kind was successfully performed in Chicago in a manner which indicates a little more skill and considerably more daring than is usually exhibited in such operations. A four-story frame building on the north side of the city was to be moved to the west side, and in order to do so it had to be ferried over the river. The bridges are through span drawbridges, and could not be used for crossing the river. But that proved no obstacle to the man who had the moving in charge, and so long as the building had to go over the river anyway he determined to utilize it as a means of transportation. The structure was consequently rolled down to the river bank and loaded on two scows, after which it was towed up the river for more than two blocks, passing through a drawbridge on the way, which it cleared but a few inches. It was then landed at the foot of West Ohio street. This was on Monday. On that night two blocks of tracks were crossed, and in the morning the building had been moved far enough to clear all ordinary obstructions and make the rest of the work easy. The loading on the scows, the towing and unloading was a very delicate operation. The building stands over 50 feet high and is very narrow, and the least jar to the scows would doubtless have precipitated it into the river. The man who did this work is S. J. Wojtalewicz. It is reported that another building is soon to be moved in the same manner by another contractor.

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A NOTABLE SUBURBAN BUILDING OI

WENDELL

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ION—VIEWS OF HOUSES AT WAYNE, PA.

TH, BUILDERS.

FOR DESCRIPTIVE ARTICLE, SEE PAGE 209.

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A SUBURBAN BUILDING OPERATION.

IT IS A WELL-KNOWN FACT that by reason of peculiar conditions, necessities and environment, the city builder possesses many advantages in the pursuit of his chosen vocation which the country carpenter does not often enjoy.

As a general thing, a plot is selected on the outskirts of that portion of a city which has already been built up and which seems to offer excellent advantages in the way of prospective increase in valuation. Sometimes these operations are confined wholly within the city limits, and then again they are conducted just outside the city line, in the expectation that in the course of a comparatively short period the newly built up section will become a part of the city by the usual process of addition. Where the builder operates in this way outside the city line or in a portion of a city where the public improvements have not been completed, questions of water supply, street grades, sidewalks, sewerage, &c., come up for consideration. Many instances might be cited in and about large cities, such as Philadelphia for example, where enterprising builders have gone ahead of the city departments and on their own account have laid out streets, dug sewers, put down water pipes and completed the entire work without waiting for the city authorities. In such cases, where the work is done within the city limits, it is necessary to obtain permits and have the work done under city supervision, so that it shall conform to lines established by other conditions and in other directions; and where it is done outside the limits it is necessary also to conform to standards that will be acceptable to the departments when the plot is annexed.

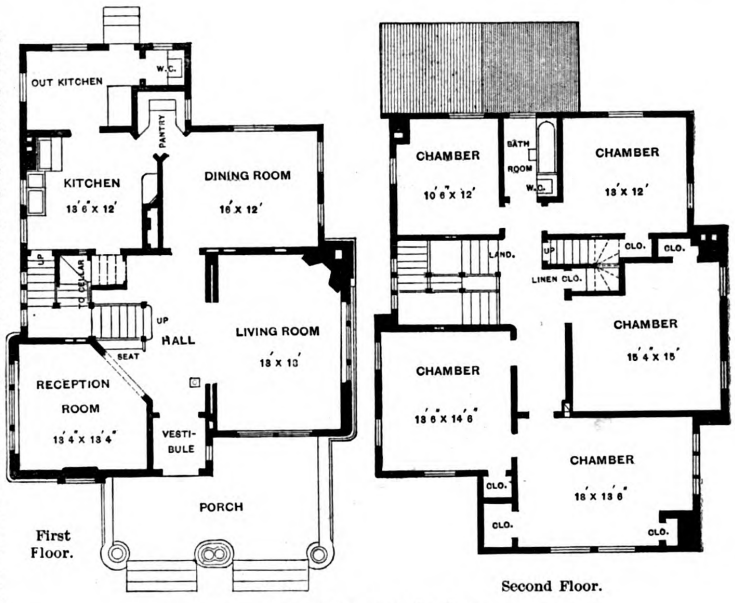


Front Elevation.—Scale, ⅛ Inch to the Foot.

ADVANTAGES OF THE CITY BUILDER.

The advantage which the city builder, or operator, as he is oftentimes called, has in constructing large numbers of houses, on the plan which has been outlined above, is something that is frequently the envy of his country brother, who builds one house at a time and is forced to contribute to each individual building as much of his own time, in the way of supervision and management, as the city builder gives to the operation of erecting entire blocks. From this it may be inferred that country building is seldom done on a speculative basis. For the most part houses are built to order, or at least one at a time. When the house is finished it is sold, and then a second one is commenced. Sometimes the builder occupies the house for a season, while it is in the market and while he is waiting for a purchaser. Many a country builder has envied his city brother the advantages derived from conducting large operations, and not a little thought has been expended on the problem of how to bring to the country the advantages

In a city the requirements of the people render profitable the conduct of building operations upon an extensive scale, by which is meant the construction of a large number of houses based upon practically the same set of floor plans and finished in a style which enables the contractor or builder, as the case may be, to purchase his materials in quantities. In work of this kind it very often happens that entire blocks of houses are built to nearly the same floor plan, the front of one building corresponding to that of all the others. It is, of course, cheaper to purchase lumber by the cargo than by the foot, front doors by the hundred than by the pair, and so with window sash, mantels and hundreds of other things that are usually included in the list of ordinary building materials. The same remarks apply to plumbing and gas fixtures as well as to furnaces or whatever form of heating apparatus is employed. Taking the whole work, therefore, there is such a duplication of parts as to bring the cost of each house involved in the building operation down to a figure below that for which a single dwelling of the same kind could be erected. It is in this way that cities have been rapidly extended and habitations provided at a cost far below the same general grade of accommodations in the country districts. While this system of operation or contract building has often been abused, it has in the long run proven a decided advantage and is in very common use.



Scale, 1-16 Inch to the Foot.

A Suburban Building Operation.—F. L. and W. L. Price, Architects, Philadelphia, Pa.

SELECTION OF THE GROUND.

Whenever a builder undertakes an operation of this kind, the first thing for him to do is to find a suitable piece of ground upon which to erect his buildings.

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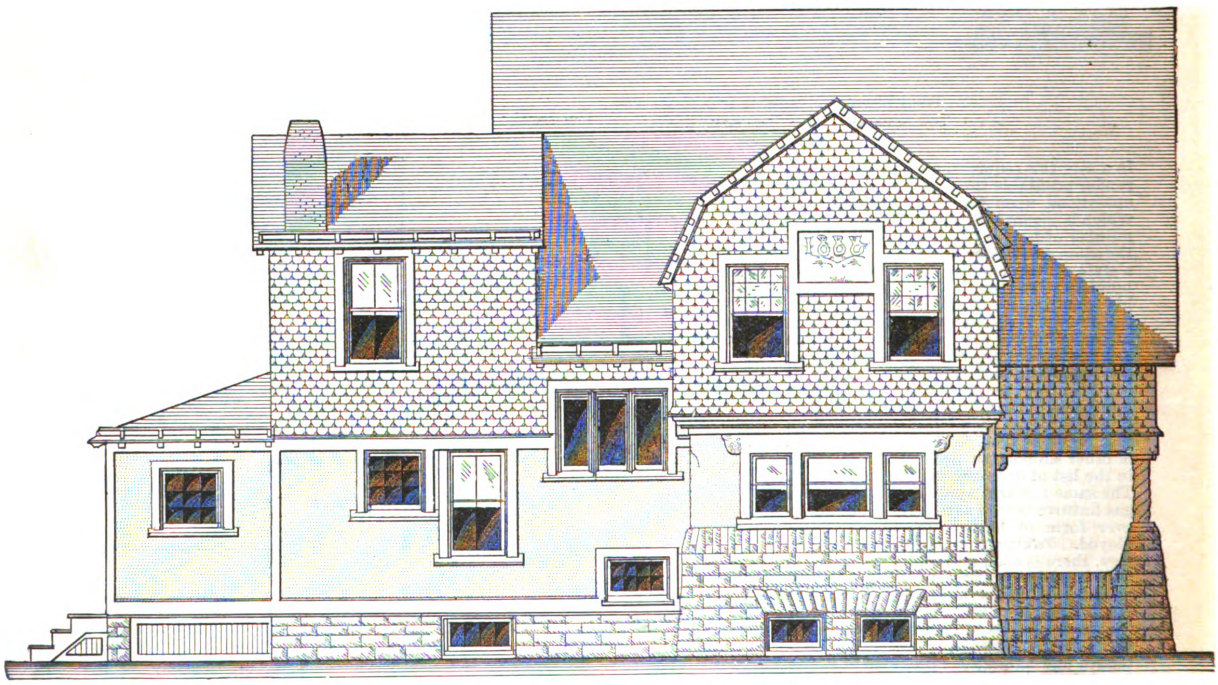
which are possessed by a rapidly growing city. How this problem has been solved, in at least one case, is our purpose to explain in this issue of *Carpentry and Building*. Incidentally we shall show how certain enterprising builders have prise upon the part of the firm whose operations we more specifically describe below, to cause them to engage upon an operation which at once called for the exercise of numerous functions. It was one that made them within a comparatively short period, architects, builders, real estate dealers, street commissioners, town improvement society, water board, steam heating company, electric light company, and possibly a half dozen others. But whatever may have been the case in this respect, they have made a great success of their venture, and we now submit an account of it for the consideration of our readers, both in the sense of a narrative which all will enjoy reading, and as an example for other enterprising builders to follow. We venture to assert that the time is ripe for operations of this kind. The time is at hand when the building business can be extended to the suburban districts on the operative plan, in a way which will result to great advantage to



Side (Right) Elevation.



Side (Left) Elevation.

A Suburban Building Operation.—Elevations.—Scale, ⅛ Inch to the Foot.

occupied a most eligible section of ground in the country, in a way to bring within the reach of a large number of people suburban residences with all the comforts and conveniences which a city affords. It, no doubt, required a great deal of enter-

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those who are sufficiently enterprising to lead.

WAYNE, PENN.

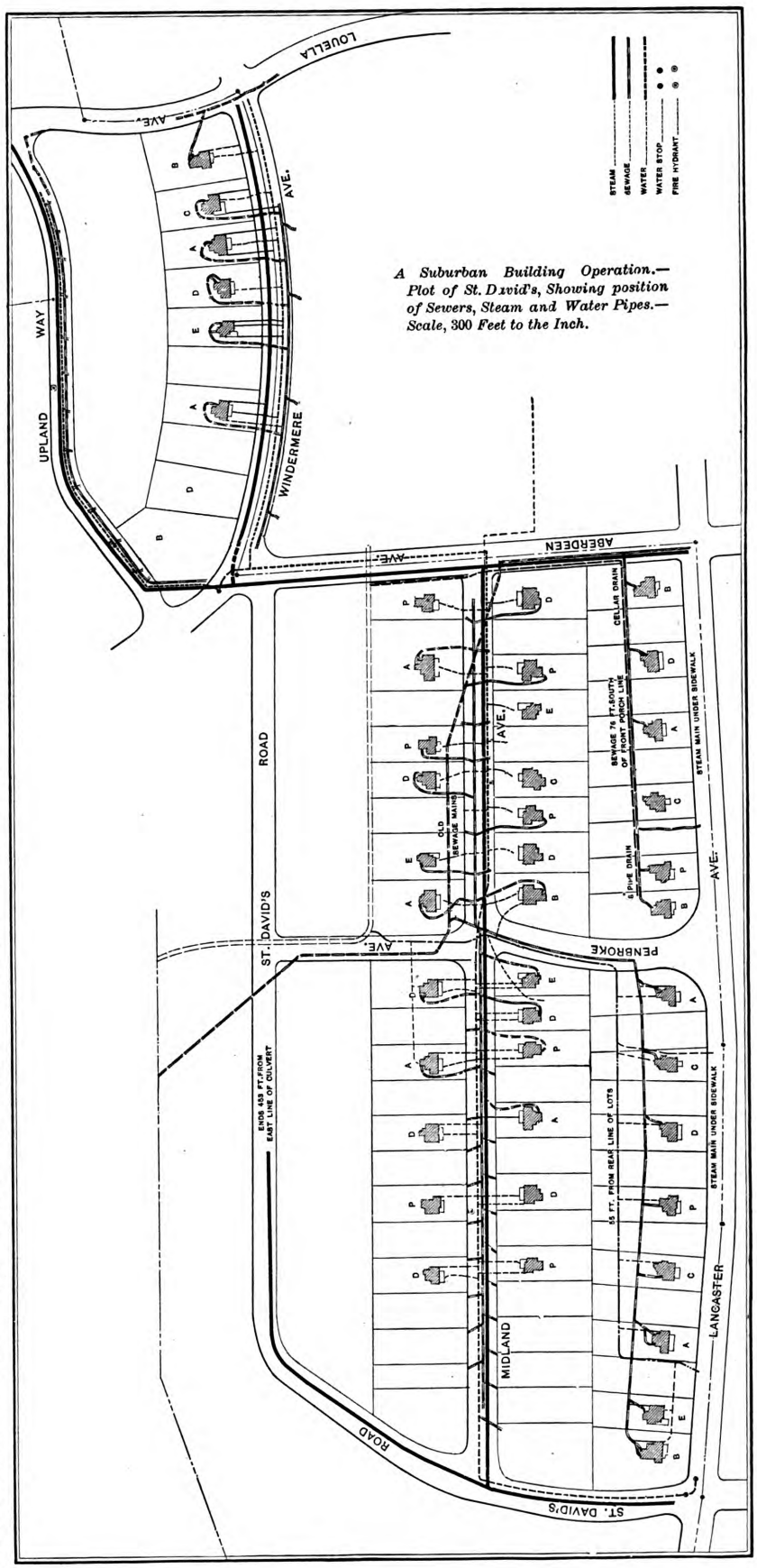
The scene of the operations which we are about to describe is the handsome suburb of Wayne, located in Delaware County, Pa., on the main line of the Pennsylvania Railroad, a half hour's ride from the city of Philadelphia. The territory of this town embraces an area of about 600 acres of plateau, environed by woodlands, the hight of the section being about 400 feet above the level of the sea. The original title for the land, comprising the Wayne estate, dates back to December 1, 1685, and was a patent grant of some 500 acres of land by William Penn to David Towell. At the present day there are still remaining of the old landmarks the St. David's Church, in Southwest Wayne, founded in 1700, and the Great Valley Baptist Church, in Berwyn, founded some 11 years later. The tract named embraces three stations on the main line of the Pennsylvania Railroad —namely, St. David's, Wayne and Strafford. In the preliminary town building the ground was carefully surveyed by Geo. W. Hancock, and then resurveyed by George B. Mifflin of Wayne, who has been the supervising engineer of all recent work.

THE BUILDERS AND THEIR WORK.

The firm of enterprising men who have built up some 125 acres of this town is Wendell & Smith, with offices at Wayne and also in Philadelphia. In conducting these operations it has been the custom of the firm to construct anywhere from three to a dozen or more houses at a time, but instead of erecting them in blocks or rows, as is customary in the city, they have interspersed them with other designs. Then by variations in external architecture, painting, color of stone-work and staining of roofs, enough variety has been given to prevent any but an expert from detecting the points of similarity between any two houses in the same neighborhood. The double-page plate, which is presented in connection with this issue of the paper, affords an excellent idea of the work which Wendell & Smith have been doing at Wayne, and of the general appearance of some of the leading avenues of the town. We also present the floor plans and elevations of one of the houses shown in the group, the one selected for the purpose being that indicated in the upper right-hand corner of the supplement plate.

PILLAR HOUSE, WAYNE, PA.

In designing this house the idea of the architects, Messrs. F. L. & W. L. Price of 731 Walnut street, Philadelphia, has been to obtain, by the use of hard material, a strong foundation up to the second story, and by this means avoid the shrink-



A Suburban Building Operation.— Plot of St. David's, Showing position of Sewers, Steam and Water Pipes.— Scale, 300 Feet to the Inch.

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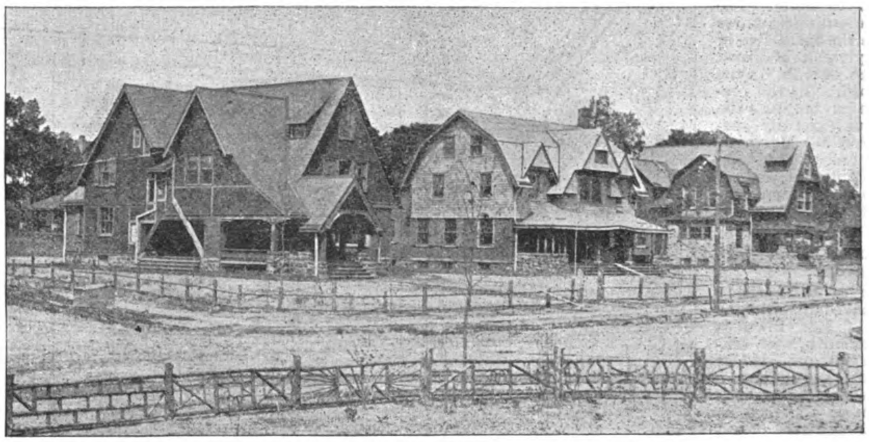
ing of timber construction. It will be noticed that the stone work is carried up to the window sill lines, while above that is brick roughcast, or, as it is more generally termed, "pebble dashed." The second story is covered with stained shingles, while the gable finish is in plaster, pebble dashed. Referring to the floor plans it will be seen that provision is made for five rooms on the first floor and the same number of sleeping rooms on the second floor. An interesting feature of the house is the arrangement of the front hall and the reception room at the left as one enters from the vestibule. The stairway is made open, and the whole space downstairs so arranged as to give an airy effect. This has been done in such a manner that while the living rooms are in easy communication one with another the house is not spread over an unreasonable amount of ground. A very neat effect is produced by the entrance to the reception room in connection with a seat running along the main stairway. The chimney is carried up entirely of stone, affording a flue for the library grate, or living room, as it is designated on the plan. The kitchen, which is in the rear of the main stairway, is connected with the dining room by means of a pantry, while there



A Suburban Building Operation.—Row of Houses on Midland Avenue, St. David's, Pa.

is a direct door from the kitchen past the cellar stairs to the front door.

On the second floor the chambers are provided with ample closet room and are easily accessible from the main stairs, which rise from the central portion of the house. The bathroom is at the end of the hall and to the rear of the house. The inside work is of white pine, treated in such a way as to give the effect of hard wood finish, except the first floor, which is oak throughout.

Running around the front of the house above the porch is a base of 12 x 12 oak, so placed as to sustain the floor above, even though two of the columns beneath should be removed. The room over the porch is protected against the weather by having the floor laid with building paper, plaster and tongue and grooved boards beneath it. The roof is capped out and closets are made in corners of the house for the purpose of hiding the cut of the roof. The house here illustrated has been duplicated in several instances, with slight modifications, and in exterior treatment has been varied so as to give an attractive landscape effect. In the different houses which have been erected from these plans by Messrs. Wendell & Smith six different kinds of face stone have been employed.

WORK AT ST. DAVID'S.

The first operations of the firm of builders were as, already described, conducted at Wayne, located north of the railroad, but these were rapidly followed by those at St. David's, where they profited by their experience in connection with the work at Wayne. The map shown herewith represents the field of operations at St. David's, which tract adjoins that of Wayne, while the illustrations which follow represent some of the later work of Wendell & Smith, at St. David's. The map referred to shows, by means of solid and broken lines, the location of steam pipes, sewers, water pipes, fire hydrants, &c. The water was originally secured by leading a number of small springs to a central bowl of concrete, from which it was pumped to an earthen reservoir at an elevation sufficient to carry it by gravity, with ample pressure, to the various houses. As the demand increased a large well was made by building a 24-inch wall in a circle with an open space 20 feet across, the wall being 35 feet high. After this the wall was covered with vertical timber and hooped with heavy iron bands. The earth was excavated in the center and below the walls and the whole gradually sunk in the ground. This well gave a steady supply of 100,000 gallons per day, and another source of supply located about a mile to the north of the railroad has lately been developed.

The plan of sewage is based on Col. George E. Waring's system of absorption, and the plant which he is at present enlarging will have a capacity for 5000 people. Long lines of porous tile are laid in ditches which are filled with stone and covered with about 18 inches of earth. These ditches are divided into three parts, or systems, which can be used in rotation, while all are supplemented by a hillside, to the top of which the sewage water is forced and allowed to flow down through lines of nearly level ditches, thus securing an extended absorbing surface.

THE HEATING SYSTEM.

The heat for the town is furnished by the Wayne Steam Company, who were incorporated on August 6, 1890, with a capital stock of $10,000, but which has since been increased to $50,000. The system employed is that of the American District Steam Company of Lockport, N. Y. The preferred plan in the houses is the indirect system. The steam delivered from the central plant is automatically regulated in the houses, thus insuring, it is said, an even temperature at all times. The Steam Company's plant is located in Southeastern Wayne, near St. David's Station, and consists of a large brick building containing two horizontal tubular boilers, each of 120 horse-power and over 3.11 miles of pipe laid under ground, of which 11,571 feet are mains and 4892 feet service pipes. The steam mains are 8 inches in diameter, starting from the boiler house, falling to 6 inches along Lancaster avenue, and reducing to 4 inches on the side avenues. The iron pipe employed is covered with tarred asbestos paper, secured with wire and laid with a wood log covering, allowing 1 inch air space between the pipe and log, the latter being lined with tin. About 50 feet apart are placed expansion devices, which are built around with brick, filled with mineral wool, and the whole line tied together with iron rods from end to end for the purpose of securing the expansion devices firmly in place. Under the whole line porous tile is laid, to carry off any water which may reach the pipes. Last winter, it is stated, the company carried 40 pounds pressure on the boiler, 10 pounds on the main, and about ½ to 1 pound pressure on the house pipes. A lever valve with weight enables the householder to regulate the amount of steam entering the fixtures, and the arrangement is such that each fixture can be shut off without affecting the others. By the indirect system the radiators are placed in the cellars, with separate flues to each room. The ventilation in the houses is such that as much cold air is taken out as there is of heated air introduced. The water of condensation is carried through a steam trap to a coil of pipe called the "cooling coil" from which it is discharged to the sewer with very little heat, probably not over 80°.

The town is lighted entirely by Edison's system of electric light, furnished by the Wayne Electric Light Company who were incorporated January 18, 1886, with a capital of $14,000, but which has since been increased to $50,000. The company have about 25 miles of lines, six dynamos and four boilers of 100 horse-power each. According to last reports there were 3500 lamps in use with an average candle-power of seven each.

SOME HOUSES AT ST. DAVID'S.

It will also be seen that on the map each house is designated by a letter of the alphabet, and that the letters are frequently duplicated. An explanation of this is found in the fact that each building erected from the same set of floor plans is represented by the same letter. An examination of the plot on page 211 of this issue will give the reader a good idea of the manner in which the houses built according to one set of plans are scattered among those of different design in order to vary the street architecture and enhance the landscape effects.

The row of dwellings shown on this page are situated on Midland avenue, St. David's, while the house in the foreground of the upper picture on page 213 is located on the northwest corner of Pembroke and Midland avenues, and is known as Plan B, according to the builder's scheme of

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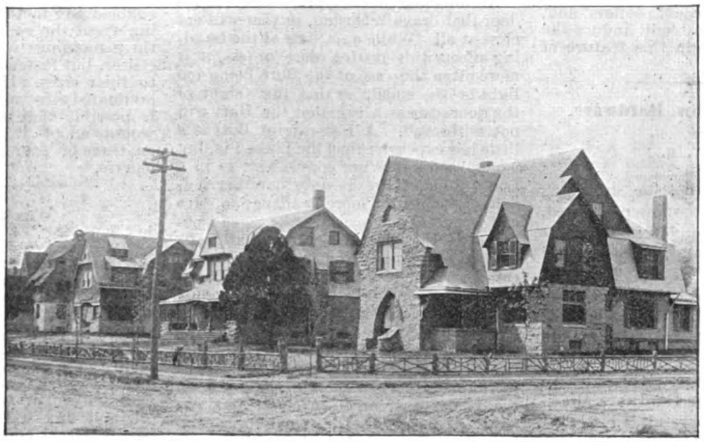
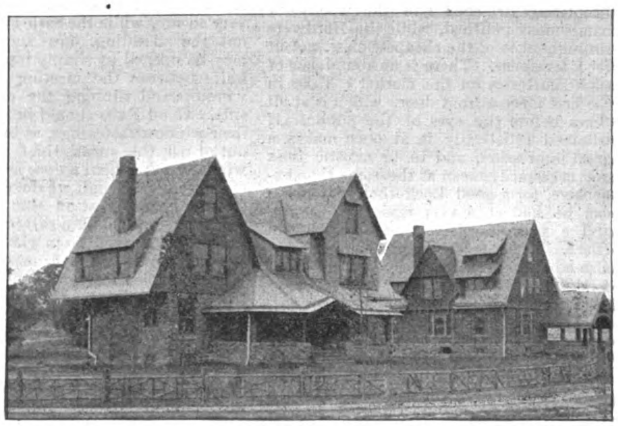
designation. The first house in the lower right hand picture on the same page is situated at the southwest corner of Pembroke and Midland avenues, and is known as Plan A. The lower left hand picture represents a dwelling erected in accordance with Plan C. All of these are included in the later work completed by the builders at St. David's.

The buildings erected at Wayne and St. David's by Wendell & Smith, up to a recent date, number 170, valued at $1,182,220. In preparing the plans for this work the builders have had the assistance of the following architects, all of Philadelphia: F. L. & W. L. Price, Brown & Day, J. C. Worthington, Miss Minerva Parker, William L. Baily and Horace Trumbaer.







A Suburban Building Operation.—Views of Some of the Recently Erected Houses at St. David's, Pa.

Simplicity in Furnishing and Decoration.

If only people could be guided into simple habits and ideas as regards so-called comforts and ornaments, we should not only be more likely to develop nobler art, says the *British Architect*, but also to secure less of toil and trouble in the care and keeping of the useless gimcrackery with which the homes of all, from noble dukes to well-to-do tradespeople, at present abound. As a rule, it may be safely admitted that rooms are too much furnished and that the doors, windows, fire place, floor, walls and ceiling have too little competent care bestowed upon them. Were the constructive features of a room properly looked after, much furniture and upholstery would be as needless as it is troublesome to keep in order and move about. And this brings up another important point in house furnishing too often forgotten—the question of dust. Dwellers in town are particularly subject to this all-prevailing evil, an evil arising not altogether from without.

Houses are more or less vibratory, especially where there is heavy street or train traffic in the vicinity, and we have not yet cleared out our stock of smoky flues. So that in addition to paying particular attention to the fitting of doors and windows, we would urge the selection of only such furniture as may be easily moved about, or so raised above the ground as to leave at least 9 inches clear space underneath. Avoid useless side tables and cabinets, which are so often dragged in for no other purpose in the world but to carry "art emporium" rubbish. Remember that all furniture beyond what is really necessary for comfort and convenience only provides so many more traps wherewith to catch the dust. Avoid all woolen or fluffy material in such upholstery as it may be deemed necessary to have. These two or three simple hints can be acted upon by nearly everybody. To those whose means admit of it, we would suggest the use of thin parquet over old floors; upon such a floor only one or two rugs, in lieu of the usual carpet, would be needed, which should be of a close, hard texture. Then we would substitute the grand or semi-grand piano for the dust-attracting cottage instrument where possible, and abolish forever the hideous practice of covering our furniture with all kind of drapery and frippery.

Scheme for a Gigantic Tower and Hotel.

Another gigantic hotel and tower project for the World's Columbian Exposition has been set on foot by the Park View Hotel and Tower Company, incorporated under the laws of Illinois, with a capital stock of $800,000, all of which, it is claimed, has been subscribed. The directors of the company are E. W. Allen, Louis Shissler, W. H. Dougherty, J. B. Long and Architect Pearley Hale. The enterprise has been gradually assuming tangible form in the hands of these men for several months. The tower, which is to be built first, will be 533 feet high and constructed of steel throughout. It will have six balconies, two about 150 to 175 feet above the ground, and the rest higher up and about 100 feet apart, the topmost one being in the form of a huge globe. Three of the upper balconies will be inclosed with glass, while the rest will have simply open lattice work around them. The hotel is to occupy the space between the ground and the first balcony. Its proposed dimensions are 160 feet frontage by 125 feet in depth. Steel will also be the principal material used in the construction of the hotel. The building will be fire proof, with pressed brick exterior and

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stone trimmings. The tower will be reached by four elevators running from the ground to the first and second balconies. From there the floor of the big globe at the top will be reached by two elevators. It is the intention of the managers to charge a certain fee for admission to the first and second balconies. An additional fee will be charged for ascending the rest of the way. The site selected for this new concern is on Stony Island avenue near Sixty-third street and almost opposite the central portion of Jackson Park. The company have an option on the ground and will purchase the same outright. It is thought the tower as far as the first and second balconies will be completed within a year. The globe at the top will have a bright electric light to serve as a beacon to sailors, and, if possible, the company will induce the Government to maintain this feature of the affair.

Door and Window Hardware.

BY W. W. B.

Suitable and appropriate trimming is something that is too often slighted, both by owner and architect, and the tendency to cheapen the entire contract by reducing the cost of the Hardware is daily evidenced by the appearance of some of our buildings. As a rule, the Hardware is a neglected matter until the building is nearly completed, and then as an offset to the excess in expenditure in other details, the Hardware allowance is cut down. The result is just what you might expect. A handsome house or apartment with everything of an elegant appearance, the floors tiled, the walls beautifully frescoed and the woodwork handsomely polished, while the Hardware throughout is of the cheapest class, not fit for a tenement. There is an abundance of such Hardware on the market. Take in the first place a front door, which is at all times before the eyes of the public. If trimmed artistically it at once makes a good impression, and to be artistic does not necessarily mean at the same time expensive, for a good Lock that is reliable can be had at a very reasonable figure, and a plain Grille will pay for itself in effect. Ornamental Hinge Straps will also add wonderfully to the appearance of a house, while on the other hand a cheap Lock and trimming will cheapen a door, no matter how handsome it may be. A door cheaply trimmed makes just the same impression as a soiled shirt front on a person, both are criterions by which you may judge of the rest of the make up.

Locks for interior doors need not be either elaborate or intricate, but they should be in keeping with the other appointments; if an ornamental design is too costly then plain trimming is by all means in good taste and, like black clothes, always in keeping. When the cheap ornamental designs have the word cheap woven in the pattern, the owner makes a sad mistake when using such goods; the public notice and are influenced by such apparently little things. Plain Bronze Hardware is but very little more expensive than the cheap trade ornamental goods, and its application shows vastly better taste. Then, again, the utter disregard of the general architecture of the building in applying trimmings, also of wood finishes, is a very common mistake. The effect of an elegantly carved door of a Romanesque style trimmed with Colonial Hardware is not only an example of bad taste, but is a mistake that means a money loss, as a tenant may not be artistically educated, still a feeling of inconsistency will be experienced, for no person is so constructed that discord will not affect to a more or less degree.

No clause in the contract is so much neglected, nor none of more importance, than that one relating to Hardware. In the matter of Butts there are many varieties from which selections may be made, but experience and judgment should be brought to bear in this matter. Bronzed Iron Butts for the purpose of hanging the door do the work as well as the more expensive solid bronze, but they will not remain bronze but a short time. The appearance of iron on a hardwood door, where the lock trim is bronze, certainly is not pleasing. Then, again, the mistake of cheapening the trimming by using a light Butt is a most serious one.

Nothing can be more provoking than a door that drags in closing, or that will not close at all. While a settling of the building affects this matter more or less, it is more often the case of the Butt being too light or too small, so that the weight of the door causes a sag that the Butt will not withstand. A Loose-Joint Butt is a little less expensive than the Loose Pin, but is not so durable nor convenient, as in a Loose Joint there is only one bearing, and consequently more tendency to give and wear, thereby causing the same trouble as in the case of using a light Butt. The Loose Pin has three bearings, and in case of a necessity to remove the door it is much easier to do so. A conspicuous fault in the present cheap trimming of flats and residences is the fact that the Keys are interchangeable, or, in other words, the Key that opens the hall door is more than likely to operate the Lock on the pantry door or linen closet and *vice versa*. This may be overcome by specifying in contract that the Locks have two or more tumblers and all to be different.

Then, again, we find that the front-door Lock is of a most approved make and very secure, while the Sash Fasts throughout the building are such that they may be opened by simply inserting a pen knife between the meeting rails of the windows and slipping the catch to one side. Good Fasts should be used in first-floor window fastenings, as in seven cases out of ten the sneak thief will select a window rather than a door as a means of entrance. Although we do not know of a burglar-proof Fast on the market, still there are some that are so secure as to be immovable unless glass in window is broken to reach them. At the same time it is very desirable to have a Fast that will bind the lower and top sash together, thus preventing a draft between; also the annoyance of window rattling. A Fast that simply secures the window from being raised is not a suitable one. Slight attention to the minor matters and better satisfaction will be the result.

Laminated Beams.

The roof of the Leeds Town Hall, designed by Mr. Cuthbert Broderick is noticeable for the absence of tie beams, says the British *Architect*, which allows of the ceiling of the hall being brought nearer to the exterior of the roof than is usually the case. The roof consists of eight sets of principals framed together. Each principal consists of a semicircular laminated rib, formed of 12 1½-inch planks, 9 inches wide, nailed together and fastened with wrought-iron bolts and straps. They are placed in couples, and stand immediately over each of the columns in the hall. They are respectively 4 feet and 18 feet apart. The width of the room is 71 feet, and the springing of the ribs 53 feet from the ground. The entire hight to the top of the roof is 99 feet, the hall being 73 feet high in the clear. This system of roof has been adopted more frequently in France than in England. The laminated rib is the invention of a French engineer. It was at first suggested for a bridge over the Rhine in the year 1811. Several years later M. Emy constructed several roofs on this plan, but all his roofs, being very near to the ground at their springing and without ceilings, are consequently much more manageable than the roof of the town hall, which has a very elaborate plaster ceiling attached to it, and the springing is at a considerable distance from the ground. Precaution had to be taken to insert several additional struts and braces as a preventive against any change of form or outward thrust. Both these points had been attended with the most complete success, there being not the least perceptible outward thrust or change of form. The latter fact was proved very satisfactorily by the plasterers, who were enabled to run the moldings on the ceiling from the center. The brackets for these moldings were not gauged from a center, but fastened to the ribs according to their sizes. If the principle of these laminated ribs were better understood, it is possible that many of our architects would adopt it, instead of depending on three or four overstrained joints for one tie.

Waxing Floors.

A good preparation for waxing floors, says the *American Druggist*, may be obtained as follows: Of yellow wax, take 25 ounces, yellow ceresin, 25 ounces, burnt sienna, 5 ounces, boiled linseed oil, 1 ounce, and of oil of turpentine, 30 ounces. Melt the wax and ceresin at a gentle heat; then add the sienna, previously well triturated with the boiled linseed oil, and mix well. When the mixture begins to cool add the oil of turpentine, or so much of it as is required to make a mass of the consistence of an ointment. Yellow ceresin is purified ozokerite, (fossil paraffine), and may be had in almost any quantity. The burnt sienna may be used in smaller or larger quantity, according to the tint desired, or may be replaced by raw sienna, &c. Dieterich recommends the following: To 400 parts of boiling water add 200 parts of yellow wax; when this is melted, add 25 parts of carbonate of potassium; boil for a moment or so, then remove the vessel from the fire and add 20 parts of oil of turpentine. Stir until cool, and dilute with water to make 1000 parts. If the floors are well preserved, the dilution may be carried to 1500. The object of the potassium salt is to form an emulsion with the wax.

AN AMERICAN ENGINEER writing from China gives the following account of the Great Wall of that country, together with a description of the brick of which it is composed: "What interested me as much as anything that I saw in China was the Great Wall along its old northern boundary. From an engineering standpoint it is simply a marvelous piece of work. We passed through the Tieh Men Kuan gate, which means the great iron gate. The wall was at that point in a perfect state of preservation. It was 30 feet high, with a width of 12 feet at the top. The foundation was of squared granite blocks, and on them were built two brick walls. The space between those walls was filled in with dirt. And by the way it seems to me that the Chinese bricks furnish just the colors that some of our architects are looking for. When they are baking water is thrown on them and they come out of the kiln a bluish color. The effect of these shades of blue in a Chinese building is pleasing and might be advantageously tried in some of our American houses. When you realize that the foundation for the 2000 miles of this great wall is built entirely of squared granite blocks, and that the wall runs over the crest of some very high and steep mountains you can appreciate the difficulties that must have been overcome in building it."

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SHEET-METAL STORE FRONT.

THE SHEET-METAL FRONT which was furnished for a store building on Newark avenue, Jersey City, N. J., a short time since, by Jacob Ringle & Son of that place, so well embodies modern ideas in architectural sheet-metal construction that we have had engravings of the same prepared and now submit them for the consideration of our readers. The building in question is two stories in hight and the iron work included the entire front, as shown in the elevation and sections presented herewith. The architect was George C. Bettcher, 40 Montgomery street, Jersey City. In order to give pleasing variety to the front and to add to its attractiveness, as well as to the convenience of the upper room, a bay window was thrown out with a very slight projection. The lintel cornice butts into this at either side, while the bottom of the window is finished by mitered work, as indicated. At the top the foot mold at the cornice continues around the bay, while the part corresponding to the frieze is finished in a manner peculiar to itself. The upper part of the bay is extended up in the shape of a conical roof, from which rises a flag staff. Our engravings show all necessary details, so that further description is scarcely necessary. The entire work is made of No. 24 galvanized iron, the various portions being combined in such a way as to conceal joints. Special care has been taken to so construct the work as to make it proof in the event of fire. The attractiveness of the sheet metal lines in themselves has been enhanced by judicious painting. The last coat received a sanding and is of a tint to represent drab stone.



Sheet-Metal Store Front.—Elevation and Section.

Architectural Terra Cotta as Compared with Stone.

Some writers on the application of building materials have the impression that architectural terra cotta can be used in the same sense as stone in construction substantially as well as ornamentally. This, however, is not a fact, says F. P. Meyenberg in a recent issue of the *Brick, Tile and Pottery Gazette*, as the following examination of the subject will explain:

There are tests on record proving that terra cotta will stand an equal crushing strength to any granite, to the square inch in solid material. That cannot be denied; but when we enter into the construction

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of so-called stone buildings, or application of stone in all its various forms, with the required dimensions as necessary in the use of stone to carry out successfully designs and plans prepared to be in harmony with the character and appearance of such construction, then under the same conditions terra cotta would be unfit on account of its uncertainty of strength when in large pieces. Aside from strength in large pieces it can further be said that it is difficult to make it true, once passing its limit of easy manufacture. And then, too, if made beyond its strength-appealing feeling, it must be acknowledged that terra cotta bears the impression rather of artistic tone than the cold cast suggesting strength as conveyed by stone.

In the erection of weighty buildings, where strength in the construction is one of the chief requirements, and the adopted building material stone and bricks, it has been found necessary by experience to limit the dimensions or stone, as the bond must be the same as the hight and the length not to exceed six times its hight. How impractical it would be to attempt such proportions in terra cotta! In cases where stone appears as trimmings, being a mere veneering of a structure, it does not directly become a part of the carrying capacity of the walls. The bonding or connecting of the stone facing with the brick masonry is mostly by means of iron anchors, permitting a slight separate action of variation in shrinking of brick masonry without materially affecting the position of the stone work. Entering upon the application of architectural terra cotta as a general building material in the sense of using it like stone, in connection with its adaptness, its character actually and sensibly considered as a building material—recognizing the difficulties, expense and imperfectness of solidity experienced in its manufacture—if the proportions of its economical limits are exceeded, in no cases can large pieces of architectural terra cotta enter upon equal basis as to strength with stone, where terra cotta, like stone, becomes a part of the carrier of the structure itself.

Supposing the corner of a weighty building 150 feet high were laid up with terra cotta hollow quoins 15 inches high. Such hight of wall would represent 120 courses of the described quoins and equally as many joints; the same hight built up of common bricks would make 720 courses, or six times more mortar joints and shrinkage to that of the quoins. It can readily be seen that such uneven shrinkage must be damaging to the lower courses of the terra cotta, as the load of the wall will tear down upon the flimsy (generally only 1 inch thick) partition or struts of the terra cotta blocks, which might, if bedded solidly against a resisting material, carry a weight of 12,000 pounds to a square inch; but under the described position, often only a few pounds pressure will break away the part and cause cracking of the block.

Were it possible and practical, from a manufacturing standpoint, that architectural terra cotta could be made solid into large blocks, of uniform hardness and free from cracks, then only crushing tests need be taken into account, but as long as transverse strength, depending upon numerous imperfections by drying and burning, contracted and damaged struts, is the relied upon agent for safety, terra cotta will always be faulty whenever used in connection with heavy building materials to be made answerable to bear weight such as would be safe even of very inferior stone work. Terra cotta blocks made in small sizes, 4 and 6 inches thick, of which the manufacture is easy, cheap, and without the imperfection caused by unequal drying, producing breaks in every direction, it may be said, can be built up to any hight as architects and engineers have deemed it economical and practical for modern conditions and requirements of the most lofty buildings. And, further, in such sizes it can be made and furnished at favorable prices, while in the form of large stone work it would cost much more than granite and failure in its use.

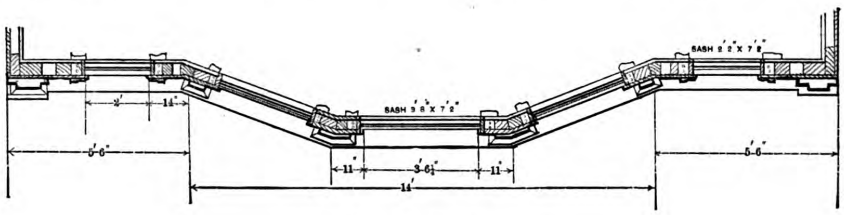
The Largest Plank in the World.

The *N. W. Lumberman* gives an engraving from a photograph of a redwood plank that is 16 feet 5 inches wide, 12 feet 9 inches long, and 5 inches thick, and is about 90 per cent. clear. It was taken from a tree 35 feet in diameter and 300 feet high. According to its rings it was more that 1500 years old. The tree was cut 28 feet from the ground, and the plank was hewed out of the stump, representing a section taken from near the heart to the bark. After it was displaced it was lowered by block and tackle, with a locomotive for power. In the way of labor its cost represents the time of two men for a month, simply to prepare it in the rough for shipment. To this the cost of transportation must be added, making a total of about $3000. It was moved by water to San Francisco.

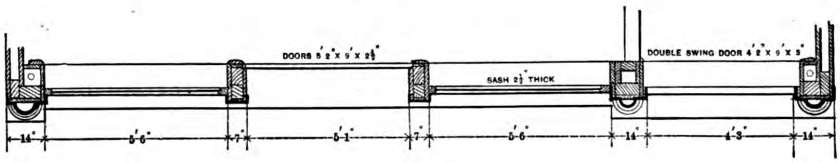
After being on exhibition some time, a car was specially prepared to transport it to Chicago. This was done by cutting a slot in the center of a flat car, in which stirrups were pendent. The plank was placed on edge in the slot, its lower edge being within about a foot of the ties. The plank was cut on the lands of the Elk River Mill and Lumber Company, in Humboldt County, Cal., is the property of J. L. Harpster of Eureka and B. F. Noyes of San Francisco, and is on exhibition in Detroit, Mich., whence it may be sent to East Saginaw and elsewhere, to finally bring up in Chicago at the world's fair. The plank shows coarseness of growth, with richness of figure, and a finish such as the highest quality of material and the best efforts of Berry Bros. of Detroit can secure.

Some of the Uses of Wood Pulp.

Wood pulp is now extensively used as a composition for moldings and decorative purposes in private and public buildings. In the manipulation of this composition beautiful effects can be obtained by mixing in it the various analine colors—strong or tinted—or those known as metallic colors. Bronze powders of varied colors may also be used with pleasing results. By the use of this material all the better qualities of fine-grained wood are obtained without any of the drawbacks of shrinking or expanding on account of atmospheric conditions, says the Pittsburgh *Dispatch*. The extent to which the wood-pulp business has been developed in this country is not generally known. The inroads on our forests which the growing consumption for railway ties, building and the requirements of the press involve are enormous. So serious has this matter become, it is stated, that unless each State passes a law for the encouragement of tree planting, so that our woods can be replenished, there will soon be a tree famine. As giving an inkling of the magnitude of the general consumption of wood pulp, a correspondent states that for a single edition of a prominent daily paper 17 tons of blank paper was recently required. This was the product of 67 cords of poplar. In 22 hours from the time of felling the trees it had been turned into printed papers. The process is thus divided with respect to a test case: Chopping 1½ cords of wood, 3 hours; manufacturing into pulp, 12 hours; transporting to printing office, 1 hour and 20 minutes; wetting paper preparatory to printing, 30 minutes; printing 10,000 copies, 10 minutes. This shows the rapidity with which raw material may be turned into a finished article. When it is considered that the foregoing figures refer to only one paper in one city, and that almost every newspaper is printed from material consisting largely, and often almost wholly, of wood pulp, which is also used in the production of nearly all common and medium grades of paper for almost all uses, the magnitude of the consumption of wood in pulp making becomes apparent.



Plan of Second Story.



Plan of First Story.

Sheet-Metal Store Front. *(See Article on previous page.)*

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CORRESPONDENCE.

Design of Double Bake Ovens.

From F. J. G., *Denver, Col.*—I notice in the March issue of *Carpentry and Building* the request of a correspondent for sketches of bake ovens. There is a pair of 10 x 12 foot ovens at Fort Logan, Col., which are perfect in all respects, and I have no doubt a description of them will prove of interest to many readers of the paper. While they are probably larger than most people would require and constructed in accordance with army regulations, the proportions are given from which other ovens of a similar nature could easily be made. These ovens, a front elevation of which is shown in Fig. 1 of the engravings, were erected under the direction of Capt. L. E. Campbell, Assistant Quartermaster United States Army, from designs prepared by Col. George Bell. The description here given is taken from the work of Colonel Bell, entitled "Bread Making, Permanent and Field Ovens and Bake Houses."

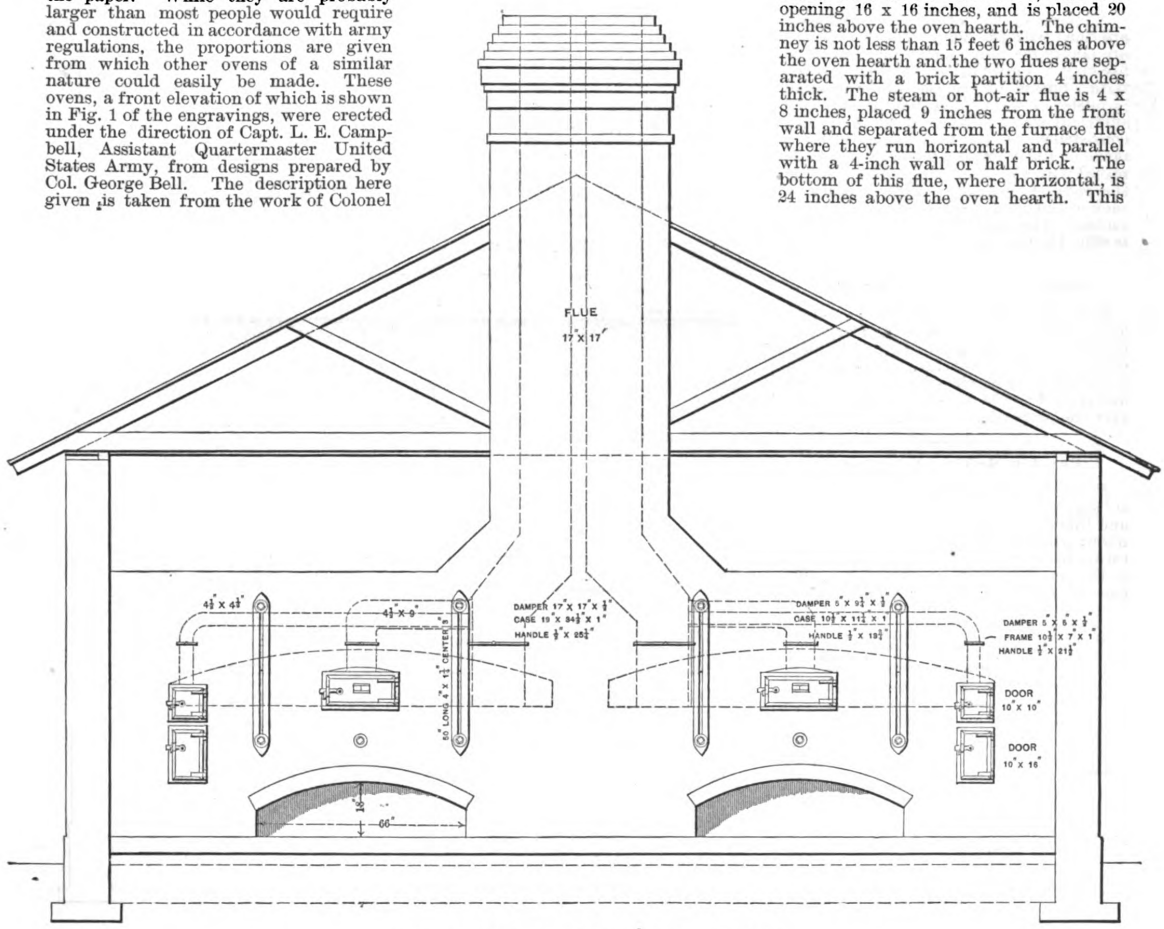

Fig. 1.—Front Elevation.—Scale, ¼ Inch to the Foot.

Design of Double Bake Ovens at Fort Logan, Col.

The ovens are constructed of good common hard brick, and all parts exposed to heat lined with fire brick. Fig. 2 of the illustrations represents a longitudinal section through the ovens, while Fig. 3 represents a plan of the two ovens. The outside measurements are 16 x 25 feet 6 inches and 7 feet high above the hearth or bakeroom floor. The division wall between the ovens and the outside rear and side walls are built 17 inches thick. The ovens are 120 inches wide and 144 inches long. The hearth of the ovens is placed 40 inches above the foundation. The crown of the arch is 18 inches above the hearth and the spring of the arch 8 inches above the hearth at sides and end. The cut of corners is of 36 inches radius. The arch under the oven is of 66 inches span and 8 inches high above the hearth at spring of arch, 18 inches high at crown of arch and extends through to the rear wall, giving a place for the firing tools, &c. The object of this opening, however, is to give a heat below the ovens equal to that above.

The furnace doors are 12 inches long on the frame outside and 12 inches high, 1 inch thick and 4 inches wide. The doors are 10 inches high and 10 inches wide. The oven doors are 24 inches long on the frame outside, 12 inches high, 1 inch thick and 4 inches wide. The doors are 10 inches high and 22 inches long. The ash pit doors are 12 inches long on the frame outside, 18 inches high, 1 inch thick and 4 inches wide. The doors are 10 inches long and 16 inches high. The ash pit door frame is placed 2 inches below the furnace door, or with one brick between.

The furnace, a transverse section of which is shown in Fig. 6, is 30 inches deep from face of front wall, 12 inches wide and 12 inches high. The bottom of the door sill is placed 36 inches above the floor. The grate is 26 inches long and 12 inches wide, with a depth of 1¼ inches at the ends and 2 inches at the center. It contains ten bars, each ¾ inch wide. A section of the grate and of the bars is shown in Fig. 4 of the cuts. The grate frame is placed 3 inches below the oven hearth. The furnace splays 5 inches from the side of the oven. The main flue starts level with the hearth of the ovens, and 9 inches back from the face of the front wall, and is 17 inches by 17 inches. These flues start 9 inches back from the prolongation of the sides of the oven. The damper for the main flue is 17 inches long and 17 inches wide and ½ inch thick. It has a handle made of ½-inch round iron 25¼ inches long, with a ring at the end 1½ inches inside. This damper slides into a cast-iron case 34½ inches long, 19 inches wide and 1 inch thick, with flue opening 16 x 16 inches, and is placed 20 inches above the oven hearth. The chimney is not less than 15 feet 6 inches above the oven hearth and the two flues are separated with a brick partition 4 inches thick. The steam or hot-air flue is 4 x 8 inches, placed 9 inches from the front wall and separated from the furnace flue where they run horizontal and parallel with a 4-inch wall or half brick. The bottom of this flue, where horizontal, is 24 inches above the oven hearth. This flue has a damper 5 inches long, 9¼ inches wide and ½ inch thick. It has a handle made of ½-inch iron 13¾ inches long, with a ring at the end similar to the main flue dampers. This damper has a case 10½ inches long by 11½ inches wide, 1 inch thick, with flue opening 4 x 8¼ inches. It is placed 20 inches above the oven hearth. The furnace flue is 4 x 4 inches, placed 17 inches from the face of the front wall, while the bottom of the horizontal portion is placed 26 inches above the oven. This flue has a damper 5 inches long by 5 inches wide and ½ inch thick, with a handle similar to the other dampers, except it is 21½ inches long. It has a case 10½ inches long, 7 inches wide and 1 inch thick, with a flue opening 4 x 4 inches, and is placed 20 inches above the oven hearth. The buck stays employed are of cast iron, 50 inches long, 1¼ inches at the sides and 3 inches at the center. Seven of the longitudinal rods are ⅞ inch in diameter and 25½ feet long between washers while 10 are ⅞ inch in diameter

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and 16 feet long between washers. Each rod is cut with 6-inch threaded ends. Where the rods pass through buck stays they have 2-inch cast-iron washers ½ inch in thickness. The longitudinal rods are placed 3 inches below the oven hearths and 34 inches apart. They are 3 inches above the crown of the oven arches, while the transverse rods are 34 inches apart.

The sand on top of the ovens is not less than 14 inches deep. A study of Fig. 5 of the illustrations, showing a transverse section through the center of one of the ovens, is interesting in this connection. There is a pavement in front of the ovens their full length and 5 feet wide.

All parts of the ovens, furnaces, &c., are lined with fire clay. The fire bricks are laid in fire clay mortar, or grouting of fire clay. A good fire clay mortar is made with 1 bushel of fire clay finely ground, ½ bushel of sand, ½ bushel of salt and sufficient water to bring it to the proper consistency. Good fire clay grouting is made of finely ground fire clay sifted and mixed with the above ingredients and in the same proportion. The capacity of each of the ovens equals 30 pans 19 x 21 inches. The cost of the completed ovens is stated to have been $970.

Sawdust vs. Hair in Mortar.

From W. K. H., *Chase City, Va.*—I desire to ask if any readers of *Carpentry and Building* ever used sawdust in place of hair in plaster mortar. I would also ask if any ever employed sugar in mortar, and if so, I would be glad to have them give the proportion of each.

Pay for Making Estimates.

From S. & R., *Delphi, Ind.*—We are subscribers to *Carpentry and Building* and therefore presume to ask a question about who should pay for making out an estimate when the work is not awarded to the person undertaking this labor. The case in point is as follows: A fire occurred in our town, and we were called upon to estimate the damage done to one of the pieces of property. We made the estimate at the request of an insurance agent upon the general understanding that we were to have the work of restoration. There was only a verbal agreement to that effect. Our estimate was accepted and the agent made out a check for the amount in favor of the policy holder, but instead of awarding us the job of repairs he gave it to another. The question is, How can we secure pay for our work in making out the estimate?

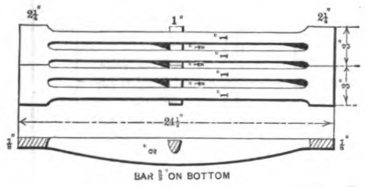

Fig. 4.—Grate Bars.—Scale, 1 Inch to the Foot.

Answer.—What our correspondent describes above is one of those particularly aggravating circumstances which frequently arise in business. We doubt very much if he finds any plan of reimbursement for the trouble and labor involved. There has been a dishonorable act on the part of the agent. Without knowing all the facts it would be unwise for us to insinuate anything against the agent's integrity, but we have no hesitation in saying that in circumstances similar to this other agents have been influenced away from what would have been a straightforward, fair business course to pursue by a bonus or a percentage which some competing builder offered. As a rule builders make estimates at their own cost and without any expectation of pay for the labor, and this fact makes it hard to prove a damage done, even under the circumstances above narrated. Among those who read this paragraph we venture to say that there are few who have ever been paid for an estimate that they have made. Some will go further and say that they have to estimate on four or five jobs in order to secure a single contract. We do not think this state of affairs is right, for estimating is labor as much as doing the work, and should be paid for. But it is the custom to estimate without charge, and builders are responsible for it. If any of our readers who have had experience in insurance lines have anything to offer for the benefit of these correspondents we should be glad to have them use our columns.

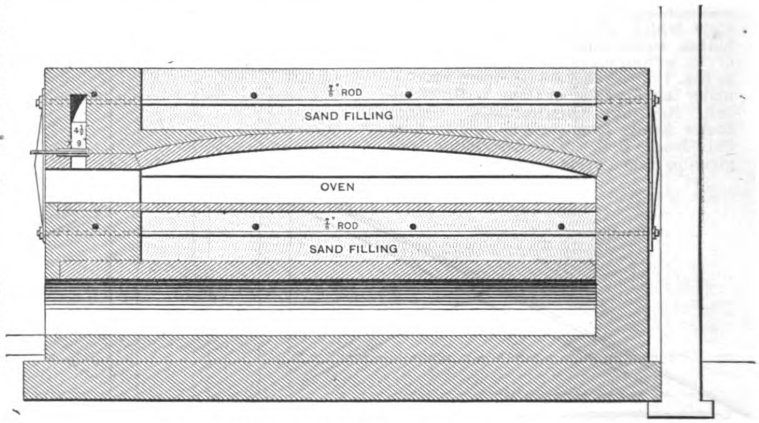

Fig. 5.—Transverse Section through Center of Oven.

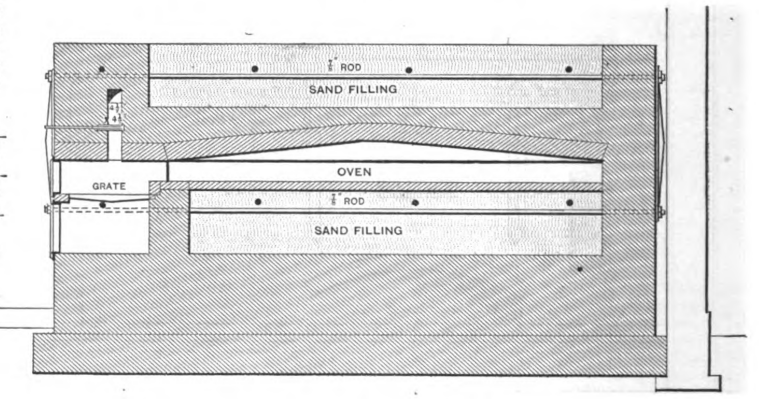

Fig. 6.—Transverse Section through Furnace.

Design of Double Bake Ovens.—Scale of Sections, ¼ Inch to the Foot. *(See Article on previous page.)*

Proportions of Cupolas and Ventilators.

From H. M. B., *Bangor, Maine.*—I have been an interested reader of *Carpentry and Building* for a long time, and now desire to ask its practical readers if there is any rule of proportion for cupolas and ventilators. The style here ranges all the way from a small dry goods box to a small church, regardless of the size of the buildings. If any of the readers have a good rule I should be glad to see it published.

Note.—We doubt very much if our correspondent will find any fixed rule for ascertaining the proportion of cupolas and ventilators, for conditions vary so greatly. The question, however, is a good one for general discussion at the hands of the practical readers of the paper, and we refer it to them in the hope that they will give it attention and express their views concerning it.

Furring for Back Plastering.

From G. W. H., *Jefferson, N. Y.*—I would like to inquire which is the better way to put in the furring for back plastering—to run it up and down next the studding and lath crosswise, making one continuous air passage, or cut the furring across and run the lath the same way as the studding, thus making several dead air spaces? I would like to know which gives the better results, if there is any difference.

What Constitutes a Day's Work?

From L. M., *New York.*—Will some of the readers of *Carpentry and Building* please tell me how many square feet of narrow flooring one man is supposed to lay in one day? I should also be glad to know how many door openings he could trim in one day, including the hanging of doors, and how many pairs of sash he could hang in the same length of time.

Tie Beams in Barn Construction.

From H. B. M., *Lincolnia, Va.*—In reply to the suggestions made in the editorial note appended to the request of "H. J. C.," published in the December number of

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Carpentry and Building for 1890, I offer a few remarks concerning barn construction which may be of possible interest to the readers. In some barns it may be necessary to cut away or dispense with the tie beams in the body of the barn, substituting therefor other and effective framing. Yet the tie beam is a very important timber in barn construction. In barns of ordinary width, say of 30 feet or more with one third or more pitch, it does not obstruct the storing of the hay with a horse hay fork. The tracks for the carrier are secured at the highest point of the rafters, and it is necessary that the fork when loaded should ascend to the carrier before moving away with its load. When in that position the fork with its load is above any tie beam framed in below the plates. By the use of purlins, which should be in all barns of 25 feet or more span, the tie beam may be placed 2 or 3 feet below the plates, as the purlins relieve the main plates of most of the side pressure. In the absence of purlins in barns having 20 or 25 feet span, the rafters may be lengthened to half or more pitch in order to give sufficient room to work above the beam. The tie beam should be placed near the plate and well framed into the posts with part dove-

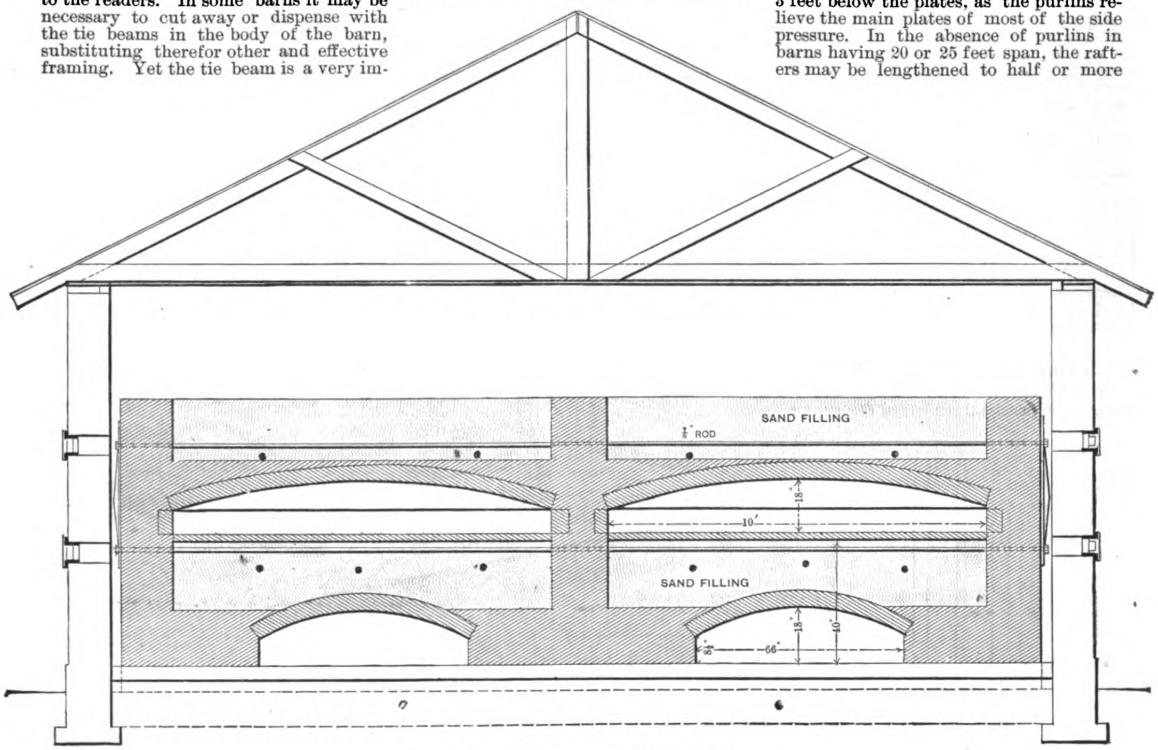

Fig. 2.—Longitudinal Section through Ovens.

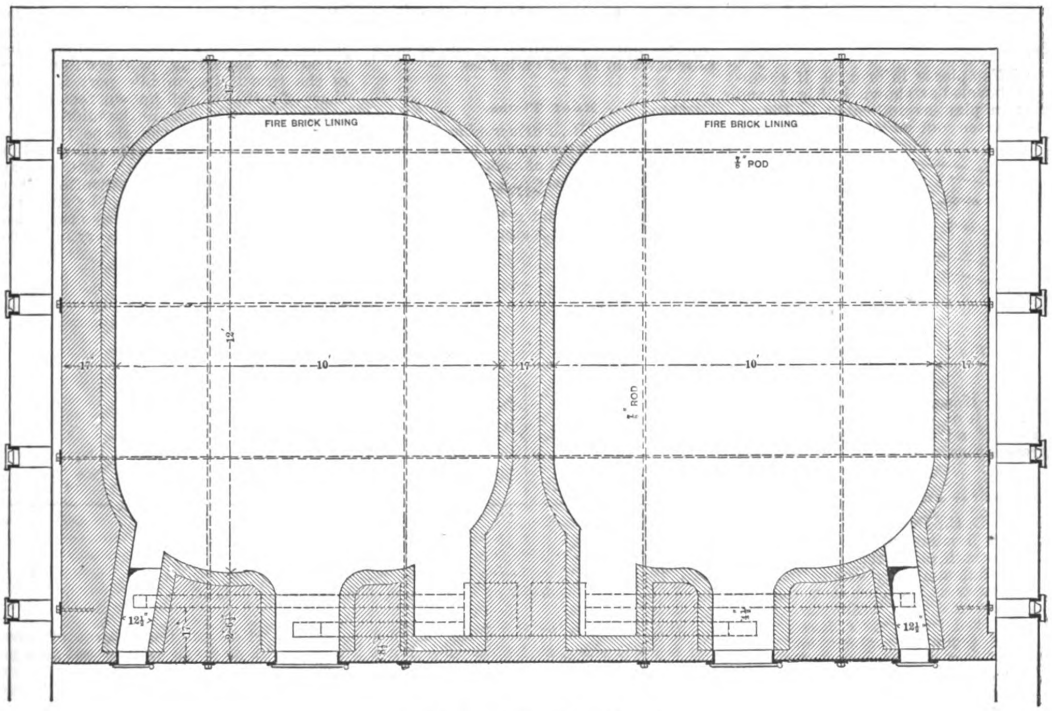

Fig. 3.—Plan of Two 10 x 12 Ovens.

Design of Double Bake Ovens.—Scale, ¼ Inch to the Foot. (*See Article on page* 217.)

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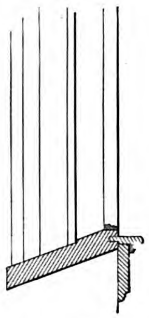
tailed joint securely wedged and pinned. The strain on the framing caused by the use of horse forks is considerable, and therefore good construction is called for. A ridge pole or timber, 2 x 6 or 8, firmly nailed in at the peak, helps to strengthen the roof very much. If the purlin posts are placed perpendicularly there will be more room for the passage of large forks full of hay. The size of timbers should be in proportion to the size of the barn. For one approximating 30 x 50 feet the following will answer in ordinary cases: Basement timbers, such as posts, trusses girders, &c., 10 x 10; braces for same 4 x 6; mud sills placed on solid masonry 4 x 10; main sills and cross sills 8 x 10; posts 8 x 8 and 6 x 8; ties 8 x 8; plates 6 x 8; rafters 2 or 2½ x 6; braces 4 x 4; nailing pieces, when 12 feet or more, 4 x 6. These remarks are subject to amendment by those who have contributed the many valuable articles on barn building.

A Question in Window Sills.

From YANK, *San Francisco, Cal.*—Will some of the practical readers of *Carpentry and Building* please inform me if a window sill, beveled as shown in Fig. 1, and circular in plan, as indicated in Fig. 2, can be gotten out of a plank its own thickness? If so, I should be glad to know how it is done. Must it first be sawed out of a thick plank to the line of the ground plan and afterward beveled?



Question in Window Sills.—Fig. 1.—Showing Bevel.

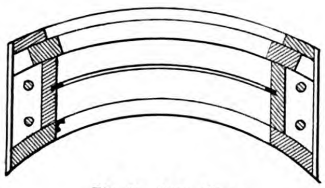


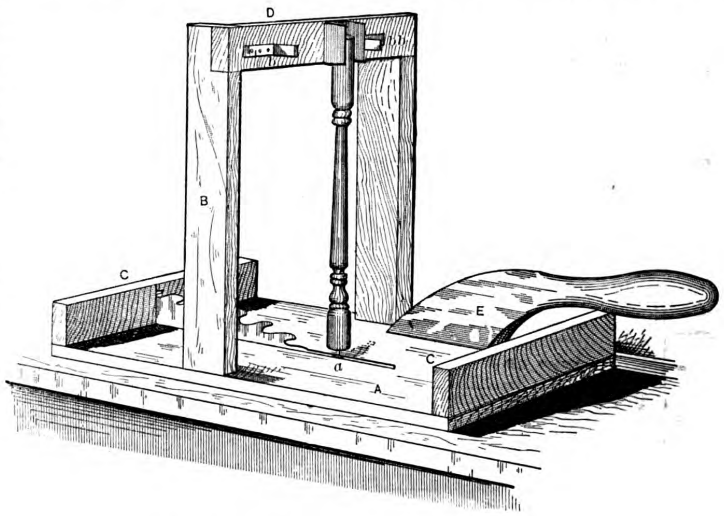
Fig. 2.—Plan View.

Plans for an Octagon Barn.

From N. D. C., *Dixon, Ill.*—Will some one of the readers of *Carpentry and Building* submit plans for a round barn having a diameter of about 70 feet? I desire it so arranged that cows may be kept in the basement while the upper portion is used for hay. I have seen a number of plans for square and long barns, but have never seen a plan of a round or octagon barn. The latter are fast coming into use in this section, and I should be glad to have some of the practical readers help me in this matter.

Dovetailing Balusters.

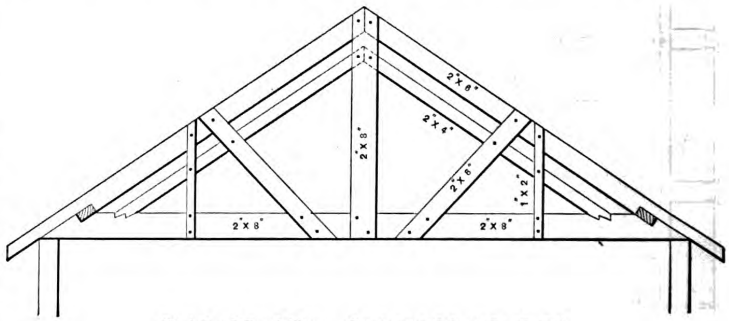
From A. L. Z., *Napa, Cal.*—I send herewith a rough sketch of an appliance which I use to dovetail balusters by means of a circular saw. The sketch, I think, shows the construction of the device so clearly that an extended explanation is unnecessary. Bend a piece of heavy sheet iron or brass and slip on the baluster so it will come against the cross-piece D as indicated in the sketch. This enables the dovetail to be properly cut. Set the center mark on the end of the baluster on the pin *a*. Lay the bent piece of sheet iron or brass on which rests one end of the baluster against *b b*. Saw the square sides of the dovetail, then let the incased end of the baluster rest against *b* and saw the dovetailed sides. Clamp or tack a piece on the saw table to keep the frame up to the guide. The handle to move the frame is indicated by E. With this appliance 50 balusters can be dovetailed within 15 or 20 minutes.



Device for Dovetailing Balusters, Used by "A. L."

Roof Truss.

From L. K. B., *Farmersville, Ohio.*—I have been much interested in the discussion of the question of roof construction, and I take the liberty of sending a rough sketch of a support which I have frequently employed on school houses and other buildings. It is simple, strong, and for a span of 26 to 35 feet is the cheapest self support that can be put up. For a longer span the size of the timbers might be increased. The dots in the sketch which I send indicate bolts ⅜ x 4½ inches.



Sketch of Roof Truss, Contributed by "L. K. B."

Sharpening a Plane.

From C. R. McC., *Chattanooga, Tenn.*—In the editorial columns of *Carpentry and Building* for August attention is directed to the article on "Sharpening a Plane," by James Francis, and an invitation extended to practical men to give their views touching this subject. Permit me to say that if the readers had the privilege of reading more articles on subjects of a like character by such men as Mr. Francis evidently is, those who are not experienced in the practical application of the rules of geometry would be greatly benefited. Mr. Francis says: "It is a great test of proficiency in setting an edge on a plane iron to be able to whet up a cap plane iron in the manner shown in Fig. 28 and to stop whetting when an edge has been brought up sharp, so that it will not be necessary to remove the cap and rub the feather edge off the plane iron." While this can sometimes be done, I think it is impossible to whet the plane iron many times without the "feather" appearing on the outer edges of the iron if the middle part is made sharp, for it is a well-known fact that a plane iron wears most in the middle. To preserve, therefore, the shape the iron must be whetted in all parts alike, and in doing this the "feather" will appear where the plane iron is less worn. I get rid of this light feather edge by stroking the iron back and forth across the palm of the hand. I should like very much to read an article on the subject of saw filing, and hope some experienced men in this art will respond.

From A. C., *Bridgeport, Conn.*—In the August issue of *Carpentry and Building* I notice the very valuable and instructive article by Mr. Francis, entitled "Sharpening a Plane." I am free to say that I know most of what he says and illustrates is correct. If the carpenter has served a proper apprenticeship, which every one should do, he would soon learn how to sharpen his plane. In Fig. 28 Mr. Fran-

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cis illustrates the sharpening of a bit with the check iron in place. I do not agree with his theory as to the efficiency of a mechanic in being able to sharpen his plane in the manner illustrated. The edge of a plane is slightly rounded, causing the center to become dull and thicker than the ends, thus necessarily causing the thin end to be rubbed at the same time as the middle, and would therefore cause a wire edge on the ends. This, of course, needs rubbing off.

Finding Center for Striking an Arc When Width and Hight are Given.

From P. H. B., *Albany, N. Y.*—I would like to have the following question answered through the columns of *Carpentry and Building:* Having a given width and hight, is there any rule for finding the center from which an arc can be struck? I think such a method would be very useful in describing the head of a window frame or similar shape. The width and rise may be given when it is necessary from these two dimensions to find the center from which the arc may be struck.

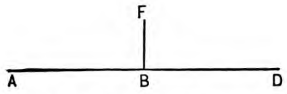

Fig. 1.—Diagram Showing Width and Hight.

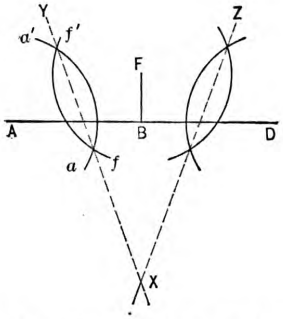

Fig. 2.—Obtaining Center by the Use of Arcs.

Answer.—To find the center from which a given arc is struck, the width and hight being given, draw A D, in Fig. 1, equal to the given width; bisect A D at B, and erect the perpendicular B F equal to the hight. The arc is required to pass through the three points A F D. The method by which the center may be found by the use of small arcs is shown in Fig. 2. From A as center strike the arc *a a'*, which intersect with a similar arc struck from F as center, as shown by *f f'*. Similar arcs are to be struck from F and D, as shown. Lines drawn through the intersection of these arcs, as Y X and Z X, will pass through the center at X. From this point the arc can be struck, as shown by A F D in Fig. 3. If F D is prolonged and bisected by Y X the center can be found without drawing the line through the arcs struck from F D. Supposing the arc A F D to have been struck, and it was required to find the center; by describing the two sets of arcs and drawing the two lines Y X and Z X, as shown, the center would be found at X.

To find the center by the use of the square, as in Fig. 4, draw A D F B as in Fig. 1, and draw the two chords A F and F D. Bisect these chords, obtaining the points L and N. Then place the square against the chord A F with the heel against the center point L, and scribe along the blade indefinitely, as shown. The square is then to be placed in a similar manner with the heel against the center point N, of the second chord, when by scribing along the blade so as to cut the first line drawn, as at X, will give the center from which to describe the arc A F D. If the arc A F D was drawn, and it was required to find the center, it would be only necessary to draw the chords A F and F D, then proceed as above directed. While this rule is convenient to use under certain circumstances, it is not intended for use when the radius is longer than the blade of the square.

In practice, it may occur that there is not sufficient room to locate the center, on account of the length of the radius, and a method by which the segment of the circle can be struck by mechanical means may be found convenient. This can be done as shown in Fig. 5. Let A D be the given chord, and B F the given hight, and to construct the triangular guide proceed as follows: Draw the chord F A, which can be extended past A. From F, parallel with A D, draw F G, making it about the length of F A extended. Then A F G is the angle of the triangular guide to be used, which can be made of any suitable material, the angle of two of its sides being equal to the angle A F G. Drive pins at the points A, F and D, then place the guide as shown. Put a pencil at the point F and slide the guide in such a manner that the pencil will move toward A, keeping the guide at all times against the pins A and F. By this means the arc A F will be struck. After this has been done shift the guide so the pencil at the point F will move toward D, keeping the guide at the time against the pins F and D. By this means the arc F D will be struck, completing the arc A F D.

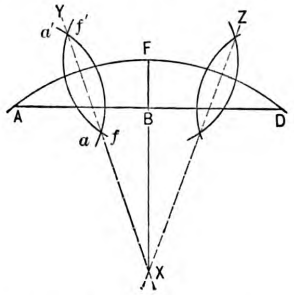

Fig. 3.—The Arc Struck from Centers.

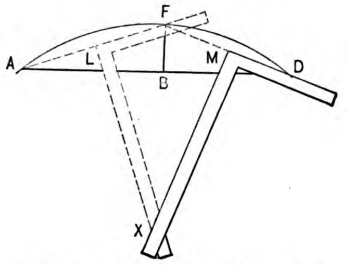

Fig. 4.—Center Found by Use of the Square.

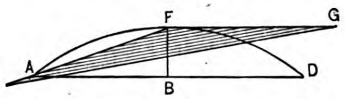

Fig. 5.—Arc Struck by Means of a Triangular Guide.

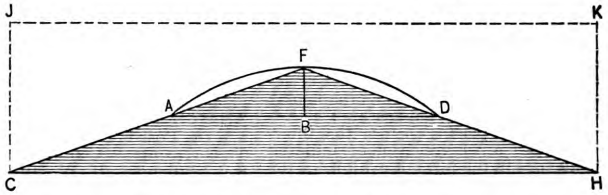

Fig. 6.—Another Method of Striking the Arc by Means of a Triangular Guide.

Finding Center for Striking an Arc when Width and Hight are Given.—Method Suggested by "P. H. B."

Another method of striking the arc by means of a triangular guide is shown in Fig. 6, by which the arc can be struck at

Backing Hip and Jack Rafters.

From D. S. S., *Emporia, Kan.*—In the July number "H. T.," of Holyoke, Mass., desires some one to explain by draft how to obtain the back cuts of hip and jack rafters. I will give him my plan of getting them without draft, as I prefer the steel square and measurements, when possible, to the method above mentioned. I consider it simpler and more expeditious. There are three things which must be known about rafters—namely, the rise, run and length—and when these are determined, the three cuts are easily secured by the use of the square. For example, let the rise be 6 feet, the run 8 feet and the length 10 feet. Lay the square on the stick at 8 on the blade and 6 on the tongue and it gives the horizontal cut for all main and jack rafters by the blade. All plumb cuts are given by the tongue. Now lay the square on the edge of the stick at 10 on the blade and 8 on the tongue, and the blade gives the side or back bevel of the jacks. Summarized, the rule is: The rise and run give the bevel and plumb cuts; the length and run give the side cuts. The rule applies to hip rafters when the three dimensions have been found.

Design for Odd Fellows' Hall.

From A. H. F., *South Boston, Mass.*—I would like to ask, through the columns of *Carpentry and Building*, if some of the

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readers of the paper will kindly contribute plans for an Odd Fellows' Hall building. It is to be 40 x 70 feet in size, constructed of wood and three stories in hight. There is to be a side entrance to the hall. The first story is to contain two stores, the second story rooms for Young Men's Christian Association and the third story Odd Fellows' apartments.

A Curiosity for Builders.

From E. C. R., *Streetsboro, Ohio.*—I enclose a *verbatim* copy taken from the original of an "Article of Agreement," which has afforded a great deal of amusement to all to whom I have shown it, and I send it to you thinking the readers of *Carpentry and Building* may find it entertaining.

Note.—The "agreement" referred to by our correspondent is certainly a curious production, from whatever standpoint it may be regarded, and we present it to our readers *verbatim et literatim:*

HOW I WANT IT BUILT A. D. 1875.

The fraim is to bee a good-stanch one and corporal braces above and bee low, Their will bee 11 windows above. Lore story two windows in the east end. And the west end two windows. In the south wall their will bee 2 windows to fit up. At the west end is the cow stable. stall it all off and fix all the maingers and put boxes in the first four stalls. Midle stable put the mainger clear thrue And our boxes in. And if I should desire apartition in and a door hung it shall bee done with out cost. The horse stable as many stalls as their may bee stall them off and put in boxes and maingers. Side up all the entryes and every thing that requires siding up. Make all the dowrs that I want for this barn and plow and groove them every one. The uper doors will bee hung on hinges. Their will bee a doble dore in the center of the stableing at the east end. Their will bee 5 doors under the over shoot. Grannery doors 2 Barn doors on the south 3 Barn doors in the north 2. The stable and entry doors is al to bee double doors, the out side shell of the granery I will get matched. The binns I want you to match. The uper weather boarding I want them fited up close as they can bee. The Flore weather boarding you half to plow and grove them that is along the ends. Their are to bee one pair of. Their will half to bee four posts under the over shot. The siding above the barn flore is to bee plowed and groved. The grainery is to bee on the east sid of the south barn door. The laders is to go up on the nort sid of the second post from the north. On the west of the South barn door is the place for the hay to go down I want that fixed Just like J—— W——s. All the rest of the post that is wanting that is not sawed at this time I want you to hue. And all the huing and scoring that it needs to fit this barn out. The side of the grainery entry is to bee sided up. I want the grainery mouse proof. The carpenters is to help to tare the oald barn down in the baregain. The horse stable I want the stalls made prety nice. I am going to get no more squaring done. All the girts is to be fraimed in and pined. I want the post all well pined And a good many of the brodest shingles I amagoing to split.

Their will bee no green hand put on the roff with satisfaction to me nor working at my grainery. If their should bee any bauch after all my warning I it shall bee left to me to set what the damage shall bee When comenced once I want them not quit and go somers else to work a few days The carpenters cant comence bee fore the first of May 1876

You are to have not less than four hans I shall build with out sickness or death prevent it. Who ever gets this Job I want them to sign their name wright away to this agreement.

When the barn is built and satisfaction is given he is to receive $170.00

(seal) ———

———

CHICAGO INSTITUTE OF BUILDING ARTS.

THE INSTITUTE of Building Arts, owned and conducted by the Illinois Chapter of the American Institute of Architects, has issued a handsome catalogue which contains, in addition to matter pertaining to the administration of the institute and the association controlling it, descriptions of the various exhibits at the institute building, 63 and 65 Washington street, Chicago. From this interesting volume it is learned that the Institute of Building Arts was established for the purpose of centralizing information relating to building, and congregating in permanent exposition all materials, appliances or inventions of a practical or ornamental character, and its advantages are: 1. Educational, by placing before the interested public an aggregation of building intelligence in the form of exhibits of the actual materials, appliances and inventions employed in modern construction. 2. That in the fact of such centralization of materials, a vast amount of time is saved to the public concerned in building interests. The Institute of Building Arts, as a central place of information upon all subjects relating to the sciences and arts of building, is of the greatest value to all interested in architecture.

The income of the Institute of Building Arts, says the catalogue, is but from one source—namely, a nominal annual charge for exhibit space, and, beyond a necessary reserve for running expenses, all funds are applied to the carrying out of the various educational and beneficial features of the institute, which are solely for the public interests, the advancement of architectural information and the benefit of every science connected with building. The high aims and purposes of the Institute of Building Arts rank with those of the noblest of educational and scientific institutions.

The institute is free to the visiting public. It furnishes, gratuitously, information relating to building improvements. It maintains a series of tests of materials, the results of which may be obtained by any one asking for them. Courses of lectures by skillful specialists are given under its auspices, and it purposes extending its educational advantages to the creation of a school or college of architecture. It embraces a library of architectural works, and contains assembly rooms for the meetings of all associations connected with architecture and the building arts. The Illinois Chapter of the American Institute of Architcts assumed control of the Institute of Building Arts on May 1, 1890, since which time the institute has increased beyond the anticipations of even its most ardent supporters. That it is appreciated by the public is demonstrated by the fact that over 15,000 people visit the rooms each month.

CONTROL AND WORKINGS OF THE INSTITUTE.

The control of the Institute of Building Arts is vested in the Executive Committee and the Board of Trustees of the chapter. The Executive Committee consists of S. V. Shipman, H. W. Hill, W. A. Otis, George Beaumont and D. Adler, while the trustees are D. Adler and S. A. Treat. H. W. Perce is the manager of the institute.

The workings of the institute form the chief public function of the Illinois Chapter of the American Institute of Architects, and its members are proud of the record the institute has made. The idea was unique, so far at least as Western cities are concerned, and the institute would doubtless have succeeded under private management. With the prestige of such a body of men as those composing the Illinois Chapter, failure was impossible.

The chapter has worked energetically for the progress of art in building, and its importance as a factor to the well-being of the city of Chicago is said to be generally recognized. Director-Gen. Davis, in response to a communication, stated to the Executive Committee that he would create a department of architecture for the World's Fair, to be conducted under the auspices of the chapter and to be managed by any one the chapter might select. The name of Henry Lord Gay, the originator of the institute, a member of the Illinois Chapter and formerly editor and proprietor of the *Building Budget*, was sent to Mr. Davis, and his appointment will be made when Mr. Davis organizes the department of architecture. Mr. Gay is a man of good artistic taste, with the critical faculty well developed, while his experience with the institute will aid him in managing a department of the fair.

A NEW SORT OF ELECTRIC BELL has been devised, consisting of a vibrating plate of metal, like the reed of a parlor organ, which is set in motion by the electro-magnet and emits a clear and continuous musical sound, much more agreeable to hear than the startling rattle of the ordinary electric bell. It is claimed for the invention that it can be applied to the construction of a new class of musical instruments, and the idea seems to be an excellent one, says the *American Architect and Building News*. Evidently, also, as the instrument could be played automatically by the same current that produced the sounds, an extensive field would be opened for the refinement of domestic apparatus of the sort. The front-door bell, for example, instead of its ordinary noisy appeal in the kitchen, might be made to sing a song of welcome at the visitor's ear, at the same time that it notified the household, in animating strains, of his arival, and the clang of school gongs, and perhaps of fire-alarm bells, might advantageously be replaced by a few bars from melodies appropriate to the occasion.

E. T. BARNUM, manufacturer of Art Wire and Iron Work, Detroit, Mich., calls attention in a published article commenting on a recent tour in Europe to the immense amount of ornamental iron work used there in place of wood, and such is the education of foreign artisans, owing to their artistic surroundings, that they make this work of superior merit from an artistic standpoint. Wood is scarce there and much more attention is paid to durability than in our country. But Mr. Barnum calls attention to the wonderful increase of the use of metal in building in the United States during the last decade, in the substitution for wood, such as stairways, roof and tower ornaments, and balconies and stable fixtures, as well as for the more structural usages, and to the characteristic way the Yankee is borrowing artistic points from his foreign brother and improving on them.

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SLOW COMBUSTION CONSTRUCTION OF BUILDINGS.

AT A MEETING of the Engineers' Society of Western Pennsylvania, held not long since, Harvey B. Chess read the following paper on the Slow Combustion Construction of Buildings:

In the United States nature has been lavish in the matter of timber supply, and our injudicious, not to say thoughtless, use of it has been largely responsible for the enormous annual loss of $125,000,000. In one year it reached $142,000,000, and at the rate being maintained during the current year, with $50,000,000 loss reported in the first five months, we bid fair to keep up the record. Coming home to our own community, Fire Marshall McFadden of Pitsburgh reports the gross loss of the year ending March 23, 1891, at $1,283,000, of which $994,691 were paid by insurance companies, or within a few thousand dollars of a round million. These rough figures of the national and municipal loss do not cover the cost of the fire department and its equipment and maintenance, of private fire apparatus, water consumption, &c. In Pittsburgh, for instance, we find the outlay of our fire department for the year ending January 1, 1891, to have been $245,495. This expenditure added to the gross loss given makes the municipality's annual contribution to this moloch just about $1,500,000!

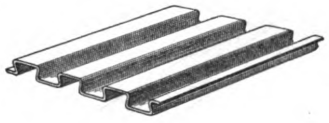

Fig. 1.—Dovetailed Corrugated Sheet.

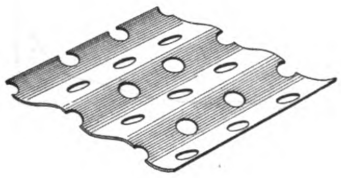

Fig. 2.—One Form of Perforated Metal Lathing.



Fig. 3.—Another Form.

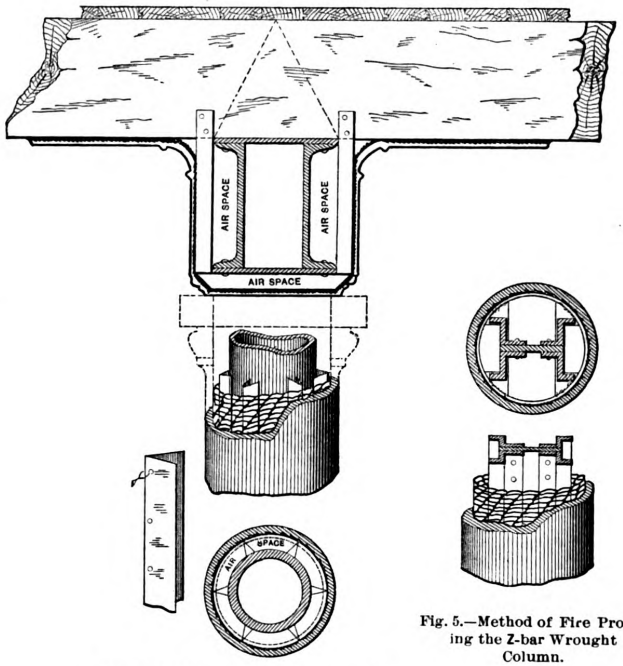

Fig. 4.—Method of Protecting Iron Box Girder, Wooden Joists and Cast Iron Column.

Fig. 5.—Method of Fire Proofing the Z-bar Wrought Column.

Slow Combustion Construction of Buildings.

SYSTEMS OF CONSTRUCTION.

Thoughtful minds in America have developed systems of construction and invented safeguards and preventives. Improved structural material and their adjustment and arrangement, innumerable devices for extinguishing fires automatically, and otherwise improved fire extinguishment services, sprinkler service, &c., have been developed. While they have seemingly been brought to the highest pitch of perfection, the fact remains that losses by fire continue at an enormous rate. It is not generally appreciated that the loss of the nation by fire is about one-third of the whole return from our wheat crop, so laboriously garnered, or as nearly as may be estimated close to the value of one year's production of pig metal. Innumerable laws, ordinances and regulations prevail in every considerable city, to which are added the specifications and requirements of that very vigilant army, the fire underwriters. All are wholesome and praiseworthy as laid down, but somehow are lamentably short in practice. In thrifty New England a scheme of mutual insurance has been developed, and so successfully maintained over a long period as to be a pronounced success in every way. It does not pay out of an accumulated fund to recoup losses of a brother who possibly built so as to have deliberately invited the calamity incurred, but its main business is to have the brother so build that so far as human foresight can provide he cannot easily burn down honestly. After these requirements are complied with, he is admitted into a partnership which makes up to him a loss if it comes. The class of buildings insured is mainly textile factories and storehouses. These have undergone such a transformation in their structure, that the term "slow combustion" construction has been applied to the system. This is most admirably described by that versatile gentleman, exponent and president of the Mutual New England Company, Edward Atkinson of Boston, in a popular article in the *Century* of February, 1889. The term itself seems clumsy, but for its honesty and expressiveness, it has come to stay. Mr. Atkinson, whose statistical statements none will gainsay, however much we Pennsylvanians differ with him in some features of national economics, asserts, and proves by the record, that by sedulous observance of their regulations and by their constant supervision, the fire losses have been reduced much below general high-grade risks of the country, even in that department of textile factories known as "picker."

JAPANESE FIRE PROOF CONSTRUCTION.

In Japan there has been in use from time immemorial a domestic institution, singularly unique, in the shape of a fireproof structure, used by all classes as a safe place for their valuables on the occasion of frequent and destructive conflagrations. The walls are built upon a vertical foundation, or screen, of bamboo and netting, by successive additions of small clay masses, the construction frequently occupying two years. Doors and windows are made of the same materials as the walls and roof, and they have stepped edges like our own safes. At the approach of fire valuables are hastily gathered together into the Kura. The crevices of the doors and windows are quickly closed up with soft wet clay, so that the structures are built not to add in any degree to the conflagration, but to absolutely resist its attack.

We cannot build high and many storied Kura, but we can modestly take the suggestion to meet fire with earthy matter, and with that alone. It is admitted that ordinary wood lathing is entirely deficient in supporting that excellent flame-resistent common mortar. It supports plaster poorly enough under ordinary circumstances, but it utterly fails in opposing fire attack, and affords a most admirable kindling of thoroughly dry light wood to the rapid widening of the flame. When it is considered that the plastering and chimneys

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are the only fire-resisting material entering into a very large share of America's structures to-day, it is not to be wondered at that such an amount of treasure is destroyed. Even in our brick houses outside of the walls the same condition exists. Floor, partitions, ceilings, &c., all add to the fire. The plaster is well enough, but the manner in which it is attached seems entirely wrong, because it does not hold, and because it contributes itself to the conflagration.

METALLIC LATHING.

Metallic lathing in its various forms has now had such an extended use, and has proved itself of such economical and structural merit, that it may be safely used. namely, netting of various gauges of wire, perforated sheets and expanded metal.

WIRE LATHING.

The wire was probably first used in the form of plain netting, woven with square interstices of about $\frac{3}{8}$ inch. To produce it at a reasonable cheapness the gauge was gradually reduced, and to make up for its consequent lack of rigidity, stiffening members are introduced transversely in the web at short intervals. These members are either of light sheet iron made prismoidal form or V-shape, or they may be of, say, $\frac{1}{4}$-inch rods. Again, corrugations or trusses have been struck up across the webs both to stiffen and to yield "furring,"—*i. e.*, maintain a distance out from joist or studding. Again, forations, through which tongues of plaster project, giving a certain amount of key. This, while it is a great improvement on the rigid, unperforated dovetailed form last described, and is of a yielding nature transversely, is dangerously the reverse in a longitudinal direction.

Another form is that of sheets 15 inches wide, perforated at close intervals with a pyramidal punch, so that the ragged burr made forms at each hole four ragged claws to clutch the coating, while tongues of the latter may go through to assist (Fig. 3).

EXPANDED METAL LATHING.

These examples are typical and cover the more important forms of perforated sheet systems. We then come to a cross

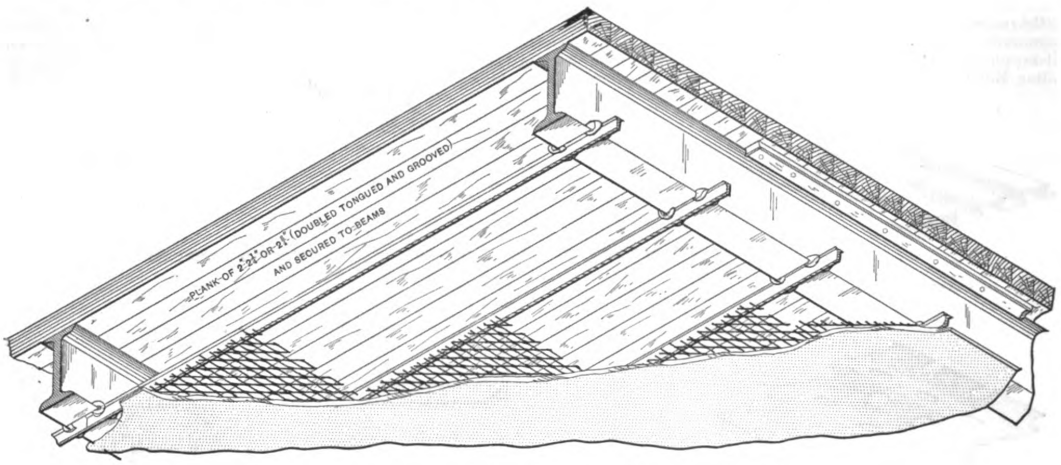

Fig. 6.—View of what is Designated as a Composite Floor.

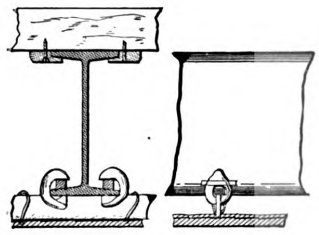

Fig. 7.—Sections of Floor.

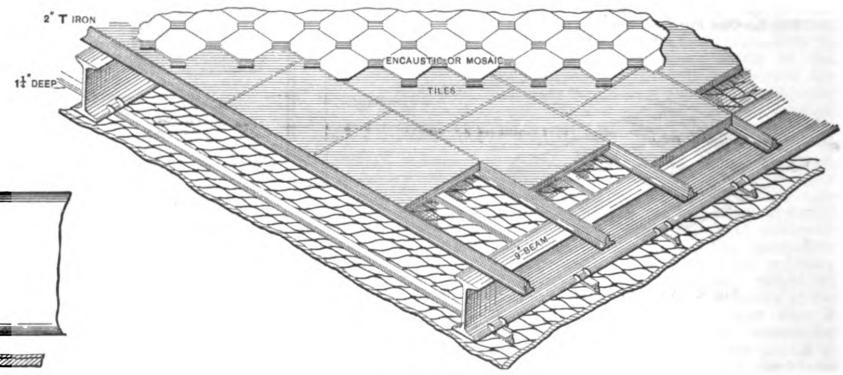

Fig. 8.—Incombustible Floor.

Slow Combustion Construction of Buildings.

When of good form it holds its coating unflinchingly, filling the dual function of protecting itself and the structure it sustains. Even when through faulty form and quality it fails in holding its coating, it is at least incombustible, and it does not add treacherously to the burning. A good metallic lathing should be capable of easy application, should be properly rigid to yield good workmanlike result of coating and surface, and should readily permit molding into any form called for by the structural requirements, and finally it should yield all the keying possible. It should have practically an equivalent coefficient of expansion and contraction with its plastic load through extreme ranges of temperature, and not fling it off by buckling. Three general types have been designed to meet these requirements—plain netting, of say 18 gauge, is galvanized, thus soldering the wire at intersections, giving a most excellent lathing, but its greatly enhanced cost forbids its general adoption, and I may remark that it is not generally considered by experts that the zinc coating is any improvement other that the incidental soldering of the wires, gives a rigid structural quality.

PERFORATED METAL LATHING

Before referring to peforated metal lathing it may be proper to call attention to a dovetailed corrugated sheet, Fig. 1, the crumples or corrugations of which furnish dovetailed recesses for the reception of mortar.

In perforated sheets proper one system consists of light corrugated iron about 4 inches wide, Fig. 2, with staggered perbetween wire netting and the systems just alluded to, embodying probably the valuable qualities of both types without the drawbacks of either. It is an adaptation of expanded metal and is known as expanded metal lathing. It will be observed that it is tight, self-bound and so full of interstices as to give keying throughout all of its surface. Being made of steel it is strong and tough and may be molded like sheet lead. Indeed, the molding into corrugated or curved forms only makes a more rigid structure. Its peculiar form creates a space back of it, thus providing for "furring" so as to clinch the mortar. It cannot be nailed so close as to prevent this. A simple experiment proves how unflinchingly it holds the fire armor for wood. The lathing has been simply nailed to the surface of a plain hemlock board

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and common mortar applied to the whole. Dropping it upon the floor, the mortar is not detached by the shock. The metal makes a dainty series of slight tied girders whose edges stand perpendicular to the face of the mortar and under great fire stress are so disposed as to prevent the mischievous stripping. In other words, the metal fabric remains neutral in its plastic bed.

FIRE PROOF QUALITIES.

An architect who had prepared this sample as a study of stippled surface for exterior use, tested its fire-proof quality by keeping it four or five hours over and in a glowing gas fire in his grate and cooling it under a stream of water, so as to simulate the conditions of actual fire. He repeated this double operation to his entire satisfaction, the sample coming out of the ordeal in an unchanged condition structurally, as is evident on examination. The naked lathing at the edge of the plate was heavily oxidized.

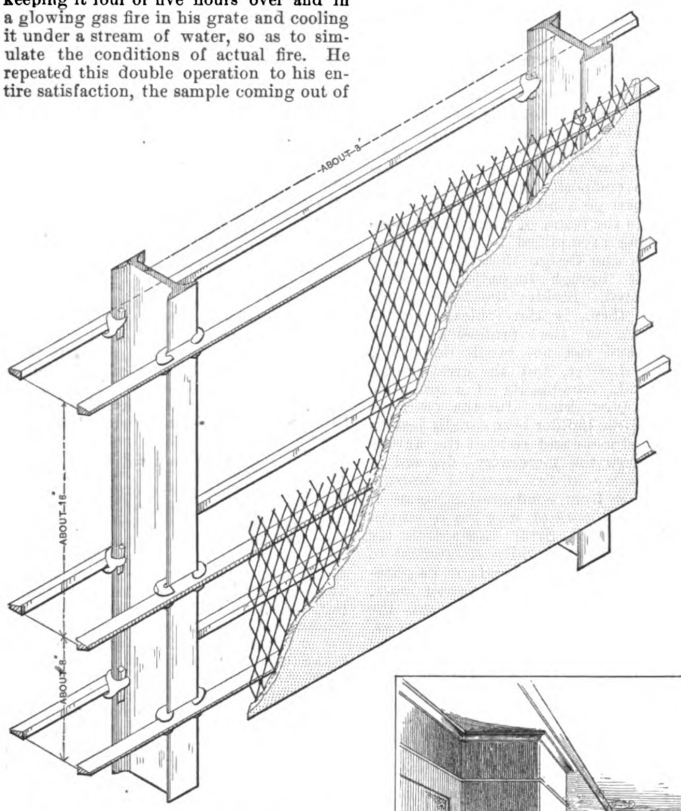

Fig. 9.—Broken View of Incombustible Partition.

A small structure was built of fire brick with a clear hight of 5 feet, and was roofed with common 2 x 12 inch hemlock joists. Just below the ceiling small openings were provided for the egress of flame at the sides and larger arched openings at both ends low down for air supply. The ceiling was made of common plaster applied to expanded metal lathing, simply nailed to the bottom of the joists, without furring or distance. The joists were covered with old sheet iron simply laid on. A fire was started and vigorously maintained with old oil barrels for over an hour, when a prominent insurance party present called out "Enough." Although the fire-resisting coating was only common plaster, it was unflinchingly held. It was found that while the superficial skin coat had flaked off here and there its body was intact. A piece of pine studding, 4 x 4 inches, wrapped with expanded metal lathing without air space and plastered in the usual manner, was laid across from wall to wall, a space of 6 feet, where it remained in the thick of the fire during the entire experiment. When it is remembered that nowhere was its surface more than 2 inches from the center of the section, it is a remarkable fact that quite a core of unburnt wood was left to sustain the beam as it did through the test. Through the intervention of the inclosing jacket of plaster, the charcoal of its exterior portion had not been allowed to be consumed to ash or to fall away. Similar successful tests, it is but just to say, have been made in quite a number of cities by makers of wire lathing, all pointing to the fact that there is a well defined systematic method of using a universal material of the greatest value in such a manner that we shall not readily burn down; in fact, may build any form of structure "slow combustion" and at reasonable outlay.

DENVER COMPETITIVE TESTS.

Let me say one word in regard to the recent Denver competitive tests which have deservedly attracted so much attention because they were manifestly fair so far as they dealt with an important detail, and would seem to be authoritative and conclusive, that far, but you will remember the fire walls of the firing tests were placed properly enough 2 inches in from the lower limb of the I-beams. They furnished not only the needed protection to the metal member so essentially an integral part of all such systems, but they also supported squarely the arches at their spring. Both clearly were conditions so remote from practice as to be remarked upon by the arbitrating experts. Manifestly and fairly the whole constituted a decidedly negative test, not at all complimentary to the system as a whole. I beg also to recall that the experts' report on the final condition of the material entering into the arches gave unbounded praise to the cement mortar used. In all the tests it was of all the materials the only one apparently unchanged. With the aid of illustrations let me present some applications of these fire-resisting metallic bound coverings in ordinary constructions.

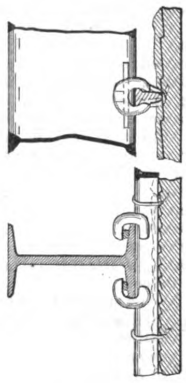

Fig. 10.—Section of Partition.

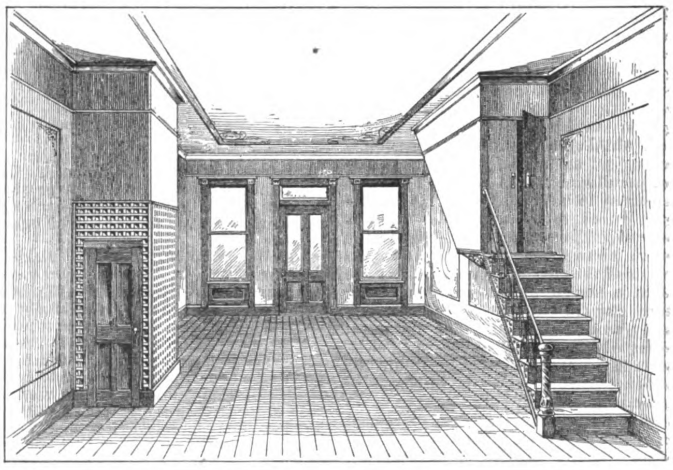

Fig. 11.—Elevator and Stairway Arrangement.

Slow Combustion Construction of Buildings.

METHOD OF PROTECTION.

Fig. 4 shows a method of protecting a common iron box girder, wooden joists and cast-iron column. Light loops or straps are nailed to the joist. Expanded lathing, starting from the joist, bent into easy curves at the girder, is wired on to the strips, giving unbroken connection between ceiling and girder covering. It is

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plastered and ornamented in the usual manner. The column has placed about it, at regular intervals, strips of light sheet iron bent into V-form, and slightly held until an expanded metal jacket is securely wound around it. A plaster and cement coating is then applied, and swept on this foundation. The whole protecting coat is of a monolithic character. Of itself, structurally, this strong cylinder is of no mean added value. Large valuable air spaces are provided in both girder and column.

Fig. 5 indicates the manner of fireproofing the Z bar wrought column. The furring in this case takes the form of light loops sprung into place, giving approximately a circular shape for the jacket of lathing as before, with the essential air spaces. Fig. 9 shows an incombustible partition capable of being a supporting one. Studding of I-beams are properly spaced, say approximately in 3-foot centerings, and light iron furrings ¾ inch in depth are clamped by keys to the former in a horizontal direction and on a spacing of 16 inches. This detail may be varied to meet the exigencies of the situation. Thus at the top of the wainscoting it may be closer, as shown. No special care need be taken in spacing either the studding or the furring; no drilling or tapping is done; no bolts or screws are used. The section of studding may be varied. The oblong mesh in expanded metal permits easy wiring at any location, and plaster is applied in the usual manner. We thus have supporting vertical members of iron, tied and braced by the cross furring, reinforced by the steel lathing foundation and over all plates of good mortar, thus making a partition of undoubtedly great sustaining power in every way and not fragmentary in its make-up.

COMPOSITE FLOORS.

Again, let me present a floor, which, when covered with wood, is called composite. I-beams of proper section and depth, Fig. 6, span the building at centerings of 6 to 7 feet, and with no particular care as to spacing. On these the Atkinson or factory floor is laid. Instead of the one spline we propose double tongueing and grooving. Scantling, 3 x 4 inches, easily obtainable anywhere, will give us 2¾ by about 3½ inch face flooring. This is laid and clamped as indicated, while underneath is clamped transversely, just as in the case of the partition, peculiar sectioned furring 1½ inches deep at say 16 inches centering. The lathing is wired to them and the whole is plastered. The sections, Fig. 7, show the relative arrangement of the parts. An analysis of the construction shows that we sustain a screen of proven fire-resisting nature say 10 to 11 inches from our heavily sectioned wood. The first metal binding of our earthy coat is of such character and so arranged that it fulfills its function perfectly, while the furring is of heavier make-up, but yet so light as to do no mischief in an expansive movement caused by great heat. This neutrality is secured by its provisional attachment. The heavier or main supporting members, the I-beams, are protected against sharp heat in the lower limbs or flanges, while their webs and upper limbs may confidently be counted on to receive nearly the same degree of heat, insuring their remaining straight and normal. No bolts, special drilling, tapping, &c., no precision of setting, are needed in this floor. As a construction it is resilient in a high degree, is not in any sense fragmentary, and as a horizontal plate girder is of such disposition in its parts and details as to be of great strength. Where it is undesirable to use wood, 2-inch or other proper-sized T-iron may be reversed and laid across to receive the usual tile, which, in turn, receive encaustic or other final covering, as in Fig. 8. The resilience and other qualities noted are retained in this variation. Between this construction and the usual filled iron joist systems great differences exist in the dead load of floor, of foundation and footing, weight of wall, facility and certainty, the time demanded for erection and the cost. Figs. 9 and 10 show the construction of a partition, and Fig, 11 a suggestion for an arrangement of an elevator and a stairway so that the opportunities for attracting a fire are improved.

RANGE OF APPLICATION.

Something is to be said about the range of application. We shall see metal joist and other like members in even our dwellings. We shall taboo inflammable wood as far as possible in our construction and relegate it and its softness and grained beauty to more nearly an ornamental function, using it for quality, not in quantity.

Architecture to-day, as it always has been, is a composite art, in which artist and engineer go hand in hand for a proper result. In the realm of more nearly pure engineering exemplified in bridge building, those who design them do not have them fail through limitations imposed and accepted. Besides the large factor of safety there is the ethical spirit—the *morale* in the profession—which will not and can not brook limitation, to invite disaster, and the great structures stand, monuments of a principle of the noblest kind. In the twin art cited, had the builder been equally jealous of his good name and resisted the unwise—often even the mercenary—demand of the patron, would the record of destruction and loss from conflagration stand as it does? All work of man has an ethical side. When the great Richardson lay dying, no further worldly emolument to be his, with poor hand bereft of its physical cunning, he, with borrowed ones, wove out his unclouded fancies, and the realization, his greatest work, we possess, a Temple of Justice, superb, peerless! "Faithful to the end." Cannot we, in our humbler work, be true to ourselves, too, and, while holding fast to that which is good, be courageous enough to cast off and break away from that which is bad?

Managing Workmen.

A correspondent signing himself "Nester" contributes to a recent issue of the *Builder, Decorator and Woodworker* the following views on the subject of managing workmen:

I am about to deal with a "ticklish" question, yet one full of importance to every master and mechanic in the building trades, and I would respectfully ask the consideration of readers in studying it. What is the proper way to manage men so as to make them as profitable as possible when fulfilling a contract? This is the question; now for the answer.

In order to gain the best results from a gang of men employed in a shop or on a building, it is necessary that the employer be in himself a close observer, and if he be unacquainted with the capacity or skill of each individual, then he must use this observing faculty to ascertain their degrees of skill, so that he may assign them accordingly. When each has shown his ability it is easy to place him at what he will make the most rapid and accurate progress, and the master can therefore avoid the error of putting first-class mechanics at rough work. A very good plan which the writer follows is, to question each one separately and at length, when they are hired, thus finding out their capabilities and experience, and, if any one should misrepresent himself, then his work will deny his statements. Mechanics or workmen of any kind should, when being engaged, state what they can do, clearly and accurately, without talk or bravado, and let the future prove the truth of what they say. After each is started the next thing is to see that all work steadily and execute enough daily to make up what was figured in the estimate, and from experience the builder will find that it would in no case pay to do this work himself, as the business matters must be attended to. He must therefore appoint a deputy or foreman.

On the proper appointing of this official depends entirely the success or failure of running the men, and it ought therefore to be very judiciously done, so I will now try and explain what are his necessary requirements. A good foreman must be a good mechanic, in order that he may see that the work is properly done, and be able to take the tools and do it in case any of the men under him should fail. He should have that all-important faculty, evinced by the few, which gives him the power to push on the hands and expedite completion without their feeling it, being friendly and popular with all, yet keeping that respectful distance which is necessary between those who oversee and those who execute the work.

Many workmen claim that foremen put on airs and get high opinions of themselves when they are placed over others. To all mechanics who will read this article I would say that this distance is essential, when one considers that familiarity breeds contempt, and contempt is a rapid spreader. There was a time, it is true, when masters and foremen were fellow workers and had much in common, and George Eliot has exemplified this beautifully in "Adam Bede," where the sturdy master Adam talked and fraternized with his men, while the work went briskly along; however, we now live in a different era, and this friendliness is rare, except in very small shops, or when men and master have been working together for many years. The foreman also should be of good moral habits, and at least steady enough to never be a day or hour away from his duties in shop or at building, and be a little considerate of those whom he has in charge, and not overbearing or irritable, which qualities fret men, make them nervous, and debar them from doing their work in that easy, perfect fashion which is necessary; besides, they will soon learn to hate him, and create a desire to change their job. For an opposite reason he must be strict and exact about doing a proper day's work, and seeing it is done up to the full meaning of the specifications. I regret that I cannot devote more space to this personage, who plays such an important part in building practice; still builders will see from the above the necessity for appointing a thoroughly competent and reliable foreman. Some time in the future I may take up this subject again, and in the meantime would advise all to relax the tension and work for mutual benefit, to be more in unison of object—that is to say, to strive for better work and larger emoluments for the whole trade. I cannot but feel that there is something suicidal in the disintegration of that body termed the "Building Fraternity," and how can it stand or become prosperous when its component members are daily growing opposed to each other? Surely it is opposite that those whose interests are so mutual should work in harmony.

CHARLES P. SOUTHARD of New Jersey has applied for space on the exposition grounds of the World's Fair at Chicago for the erection of a model home, valued at $2000, to be built through the medium of a co operative building loan association. The grounds surrounding the home are to constitute an exhibit of model house gardening. The whole exhibit is to practically illustrate an American home that may be owned by a wage-earner capitalizing $10 a month, with interest. The applicant says there are in this country 5000 building loan associations, with a membership of 1,000,000 and an invested capital in homes of $75,000,000.

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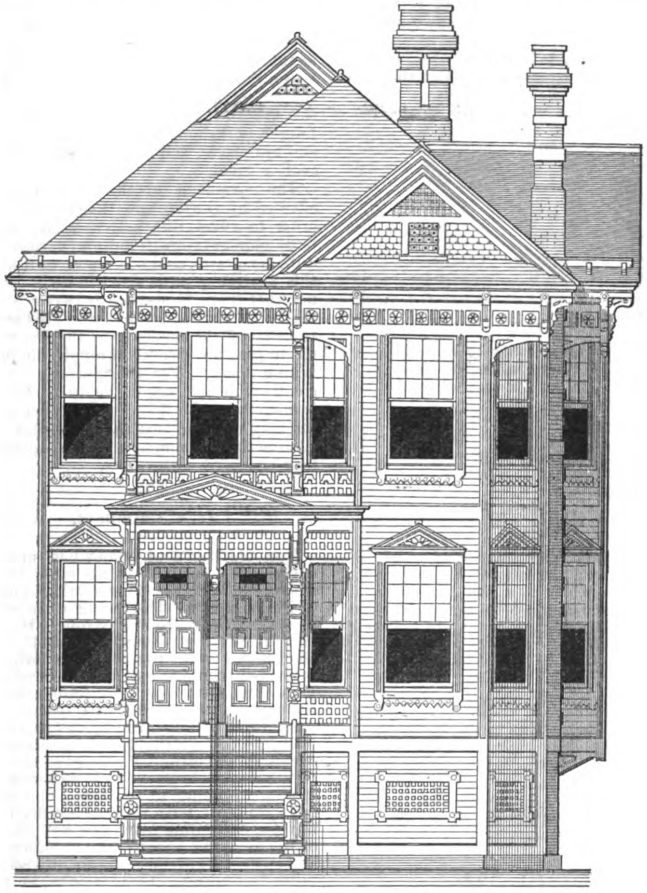
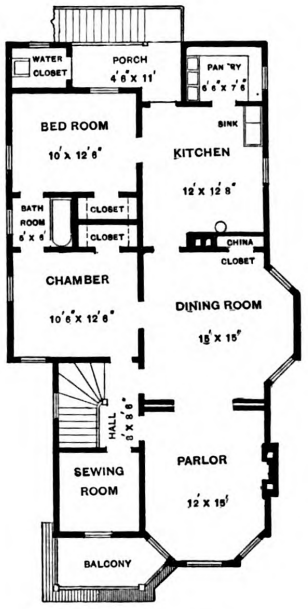
A CALIFORNIA APARTMENT HOUSE.

THE apartment house, or French flat, as it is called in the Eastern section of the country, is also becoming more and more popular on the Pacific Coast, and the front elevation, floor plans and sectional view which we present upon this and the following pages give a good idea of the style of flats that are being erected in California. The drawings were made by A. A. Cook of Sacramento, Cal., and call for a building arranged for the accommodation of two families. The house is constructed with brick foundations, while the frame work is of Oregon or Puget Sound lumber. The rustic finish and shingles are of California redwood. The inside is finished in plaster in the usual manner, and the second floor deadened, in order to render the movements of the occupants of the second floor less noticeable to those occupying the rooms below. It will be seen from an inspection of the plans that there are five rooms on the first floor, which include parlor, dining room, kitchen and two sleeping rooms. In addition to these there is a bathroom, large pantry, china closet and hall. Upon the second floor there are six rooms in addition to the various closets, a part of the space over the lower hall being utilized as a sewing room. The author states that the California climate is such as to require higher ceiling, basement and attic than that of the Eastern and Northern States, and that it is also necssary for the basement and attic to be well ventilated, for the reason that while there are six months of bright sunshine with refreshing sea breezes in the latter part of the day, the remainder of the year, which is the rainy season, is wet and damp. The building sites in Sacramento are usually 80 x 160 feet, and the flats erected thereon each 40 x 80 feet. A separate entrance is provided for each flat, both from the front and rear, and there is also a division fence, giving 20 x 80 feet of yard for each tenement. In this way the occupants of the two floors are as much separated as though they lived in distinct houses. Mr. Cook states that he has built a number of two-story flats similar to the one here illustrated, at a cost not exceeding $3500 for each building.

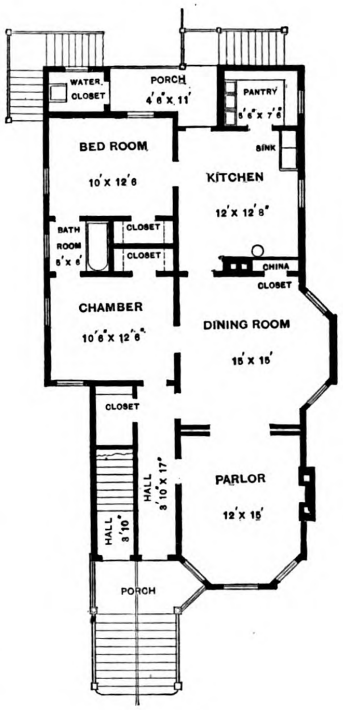


Front Elevation.—Scale, ⅛ Inch to the Foot.

A California Apartment House.—A. A. Cook, Architect, Sacramento, Cal.



Second Floor.



First Floor.

Scale, 1-16 Inch to the Foot.

Ventilation and Walls.

We are becoming more and more convinced, says the *Weiner Bauindustri Zeitung*, that the pernicious effect upon health of humid dwellings is chiefly due to the fact that the moisture arrests the circulation of the air. Prof. Max Von Pettenkofer, the father of modern hygiene, has shown that, as regards the ventilation of dwellings, walls play a more important *rôle* than the opening of windows. As, however, our dwellings *par excellence* have for their purpose to protect us against climatic vicissitudes, it might be assumed that the porousness of the walls might counteract this object. This is, however, not the case; on the contrary, porous building materials are the best protection against rapid changes of temperature. As is generally known, the air is a very bad conductor of heat—*i.e.*, it absorbs heat very slowly and discharges it equally

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slowly. The more porous the building materials the larger is the volume of air they are capable of containing, and while the pores do service as ventilators the air inclosed in them acts as a regulator of heat.

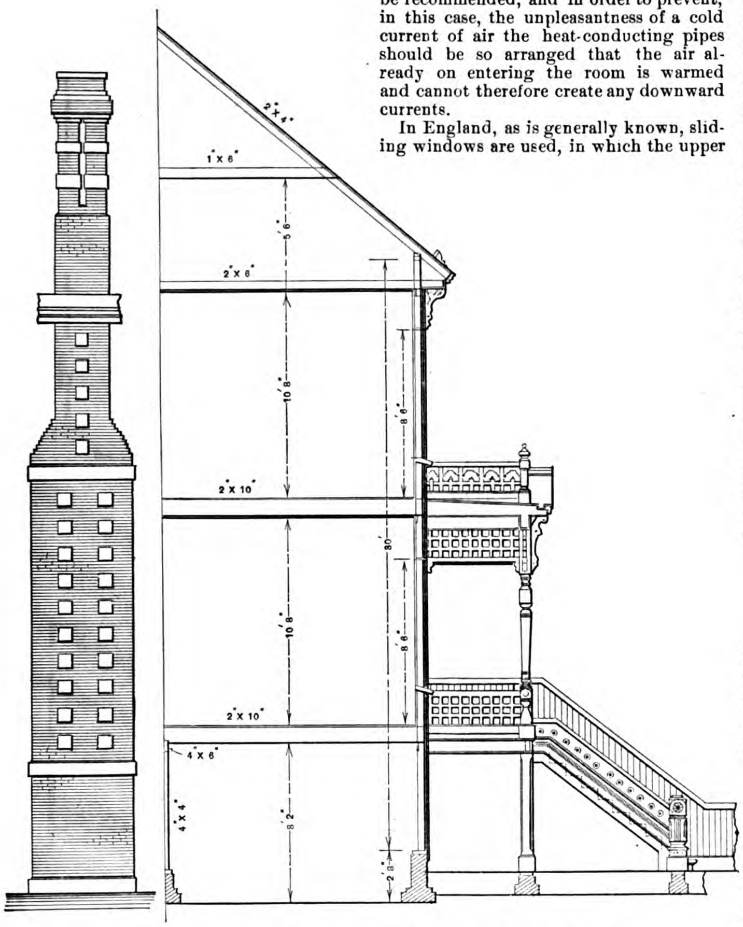
It is only of late that we have commenced, when building new houses, to make special arrangements for ventilation. The best of these hail from England, where generally great stress is laid upon good ventilation On arranging ventilating apparatus it is not sufficient to provide fairly wide canals for the ingress and egress of air; but certain settled mathematic-physical laws have to be considered. Pre-eminently it is important to prevent the generation of draft, and, at the same time, not arrest a strong exchange of air, for which reason it is particularly advisable to connect the ventilating apparatus with the fire place.

On building a house it is most advisable, as is the custom in England, to make the canals for the escape of air of zinc sheeting and run them up to the roof, close to a chimney, or, better still, between two chimneys. The escaping air becomes, through this arrangement, slightly warmed on ascending, and escapes the quicker. One may also install an air syphon pipe, leading from the upper part of the room to the floor, and finishing behind the fire place. However, this apparatus only acts when there is a fire. Of special importance is the manner in which the fresh air is let into a room. If it be effected from below, it is advisable to conduct the air coming from without under the floor to the fire place, so that on entering the room it is warmed. With this arrangement the advantage is combined that the occupants of a room are not exposed to draft, and that even when seated close to the fire place no closeness is felt from the heat emanating therefrom. A pleasant fresh warmth is diffused throughout the room. If the situation of the latter or that of that of the fire place should not admit of such an arrangement the fresh air may be made to enter about halfway up the wall, which is simplest effected through a pipe. In heating with steam or hot water this arrangement is in particular to be recommended, and in order to prevent, in this case, the unpleasantness of a cold current of air the heat-conducting pipes should be so arranged that the air already on entering the room is warmed and cannot therefore create any downward currents.

In England, as is generally known, sliding windows are used, in which the upper half may be drawn down a couple of centimeters, but still draft be prevented by a list or border, while fresh air may be let in by similarly opening the lower half. However, this arrangement is unsuitable in countries where there is generally a greater difference of temperature of the air within and the air without than in that country, as it generates a most unpleasant draft. Fresh air may also be introduced into dwellings by mechanical agencies—namely, by the so called impulsors. The pure air is derived somewhere near the house and conveyed to the ventilator, which diffuses it through canals into every corner of a room. The impure air escapes through fissures and openings in windows, doors, walls and ceilings. And if, in addition, a corresponding system of suction canals be arranged, the effect is the greater, and the division of air is under complete control. Indeed, in certain circumstances, dust may be carried away with the vitiated air. The circulation of air is effected by the fresh air entering at the top of the room and sinking downward, while the impure air, together with any falling dust, is sucked out at the bottom under the floor.

But for the ventilation of factories and workshops arrangements of a different kind are required. In such cases the main point is that in the cold season the fresh air enters the workrooms warmed, and that the vitiated air continually escapes. Solitary apertures conveying cold air into the room cause draft and discomfort, and are therefore generally stopped up by the work hands. However, the conveyance of fresh air into such shops may be easiest effected by running a fairly wide canal under the floor, carrying the air from without to the fire place, which should be encircled with a mantel of sheet iron, extending to the floor. The mouth of the air canal is situated in the space between the fire place and the mantel. Thus the air on entering becomes warmed by the fire and escapes at the upper end. Larger workshops require, of course, several fire places, and each one should have such a canal.

The ejectment of the vitiated air is effected by the fire and the chimney. In order to effect this better, square brick-built chimneys are to be preferred to the ordinary grates, and of greater width. In this an iron pipe is fixed in such a manner that there is a space between it and the brick chimney. The iron pipe serves to carry off the smoke from the fire, while the impure air escapes through the intervening space. For this purpose a sufficiently wide aperture in the brick chimney is made near the floor, and another opening may be made near the ceiling for ventilation in the summer. Both apertures may be closed with valves.



Detail of Chimney. Section Taken Through the Front of the House.

Miscellaneous Details of a California Apartment House.—Scale, ⅛ Inch to the Foot.

Iron Chimneys.

Iron chimneys of somewhat unusual design are now built in all sizes by the Philadelphia Engineering Works, Limited, of Philadelphia. The casing of the chimney is made of plate iron, strongly riveted, thus forming a continuous shell from the ground to the top. At the bottom it is riveted to a heavy cast-iron foundation plate ring, secured to the foundation by bolts passing through it to a second plate ring, built solidly in the bottom of the foundation. At the top is a plate-iron ornamental casing. Fastened to the shell of the larger chimneys is a wrought-iron ladder extending to the top. The chimneys are built with or without fire brick linings, depending upon the temperature of the escaping gases. The chimneys are self-sustaining, requiring no guy rods or other fastenings. Their weight, in most cases, is sufficient to withstand overturning by ordinary wind pressure, but when bolted to a foundation of brick or stone will resist the highest wind pressures.

Iron Houses.

In Guatemala, says an exchange, wood is scarce and very dear, owing to difficulties of transport, and as it is sent damp and used in that state for building it is especially liable to mold and rot. Iron houses are, therefore, much more suitable, especially as they are free of duty, and therefore cheaper than those made of wood, and have come into use pretty generally at Guatemala and other parts of Central America. Iron buildings are much safer in case of earthquakes, which are unpleasantly common, protect fairly well against vermin, and admit of better ventilation than the wooden shanties. The Belgians are already taking the matter up, and a merchant of that locality, established in Guatemala, is putting up a number of iron houses.

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LAW IN THE BUILDING TRADES.*

BEARING OF FIRE ORDINANCE ON REBUILDING WITHIN FIRE LIMITS.

A WOODEN BUILDING two stories high with an attic, was divided by a partition, and the north part was used as a tenement, and the south part independently as a saloon. A fire destroyed the roof, injured the attic and upper story of the north part, and burned most of the south part to the sills. Defendant repaired the north part, put a new roof on it, and replaced the partition so as to make it a complete building, and his tenants reoccupied it. About three months later he rebuilt the south part substantially as before. This was a repair, and not the building of an addition within the meaning of an ordinance forbidding the erection of "any building or addition thereto" whose outer walls were not composed of materials specified by the ordinance, or approved by the fire wardens.—Borough of Stamford *vs.* Studwell, Supreme Court of Errors of Connecticut, 21 At. Rep., 101.

PRIORITY OF MECHANIC'S LIEN OVER PURCHASE MORTGAGE.

S. entered into an agreement to sell certain lots to J. on credit, which provided that J. was to build a house on the lots to cost not less than $1500, and when the house was inclosed S. was to convey the lots to J. by warranty deed, when J. was authorized to make a mortgage and obtain a loan on the lots for $1200, after which J. was to execute a mortgage on the lots to S. to secure the payment of the purchase price of the same. It was also stipulated that until the deed and mortgages were made, as provided, the legal and equitable title should remain in S., and that until that time J. could not subject the property to any liens. The deed and mortgages were made as provided in the contract, but some time prior to their execution J. purchased from a lumber company material for use, and which was used, in the construction of the house, but did not pay for the same, and the lumber company filed a statement for a lien on the lots against J. as owner. In an action to foreclose the lien of the lumber company, the contract under which J. held limited his interest and ownership, and his right to create liens on the lots, and the lien of the lumber company is subordinate to the mortgage liens given in pursuance of the contract.—Chicago Lumber Company *vs.* Schweiter, Supreme Court of Kansas, 26 Pac. Rep., 592.

DANGER SIGNALS WHILE CONSTRUCTING BUILDINGS.

Where a building is in process of construction and it becomes necessary for the contractor to so obstruct the sidewalk as to render it dangerous, if the contractor protects the public by such proper guards and signal lights as will render it possible for persons in the exercise of ordinary care to avoid the danger the contractor is exempted from liability, and the city has as much right to plead the protection afforded by such signals in defense to an action against it to recover damages for personal injuries as it would have had had it placed such guards and signals there itself. The question is as to the sufficiency of the protection and not as to its authorship.—City of Kansas City *vs.* Bermingham, Supreme Court of Kansas, 25 Pac. Rep., 568.

ACTION FOR PRICE OF BUILDING MATERIALS.

Building materials, for the price of which action was brought, were delivered from plaintiff's dock at defendant's house, within sight of the dock, by teamsters who took receipts for the contents of each load sent. One of the plaintiffs helped unload part of the material, and saw other portions of it carried to the house, and there was testimony that the brick delivered there equaled the quantity alledged. Defendant when informed of the amount of plaintiff's bill, after an interview with his contractor, promised to pay it. This was evidence for the jury of the delivery of the whole bill.—Henderson *vs.* Wasserman, Supreme Court of New York, 12 N. Y. Supp., 151.

INTERPRETATION OF BUILDING CONTRACT.

By a contract to furnish certain materials for buildings, including all "standing trim panel backs, . . . window sashes, doors, blinds, and all inside wood and glass required," the first payment was to be made on delivery of the sash and "standing trim panel backs," and a second payment on delivery of the doors and other work specified. The owner refused to make the first payment, because the contractor omitted to furnish all the head lights over the doors with glass. Whether the head lights were regarded as a part of the door or as a separate frame over the door, they were not included in the word "sash," and as glass was not, by the contract or the specifications annexed to it, clearly included in the term "sash," the owner's refusal to pay was not justified.—Smith *vs.* Collins, Supreme Court of New York, General Term, Second Department, 12 N. Y. Supp., 33.

SUFFICIENCY OF STATEMENT FOR MECHANIC'S LIEN.

Where, under the Mechanic's Lien law of 1872, a statement for a sub-contractor's lien for materials furnished was filed with the clerk of the district court within 60 days after the contractor had completed the building, but not within 60 days after the sub-contractor had fulfilled his contract with the contractor, the statement was filed in time. Where it appears from the statement of a sub-contractor's lien that the sub-contractor, or one of a firm of sub-contractors, had appeared before the clerk of the district court and subscribed and sworn to the statement, the statement was properly verified. Where it is shown from the statement for a sub-contractor's lien and otherwise that the contractor purchased of the sub-contractor materials to be put into the house of the owner of the land, and that such materials were actually put into such house, such statement is not necessarily invalid, although it may also be shown from such statement that the credit was originally given to the owner of the property.—Cunningham *vs.* Barr, Supreme Court of Kansas, 26 Pac. Rep., 583.

CONSTRUCTION OF BUILDING CONTRACT.

In an action for breach of building contract which, after specifying by numbers various materials to be used, recited "the above numbers refer to P. Bros.' catalogue," evidence that a certain portion used by the builder, for which the contract called for "No. 47," was substantially like "P. No. 47," is admissible, as the contract meant simply that P. Bros.' materials of the specified number should be used as models. Where the contract fixed the size of sills on which certain columns were to rest, and did not expressly state the diameter of the base of the columns, evidence by an expert as to the proper diameter of the base of such columns to rest on such sills is admissible. A charge, "in deciding whether or not plaintiff was proceeding with said building in compliance with the contract, . . . there must have been a substantial compliance in every material particular, . . . as called for by a fair, reasonable and practical construction of the contracts, plans and specifications taken together, and where there is a conflict in any in these this should be reconciled in a practical, workmanlike manner, so as to arrive at the fair and reasonable intention of the same," is correct, and does not leave the construction of the written contract to the jury.—Linch *vs.* Paris Lumber and Grain Elevator Company, Supreme Court of Texas, 15 S. W. Rep., 208.

MECHANICS' LIEN LAW IN THE STATE OF WASHINGTON.

The mechanics' lien law of the State of Washington provides that the notice for a lien shall contain a statement of the demand after deducting all just credits, and also a statement of the terms and conditions of the contract, if any. Such a notice is defective where it states that the material and labor for which the lien is claimed were furnished under a sub-contract, but omits to set out the terms of the original contract. The notary must use his seal in certifying the verification of such lien notice, as the notice is not intended primarily for use in court or in judicial proceedings, and hence is not within the exception of a statute providing that such documents need not bear the seal. Gates *vs.* Brown, Supreme Court of Washington, 25 Pac. Rep., 914.

CONSTRUCTION OF TECHNICAL CONTRACT.

Where an ambiguous expression is used in a contract, extrinsic facts and circumstances showing the practical interpretation placed upon it by the parties may be received in evidence. While generally it is the province of the court to construe written contracts, yet, where a term is used in a technical or peculiar sense, the question of what that sense is or what the intention and meaning of the parties were may be submitted to a jury upon competent evidence and proper instruction; but, even if the court alone should have given a construction to the term, and it clearly appears that the jury has put upon it a correct construction, and such as the court should have given it, the submission of the question to the jury is not error. While this is a question of law, under these peculiar circumstances the meaning of the parties becomes a question of fact, and that is for the jury.—Casper *vs.* Nesbitt, Supreme Court of Kansas, 25 Pac. Rep., 865.

Architectural Foliage.

How often do we see in modern foliage the very first and simplest law of nature totally disregarded, and foliage made to grow two ways—growing out at both ends at once. What, asks a writer in one of our foreign exchanges, can be more absurd? Yet it is done every day, more particularly in classic foliage. And as to any natural form or divisions in the leaves, it is never thought of; we are content to go on copying the leaves of the Greeks and the Romans without ever thinking it worth while to make them at once more natural, or even to get any more variety in form. We look upon it as architectural foliage, we are willing to accept the conventional forms as being the highest and most beautiful that can be attained, and we completely and purposely separate it and cut it off from the original source from which those old artists took their ideas. We shut out nature, and go on every day further and further from her. Modern foliated carving should be based upon nature and nature's laws, as all carving, whatever may be its tyles, has been originally; but we may and should take ideas from all styles of architecture, but let us not confine ourselves or copy from any. Copy nature in the vast variety she gives us and never-ending beauty of form, and let us have a little of this variety in our architectural enrichments. Its leading charac teristics should be elegance of form and beauty of light and shade, while retaining all the quietness and repose necessary for its various positions as architectural enrichment.

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The Builders' Exchange

CONDUCTED BY WM. H. SAYWARD, SECRETARY OF THE NATIONAL ASSOCIATION.

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Indications.

The Secretary of the National Association is constantly receiving letters from all over the country, which indicate that the work of the National Association is commanding attention among builders of all classes, and that the objects it is prosecuting are important issues.

Much correspondence is received from cities not yet affiliated, in which the exchange idea is yet but imperfectly understood, and one of the most interesting features of this indication of the value of the work in hand, is the fact that the workmen manifest almost as much interest as do the employers. The form of arbitration advocated by the National body is attracting the attention of trades unions in various localities, and in response to the offer (published in the July issue of this journal) to send copies of the form to persons desiring the same, the secretary has been enabled to place the plan in the hands of various associations of workmen. In one or two instances the request for the form has come from officers of State federations of labor, which may be assumed an indication that the plan is being considered at headquarters, and with the knowledge of the complete success of the plan wherever it has already been adopted, beneficial results will undoubtedly accrue from the consideration of the form by the workmen as a proposed solution of labor difficulties.

WORKING FOR THE GOOD OF THE EMPLOYEE.

The action of the Bricklayers' Association of Philadelphia, in reference to pupils of the trade schools connected with the Builders' Exchange, is a further indication that the workmen's associations are recognizing the fact that the National Association is working for the good of the employee as well as the employer, and the example thus set will be felt all over the country. Not only does the co-operation of the bricklayers with the master builders show a recognition of the value of trade training, but it is more significant as a proof of change of policy on the part of trade associations, and indicative of the result which will follow joint consideration of this important subject.

These two instances which have come to the notice of the secretary of the National Association may be safely taken as indications of conditions existing in other localities of which no knowledge has yet been obtained, and it is not unwarrantable to assume that they reflect conditions that promise much for the future.

The fact of this spirit of inquiry and investigation being manifested by the workmen, considered in the light of the too great lack of harmony which has heretofore existed between themselves and the employers, shows beyond question that the old spirit of unreasoning opposition is giving way to one of harmony. The beneficent result to be gained through this harmony and the preservation of the harmony itself depends in a great measure upon the employers themselves, and it is incumbent upon them to pursue such lines of action as shall foster the work thus auspiciously begun.

VALUE OF THE NATIONAL ASSOCIATION.

It cannot be reiterated too often that the work of the National Association is constantly proving the wisdom of its existence. The seed sown is beginning to bear fruit, and, although the period between the planting and the harvest is long and the growth of the tree imperceptible to many, it is already casting its peaceful shade over the entire country, and the result will eventually exceed the anticipation of the most hopeful. The fact, again, that every recommendation of the National body represents the honest convictions of builders from many localities, and is the outcome of their earnest endeavor to create better conditions, better methods, better practices in every branch of the building business, between employers and workmen, employers and the public and among themselves, is sufficient in itself to most strenuously impel every member of each filial body to assist the work at all times, and by every means in their power, even though they may be able to discern no immediate result.

A Western Plan for Bringing Employers and Workmen Together.

The builders of Sacramento, Cal., have inaugurated an entirely new departure that is somewhat experimental in its character. The plan has been on foot some time, its purpose being to bring about more harmonious relations between employers and workmen, and to create a more perfect understanding of the principles which should govern their relationship to each other. The methods by which this desirable condition of affairs is to be secured is by holding, at stated intervals, public meetings at which both employers and employees shall be present. The speakers at these meetings are chosen from the rank and file, and no paid orator with theoretical arguments will be allowed to speak, thus insuring the creation of a feeling of friendliness and harmony begotten of personal contact, and the benefit of the advancement of practical ideas and plans for the peaceful solution of local necessities.

Several of these meetings have already been held, at which remarks have been made by representatives of both sides. Among important topics that have been touched upon are shorter hours, the value of organization, the apprenticeship system and other subjects of equal moment. The subjects that have been brought up have been discussed in the most friendly manner by the workmen as well as the employers, and the effect of the plan is already being beneficially felt throughout the various branches of the trade.

CONTRACTORS AND WORKMEN.

The importance, as affecting the interests of builders generally, of establishing some means for bringing contractors and workmen into harmonious contact with each other for the consideration of subjects touching their common welfare, cannot be overestimated. By these means the first and most important stumbling block in the path of more perfect understanding of the duties of each is removed, important questions that have previously been avoided are brought up for discussion, and only by discussing these duties which pertain to each, are they recognized and established. The greatest drawback to the welfare of the building trades that

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exists to-day is lack of comprehension of proper rights and legitimate action, and so long as the employers and workmen remain apart, just so long will the present condition of affairs continue to exist. Each interest when considered separately, without the presence and influence of the other, naturally produces one-sided and imperfect conclusions.

Mutual understanding between two parties to any discussion or condition must be arrived at before an equitable adjustment can be effected. These mutual understandings cannot be obtained unless both parties participate in the adjustment, and no adjustment can be secured until each party is willing to do its share.

The principles published by any organization in the building trades are presumably the expression of what the members consider to be just and honorable, and such conditions as are deemed unjust by the opposite side are likely to be the result of lack of understanding of the inherent equity of the case, which are arrived at through long terms of one-sided legislation. The habits of thinking thus engendered by looking at only one side of a question have increased the difficulties attendant upon bringing about a recognition of the fact that employers and employees are not opponents, but, in a measure, interdependent one upon the other.

Whatever the means that are finally adopted to establish that mutual consideration of vital topics which is to bring about more perfect understanding, one side or the other must make the first overture, and it is the duty of the employers to form such plans as may seem best to afford the employees the chance to secure a knowledge of the principles which must govern.

HOW TO REMEDY SOME OF THE EVILS.

Employers are too frequently in the habit of finding fault with the action of trades unions, saying, justly perhaps, that their action is arbitrary and one-sided, but that this is a reason for wholesale opposition or an effort to crush them out of existence is not true. They should first be given the opportunity to correct evils which exist within themselves, and if the opportunity is not profited by steps should be taken to create organizations of workmen such as would enable united and equitable action on their part to be had. No attempt should be made to crush a union that is unreasonable in its demands without seeking first to show it the unreasonableness of its position, any more than a fractious child should be punished by its parents without being told what the punishment was for and given an opportunity to mend its ways.

Some means should be provided by every community of builders, whether the plan adopted by Sacremento is used or not, for bringing about a full recognition of the duties incumbent upon both employers and workmen. The plan of arbitration advocated by the National Association, and which has already been successfully adopted in a number of instances, offers a most excellent solution of this problem in that its prime object is to establish harmonious relations between organizations of employers and organizations of workmen in the beginning, and from this harmonious beginning the desired results are to be evolved.

The Mid-Year Meeting.

With the approach of the time for holding the mid-year conference of officers and directors of the National Association, the attention of every member of the filial bodies is drawn to the importance of sending to the secretary any and all suggestions of topics for the consideration of the meeting.

The benefit and assistance to the work of the National Association of a mid-year conference cannot be overestimated. An opportunity is thus given for the arrangement of the work of the convention and the exchanges are given ample time for the consideration of every subject that is to be acted upon at the annual meeting.

Instead of, as heretofore, subjects brought up for action in the convention being acted upon by the delegates without previous consideration in their various exchanges, or the subject being laid over for a whole year in order that it may receive consideration in each exchange, the mid-year meeting takes up every subject that is presented, and from what is submitted and from the needs of the builder generally formulates a programme for the convention, that is given to each filial body for consideration and discussion. The action of the delegates under this plan must of necessity be much more intelligent and representative than formerly and the result is of greater importance from the fact that the delegates more perfectly voice the sentiments of their various exchanges under this plan than they did when action represented the voice of the delegates only.

The importance of every person who is interested in the general welfare of the building business expressing, in the form of suggestions for consideration, any thoughts or opinions that might tend to improve any condition or custom that needs correction, cannot be urged with too much force.

These suggestions should be forwarded to the secretary as soon as possible, in order that they may be classified and tabulated in time. Every builder who thinks at all must observe many practices that should be corrected, and probably has some plan for that correction. If through neglect or carelessness he does not accept the opportunity to have that plan perfected and offered as a remedy for the evil practice or custom wherever it may exist, he is doing not only every reputable builder in the country a wrong, but himself as well.

There are plenty of issues staring every builder in the face to-day that need careful, earnest and universal consideration. Arbitration, the apprenticeship question, necessary improvements in methods of sub-contracting, are only three of the subjects that are sufficiently important to command the attention of every builder in the country.

Letters are being constantly received by the secretary which indicate that the writers do not attach sufficient importance to steps that are being taken in their localities for the improvement of some method or practice, and the same thought applies to builders who fail to give their opinions to their fellows, in this connection, because they may not think them of sufficient importance. It should be remembered by all that one thought suggests another, and that if no one expressed their thoughts there would be no advance, no progress; then, too, what might be considered unimportant by a builder in one locality might contain suggestions of the utmost importance to builders in other localities.

Builders who are interested in the work of the National Association, but who may be in localities where there is no filial body, are invited to send suggestions to the secretary, whose address appears among the list of officers in another column.

Arbitration Between Owner and Contractor.

As an illustration of how the experience and judgment of a builders' exchange may be utilized in the settlement of disputes between owners and contractors, thus avoiding long, tedious and expensive litigation for both parties, the following case is given in detail.

A member of one of the exchanges connected with the National Association had a matter of importance in dispute with a certain owner, and being convinced that a quicker and more equitable settlement could be reached by referring the case to a leading official, of his exchange, whose position and experience were such as to warrant a fair hearing of both sides and a just conclusion, rather than to carry the matter to a court of law, proposed such reference to the owner.

The owner, being convinced that the reputation of the exchange and of its official was such as to insure a proper hearing and an honest conclusion, agreed to so refer the case, and the arbitration took place, with results as are hereinafter stated.

An agreeable feature of the whole affair is that both parties express satisfaction in the judgment rendered.

This example of what service can be rendered through the opportunities offered by a well-organized builders' exchange is important to all builders, and should be a further demonstration of the power for good existing in such bodies.

Arbitration of matters in dispute between Messrs. Blank & Co., contracting plumbers, and the Corporation, owner, of the building herein mentioned.

APPOINTMENT OF ARBITRATOR.

It is hereby agreed, by and between owner (acting through its authorized representative Mr. ——, architect, of Boston), and the contractors, that all matters now in dispute between them shall be referred to the secretary of the Master Builders' Association of Boston, as sole arbitrator; that his decision in the premises shall be final and binding; that the amount decided by him to be due the said contractors shall be paid by the said owner within five days after such decision, and that the said arbitrator's fee shall be equally divided and paid by the parties hereto.

(Signed) ——, Architect,
Architect for Corporation, owner.
Blank & Co., Contractors.

CLAIM OF THE CONTRACTORS.

1. That the owner did, through its president and authorized agent, give them orders to do certain plumbing work in the old wing of its building, under general instructions given by the president at the time, the same to be carried out to the best of the judgment and ability of the said contractors, and under their own superintendence.

2. That the work was to be done "by the day," and charge made therefor at "cost" with but five per cent added for profit, which last agreement was made in consideration of the fact that the funds of the corporation were low.

In further consideration of the low state of the corporation funds it was agreed to wait for payment to suit the convenience of the said corporation.

3. That under these conditions and none other, they, the said contractors undertook

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the work, ordered and delivered at the building material of various kinds, and proceeded to carry out the agreement on their part.

4. That after they had been at work several weeks, had laid out the whole detail, had substantially completed the iron piping for soil and ventilation, and were busily prosecuting and pushing the work to completion. Mr. ——, architect, appeared at the building, stating that he had been engaged to have full charge of the plumbing work, in connection with other work which was now contemplated, and demanded an estimate from the contractors of cost of the work they had undertaken.

5. That they, the contractors, demurred at the interference of the said architect, and declined to make such estimate; but finally, at the urgent request of the president of the corporation, submitted an estimate based upon the general instructions originally received and the plan and specifications they intended to follow.

6. That immediately after the submission of this estimate they were notified by the architect to stop work and remove all material delivered by them at the building and which had not been placed in position.

7. That they did not recognize this order of the architect and did not stop work, but upon receipt of an order from the president of the corporation they did stop work, but declined to remove any of the unused material.

8. That in view of these recited facts, they, the contractors, are entitled to receive payment from the owner for all labor performed by them up to the time they ceased work by order of the president, and also for all material ordered by the contractors for the work contemplated; also that the prices for said labor and material should be the usual prices charged when day work is performed.

9. That the bill they have rendered, amounting to $2840, is true and correct under the facts and conditions above stated.

REBUTTAL OF THE CORPORATION, OWNER.

1. The owner does not deny the truth of the statements covered in items 1 to 7 (inclusive) of the contractors' claim, but avers that it should not be charged for anything more than the labor actually performed and the material actually placed in position up to the time when work was stopped by its order, and also avers that the price for such labor and material should only be "cost and 5 per cent."

2. The owner does not aver that the prices charged on the bill rendered by the contractors are greater than are usually charged for labor or materials, when work is done "by the day," neither does it aver that the amount of material charged is greater than would be needed for the work that was contemplated by the contractors, except in the following items:

Of cast iron pipe, charged for soil piping and ventilation piping, a large surplus remains (the whole of the work contemplated in that department being completed before the contractors stopped work); also, that the wrought-iron pipe charged was not used, is not now on the premises, and was not redelivered.

In brass pipe, that there is the following discrepancy, the contractors' bill calling for 3 feet 5 inches of 1¼-inch heavy brass pipe, 6 feet 4 inches of 1-inch heavy brass pipe, 7 feet 6 inches of ½-inch heavy brass pipe more than is on the premises.

That the sheet lead is much greater in amount than could possibly be used, also that the weight of sheet lead on premises is 49 pounds less than amount charged on bill.

3. In regard to the number of days labor charged, the owner avers that it seems greater than should have been expended on the amount of work done, but would not dispute that item if the contractors present it in detail instead of in a total number of days.

4. The owner avers that the contractors gave it permission to return certain articles to the manufacturers, that it did so return them, and, therefore, these said articles should not in any event be charged on the contractors' bill.

REVIEW OF EVIDENCE.

It appears from evidence submitted that the corporation, owner, did, through its authorized agent, who is also president of the corporation, interview and consult Messrs. Blank & Co., plumbers (the contractors), in regard to certain work contemplated in and about its building, and that as a result of said interview the said agent did instruct and order the said contractors to proceed to do the work, placing them in sole charge thereof, trusting to their judgment as to way and manner of construction, quality of materials and general superintendence, and did agree to pay for the work comprehended in the agreement as "day work," and at prices that should represent cost with 5 per cent. added.

It appears that upon being thus ordered the contractors did purchase, deliver and order such materials as seemed in their judgment necessary, and did put their workmen at work upon the premises for the purpose of carrying out and completing the agreement upon their part.

It appears that after the contractors and their workmen had been engaged for several weeks upon the premises, tearing out and removing old plumbing and laying out and putting new plumbing in position, that the said owner decided to undertake other work in and about the building of a different nature from that upon which the contractors were engaged, but which had to be prosecuted more or less in conjunction with it, and for that reason engaged the services of an architect, placing him in full charge of all the work.

It appears that the contractors were not consulted in regard to the desire or intent of the owner to make any change in the charge or superintendence of the work which had been placed in their hands, and gained their first knowledge of it through the presence of the said architect upon the work, and the announcement by him that he was in charge thereof.

It appears that the contractors did thereupon object to having the work which had been once given into their sole charge, which they had planned, laid out and partially performed, put into the charge of and under the direction of the other party; but, upon the urgent request of the president of the corporation, they finally consented that the said architect should superintend their work, inasmuch as the president wished to insure harmonious prosecution of the whole undertaking, but this consent did not involve any specific or implied authority for the architect to annul any portion of the agreement previously entered into by the contractors with the owner, nor to interfere materially with the carrying out of the same.

It appears that this consent of the contractors immediately led to a controversy with the superintendent in regard to an estimate of probable cost of the work as undertaken, which had been submitted by the said contractors upon request, and this controversy finally resulted in the contractors being ordered by the owner, through the president, to discontinue work and remove all unused material from the premises.

It appears that the contractors did, on receipt of this order, discontinue work, but declined to take away any material, and now render a bill to the owner for all labor performed and all material delivered or specially ordered for the work in question at regular prices and demand payment of the same.

DECISION.

The corporation, owner, having engaged the services of the said contractors for the purpose of securing the performance of certain work, and having ordered and permitted them to enter upon the premises of the corporation and proceed with the said work by a combination of labor and materials necessary for the same, is justly and equitably bound to the said contractors for any and all time expended in prosecution of said work, or any portion thereof, and is also justly and equitably bound to them for all materials delivered or ordered for the said work.

The appointment of an architect as superintendent or agent does not in any sense relieve the owner from responsibilty for orders given by it to the said contractors prior to the said appointment.

The discontinuance of the contractors' employment on the work in question by order of the owner abrogates that portion of the original agreement which refers to prices to be charged, inasmuch as the said agreement as to prices comprehended that the contractors were to be permitted to complete the work undertaken, but being estopped thereform they are entitled to the regular and customary charges for "day-work," not only for labor but for meterials.

The owner has no right in justice or equity to demand that the contractors remove any of the materials ordered or delivered and necessary for the work contemplated, and to render no bill for the same, for the materials so ordered were not ordered for the use and benefit of the said contractors, but were ordered for the use and benefit of the said owner, and upon delivery became and remain its property to be disposed of as it sees fit.

The claim of the owner that the contractors gave them permission to return certain of the materials to the manufacturers, and that, therefore, the said materials should not be charged on contractors' bill, has no weight, for the reason that the contractors had no control over the disposal of property of the said owner, and any statement by them to the effect that the said owner could return certain materials to the manufacturer cannot be construed that the said materials were to be credited to the said contractors, and as a matter of fact the materials, so returned are not credited to the contractors, but to the corporation or its agent.

No precedent can be claimed as to any materials charged for, on the basis of the statement made by the contractors as to return to the manufacturer.

The owner, however, has right in justice and equity to claim that surplus of material ordered for such portion of the work as the contractors were permitted to complete—to wit, the soil and ventilation piping with fittings therefor, be removed by the said contractors and be not charged on their bill.

It has also the right to claim that the weight, measurement or amount of certain materials charged shall be correct—to wit, brass pipe and sheet lead.

The claim of the owner that the number of days labor charged is excessive cannot be allowed, for it does not so appear to the arbitrator after submission of the testimony and an examination of the premises, and, furthermore, the owner itself admits that it would not question this charge if it were made in detail, instead of a total number of days work, although at the same time admitting that it is not in possession of any facts to guide it in checking such charge if made in detail.

The claim of the owner as to the non-use or non-delivery of the wrought-iron pipe charged on the bill is not sustained, the said work having been discovered, viewed and measured by the arbitrator and declared correct.

The claim of the owner that it should not be charged for certain marble which appears on the bill is sustained, inasmuch as it appears that the marble was not specially ordered for this work, but was material left over from previous work, and which might or might not be favorably used.

JUDGMENT.

Judgment in this case is as follows:

Messrs. Blank & Co., the contractors, are to take away from the premises all and singular the surplus of soil and ventilation pipe, with branches, bends, elbows, &c., which they originally delivered there, and did not use in the completion of that portion of the work, and deduct the same from their bill at same rates as originally charged. They are also to deduct 3 feet 5 inches of 1¼-inch heavy brass pipe, 6 feet 4 inches of 1-inch heavy brass pipe, 7 feet 6 inches of ½-inch heavy brass pipe, and 49 pounds of sheet lead, all at prices originally charged for same.

They are also to take away the Tennessee marble slabs, sides and ends, deducting price originally charged.

The owner is to pay the said contractors the amount of their bill as originally rendered, less the deductions hereinbefore stipulated, the balance of materials being their property and at their disposal. Signed,

..... .
Arbitrator.

EXCHANGE NEWS.

Builders have long recognized the necessity of some uniform and equitable practice for the government and control of the business of subcontracting, some uniform custom to be followed in the submission of sub-bids and their treatment after submitted.

The subject is one that requires the earnest thought and consideration of every builder in the country, not only because of its inherent importance, but from the fact that so many varied customs and practices exist in different localities. Each of these different customs has some good features about it, and a combination of the good of the whole is what is necessary for the welfare of the trade.

The national secretary has recently addressed a letter to the secretary of each filial body on the subject, and such replies as have been received up to date of going to press show that in the majority of cases builders make no open cause of complaint of the practice which exists, but are fully conscious that there is a great necessity for more uniform customs and rules of government in this branch of the business.

Every exchange that can see opportunity for improvement should take the matter up, and such associations as are satisfied with the customs that exist in their localities should give all the builders of the country the benefit of such satisfactory customs and practices by making the same public. Such replies as have been received to the letter of inquiry on this subject will be incorporated in this month's exchange news.

Buffalo, N. Y.

The Builders' Association Exchange is in an active and healthy condition and the effect of the prospect of so soon having a suitable home of its own is perceptibly increasing the interest of builders in the association.

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Sub-contractors find no cause for complaint in the customs which govern their business and the relations between contractors and their "subs" are mutually satisfactory.

Chattanooga, Tenn.

Advices from Chattanooga, the last city affiliated with the National Association, show that building interests are in a properous condition. As an indication of the amount of building being prosecuted, the report from the building inspectors' office shows that during the month of July over $100,000 worth of permits were issued.

Chattanooga is at present the most southerly city connected with the National Association, is growing rapidly and is progressive in all its instincts.

Chicago.

The recent strikes in the building trades and the natural influx of workmen into the city at this time, owing to the erection of the World's Fair buildings, has flooded the market with carpenters, and has had a tendency to disturb the harmonious relationships existing between the master carpenters and the United Carpenters' Council resulting from the recent arbitration, a report of which appeared in the July issue of this journal. A mass meeting of carpenters was called early in August to consider the situation, as it had been stated by some of the contractors that certain carpenters were not living up to the agreement, and the meeting was called for the purpose of ascertaining the truth of the charge.

The discussion which followed showed that if any union carpenter was violating the agreement it was without the knowledge of the council or his individual union, and it was the unanimous decision that if such violation was practiced and the recreant parties could be singled out, their union should expel them.

The making of the agreement was not child's play, and the carpenters do not propose that a few men shall undo the work which has taken months of hard labor on the part of the entire organization to accomplish. The carpenters are fully alive to the importance of maintaining the agreement with the employers, and are using all their power to prevent its being broken. Resolutions were adopted at this meeting looking toward the prevention of any misunderstanding, and in harmony with the terms of the agreement.

The condition of affairs which necessitated the meeting was the result of the action of non-union men and would never have arisen if they had had the wisdom to have taken advantage of the agreement between the employees and the contractors. This they could have easily done by simply refusing to work for less than the regular wages fixed by the Joint Committee, which was 35 cents an hour. In this way they would not only have beenable to have maintained higher wages for themselves but would have materially assisted in increasing the amount of work to be done in Chicago by assuring owners and builders that there would be no cause for fearing the trouble and inconvenience of a strike.

Regarding the condition of affairs among sub-contractors, Secretary John writes that no word of complaint is heard and that there is no prospective action on the part of sub-contractors looking toward change in the present customs which are prevalent in their branch of the trade.

On work of any magnitude in Chicago bidders for each branch of the work are direct contractors, there being only one contractor in the city who is in the habit of taking entire contracts.

Kansas City, Mo.

The Builders' and Traders' Exchange is continually demonstrating its importance as one of the solid institutions of Kansas City and is progressive in every move that it makes.

A letter from Secretary McDonald states that building generally is in its usual condition, though a trifle less active than usual.

In reply to questions upon the condition of the building business as relating to sub-contracting, he says that the prevailing custom under which sub-contractors of this Exchange submit their estimates, draw their pay, &c., is generally satisfactory; complaints that have arisen in this connection in the past have been based almost without exception upon abuses of the custom.

The practice of sub-contractors leaving sub-bids with architects for the use of general contractors is discouraged, it being believed that this custom tends to increase the evil of trading upon the figures of others, and to otherwise disturb the harmony between general and sub contractors which is essential to the success of every exchange.

General contractors submitting estimates for an entire building and accepting sub-bids for various portions of the work are supposed to award the same to the lowest bidder, and while circumstances have occasionally seemed to indicate that the general contractor has ignored the custom, yet it has been almost universally the case that upon investigation no well founded cause for complaint has been found.

Sub-contractors are paid for labor and material as the work progresses in accordance with the stipulation under which the general contractor receives his pay, unless other arrangements have been made before the work is undertaken. This custom has proved generally satisfactory, but occasionally complaints have been heard over the question of the retention by the general contractor, until the final completion of the building, of the same percentage upon the work of the sub-contractor as is required of himself.

The establishment of a code of rules to govern the receiving of bids and awarding of contracts, both as between the architect and the general contractor and the general contractor and the sub-contractor, has been under consideration for some time past, and, while it has been found extremely difficult to form a code that meets the approval of all, the progress thus far made is exceedingly satisfactory, and it is felt by members of the Exchange that efforts in this direction will not be unrewarded.

The permanent exhibit of building material in connection with the Exchange is constantly being improved and increased in importance, and it is safe to say that the Exchange has the finest display of building supplies in the West. A large number of representative concerns have taken advantage of this opportunity to exhibit their products, and the display embraces every variety of material which enters into the construction of buildings.

The Exchange has addressed a notice to manufacturers and dealers in the building trades, setting forth the advantages of the exhibit as a place for the advertisement of their wares, and to visitors to the Exchange who desire more explicit information regarding any material or device, a postal card containing the address of the proprietors of the material in question is supplied free of charge.

The benefit to an exchange of an exhibit of this character should not be underestimated, for its value and assistance, both to architects and builders, has been proven in the experience of both Kansas City and Philadelphia. These two exchanges have set the mark high, and their example should be followed by every other association in the national body.

Lynn, Mass.

Members of the labor unions in the building trades are taking steps to secure an increase in the number composing the State Board of Arbitration by the addition of two members who shall be practically conversant with the building business. The workmen maintain that the board at present is so made up that controversy in their branch of the trade cannot be properly adjusted, and it is believed that the presence of men more familiar with the building business would be of great advantage. No criticism whatever is made as upon the character of the membership of the board, but that it should contain men familiar with building is considered essential for the welfare of the trade.

The Master Builders' Association is in a prosperous condition, with about the usual amount of business going forward.

The sub-contractors of Lynn are very much dissatisfied with the present system of sub-contracting. The sub-bids are placed by the architect with the general contractor in most instances, and the system of payment is very much at loose ends.

Building generally is in fair condition and no trouble is being experienced with the workmen.

Milwaukee, Wis.

A letter from Secretary Vogel states that sub-contractors find considerable fault with the fact that there is so much trading of bids, alleging that they suffer by the practice.

Everything is quiet in the labor market at present, the readjustment of affairs resulting from the recent strikes having proved sufficiently satisfactory to prevent any further disturbance.

The Exchange, at a meeting held August 12, adopted the final plans for the Exchange building to be erected at Fifth street and Grand avenue. The plans are a decided modification of those adopted last spring. The original plans did not provide for a fire-proof building, and they were made on the basis of an expenditure of $75,000. At the meeting mentioned the Exchange voted an additional expenditure of $25,000, with which the building can be made fire proof. It is to be six stories high, with a high assembly hall on the top story.

Minneapolis, Minn.

The project of uniting St. Paul and Minneapolis into one city was recently considered by the Builders' Exchange, and after several speeches on the subject had been made by various members the question was put to vote, which established the fact that the Exchange was unanimously against the proposition.

In response to the query regarding the condition of sub-contractors, the secretary, Mr. Richardson, writes that there never was a time in the history of the city when all trades were so well satisfied as they are at present, and that no desires have been expressed for any changes in the present method of carrying on the business of contracting. There is no apprehension of any disturbance of the present harmonious relations existing between employers and workmen, and it is the general opinion that the future is very promising in this connection.

Omaha, Neb.

The builders have been having trouble with their bricklayers, who struck early in August. The men returned to work, after being out about two weeks, under the old conditions, and everything is running smoothly at present.

Pittsburgh.

The bricklayers' strike is still on, and many sensational statements that are being sent out by the strikers indicate that they are assured of success. The Builders' Exchange is, however, standing firmly together and the master builders are securing men as fast as possible from whatever source they can be obtained. The Philadelphia builders have been helping their brothers of Pittsburgh in every way in their power and have sent many of their workmen to the latter city.

There have been no new developments of any importance in the strike since the last issue of this journal, everything being at a practical standstill so far as union bricklayers are concerned. Already this trouble has cost the building industry of the city over $500,000 in wages and profits. The Builders' Exchange has taken a determined stand against the strikers and the members of that organization have agreed to stand out for their rights. The whole strike now hinges on the action of the bricklayers. Not a building of consequence is being erected that was not started prior to May 1.

There are several thousand men out of employment. Of the 400 bricklayers who originally went on strike, only about 100 are without employment, and this number is being paid regularly by the national organization of bricklayers. The distressing part of the situation lies in the fact that all other skilled mechanics and laborers who would be employed about the buildings are without work because of the bricklayers' strike, and are receiving no financial assistance whatever. Many of them are in actual want. They, too, struck on May 1, but went back to work, and are now willing and anxious to work, but cannot, as the bricklayers hold the key to the situation and will not give up. The fact that the Builders' Exchange has imported 150 bricklayers from this and other cities is not having the effect that was expected. Very few of this number are practical bricklayers, skilled in the trade. It is rumored that the striking bricklayers intend to form a builders' exchange and take contracts for buildings in opposition to the Builders' Exchange. At this time it is impossible to ascertain how much truth there is in the story.

In the August issue of *Carpentry and Building* it was stated in this department that the Mason Builders' Association of Boston was the first to practically apply the form of arbitration adopted and advocated by the National Association at the fifth convention. This statement was made previous to the receipt, by the secretary, of information from Pittsburgh to the effect that the mason builders of that city had taken similar action and had established the plan as a practical success not later than the middle of April.

Nothing half so strong can be said in favor of the wisdom of advocating the form of arbitration as is evidenced in this example of its utility: All through the strikes which have so seriously disturbed Pittsburgh not a single stone mason has been thrown out of employment through labor troubles.

Portland, Maine.

The members of the Builders' Exchange held their annual outing on August 12, and all turned out and enjoyed themselves thoroughly. The day was spent in field sports, in which all participated, and every member returned to the city feeling better for the day. An excellent dinner was served at the place of resort, which contributed much to the pleasure of the occasion.

The carpenters have been granted nine hours per day.

Providence, R. I.

Providence builders find the present system of sub-contracting entirely satisfactory, and everything in the building business and the Exchange is moving along smoothly

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Saginaw, Mich.

A small strike of bricklayers for an increase of pay over $3.50 per day is now in force. None of the other trades are affected, and an early settlement is expected.

St. Louis, Mo.

Secretary Walsh writes that everything is quiet in St. Louis in the building trades, and that affairs in the Exchange are moving along about as usual.

Regarding the practices existing in the subcontracting branch of the trade, there seems to be no general dissatisfaction. About the only unpleasant feature of this branch of the business is the habit of certain sub-contractors in sending bids for portions of a job to general contractors indiscriminately, unsolicited. These bids are frequently the lowest, and too often fix the amount for which that portion of the work must be done by the sub-bidder whose estimate is solicited. Aside from this custom everything is seemingly satisfactory.

Worcester, Mass.

At a meeting of the Builders' Exchange, held on August 13, the association was duly organized under the laws of Massachusetts as a corporate body, with the following charter members: C. D. Morse, Millbury; O. S. Kendall, H. W. Eddy, E. B. Crane, Franklin B. White, George W. Carr, George Kingston, Jesse Smith, O. W. Norcross, George F. Barnard, Thomas Barrett, William Knowles, Thomas O'Gara, Henry T. Farrar, Frank H. Goddard and George Bouchard. C. D. Morse of Millbury was elected president of the new corporation, and George Bouchard clerk.

The by-laws of the Builders' Exchange were adopted, and the officers elected were: President, C. D. Morse of Millbury; vice-president, O. S. Kendall; clerk, George Bouchard; treasurer, Frank H. Goddard; directors to serve until January, 1892, O. W. Norcross, George F. Barnard, George W. Carr and Thomas Barrett; to serve until January, 1893, George Kingston, Thos. O'Gara and William Knowles. The oath of office was administered to all the newly-elected officers of the corporation by Justice of the Peace H. T. Farrar, also member of the Exchange. The purposes of the corporation are to be the establishment and maintenance of a place for social meetings of its members and the interchange of opinion and discussion of architectural, social and business matters.

Notes.

The Connecticut granite cutters have recently struck in support of the striking East Haven quarry men and have decided to boycott three of the five quarries located at that place. The stone cutters have agreed not to work on any of the product of these quarries and will instantly leave any yard into which these stones may be brought.

A case is now being tried in the New York City courts to secure damages from an alledged conspirator for causing a strike of bricklayers.

The Bricklayers' Union of Chicago has donated $2000 to aid the striking architectural iron workers of that city.—*New York World.*

If contractors generally evinced as great a unity of purpose and earnestness as is shown by this paragraph an adjustment of affairs would be speedily reached and the necessity of such donations obviated.

The various trade unions connected with building in Toledo are at present engaged in an active endeavor to secure from the employers definite recognition of union labor. Committees have been appointed to visit various employers with this object in view and this committee has already begun its work.

The masters of Toledo are not as thoroughly organized as they should be and now is an excellent time for the formation of a Builders' Exchange.

Architects' Commissions in Spain.

In the annual proceedings of the Italian Society of Engineers and Architects is the following schedule of commissions (*honoraria*) adopted by the Royal Academy of San Fernando, Madrid, Spain:

Local work is arranged in 13 classes, according to cost; and a sliding scale of commissions is devised in the form of percentages on the cost of each class:

Class.					
1.	Buildings to cost within			$5,000	
2.	"	"	between	5,000 and	$7,500
3.	"	"	"	7,500 "	10,000
4.	"	"	"	10,000 "	15,000
5.	"	"	"	15,000 "	20,000
6.	"	"	"	20,000 "	25,000
7.	"	"	"	25,000 "	30,000
8.	"	"	"	30,000 "	35,000
9.	"	"	"	35,000 "	40,000
10.	"	"	"	40,000 "	45,000
11.	"	"	"	45,000 "	50,000
12.	"	"	"	50,000 "	75,000
13.	"	"	"	75,000 "	100,000

Table Showing Charges in Percentage on Cost of Building.

Class.	A.	B.	C.	D.	E.
1.....	5.0	2.5	2.0	0.5	0.5
2.....	4.75	2.375	1.9	0.475	0.475
3.....	4.5	2.25	1.8	0.45	0.45
4.....	4.25	2.125	1.7	0.425	0.425
5.....	4.0	2.0	1.6	0.4	0.4
6.....	3.75	1.875	1.5	0.375	0.375
7.....	3.5	1.75	1.4	0.35	0.35
8.....	3.25	1.625	1.3	0.325	0.325
9.....	3.0	1.5	1.2	0.3	0.3
10	2.75	1.375	1.1	0.275	0.275
11.....	2.5	1.25	1.0	0.25	0.25
12.....	2.25	1.125	0.9	0.225	0.225
13.....	2.0	1.0	0.8	0.2	0.2

A—Full architectural services. B—Drawings and estimate. C—Drawings only. D—Estimate. E—Copies of drawings.

When the cost exceeds $100,000 the architect is to receive an annual stipend of $600 to $800 in addition to the 1 per cent. for drawings and estimate. If required by the owner, the architect must always render an estimate of cost. On this estimate his commission will be calculated in case the work should not proceed; likewise in case it should be executed according to plans and the total cost should exceed the estimate. If the actual cost on the same condition falls within the estimate, the architect's commission will be based on the cost instead of the estimate. When preliminary sketches only are furnished deduct 10 per cent. from the above schedule.

For buildings at a distance not exceeding 16 miles from the architect's office, the charge for superintendence will be increased by 25 per cent. in addition to traveling expenses. When the distance is between 16 and 40 miles add 50 per cent., plus traveling expenses, to the schedule charge for superintendence. If the distance be from 40 to 80 miles add 75 per cent., and for each additional 80 miles add 100 per cent., all with due regard to the conditions and exceptions previously noted.

For superintending public buildings a suitable salary is to be allowed. For designing public buildings the commission will be double the amount charged for private work. The charge for valuations of public buildings will be the same as for private ones. For verifications of considerable importance, also for monumental restorations, a special agreement will be made as to compensation.

For ordinary restorations, repairs, &c., requiring the aid of architectural drawings, the commission will be the same as for new work. Where no drawings are required the architect should receive a salary not less than $30 per month for work lasting six months or longer, and for work of less duration a percentage as follows for valuations:

	Commission. Per cent.
Valuations of work within $2,500	5.0
" " " 5,000	4.7
" " " 10,000	4.4
" " " 15,000	4.2
" " " 20,000	4.1
" " " 25,000	4.0
" " " 50,000	3.0
" " " 100,000	2.7
" " " 200,000	2.4
" " " 400,000	2.0

Where valuations are for the division of property among heirs, &c., add 50 per cent. to the architect's commission. In case the architect should also be required to furnish separate plans of the various allotments of property among its claimants his commission will be doubled.

A Royal Villa.

The villa which the Empress Elizabeth of Austria is having built at Corfu, says a foreign exchange, will certainly be one of the most perfect and luxurious dwellings imaginable. Surrounded by superb grounds which are all the year round a mass of fragrant blossoms, and shaded by dense groves of palm and blue-gum trees, the house, throned, as it were, on a hill, looks like a huge jewel in the glorious light of the Eastern sun. It is constructed in Pompeian style, the walls, of pink Ferarra marble, are adorned with beautiful mosaics, and the flat roof is inclosed by an elaborately-carved balustrade. Behind the villa is a field of roses, comprising 25,000 bushels of all kinds and colors. A trellised walk, covered with climbing noisette and nyphetos roses, encloses this unique collection, the flower-laden branches meeting and interlacing overhead, and hanging down on both sides almost to the ground. Here and there the snowy column of a high reaching fountain rises far up into the air and falls in glittering spray on the turf smooth as velvet bordered with ground ivy. The gardens and park are almost completed. The latter descends in sloping terraces to the edge of the sea, where a marble flight of stairs leads to a private harbor. A lighthouse, also built of marble, and provided with an enormous electric lamp, will throw its dazzling rays over the waters and on the surrounding woods. A sea wall of pink marble, studded at intervals with tall vases of majolica filled with aloe plants, stretches along the shore, separating the grounds from the golden sands of the beach.

The villa contains 128 rooms, and the stables can hold 50 horses. From the windows of the Empress's sleeping apartment and boudoir the view is admirable, reaching far away to where the mountains of Cyprus and Albania tower into the sky. All the rooms will be furnished with the exquisite taste ever displayed by the Empress in all interior arrangements. Her Majesty's boudoir will be entirely in white and silver—walls, ceiling and all—with doors of white lacquered wood painted with groups of lilies of the valley, violets, and heather, and white velvet furniture. But it is said that the stables, saddle, and harness rooms will be the greatest marvel of the place. For these Elizabeth has ordered everything to be brought from England, down to the wainscoating of light oak. The building devoted to this part of the establishment is at some distance from the house, and is very picturesque, with its many gables, its latticed windows, and its pointed roofs overrun with creepers. The alley leading to it gently ascends through the woods, and is bordered with variegated geraniums and groves of camellias, azaleas, and gigantic ferns. The villa will cost, when finished and furnished, over 10,000,000f. (about $2,000,000), not including, of course, the treasures of art which are being sent down to adorn the picture gallery.

THE ALLIANCE COMMERCIAL CONVENTION held at Topeka recently had before it and discussed for an entire day a plan for the establishment of co-operative stores in every city in the Union. H. W. Sandusky of Columbus, general secretary of the Alliance Exchange, claimed that a company known as the National Union Company had been chartered in the State of New York with a capital stock of $20,000,000, $3,000,000 of which it is said is already paid up. Each town is to have a resident manager, who has charge of the store and has a vote in the meetings of the company. Goods are to be purchased by regular agents in large quantities and shipped direct from the centers or distributing points in large quantities direct to every store. The distributing points are to be New York, Chicago, Kansas City, New Orleans and Salt Lake or San Francisco.

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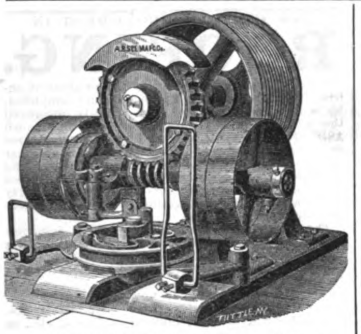

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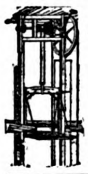

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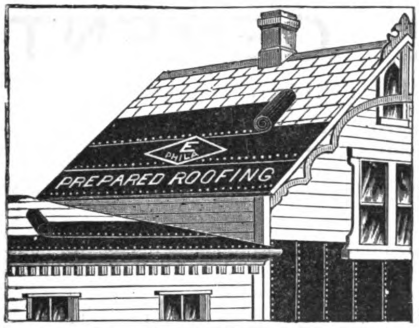

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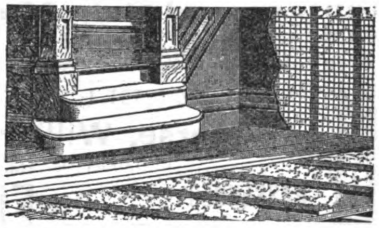

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Intercommunication Among Builders.

There never was a time when intercommunication among builders was more important to the craft or more likely to be of advantage to individuals in the building trades than at present. The work of the local Builders' Exchanges and the general supervision of the National Association of Builders has given the opportunity for all to take part in the work that is to be done, which, if improved, will tend greatly to the advantage of all in the building business. There are questions to be discussed, rules and methods to be formulated and decisions to be reached which require the active and intelligent co-operation of all connected with the building trades. There is, then, the necessity for a channel or medium through which communication may be made. The country is so large, the interests so vast and the persons concerned are so numerous that nothing short of a publication of the widest circulation is adequate for the purpose. It is with pleasure, therefore, that we open the columns of this paper to the free discussion of all questions that are of interest to members of the building trades.

CHANGE, CHANGE — WE ALL COVET CHANGE.—*Chamfort.*

The Builders' Exchange.

For some months past we have devoted several pages of each issue of this journal to a department known distinctively as the "Builders' Exchange." The subjects discussed and the news presented in its pages have been such as to specially interest those most intimately associated with the progress of the Builders' Exchange movement throughout the country. The department has been under the immediate management of the secretary of the association, and has been the means of doing great good. But we think we see the opportunity of serving the trades we address still more satisfactorily. The present number inaugurates some slight changes in the arrangement of matter, so far as concerns the special class of topics and division of work named, which we think will command the approval of our readers. These changes are made with a view to interesting builders in general in the discussions that are in progress. While still continuing the department called Builders' Exchange, it will be for the future restricted to the directory of the National Association and to the presentation of official announcements. Discussion of Builders' Exchange questions and of subjects in general interesting to builders will be scattered through our regular pages, and arranged as may seem to be expedient from time to time. We are led to take this step because more people are concerned in the Builders' Exchange movement than are members of existing exchanges. In fact, there is nothing done in any Builders' Exchange that is not of importance to every master builder in the community, and to his employees as well.

NOVELTY IS THE GREAT-PARENT OF PLEASURE.—*South.*

Benefits of Organization.

The building trades are now, as always, divided into two great camps. There are the contractors or master builders on the one side, and the mechanics and employees on the other. Organization is the watchword with all. Nor are the two necessarily hostile to each other; but there is such a vast number of persons in each class that nothing short of thorough organization and careful discipline will enable them to treat with each other in a way to secure the elevation of the building business. The workmen were the first to organize, and after they had demonstrated the advantages that follow upon organization, the employers adopted similar plans. In the limited time since both have been organized and skillfully directed by able leaders, results have been secured pleasing and advantageous to all. Disputes have been avoided, and the best interests of all have been conserved, and yet there is more good work to do.

ART IS A JEALOUS THING; IT REQUIRES THE WHOLE AND ENTIRE MAN.—*Michael Angelo.*

Mr. Sayward's Articles.

For the future Mr. Sayward's articles, either with or without signature, will be found in the pages of this periodical where their subject matter would naturally place them in the general plan upon which the paper is published. Letters from master builders or mechanics on subjects of general interest will be similarly distributed through our space, but without detracting from the technical excellence of the paper. The changes we now inaugurate are simply an enlargement of borders, a discussion in open meeting of topics which in a sense have in the past been confined to a committee room, and introducing a class of topics for consideration that has heretofore been too much neglected.

NO MAN CAN THOROUGHLY MASTER MORE THAN ONE ART OR SCIENCE.—*Hazlitt.*

American Institute of Architects.

The twenty-fifth annual convention of the American Institute of Architects will be held this year at Boston, Mass., on October 28, 29 and 30. According to the announcement which Secretary Dankmar Adler has issued, information will be given out as to the order of exercises and arrangements made for railroad and hotel fares, headquarters, &c., just as soon as the Committee of Arrangements shall have completed its work. Papers upon artistic, scientific and administrative problems are likely to be presented for consideration at this meeting, while the Boston Chapter has instituted an exhibition of architectural drawings for the convention week, in which the members of the institute are invited to participate. We understand that full particulars concerning this feature can be obtained upon application to the Executive Committee, No. 6 Hamilton place, Boston. It is believed that the attendance at the convention will be unusually large, and that the social developments, as well as the business proceedings, will be the most interesting and successful in the history of the architectural societies of the country.

The Labor Problem.

BY W. H. SAYWARD.

The statement is frequently made that the workingmen complain of an unjust distribution of the products of their labor and of the oppression of capital, and the query naturally follows, "What can be done to relieve this condition?"

The term "workingmen" has come to mean those individuals who depend solely upon manual labor for their support, to the exclusion of the great mass of workers who depend upon labor of some kind for their livelihood, yet these latter are equally affected by the fact that the product of labor is unjustly distributed.

The manual laborers, however, have been wise enough to form associations for mutual benefit and protection, and through their organizations have been enabled to arrive at and give more definite expression to conclusions in this direction than other grades of workers. They have thus demonstrated the wisdom of associated effort, as well as indicated the line upon which all must proceed if it is hoped to discover methods whereby the man who works may receive a result from his labor more exactly in relation to its value.

An absolutely just distribution of the products of labor is virtually unattainable, for the relative value of individual effort is too intricate a problem and too far reaching for the human mind to follow, describe and fix. An improvement over present conditions is attainable, however, if the relation of distinctive groups of workers toward each other, and toward the great mass of workers, be accepted as the true basis for calculation and effort, and with every approximation toward a more equitable distribution of the products of labor the oppression of capital recedes, or, in other words, the oppressive weight of accummulated wealth is reduced. It is through associated consideration and action—that is, by means of organizations of workmen upon the one hand and organizations of employers upon the other—in all the various distinctive callings or avocations, and through joint consideration and united action by them in all questions of mutual concern, that the nearest possible approach will be made to a true adjustment of the products of labor; and that with this more equitable condition will come greater relief from what is now commonly described as the oppression of capital

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BUILDING WAYS AND MEANS.

IN SELECTING A SITE for a summer residence there are many features to be considered other than the exact spot upon which the building is to be located. It often happens that a site which will command a beautiful view of the surrounding country is not of the best description for a dwelling, but by the display of a little enterprise and the liberal expenditure of money the difficulties in the way may be removed. A case in point is that of the unique summer residence of John M. Way at Pigeon Cove, Cape Ann, where a comparative desert of rocks has been converted into a luxuriant lawn. The site of the villa was one of the roughest promontories of the whole region, the solid ledge of granite standing out in rough relief on many portions of the 2 acres owned by this gentleman, while other sections were nothing but huge depressions. This lot is now occupied by an attractive lawn stretching back to the sea by a regular and easy grade, and at its foot is 1000 feet of granite wall, laid in cement. The work of leveling off the surface occupied some 40 men many months. The outcropping ledges were blasted away to the depth of 3 feet below the new surface, while large derricks lifted the waste rocks into the hollows that were to be filled. Upon the rock and in the interstices were placed smaller stone, and this in turn was covered by a layer of gravel and upon this 18 inches of loam. The slope of the ground is such that the rear of the house is one story higher than upon the street. Almost at the front corner was a solid ledge of granite under ground, and the tools of the stone cutter fashished this into a capacious wine closet, the shelves and recesses being cut from the solid rock. A cistern was built with double walls of granite laid in cement with an air space between. This runs under the entire front and measures 61 feet in length, 10 feet in width and 18 feet deep. The cellar has a floor of solid cement with smooth finish. The doors from this open directly upon a platform of cement, and here are placed the furnace, laundry store rooms and other housekeeping arrangements. On the next floor, which is really the basement story, are the dining room and kitchen.

A FEW WORDS concerning the house itself-which in some characteristics is almost as unique as its location, may be of interest to the reader. The breakfast room, a very cosy apartment, is so situated as to receive the rays of the morning sun. On the main floor are the parlor and sitting room, which open upon the main veranda, both front and rear. These rooms, as well as the principal rooms on the second floor, are fitted with open fire places of terra cotta of fanciful design, which includes the monogram "J. M. W." The floors are all of quartered oak, as are also the stairways and the finish of the wall and ceiling. Besides the dining room veranda, which occupies only the rear, there is one on the main and one on the second story elevations which run entirely around the house. They are about 10 feet in width, and are protected by substantial railings, the main one having a railing of polished brass. The bathrooms and the principal chambers are supplied with hot and cold water, while every room and hallway is fitted with electric bells and gas made on the premises. The principal entrance is directly in the center of the front and is reached by a winding flight of steps with broad landings at the turns made of hammered granite. Probably the most striking peculiarity in connection with this house is seen in the exterior walls and arches which support the verandas. These are of Cape Ann granite, but no two stones in the whole edifice are of the same size, shape or color. The material was found on the premises or in the immediate vicinity and was taken from the face of the seam or natural fissure produced by cooling action ages ago. Each piece was selected with a view to contrast in shape and color with its neighbors and the effect is that of a grand mosaic, ever varying in detail of picture with the changing position of the beholder. From the foundation to the apex of the roof the 20-inch walls are built in this manner in accordance with designs prepared by architect Alden Frink. The work upon the estate is not wholly completed and many hands are still engaged in blasting, digging, building walls and bringing everything into harmony with the immediate surroundings of the house, which are in strong contrast with the rough ruggedness of the shore below.

IT IS DOUBTFUL if in the history of cable railroad building a line was ever constructed in the face of greater difficulties than those which met the contractors of the Broadway, New York, road, now in process of construction. This thoroughfare, as every one knows, is and always has been the great artery of the city through which corporations serving the inhabitants with various conveniences, which are distributed underground, laid their main pipe lines. The street at the time work was commenced contained the main pipes of the Croton water system, the main pipes of seven gas companies, the main cables of the Western Union Telegraph Company, of the telephone companies, of the electric lighting companies, the pipes of the steam heating companies, the subway conduits, and, from Dey street to Twenty-third, the tubes of the Western Union Pneumatic Line. All these run in a confused and irregular manner below the surface of the street. The general proposition which met the engineers at the outset was that through the center of this street they would dig a wide and deep trench extending on each side to points just near enough to the curb to allow a wagon to pass, and that in doing this they would not cut off a gas, water, electric light, telegraph or telephone connection, nor interfere with citizens in the enjoyment of any of the conveniences which are distributed to them by the tangle of underground communication. This plan, however, did not avoid the difficulties. Every step in the work has been strewn with complications. The lines of water and gas pipes could not be definitely fixed, as they were laid many years ago and were put down in a haphazard fashion, running almost from curb to curb. As it was with the water mains, so it was, to a certain extent, with the gas mains. In addition to this there was the further bewildering mass of private service pipes and wires, and it was not surprising that when all the conditions had been considered the gentleman in charge of the work was told that his task was a hopeless one, but his reply is readily found in the work which has thus far been done. Every difficulty has been successfully met, and the work has proceeded rapidly.

WHEN THE TASK is at last ended it is expected that the system of underground distribution and communication in Broadway will be better than ever before. The lines of all the mains will be straightened and shortened, old and corroded sections will be replaced by new and improved ones, and each line kept distinct and in its own proper course. The work of building the cable road has included among other things the undermining at one point of the elevated railroad structure and its artificial support while the excavations and the road construction under it were in progress. At the point named, it was found that a great water main ran immediately under one of the supporting pillars of the elevated structure. It had to be removed, and this involved the digging away of the entire foundation under the railway support, which had to be done without interfering with elevated railroad traffic. Another great task was the building of an entire pneumatic tube plant from Twenty-third street to the Western Union Building at Dey street, as the old tubes ran directly under the bed of the cable road. In addition to this work for the Western Union Company, their main cable, carrying something like 60 distinct wires, had to be taken up bodily and transferred to parallel streets. In several instances the water mains have been jacked over and out of the way and into line in long sections, while the subway has been torn down and rebuilt in several cases.

THE GENERAL PLAN of operation where new sections of mains were to be put in was to have the new material prepared to the last detail and laid alongside the old. Then every move, step and measurement of the transfer was carefully gone over, the connection shut off, the old main torn out, the new section thrown into its place with all possible speed and the connection completed. Besides all this there was continually the necessity of keeping a thoroughfare on each side of the trench open for traffic. The tracks of the old horse-car road had to be shifted bodily to the side of the street and the cars kept moving, while railed and solid board crossings at every intersecting street had to be maintained. All this work was merely incidental and preliminary to the real labor of building the road.

THE IRON SKELETON on which the track rest is set in solid concrete made in the proportion of 1 part of Portland cement to 3 parts of sand and 5 parts of broken stone, the latter reduced in size so that each piece can pass through a 3⅛ inch ring and not through a 1½ inch ring. This concrete surrounding the conduit is 6 inches thick. The yokes, or iron frames, which are put down at intervals of 4½ feet, rest in concrete foundations 45 inches long, 18 inches wide and 6 inches deep. These yokes weigh 550 pounds each, and between South Ferry and Fifty-ninth street about 4000 of them will be used. These yokes are made after a special design for this road. When the work is completed and the road is in operation two distinct cables will be carried in the conduit, one being held in reserve in case of accidents, while the grip of the car will be so arranged that it can be changed from one cable to the other at will. In operating the road the first cable loop will extend from Houston street to the Battery and back, a total distance of 4¼ miles, and to a sheave pit between Thirty-sixth and Thirty-seventh streets and return, a total of very nearly 4 miles. From the power station at Fifty-first street, a single loop will extend south to the Thirty-sixth street sheave pit, and north to Fifty-ninth street and return, a total of 2¼ miles. The two power stations will be located one at Houston and the other at Fifty-first streets.

OPERATIONS WERE COMMENCED a few days ago upon what is probably the largest apartment house ever contemplated in the city of Chicago, and possessing features of construction of interest to the builder. The structure will have a frontage of 266 feet on Thirty-fourth street, and of 234 feet on both State and Dearborn streets. It will be four stories in hight, and will contain 98 flats and 12 stores. The facing of the building will be of Roman pressed brick, with stone and terra cotta trimmings, while the bays will be of brick and terra cotta. The structure is in the form of two wings, separated by a central court 66 feet wide and 152 feet deep. The court has a driveway inclosing a miniature park. In the center of each of the wings will be a covered light court, 33 x 170 feet, surrounded by balconies at each story, connected by four main stairways. There will be five street entrances. The servants' entrances will be from an alley and from the street entrances. The basement will contain heating, lighting, power and artificial cooling plants. The four floors of the building will represent 6 acres of space. The parlor of each flat will have a bay window and every dining room a hardwood sideboard. The kitchens will be furnished with gas ranges and refrigerators. The structure will be known as the Mecca, and has been designed by Edbrooke & Burnham.

AN INTERESTING PIECE OF WORK has recently been completed in Boston in connection with the old church located at the corner of Washington and Motte streets of that city. The building, put up in 1827, was recently sold to a Mr. Grace, who proposed to erect a theater on the site. To do this it was necessary either to demolish the church or raise the building, as well as two houses in the rear. The latter structures were elevated to the hight desired and the rear and front walls of the church removed. It was then decided to raise the remaining side walls, roof and interior construction of the church, a feat which many builders declared to be impossible. The church covered an area 75 x 104 feet, the side walls being brick 2 feet in thickness. From the sills to the plate was a distance of 35 feet. In order to raise the structure a string of blockings at intervals of a few feet were run under the side walls and supported by a series of powerful jack screws. Six tiers of blockings running from the front to the rear of the building were employed, with the same number of tiers of screws. With a man at each screw, and all working together, it was a comparatively easy matter to raise the structure inch by inch, until the length of the thread on the screw made a new set of blockings necessary. These were supplied and the operation repeated until the structure was raised 36 feet. The appearance presented when this work was completed was of two huge brick walls resting on a half dozen piles of cob-work blocks, on which are being erected the huge walls upon which the elevated building will finally rest. The blockings are pulled out as fast as the construction of the walls permits. The building was raised so successfully that not even the plastering was cracked.

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QUESTION OF THE LOWEST BID.

THE recent decision of the Supreme Court sustaining the verdict for the plaintiff in the lower court in the case of McNeil *vs.* Boston Chamber of Commerce establishes a most important precedent in support of the claims of the lowest invited bidder for proposed building contracts.

The case is somewhat out of the ordinary owing to the fact that certain of the conditions of the competition as announced in the notice to bidders had been verbally changed. The notice to bidders attached to each copy of specifications contained the following:

. . . The work to be let to the lowest bidder upon his executing to the Boston Chamber of Commerce a good and sufficient bond in the sum of $25,000 with sufficient sureties for the faithful performance of the said work, to be approved by the Building Committee of the Chamber of Commerce.

The Building Committee of the Chamber of Commerce reserves the right to reject any and all bids. . . .

BIDS INVITED.

Five reputable contractors were invited to bid for the work, but owing to the unsatisfactory character of the specifications, which called for estimates in 59 different ways, and to the fact that the stone specified was under the exclusive control of one of the invited bidders, four declined to submit estimates. Upon the refusal of the contractors to bid, the committee requested a conference with the bidders in order to make some arrangement whereby competition could be secured. A meeting was held at which were present all five of the invited bidders, the Building Committee and the architects, and which resulted in the changing of the specifications so that another stone was substituted in the place of the one mentioned, and the 59 different forms in which estimates were to be submitted were reduced to 12. The committee refused to waive its right to reject any and all bids, maintaining that the lowest bid might be larger than the sum the Chamber of Commerce cared to invest in a building. It was distinctly understood, however, by all the bidders that if the building was built substantially in accordance with the plans and specifications the contract should be awarded to the lowest bidder. It is on this point that McNeil based his cause for action.

BIDS SUBMITTED.

With this understanding the bids were submitted, and McNeil's estimate ($400,000) was the lowest. The chairman of the Building Committee stated at the time the bids were opened that they were thought to be high, but would be taken under consideration, and within a day or two he requested an interview with McNeil. At this interview the chairman stated that $400,000 was more than the Chamber of Commerce cared to invest, and requested McNeil to figure a list of deductions which were prepared by the architects. These deductions brought McNeil's bid down to $369,000, whereupon the chairman of the committee offered him $360,000 to build the building without further change in the plans. This offer was not accepted, and the interview ended, and several days later McNeil received the following letter:

BOSTON, April 17, 1890.

McNeil Bros.:

GENTLEMEN.—At a meeting of the Building Committee of the Boston Chamber of Commerce, held this day, it was voted

That all bids submitted for the proposed new building be rejected on the ground that they are above the views of the committee.

Very truly yours. Signed by the chairman of the committee.

THE CONTRACT AWARDED.

The views of the committee did not transpire in the trial. The list of deductions as figured by McNeil was then submitted to the bidders, but no estimates thereon were given, and the contract for the building was finally awarded to the present builder for $367,500 without further competition and without substantial change in the plans and specifications. Shortly after the contract was awarded McNeil brought action against the Chamber of Commerce, placing his estimated damages at $40,000. This was an action of contract, alleging that the defendant offered to give the contract for building its new Chamber of Commerce to the lowest bidder of certain persons invited to compete; that the plaintiff was the lowest bidder; that the defendant refused to employ him, but did cause the building to be built substantially according to the same plans by another person. The plaintiff's claim was, as put to the jury, that the defendant's offer was that the lowest bidder should have the contract, provided the building was erected substantially according to the plans and specifications submitted to the competitors.

The line of defense was based upon the ground that the Building Committee did not forfeit the right to reject any and all bids, claiming that it agreed to give the contract to the lowest bidder, if it was given to any bidder at that bidding; also, upon the ground that the Building Committee had no authority to make a final contract, the vote of the directors of the Chamber of Commerce which created the committee being as follows:

Voted, That a committee of five be appointed by this meeting, of whom the president shall be one, with full powers and authority to procure plans and specifications for a building and make all contracts for the erection and completion of the same, subject to the approval of the directors.

DECISION OF THE JURY.

Much evidence was submitted on both sides, upon which the jury decided that (1) the Building Committee purported to make a contract on behalf of the defendant, by which it agreed to accept the lowest bid in case the building was built substantially in accordance with the plans and specifications, without reserving the right to reject bids in that case; (2) that the making of such a contract was within the ostensible authority of the committee and hence (3) had the approval of the directors; and (4)that the building finally contracted for was substantially in accordance with the said plans and specifications, and (5) that McNeil's damages were $14,500.

During the course of the trial much evidence was introduced on both sides which did not materially affect the vital points of the case, and which was not touched upon by the judge in his charge to the jury. The judge, in his charge, demonstrated clearly that the evidence showed that the distinctions made by the Building Committee (previously alluded to) regarding the conditions under which the contract should be awarded to the lowest bidders, were so fine, so nice, that all the bidders were misled as to the real intent of the committee. Also, that the action of the Building Committee in conducting all details of the competition without referring the same to the Board of Directors of the Chamber of Commerce, at no time during the conference or course of the competition indicating that its action was subject to the approval of the Board of Directors, and the fact that the final contract, as undertaken by another person, was executed without a vote on the subject by the Chamber of Commerce, warranted the assumption on the part of the bidders that the committee was an authoritative body.

CASE CARRIED TO THE SUPREME COURT.

The case was carried to the Supreme Court by the Boston Chamber of Commerce with the result already mentioned. In dealing with the statement by the defense that the notice to bidders contained the words "the Building Committee . . . retains the right to reject any and all bids," the Supreme Court Justice states: "There can be no doubt that it was competent in law for the parties by an oral agreement to vary the terms of the 'notice to bidders.' This would be so even if that notice had expressed the terms of a concluded contract." (Precedent cited.) After dealing thus effectually with the first finding of the jury the Justice goes on to say:

THE SUPREME COURT.

The remaining questions are whether there was sufficient evidence to warrant the second and third findings, or either of them; that such contract, if made by the committee, was approved by the directors, and was within the ostensible authority of the committee. If either of these was supported by the evidence, it is enough for the plaintiff's purposes, and most, if not all, of the evidence relating to the second finding bears also upon the third. The plaintiff contends that it was within the ostensible authority of the committee to fix terms upon which it would receive bids, and to make the agreement which is embodied in the first finding of the jury, without any reference to an approval by the directors He urges that this was within the ordinary province of a building committee, and that in this instance the directors knew that there was to be a competition for bids, that this competition was to be limited to five selected bidders, and that the committee would fix the terms of it; that the directors were all aware that the committee was going on to attend to all these matters; that a vote had already been passed by the directors authorizing the committee to make leases in the new building; that they also knew that the architects had been selected; that the plans were hanging up in the office; that the erection of the new building was the most important subject which the Board of Directors or the Chamber of Commerce had under consideration during this period; that it was a subject of constant talk; that no director ever objected to the committee undertaking to fix the terms of the competition among the builders, or questioned its power to do so, till after a letter from the plaintiff's attorney threatening an action at law. There was testimony in support of these various propositions. So far as appears, no one of the bidders doubted the power of the committee to act in the matter. The committee assumed to make changes in the terms of the competition at defendent's own will. There is nothing to show any suggestion to any of the bidders in respect to the need of consulting the directors. The notice to bidders held out the Building Committee as having the power to act in the premises. No mention of the directors was made in it. The Board of Directors knew that the committee was trying to get bids and no effort was made to inform bidders that they could not safely deal with the committee. According to the strict letter of the original vote, the committee could not even procure plans and specifications, except subject to the approval of the directors. It (the committee) was allowed, however, not only to procure plans and specifications, but to employ the architects, without formally consulting the directors. Without dwelling further upon details of evidence, the jury might properly find that the committe itself believe that it was authorized to go on as it did without consulting the directors as to the details, and that the directors were aware in a general way of what the committee was doing. It seems to us that the jury, as a result of the whole testimony, might properly come to the conclusion that the contract was within the ostensible authority of the committee, and that the bidders had a right to assume that the defendant would be bound by the contract of the committee as to the terms of the bidding.

The defendant does not now insist that the evidence did not warrant the fourth finding of the jury.

The result is that there should be judgment for the plaintiff on the finding.

One of the minor points brought out by the trial was that in making a selection of bidders for the competition the owner should forfeit his right to reject any and all bids, for the reason that his selection makes the competition private and presupposes a choice, and that the "right to reject," &c., should cease with the selection.

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LAW IN THE BUILDING TRADES.*

MECHANIC'S LIEN IN MAINE.

UNDER THE STATUTES of Maine a statement for lien need not specify what part of the amount due is due for labor and what part for materials. All that is required to be shown is the amount due.—Wescott *vs.* Bunker, Supreme Judicial Court of Maine, 22 At. Rep., 388.

FAILURE TO COMPLY WITH SPECIFICATION.

Where a requirement of a building contract that the cellar be made water tight (its situation making it subject to the flowing of water) is not performed, and the omission is not shown to have been unintentional, there is not a substantial performance of the contract, and the refusal of an architect to give the certificate required by the contract as a condition precedent to the last payment thereon is not unreasonable, and the builder cannot recover such payment.—Weeks *vs.* O'Brien, Superior Court of New York, 12 N. Y. Supp., 720.

SUB-CONTRACTORS' NOTICE IN PENNSYLVANIA.

The Pennsylvania mechanics' lien statute provides that when a lien is claimed against a leaseholder, and the materials or labor for which the lien is claimed were furnished or performed by any other than the original contractor, that they shall notify the owners or reputed owners of the leasehold of their intention to file a lien, and that unless such notice shall be given, no such lien shall be filed, or be of any validity. This notice, in order to be effective, must precede the performance of the work.—Stranich *vs.* Munhall, Supreme Court of Pennsylvania, 21 At. Rep , 151.

LIABILITY OF SURETIES ON BUILDING CONTRACT.

The liability of a surety on a contractors' bond is not affected by alterations in the plans, where the original contract provides that the owner may make such alterations as he desires, the same to be agreed upon in writing. Nor is his liability affected by the allowance to the contractor of extra compensation for work called for by the plans and specifications but omitted from the original bid. While any material change in the relation of the parties from that contemplated when the bond was executed would, without full notice to the surety, invalidate the bond, changes of minor detail will not have this effect.—Moore *vs.* Fountain, Supreme Court of Mississippi, 8 South Rep., 509.

LIABILITY FOR NEGLIGENCE OF CONTRACTOR.

In an action against a city for personal injuries, it appeared that the contractor to whom defendant had let a contract for improving a street had piled materials which he was using in making the improvement in the street, but neglected to place warning lights thereon at night. The obstruction had been in the street for some time, and it was known to be there by the employee of defendant who had charge of the improvement. Plaintiff, while driving along the street at night, ran against the obstruction, and was injured. It was an error to grant a nonsuit, either on the ground that plaintiff's only remedy was against the contractor, or that there was no proof of negligence on the part of defendant. Under these circumstances the proof might make a good case against the city.—Bauer *vs.* Rochester, Supreme Court of New York, 12 N. Y. Supp., 418.

CONDITIONAL ACCEPTANCE OF BUILDER'S ORDER.

When an order is drawn by the surviving member of a firm of contractors for a specific sum, with direction "to charge the same to firm on account of work done and work to be done on your building now in process of erection," and the same is accepted on these terms, "I agree to pay within order when the building is completed and recived by Messrs. Bruce & Morgan," the acceptance is conditional upon the completion of the building by the drawer; and if, without fault of the acceptor, he fails to complete it, and the acceptor has it completed by others at his own expense, there can be no recovery in an action on the acceptance.—Baker *vs.* Dobbins, Supreme Court of Georgia, 13 S. E. Rep., 524.

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Sub-Bids and Sub-Contractors.

We have received from William H. Sayward, secretary of the National Association of Builders, the following communication:

The inclosed letter from the secretary of an association of master builders in Colorado may prove of interest: "Some time ago we drew up articles of agreement between general and sub-contractors fixing rules for the government of submitting sub-bids and disposing of subcontracts.

"These rules were briefly as follows: A short time previous to the hour set for submitting bids in the architect's office, sub-contractors present their estimates to the secretary of the association, and they are opened by him in the presence of the general contractor. The general contractor is then to make up his bid for proposed work upon the basis of the sub-bids thus received, and if he secures the contract must award the sub-contracts to the sub-bidders whose estimates he has used.

"The plan does not work satisfactorily, and any information that would tend to help us out of our difficulty will be gratefully received."

In reply to the above letter I stated: That there should have developed some difficulty in carrying out the plan which the exchange has adopted is not to be wondered at, for it should have tried something that has not been attempted by any other exchange in the country. The step seems to be an exceedingly radical one.

I am inclined to think that the looseness prevailing in the matter of submitting bids must be amended by slow degrees rather than by one radical step; for instance, it is quite an undertaking to secure the consent of all contractors to the opening of their bids prior to the presentation of the same in the architect's or owner's office, even when the said opening and comparison of bids is made by so responsible a person as the secretary of the Builders' Exchange; and furthermore, a custom of that character would soon become generally known, and the public might rightfully conclude that an improper combination was possible, even though such intention was furthest from the minds of those who established the practice.

It seems to me that if the exchange would take as a basis for its work in this direction the report of the Committee on Sub-Contracting, as it appears on page 44 of the report of the fifth convention of the National Association, it will suggest the best that can be offered as a feasible plan. Taking this as a groundwork, let the efforts be to influence the members in this direction and recommend certain practices to them rather than adopt arbitrary rules. It is important that they should be shown that the habit of accepting sub-bids, regardless of whether they are solicited or not, or whether the bidders are responsible or not, is one that should be severely condemned.

My experience shows me that young exchanges are very apt to adopt more radical action than older associations would dare to attempt, and I am inclined to think that the rule mentioned in the letter had better be modified. Make it, if it is the unanimous opinion of the exchange, a rule that contractors should confine their solicitation of bids to members of the association only, and that they should neither receive nor attempt to take advantage of bids thrust upon them unsolicited.

It should be a thoroughly established custom that bids for the whole work should not be submitted on jobs where the owner or architect is at the same time receiving bids for portions of the work.

By following this course, and not attempting anything more radical at present, however desirable more extended action may become in the future, the exchange will be strengthened in every way, while if too much is attempted, the result may prove disastrous, not only immediately but in the future.

The question of methods and practices prevailing in the matter of estimates, either for general contracting or sub-contracting, has been the subject of the liviliest discussion in the National Association for the past three years, and the question is being slowly boiled down to a more definite understanding of what should prevail. If the members of the local exchanges would only read the reports of the committees and discussions on this subject, as they appear in the convention reports of the National Association, they would obtain much valuable information and such assistance as only a comparison of views and opinions can secure, and if guided by the conclusions thus far reached the exchanges cannot go far astray.

The Boston Wood Turners.

The Wood Turners' Association of Boston is making an effort to raise the standard of work in their branch of the building business and have addressed an open letter to the Boston architects, couched in such straightforward and manly terms, and yet so conservative and free from the element that often makes such letters objectionable, that it is given in full, as an example of worthy effort, well stated.

To the Architects of Boston and vicinity:

DEAR SIRS: The Wood Turners of Boston and vicinity having for some time viewed with regret and no little personal concern, the introduction by employers of a cheap and poorly finished quality of work in the wood-turning business, and being anxious to devise some means by which to counteract this tendency, we have therefore, in convention assembled, unanimously voted to respectfully solicit the aid and influence of the architects of Boston and vicinity to try and inaugurate a cleaner and better quality of workmanship in our trade.

We know that there are some unprincipled men in the business (and these are the ones we would like to reach), who take advantage of the confidence placed in them by architects, and, to the injury of all concerned, substitute poorly turned, rough, half done work, relying on paint, filling, &c., to fill up and hide the defects; or again, they alter the sizes and shapes of, and even leave out some of the members, until the original form and beauty of design is entirely obliterated.

We are glad to say that there are some honest and conscientious men in the business who do good work, and strictly follow the letter of the details. These men have to compete at a disadvantage with the others, and some of them have already asked us if we could not do something to rectify this injustice.

If you will insist on having in your jobs the work done well, and according to detail, you will confer an appreciated and lasting benefit to our craft, will place a premium on the skillful workman, who in turn will reflect the genius of the architect and designer.

Hoping you will receive this in the earnest and unobtrusive spirit in which we intend, we remain, Very respectfully,

WM. H. GORTLEY,
19 Chardon street.
FRED. MARZLIN,
M. J. O'BRIEN,
P. C. RICH.

Committee for the wood turners of Boston and vicinity.

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Grand Rapids Public Library



RESIDENCE OF COL. HENRY T. SANFORD, ALBANY, N. Y.

W. P. ROBINSON, ARCHITECT.

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A DWELLING IN ALBANY.

THE ELEVATIONS, floor plans and details which we present on this and the following pages relate to a house recently erected on Western avenue, Albany, N. Y., for Col. Henry T. Sanford, from drawings made by W. P. Robinson, architect, of that city. A general view of the house as it appears complete forms the basis of one of our supplemental plates this month. The house has under the entire area a cellar 7 feet in depth with a concrete floor. The foundations are of stone. The first story is covered with clapboards, while the second story and roof are shingled. The plans provide for four rooms and a large hall on the first floor and five sleeping rooms and a bathroom on the second floor. It will be seen from an inspection of the first-floor plan that the entrance to the main hall is direct from the porch, but in winter storm doors are intended to be put up to protect the interior from inclement weather. The arrangement of the rooms is such that the parlor and dining room open directly from the main hall, while the sitting room is connected with the parlor by means of a wide arch. In the rear of the dining room is a kitchen, access to which is obtained through a commodious pantry provided with all the necessary fittings, or the kitchen may be reached through the rear hall which leads to the back yard. The kitchen is fitted with range, hot-water boiler, sink, washtubs and swinging table. The rear stairway leads directly from the kitchen to the servants' hall in the second story. The bathroom on this floor is fitted with a planished copper tub, marble washbowl and an open closet, all of the latest type. Over the main stairway and leading from the second story are the attic stairs.

The interior finish of the first story and bathroom is of ash, the staircase and mantels are of oak, while the remaining finish is of white pine. The floors of the kitchen, pantry and rear hall are of Georgia pine, those of the dining room and staircase hall are of oak, all other floors being of pine. The mantels of the dining room and sitting room are of rich design, the one in the sitting room having a beveled plate mirror. The staircase hall windows and doors are glazed with leaded stained glass. The house is heated by hot air, with registers in each room. All pine and brick is painted in three coats and the hard wood is filled, shellaced and varnished.

The floor timber of the first and second stories and the attic is 2 x 8 inch hemlock, 16 inches on center. The center rafters are 2 x 10 inches, placed 20 inches on center. The sills are 4 x 6 inches, the plates 4 x 4 inches, the ridge 2 x 10 inches, the studs 2 x 4 inches, placed 12 inches on center, the angle studs 4 x 6 inches and the collars 1½ x 10 inches. The cresting used is of wood, with galvanized iron finials.



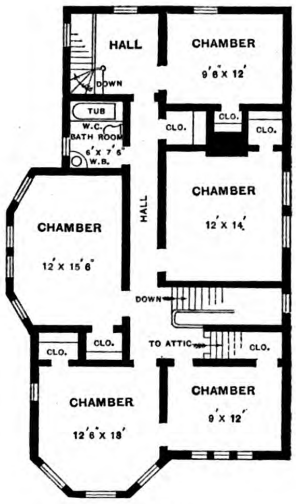
A Dwelling in Albany, N. Y.—W. P. Robinson, Architect.—Front Elevation.—Scale, ⅛ Inch to the Foot. Floor Plans.—Scale, 1-16 Inch to the Foot.

IN DESCRIBING a method of making a stone for sharpening tools, a contemporary says: "Take gelatine of a very good quality, which melt in an equal quantity of water. The operation should be performed in darkness, as daylight is injurious to gelatine. When melted, add 1½ per cent. of bi-carbonate of potash, previously dissolved. Then take about nine times, by weight, the quantity of gelatine employed, of very fine emery and pulverized flint stone, which mix intimately with the dissolved gelatine. Mold the obtained paste according to the desired form and press it in as hard as possible to consolidate the mass well. After it has been dried in the sun the result will be a first-class stone for sharpening."

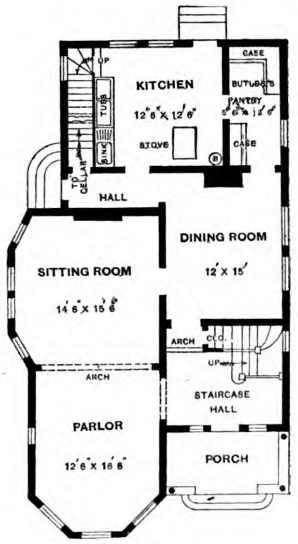
Cement and Its Uses.

BY LA ROY GRIFFIN.

Much has been said and written of late upon the exhaustion of the American forests, bitter complaints having been uttered against the lack of forethought and the willful waste of our native woods. Wise and careful men have predicted the failure of many of our most valuable kinds of lumber at no very distant day. Certainly there is reason to fear that our



Second Floor.



First Floor.

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pine forests will be gone ere long, and the rate at which the redwoods of the Pacific Coast are being stripped from the mountain slopes threatens to exhaust this timber also within a generation. Thoughtful men are already seeking additions to the material at hand for constructing homes and workshops, and they naturally look to the solid earth as their source. Clay has already been laid under tribute, and brick, little else than baked clay, is fast compelling flimsy wood work to give place to more substantial materials, and such as cannot be further changed by fire. But brick is costly, and its erection demands skilled workmen. Besides, the strength of the structure is subject to very great uncertainty through the imperfections of the mortar required to make the seams. So there is ample room for further additions to our building materials, particularly such as can be used readily and cheaply.



A Dwelling in Albany, N. Y.—Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.

WHERE BLUE STONE IS FOUND.

In several different places in the United States there is found a blue stone, considerably heavy, crumbling but little when exposed to the air, and so forming very poor soil, and soft enough to be cut readily with a knife. It has been recognized in some parts of Pennsylvania, and in others of the Eastern States, and it is always of considerable thickness. A large part of Illinois and Wisconsin seems to be underlaid with it, though at a considerable depth, and the Milwaukee River flows upon a bed of it which the water is slowly cutting away, as it has been for ages past and, indeed, ever since its birth. This rock, which is cement stone, is the foundation of a great and growing industry—one destined to occupy a much more important place in our social economy in the future, as buildings which will not burn come to be more and more demanded.

HISTORY OF THE CEMENT ROCK.

The history of the cement rock in the past is very brief. It was laid down at the dawn of the so-called Devonian age, when fishes first made their appearance, and occasionally there are found in it parts of simple fishes. Its birthplace was some shallow marshes n ɔt far from the shore of the ocean, like our mud flats, where the shorter sea weeds flourish, but which are covered with salt water most of the time. Here a considerable amount of mud, mostly sand, with a little clay, poured into and mixed with the water which was driven in from the open ocean. The water came already saturated with lime and magnesia, the former certainly in the shape of a carbonate, while the latter may have been either a carbonate or an oxide. Mixed as they were with the water, all soon became saturated with carbon dioxide, commonly called carbonic acid, when the mixture slowly settled to the bottom, and gradually hardened, so we find the rock in beds some 2 feet thick, each bed showing distinct layers. To tell the story of its formation even more plainly if that were possible, it may be said that many of these layers are full of small shells placed horizontally, caught in the mud when they sank to the bottom and kept there to show the history of their resting place. This makes the blue stone a carbonate and fixes it clearly as one of the limestones. Such materials as these furnish the source of the thousands of tons of cement used in modern construction.

FIRST STEP IN MAKING CEMENT.

The first step in making cement is to quarry out the stone. Quarrying here does not differ much from other quarrying operations, unless perhaps it be that no care is taken to split the stone into fragments of definite size. Holes are drilled in a long row, often entirely around the quarry, after which all are charged with dynamite and fired at the same time by electricity. This shatters great quantities of the rock and breaks it into comparatively small fragments. These are broken up by blows of a heavy sledge hammer into pieces a few inches across and enough material to make 40 barrels of cement loaded into each car. A cable is attached to the loaded car and it is drawn up an nclined plane to a platform elevated a little more than 40 feet above the ground. Here it is moved over the mouth of the kiln, the bottom of the car opened, and the stone dumped directly into the kiln, there to be roasted or burned.

THE KILN.

The kiln in which the cement rock is burned is built of rolled iron strongly riveted together, is between 30 and 40 feet high, and is lined with brick so as to endure without injury the great heat to which it is subjected. The operation of burning goes on continuously from the beginning of the season to the end, the rock and coal being charged alternately and in about equal volumes, the completely burned rock being drawn from the bottom of the kiln twice each day. The heat in the kiln drives off all the carbon dioxide from the rock and the combined water, leaving the lime and the magnesia as oxides, and the other materials as silica and a small amount of silicate of alumina. A great cloud, which can be seen for a long distance, escapes from the top of the kilns, showing the great change which is produced.

(To be continued.)

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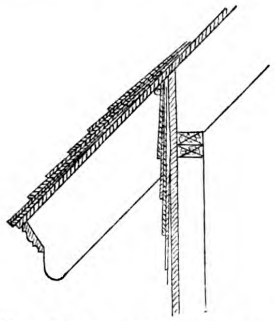
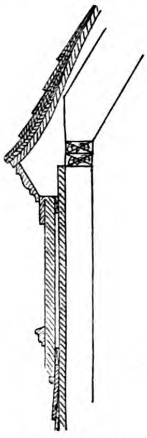


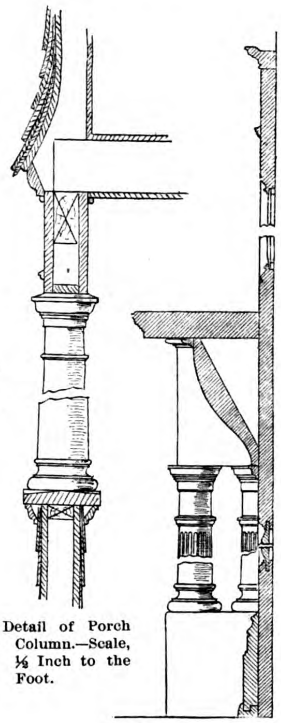
Front Cornice.—Scale, ½ Inch to the Foot.



Tower Cornice. — Scale, ½ Inch to Foot.

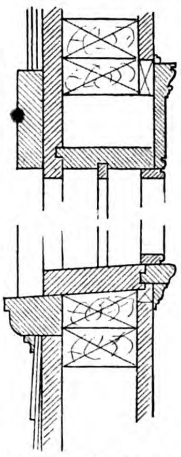


Detail of Drop to Arch in Parlor.—Scale, 1½ Inches to the Foot.

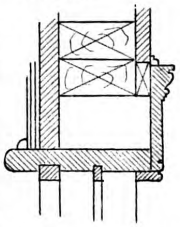


Detail of Porch Column.—Scale, ½ Inch to the Foot.

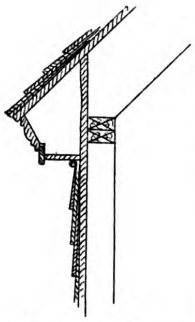
Section Through Sitting Room Mantel.—Scale, 1 Inch to Foot.



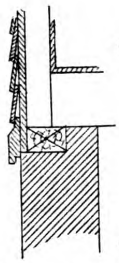
Detail of First-Story Window Frames.—Scale, 1½ Inches to the Foot.



Detail of Second-Story Window Frames.—Scale, 1½ Inches to the Foot.



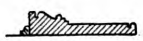
Gable Cornice.—Scale, ½ Inch to the Foot.



Water Table.—Scale, ½ Inch to the Foot.



Cresting. -Scale, ½ Inch to the Foot.



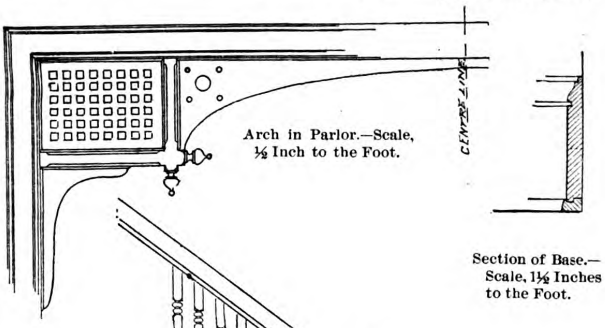
Section of Casing.—Scale, 1½ Inches to the Foot.



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

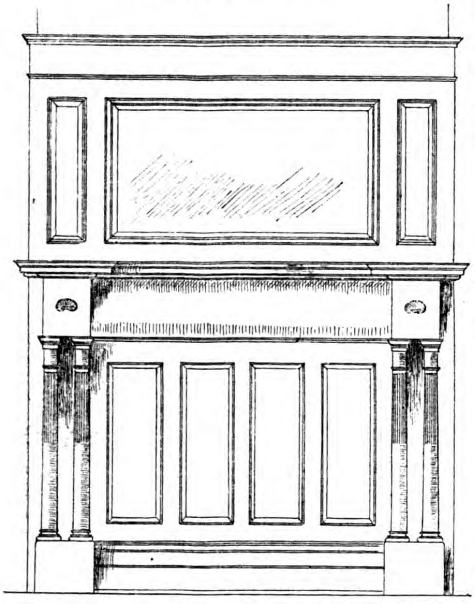


Section of Inside Doors.—Scale, 1½ Inches to the Foot.

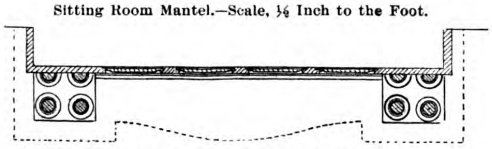


Arch in Parlor.—Scale, ½ Inch to the Foot.

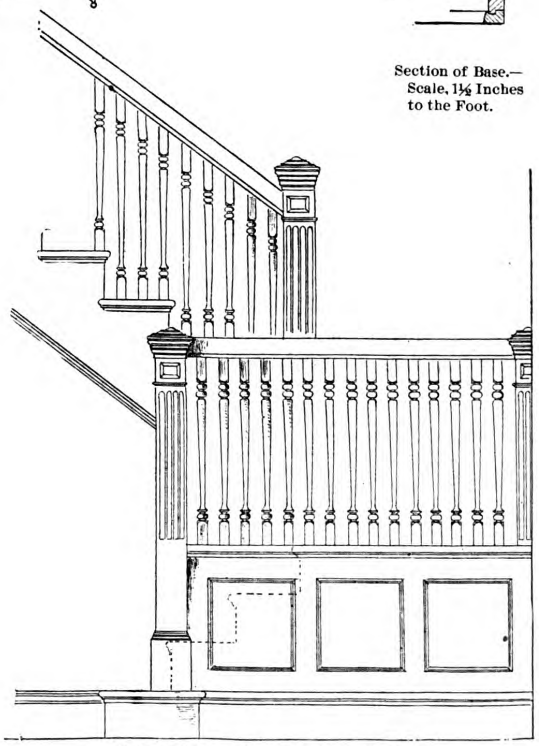
Section of Base.—Scale, 1½ Inches to the Foot.



Sitting Room Mantel.—Scale, ½ Inch to the Foot.



Plan of Sitting Room Mantel.—Scale, ½ Inch to the Foot.



Main Staircase.—Scale, ½ Inch to the Foot.

Details of a Dwelling in Albany.

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Trades Schools for Builders.

There should be a trade school for the training of young men in the building trades in every city of 50,000 inhabitants in the United States. It should be under the management and control of practical builders. The establishment of trade schools has been advocated by the National Association of Builders ever since its organization, and the plan advocated for their government is one that commands the respect and consideration of every employer and mechanic in the country.

An example of this plan may be found in the Mechanical Trade School of Philadelphia, now just commencing its second year.

Members of the trades unions have been for years in the habit of looking at the apprenticeship question as one of the subjects over which they must maintain the most rigid control and definite limitations, and there is no doubt that the whole subject is, at the present time, in a very unsatisfactory condition, both from the standpoint of the employer and from that of the workmen

The unions have passed most stringent rules in regard to apprentices, alleging as cause therefor that employers would, if allowed undisturbed to have as many apprentices as they desired, employ boys to perform work at less than journeymen's wages, and to the detriment of the latter.

The unions have been accustomed to this policy so long that they fail to see its shortsightedness and still maintain their restrictive attitude toward the question. Workmen are accustomed to submitting year after year to competition with workmen from Canada, and even from countries across the Atlantic, who are in the habit of coming to this country for the building season and returning home during the winter, with much less antagonism than is displayed toward the apprentice.

The migratory foreign workman is seldom a union man, and being usually single, he is willing to work for less than union wages, and is from every point of view the enemy of the American mechanic. His case is cited as one for comparison, for in the lack of active action against him as an element that is so evidently detrimental to what the unions are trying to accomplish, and their active opposition to the advancement of their own sons, who go to make up the quota of pupils for the trades schools, the workmen are unjustly inconsistent.

That the unions do oppose the trade schools is a fact that has been proven in the experience of Col. R. T. Auchmuty of the New York Trade Schools, and is also evidenced by the fact that the certain branches of trade which furnish fewest pupils to the Philadelphia schools are the ones in which the antagonism of the unions to the school is the strongest.

This opposition must be based upon a wrong idea of the nature of the trade-school plan, as previously alluded to, for no attempt is made to graduate journeymen from the schools, but to correctly instruct apprentices in the groundwork of their chosen trade, teaching them the proper use of tools and the proper way of doing their work. When the pupil has finished his course in the school he is apprenticed for a term of years, for the purpose of acquiring the manual skill necessary for him to possess before he can perform a full day's work, and at wages that are suitable to his position.

The schools are open to all, and every mechanic who has the future welfare of his sons at heart should do anything rather than attempt to prevent their receiving a good trade education, and saving the years that are usually spent in doing distasteful work about a shop or building.

The trade schools of the country can never turn out workmen, or, rather, boys who will ultimately become workmen, one-half as fast as foreign workmen can land at Castle Garden, and how much more desirable would it be to have the material of future unions composed of American youths properly educated than of the element which the unions are compelled to accept at present in self-protection.

Every union of workmen in the country should follow the example of the Bricklayers' Union of Philadelphia, and aid in the proper trade education of young Americans by every means in their power.

Special Trade Associations in Builders' Exchanges.

BY W. H. SAYWARD.

It is frequently made apparent in dealing with the problems connected with the establishment of Builders' Exchanges throughout the country that builders generally have acquired a very incorrect conception of the scope and possibilities of such an organization. The idea embodied in a recent inquiry from a successful builder in one of the principal Southern cities, regarding the best lines upon which to establish an exchange, was that it should take the place of the special trade organizations already existing in his city. The writer stated that there was an excellent opportunity for establishing an exchange, but that there were already in existence associations of carpenters, masons and plumbers, and considerable difficulty was anticipated in bringing about the establishment of an exchange on that account.

The fact of special trade organizations existing in a city is one of the best and strongest reasons for advocating the establishment of an exchange, because these various special organizations can be comprehended in an exchange and concerted action of the whole can be obtained upon any given subject. The organization of members of special trades, who are also members of an exchange, into distinctly class or trade associations, as carpenters, masons, plumbers, &c., should be advocated for the purpose of improving the facilities for securing comprehensive action in each branch of the building business, and still within the limits of one general organization.

In the first place, organization is simply a combination of two or more individuals for the better accomplishment of a stated purpose, resulting from experience, which teaches that unity of action can accomplish an end where diversity of action would fail.

A builders' exchange is a combination of individuals who have associated themselves together for the purpose of mutual benefit in facilitating the transaction of the business in which they are engaged, and is in no sense an association of carpenters, or of masons, or of material dealers; it is simply a combination of the whole, and called, as a proper signification of its character and functions, a builders' exchange.

The builders' exchange, as an integer, is not adapted for regulating the conduct of the carpenter's business, nor of the method by which the material dealer should conduct his business; but the carpenters and the members of other special trades should form class associations for the purpose of conserving the welfare of their particular trade, and in order that each may the more readily and effectually apply, to their special trade, the principles which have been evolved by their contact as a whole.

The principles which underlie each branch of the building business are in substance exactly the same, and a builders' exchange presents the best method for bringing individuals together in order that these principles may be developed, brought to the surface and recognized, and special trade organizations within an exchange present the best method by which these fundamental principles can be applied to the various trades. The existence of associations of employers in different branches of the building business, in a given community, presents the best possible field for the establishment of a builders' exchange.

TALL BUILDINGS.

THE CASUAL VISITOR to almost any of the large cities of the country cannot fail to notice the rapidly growing tendency to tall buildings for commercial and mercantile purposes, and where eight and ten story structures a few years ago were considered something out of the ordinary, so far as the hight was concerned, there are now to be found buildings which tower upward 16, 18 and often 20 stories without the safety limit being reached. This change is, no doubt, traceable in a great measure to the progress and improvements which have been made in hydraulic elevators, affording an easy and rapid means for reaching high altitudes, and also to the enormous increase in the value of eligible sites in the large cities for office buildings and business blocks. In cities like New York, for example, where ground space is limited and costly, the only direction in which buildings can be extended with profit is upward, and the hights to which they are being carried shows an increase year by year.

One of the most striking examples of this tendency to lofty edifices is found in the building which it is proposed to erect on lower Broadway from plans prepared by F. P. Dinkelberg. The plot of ground selected is irregular in shape, having a front of 162 feet on Broadway and about the same on Greenwich street, the depth from street to street being about 200 feet. The building as proposed will consist virtually of two structures fronting respectively on each street and connected in the middle by a central structure which will become a tower above the twentieth floor. It will cover about 32,000 feet of surface area and the top of the copper dome will be 550 feet above the sidewalk. The main structure will be 20 stories in hight, while the tower will contain six stories. On Broadway and Greenwich streets the fronts of the main building will rise perpendicularly to a hight of 290 feet. The first five stories will be faced with massive granite blocks, above which will be terra cotta incasing the steel construction.

The novel idea of modern tall building construction is found in the iron or steel frame work, which carries practically all the weight and which would stand even though the brick and stone work be removed.

An idea of the architectural effect of the front may be gathered from an inspection of the accompanying illustration made from a drawing furnished by The *Sun* of this city. There will be 1000 offices on the twenty-six floors, the average floor space for each office being 300 square feet. The tower will contain offices on six floors. The plan provides for an arcade on the main floor, somewhat similar to that of the Equitable Life Assurance Society, further up the street. The arcade will be 20 feet wide. Fireproof storage vaults for the larger offices of the building will also be placed on this floor. The ground story will be 22 feet high, the second story 17 feet, the third story 15 feet, the fourth story 13 feet, the fifth story 12 feet and the stories above 11 feet each. The steam and electric plants will be located in the basement, as will also the baths, lavatories, barber shop and rooms for employees. The entire top floor facing the west will be given up to a dining room and restaurant. Above this floor will be the kitchen and pantries, lighted by skylights from the roof. The plans also provide for two large flights of stairs extending from the bottom to the twentieth story, and one flight from there to the twenty-sixth story in the tower. There will also be 12 elevators running to the twentieth floor. Six of these are to be expresses, the first stop being at the eleventh floor. The other six will stop at every floor. The roof of the two main *façades* of the building will be utilized for a summer garden, which will be connected with the kitchen below by dumb

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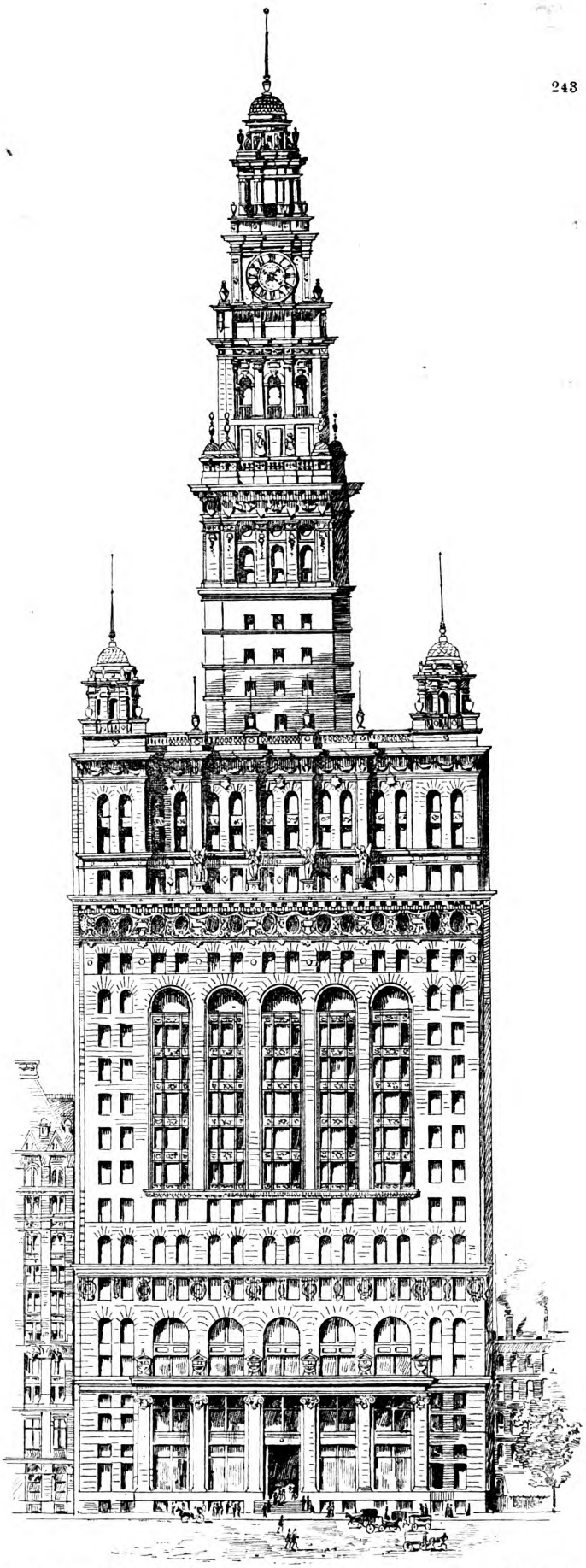
waiters. The building is estimated to cost about $4,000,000.

While this structure, if carried to completion, will outrank in hight any building at present in existence in this city, there are several which are entitled to mention in considering the lofty structures of the city. Among the earlier of these is the *Tribune* Building with ten stories, on Printing House Square, the *Times* Building, close at hand on one side, and the Pulitzer Building, about equi-distant on the other side. Should the *Sun* carry out a suggestion that it recently made, as to the possibility of putting up a building of some 32 stories and nearly 400 feet in hight upon a plot of ground but 75 feet square, this group of newspaper buildings will be without parallel in this or any other country. The Coal and Iron Exchange, the Boreel Building, Temple Court, the Welles Building, the Standard Oil Building, the Washington, Tower and Morse buildings, as well as a dozen others which might be mentioned, are also entitled to rank among the tall buildings of the city.

Other cities have been affected by what may be termed the craze for lofty buildings ; and in the West, especially in Chicago, structures have been put up some of which surpass the tallest in the Eastern metropolis. Among the more recent of these may be mentioned the Masonic Temple, planned by Burnham & Root, having a frontage of 170 feet on State street and 114 feet on Randolph street. The building will consist of 18 stories and will rise to a hight of 254 feet. It will represent an expenditure of $2,000,000. A peculiar feature of this building is the arrangement of the roof. High gables, which make the structure in reality 20 stories high, will rise on all four sides several feet higher than the surface of the roof proper. The main entrance to the building is an arch 42 feet high and 28 feet wide, opening into a rotunda containing 14 elevators arranged in a semicircle. The building is now up some 17 stories, and it is expected to be ready for occupancy by May of next year. Steel frame work is used throughout, with a light-colored brick veneer. The first five or six stories will be used for stores, which will be a novel idea in Chicago. Another lofty structure in the city named is the Unity Building, the frame work of which was erected as high as the eleventh story before a single brick of the outside buff facing was laid. Cast-iron columns with steel cross beams have been employed. The new Fair Building, as planned, will be 18 stories high, and is at present being built in sections to a hight of eight stories.

The Woman's Temple, also designed by Burnham & Root, is a deviation from the severe types of building in which outside effect is sacrificed to space and light. The style of the building is French Gothic, 13 stories in hight with an arched entrance. Above the second story the front center is cut away, and at the tenth story the building line retreats and the three-story roof begins. This is broken into Gothic turrets, from the center of which springs a *flèche* of gold bronze 70 feet high surmounted by the beautiful form of a woman in the attitude of prayer. The towering office building structures which have been erected during the past five years in the city referred to have established what is known as the Chicago style of architecture, or Chicago construction. The first building put up according to this plan was that of the Home Insurance Company of New York, in 1884. Following this was the Rookery, the Tacoma, and later the Chamber of Commerce and the Owings buildings. All of these are built after the Chicago system. Two great structures on opposite corners of the intersection of Dearborn and Jackson streets are apt illustrations of two methods of constructton. They are the Northern Hotel, with its rows of handsome bays and a frame work of steel with a covering wall which is not expected to carry even its own weight, and the Monadnock Building, the walls of which are of solid masonry.



Tall Buildings.—Front Elevation of Office Building Proposed for Lower Broadway.

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DESIGN FOR A THIRTY-FIVE TON ICE HOUSE.

CARPENTERS and builders in all sections of the country are frequently called upon to erect ice houses of greater or less capacity, and the description of a 35-ton house which we present herewith cannot fail to be interesting in this connection. While the capacity of the building is 35 tons, the bill of materials presented herewith may be increased or diminished for the purpose of meeting different requirements. The structure has been designed by C. H. Leonard of the Grand Rapids Refrigerator Company, Grand Rapids, Mich., to whom we are indebted for the use of the engravings and descriptive particulars. Referring to the illustrations, Fig. 1 represents a plan view, Fig. 2 a vertical section, while Fig. 3 shows the northern elevation of the building. In each figure similar letters refer to similar parts. Referring to the plan view, Fig. 1 of the illustrations, A represents doors, which should always face the north; B are loose boards designed to hold the sawdust at the doors; C is a ladder, and D a ventilator. The dotted portions represent the sawdust filling, while the arrows indicate the direction of the air currents constituting the circulation. According to the directions given by the designer of this ice house, the space required is 12 x 12 feet. A dry place, with sandy or gravelly soil, should be selected for the site of the building, in order that the water may run off freely.

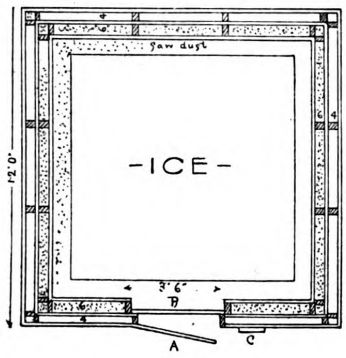

Fig. 1.—Plan View.

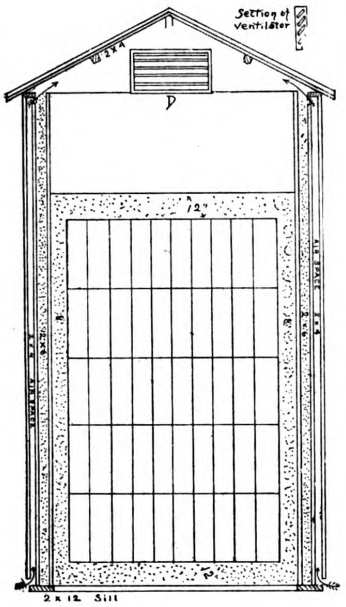

Fig. 2.—Vertical Section.

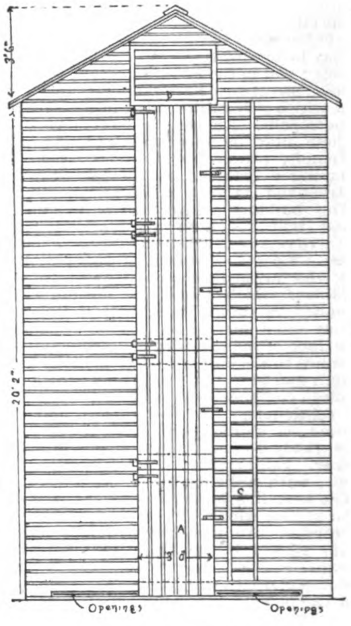

Fig. 3.—Northern Elevation.

Design for a Thirty-five Ton Ice House.—C. H. Leonard, Architect, Grand Rapids, Mich.

If the soil is clay an extra foot of sawdust should be used in the bottom. The sills are 2 x 12, and should be bedded 2 inches in the ground, so that no air can get beneath them. A coat of tar applied to the timber will add greatly to its durability. The 2 x 6 studs are set up on the inside edge of the sills and the inside boarded up with sound cull lumber, making it as tight as possible. The outside of the 2 x 6 studs is next boarded up in the same manner, the space between being packed solid with sawdust as the work progresses. Around the top a space 6 inches wide is left for the circulation of air, as clearly indicated by the arrows in Fig. 2 of the illustrations. These boards should run up beside the door 2 inches on each side, for the purpose of supporting the loose boards represented at B in Fig. 1. The next step is to set up the 2 x 4 studs on the outer edge of the 2 x 12 sills and toe-nail them to the other boards. German siding is nailed on the outside 2 x 4 studs, leaving a space 3 inches above the sill all around the house for air to enter, while at the top it is made tight. The plate is put on top of the 2 x 4 and the roof supports fastened on the plate and studding. It is recommended that the roof be a good one, although it can be constructed of 1 x 6 pine boards, double thickness, with lap joints and tarred felt between. The doors can be constructed of German siding with battens. A cleat should be nailed inside of the 2 x 4 stuff as a door jamb, and the door provided with strap and staple in order to close it tight. The bill of materials for an ice house of this capacity is given as follows:

4 pieces 2 x 12, 12 feet, for sills.
16 pieces 2 x 6, 20 feet, inner studs.
16 pieces 2 x 4, 20 feet, outer studs.
4 pieces 2 x 4, 12 feet, plates.
3 pieces 2 x 4, 12 feet, roof supports.
2000 square feet cull boards, in 12 feet lengths, for inner walls.
1200 square feet German siding, 12 feet lengths, outside surface.
80 lineal feet 1 x 4, for ventilator and ridge boards.
430 square feet 1 x 6, 16 feet lengths, common boards, for roof.
2 squares of tarred felt between the roof boards.
2 pieces 1 x 6, 12 feet lengths, for door battens.
2 pieces 2 x 4, 20 feet lengths, for ladder ties.
72 lineal feet 1 x 3, for ladder steps and door jamb.
8 9-inch strap hinges for the doors.
4 sets hooks and staples.

When putting in the ice it is best to set it up on edge, leaving a space of 8 inches all around between the inside wall and the ice to be filled with sawdust. Shave off the top of each layer of ice, so that the next layer will tightly fit. The ice should be set as close together as possible and covered with sawdust. It is well to leave at least 3 feet space below the eaves for ventilation. As stated above, the size of this ice house is 12 x 12 feet in plan and measures 20 feet to the eaves. The same general plan as that herewith presented can be used for the construction of any size of house that may be required.

Thick and Thin Walls.

Our ancestors had not made a formal classification of the varying degrees in which different bodies conducted heat, but they had discovered that wood confined it longer than stone. For the sake of the warmth it was extensively employed in the construction of houses, says a London journal, and for the same reason many of the finest mansions in St. Petersburg are composed of it still. That Russian houses should be some day burnt is almost as much a matter of course as that those who occupy them should some day die. But mankind will always run a great risk for a great advantage, and it required the Fire of London to wean our forefathers from their fondness for timber edifices. So long as houses were consumed in detail, every man hoped that his neighbor's case might never be his own. Nothing short of a general calamity could teach them that the laws of nature have no partialities, and that while fire burns and wood is fuel they can never be brought together with safety. Driven to have recourse to less combustible materials they continued to profit by their observation of natural laws, and since stone transmitted heat more readily than wood they built their walls of a goodly thickness, to counterbalance the drawback. The experience that is not recorded has to be bought anew, for a practice may seem absurd if the reason is unknown. When old houses are pulled down and the quantity of rubbish within the walls is brought to light, it is common to hear a good many gibes at former folly. "A little more solidity," it is said, "in the masonry, instead of a loose mass of dirt and stones, and half the thickness of the wall might have been spared." But it was exactly the thing they did not wish to spare, for they considered warmth no less than strength, and to have warmth there must be thickness. They filled in rubble for its cheapness; and though solid masonry would have stood longer, it is not for modern builders, upon a question of durability, to take antiquity to task. We are beginning to discover that there is something else to be considered in houses besides security from tumbling down. The thin walls so common during the last half century reverse every effect that it is desirable to produce; the sun's heat penetrates them in the hight of summer, and the heat of the fires filters through them in the depth of winter.

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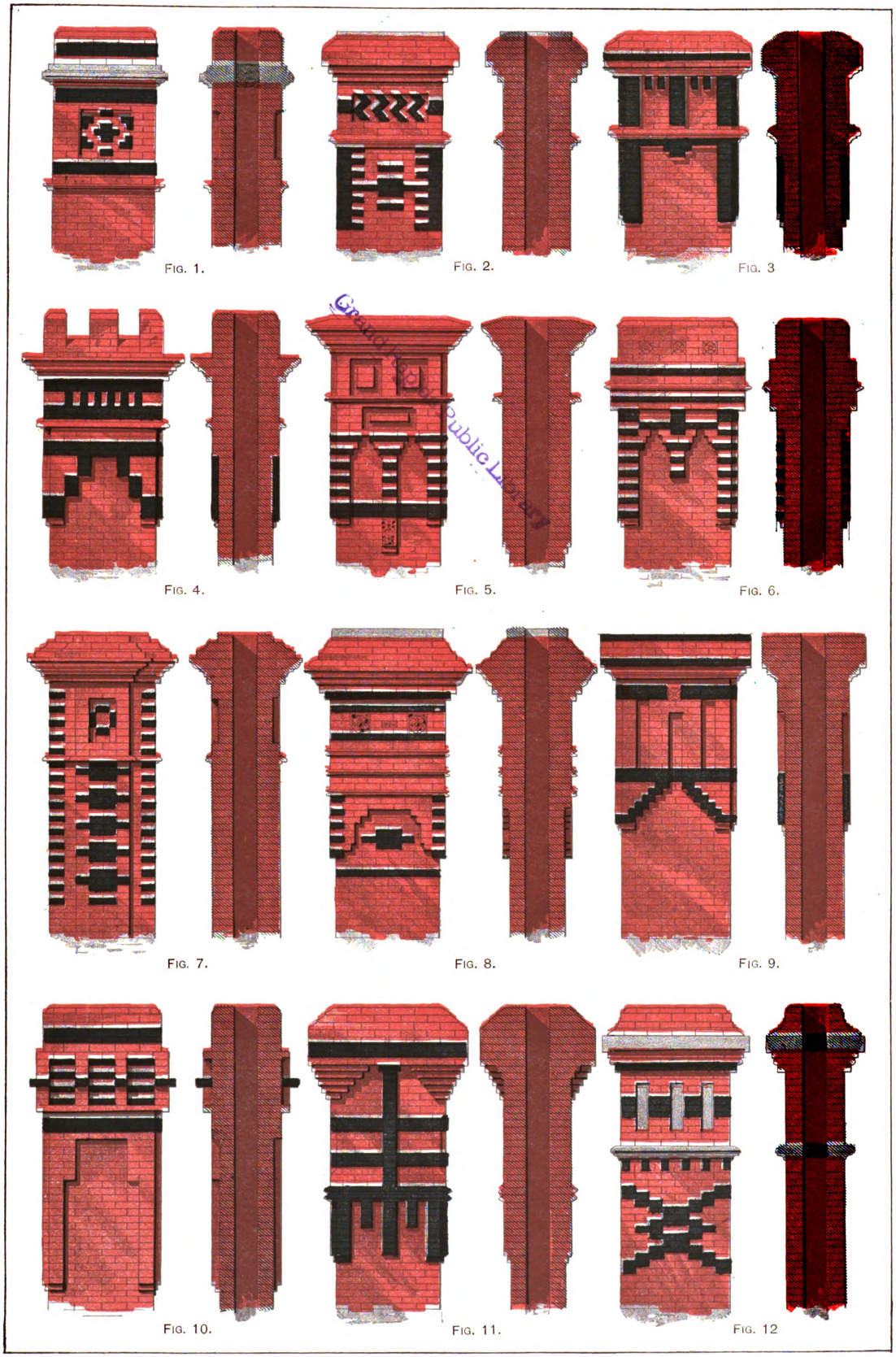

FIG. 1. FIG. 2. FIG. 3

FIG. 4. FIG. 5. FIG. 6.

FIG. 7. FIG. 8. FIG. 9.

FIG. 10. FIG. 11. FIG. 12

BRICK DETAILS SOME DESIGNS OF CHIMNEY TOPS.

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DESIGN FOR A TIMBER SPIRE.

THE SUBJECT of the double-page illustration presented in this issue is a timber octagonal spire, designed by T. Frederick Pennington, architect, and which secured the Grissell gold medal in one of the competitions conducted under the auspices of the Royal Institute of British Architects. In this connection it is interesting to remark that the Grissell gold medal is a prize founded by the late Thomas Grissell for "the encouragement of the study of construction," and is open to all architects who have not been in practice for a period of time exceeding ten years. Each year the subject of the competition varies. In the case forming the subject of our illustration the conditions involved a timber octagonal spire, to be covered with lead or other suitable material, and running from a stone tower 36 feet square to the hight of 120 feet. The spire was to have angle turrets of timber at or near the base and dormers at two intervals in the hight named. How well the author of the design has carried out the conditions of the competition may be understood from a careful inspection of the illustrations herewith presented. In submitting the design the author accompanied it with an expression of his views, which, guided solely by the conditions given, were:

"That the competitor was evidently expected to meet whatever difficulty there might be in an octagonal spire springing from a square tower in the timber construction, and not by building up the corners in solid masonry to produce an octagonal base for the spire; that an elaborate exterior would receive little consideration in view of the object of the prize, and that a simple outline would be more appropriate for the covering suggested; that the timber we should be most likely to use in practice should be employed, and that the tower walls, the thickness of which was not given, should be considered from the same point of view, for it was manifest that by making the tower walls very thick the difficulties with the roof could be much reduced. The resolution (time being precious) to limit the work to one sheet of paper has resulted in a *multum in parvo*. For the same reason, the result of the calculations of wind pressure was merely given in a report, from which the following is an extract: Surface exposed to pressure of wind, 2160 square feet; force of wind, 55 pounds on the square foot; the center of pressure is 36 feet above the wall plate; total force exerted by the wind to overthrow the spire = 4,276,800 pounds. Power of resistance—weight of timber, 121,170 pounds; weight of lead, 91,280 pounds; weight of iron (approximately), 4480 pounds; total weight, 216,930 pounds. Resistance to the force of wind in the weight of the roof alone = 3,904,740 pounds. As this 3,904,740 pounds is but 9 tons 4⅛ hundredweight short of the weight required to counteract the force exerted by the wind, and as there is upward of 200 tons of masonry above the cast-iron corbels to which the spire is bolted down, it is unnecessary to carry the calculations further to show that stability is amply secured."

Designs for Brick Chimney Tops.

We take pleasure in presenting to the attention of our readers this month a series of designs for brick chimney tops, which will be found upon our colored supplement plate. The chimney tops are shown in both elevation and section, and constitute a study of no little interest and value to the enterprising builder. The designs are of such a varied character as to offer many suggestions which may be profitably employed in cases where ornamental effects are to be produced. It will be noticed from an inspection of the plate that two kinds of brick are employed, red and black, while in many instances the introduction of gray stone trimmings add materially to the effects produced. In a number of cases special designs of bricks are shown, in connection with which are ornamental tile so managed as to bring about pleasing results. The molded brick used with some of the designs shown are of such simple patterns as may be easily obtained. Of course it is understood that the color of the brick may be varied to suit the taste, while the designs themselves may be altered for the purpose of adapting them to special requirements.

Should Building Material Dealers be Members of Builders' Exchanges?

W. H. Sayward, secretary of the National Association of Builders, recently received the following from members of a building exchange in a prominent city the Northwest:

"We desire advice as to the desirability of building material dealers as members of a builders' exchange. Some of the general contractors—carpenters and masons—would deny the members of the Builders' Exchange who are dealers in material the full privileges of membership which they have hitherto enjoyed.

"Is the presence of material dealers in a builders' exchange inimical to the best good of the organization?"

To this inquiry Mr. Sayward replied as follows:

The conditions existing in the building trades throughout the country vary so materially from one city to another that it is unwise to attempt to make a hard and fast rule which shall be applicable to all places alike.

In Boston it has seemed from experience that the management of the association and all financial and other responsibility should rest upon those trades which might properly be considered as the constructive trades—that is, those trades which involve the presence of workmen on the buildings in process of erection, for their construction and completion—while all trades, including those mentioned as constructive, those which might be considered as incidental, as well as the callings comprehended under the general term of dealers pure and simple, should together enjoy the same privileges and opportunities which the exchange offers for mutual benefit, protection and convenience in the transaction of business.

Now, while the conditions in Boston seem to make this method the most desirable and productive of the greatest harmony, securing to all every benefit which any one could desire, and at the same time preventing any clash of interests in the management of association affairs, it by no means follows that exactly the same classification, or, in fact, any classification whatever, is desirous or needful in other places.

As an illustration of this last statement I would state the case of Philadelphia. In the Builders' Exchange of that city it was found wise to include in the corporate class (for they adopted a corporate and non-corporate class, following the Boston plan) certain trades or callings which were not included in the corporate class in Boston, and they did so for the reason that those callings were materially different in their methods in Philadelphia. For instance, mill men furnish and place in position in the building material of all kinds, and therefore become contractors, while in Boston there are no mill men of that character, they simply furnishing material for the builder and have nothing whatever to do with its application. The 'Philadelphia exchange also includes brick manufacturers. Their reasons for doing so were that the brick manufacturers of Philadelphia were an exceedingly large interest and frequently took contracts for furnishing all the brick in a building, for a lump sum, and therefore became contractors as much as the men who laid the bricks. Brick men in Boston do nothing of the kind and are therefore simply dealers, and in many cases are not even manufacturers, but middlemen, and have no interest except the per cent. or commission which they get from sales.

These points of illustration are sufficient to show that the differences between builders existing in different cities of the country make it imperative that the locality considered should thoroughly weigh the proposition from its own standpoint, and not base its conclusions or acts upon what any other association may have done, for conditions may have been vastly different.

There are many cases, in my opinion, where there should be no classification such as I have mentioned as prevailing in the Boston and Philadelphia exchanges, and I should say, in answer to the direct question as to whether "the presence of material men in the Builders' Exchange of your city is inimical to the better growth of the association," that neither in your city or in any other can their peculiar representation and full responsibility for all acts of the body be necessarily injurious to the welfare of the organization, and my personal opinion of the matter is that in cities of the character of your own it is hardly wise to draw the line as strongly as we have found it desirable here in the East. With us it has been productive of greater harmony than we ever had before, but I fear that in newer communities of builders it might be productive of discord, and surely in your city the tenure of the Builders' Exchange demands the adherence of every available and honorable concern that is either directly or indirectly connected with the building interests.

In by far the larger proportion of the cities of the country the exchange idea, or, rather, the association idea, among builders and those connected with building interests is in a very embryotic state, and it will not do to press too vigorously on some minor point when the establishment and maintenance of a common interest is the principal one for the security of all. The necessity for organization is one that is very poorly comprehended by employers as a class, and the advance to perfect conditions must necessarily be slow. Even in the past, and in the city which I still feel is doing the most advanced work in the direction of centralization and organization of the building interests, we are finding constantly that errors have been made, and the necessity for changes and reforms still exists.

Strong Cement.

Prof. Alex. Winchell is credited with the invention of a cement that will stick to anything, says a recent issue of the *Jewelers' Weekly*. Take 2 ounces of clear gum arabic, 1½ ounces of fine starch, and ½ ounce of white sugar. Pulverize the gum arabic and dissolve it in as much water as the laundress would use for the quantity of starch indicated. Dissolve the starch and sugar in the gum solution. Then cook the mixture in a vessel suspended in boiling water until the starch becomes clear. The cement should be as thick as tar and should be kept so. It can be kept from spoiling by dropping in a lump of gum camphor, or a little oil of cloves or sassafras. This cement is very strong indeed and will stick perfectly to glazed surfaces, and is good to repair broken rocks, minerals or fossils. The addition of a small amount of aluminum will increase its effectiveness.

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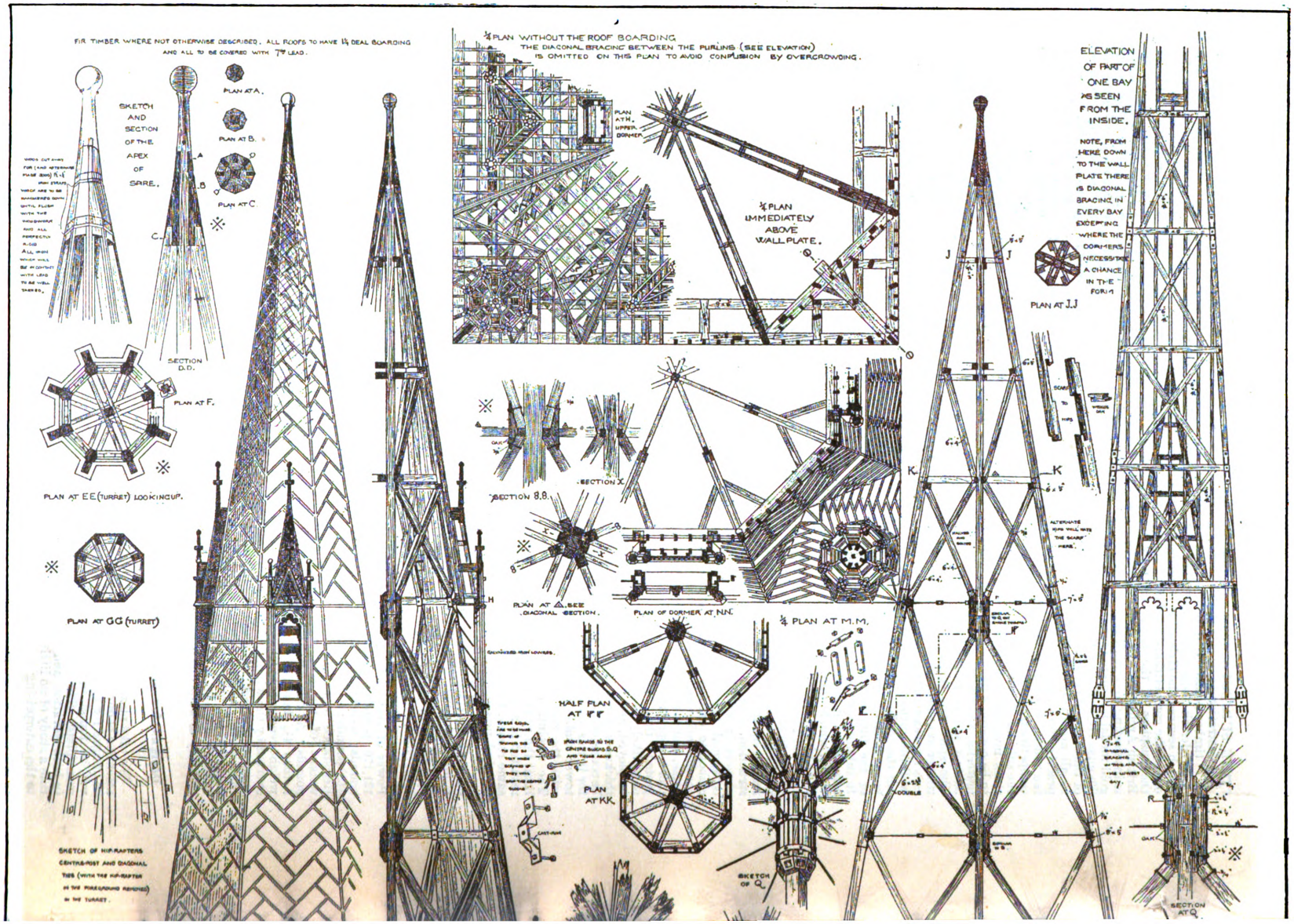

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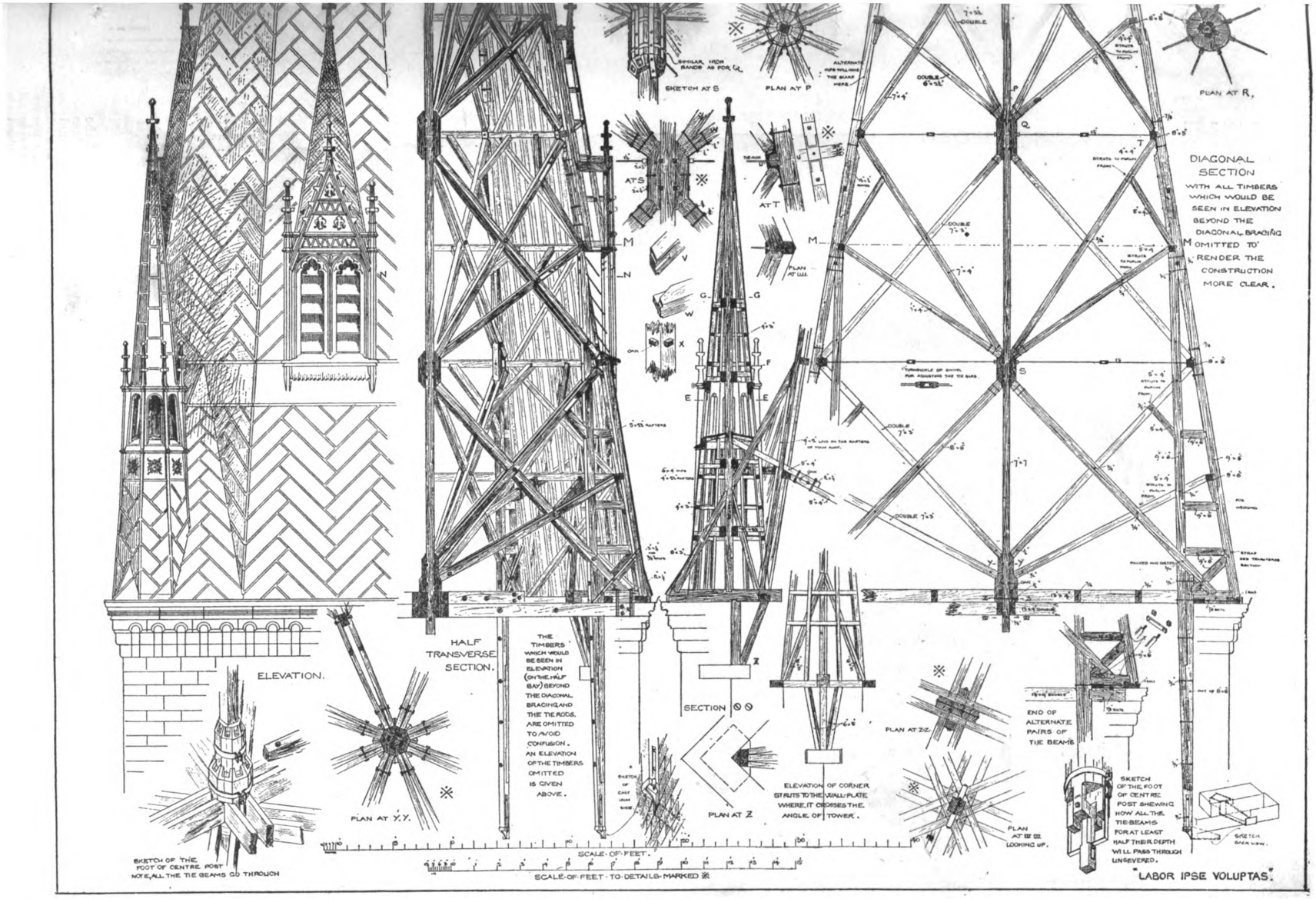

*Design for a Timber Spire.—Awarded the Grissell Gold Medal Prize by the Royal Institute of British Architects.—**(See page 245.)*

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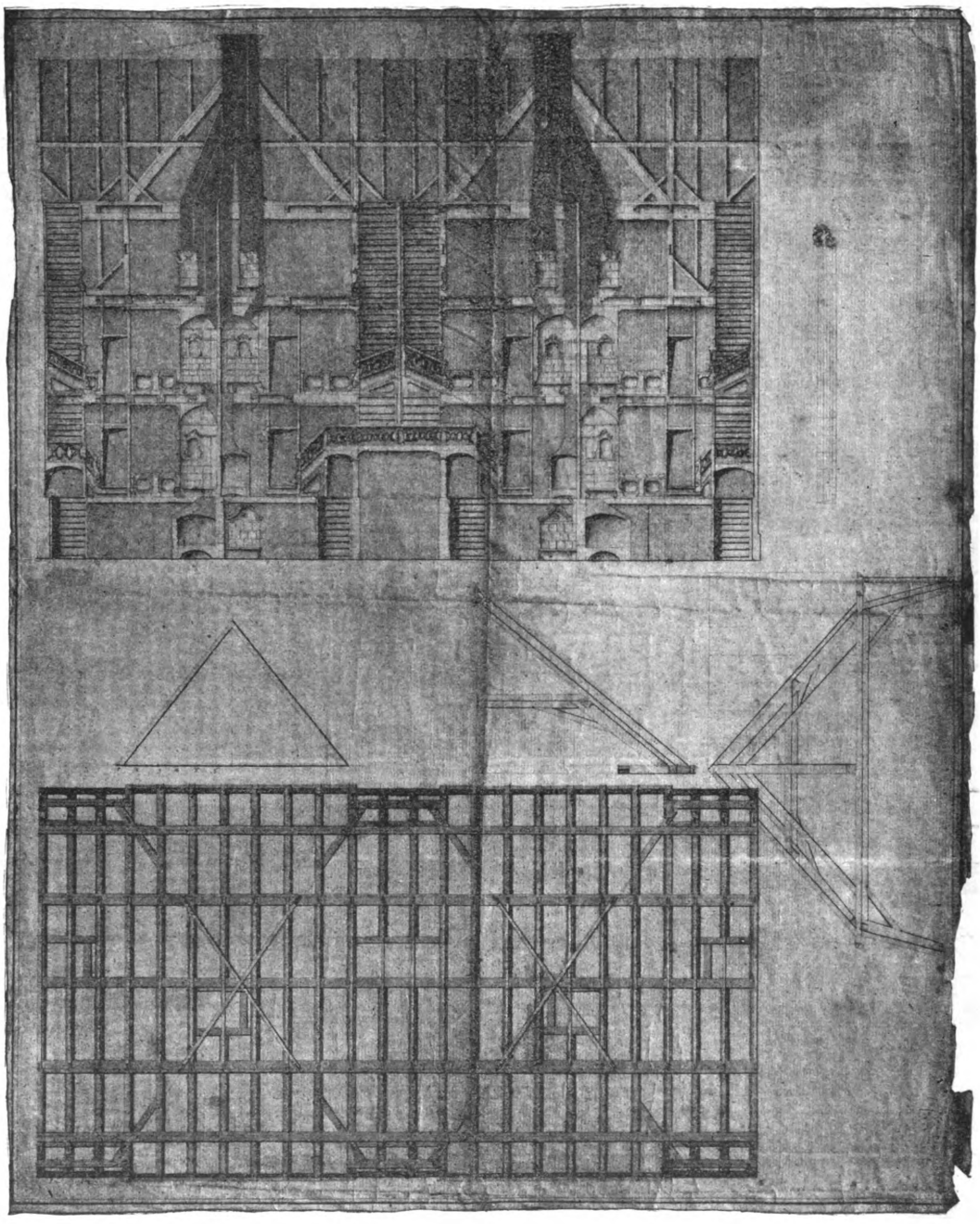
SOME CURIOUS OLD DRAWINGS.

THERE ARE no doubt a large number among our readers who will be greatly interested in the illustrations presented in this issue of the paper of two sheets of architectural drawings which were made nearly a century ago. They are of such a character as to permit the carpenter and builder of to-day to contrast the materials furnished for the guidance of his predecessors in their practical operations with the very full and complete working drawings which are involved in current practice. For the privilege of publishing illustrations of these drawings we are indebted to Louis Miller of Arcadia, Mo., who informs us that they were made with pen and ink by his grandfather in Germany early in the present century. The engravings which we give are made from photographs of the original drawings and clearly represent, with possibly one exception, all their peculiar features. This exception is the colors used by the author to enhance the effect and make more distinct the various parts of the buildings shown.

In the case of the drawing represented by the second illustration the framing of the end elevation appears on the original in yellow, while the roof of the front elevation shades on the pink. The panels of the front door are also of a yellowish tinge. In the illustration showing the timbering of the roof and the vertical section taken through the center of the chimneys, it will be noticed that the edges of the sheet of drawings are worn and ragged, as well as discolored with age. The dark streaks running through the middle from top to bottom and from side to side show where the sheet was folded



Some Curious Old Drawings.—Vertical Sectional Elevation and Plan of Roof.

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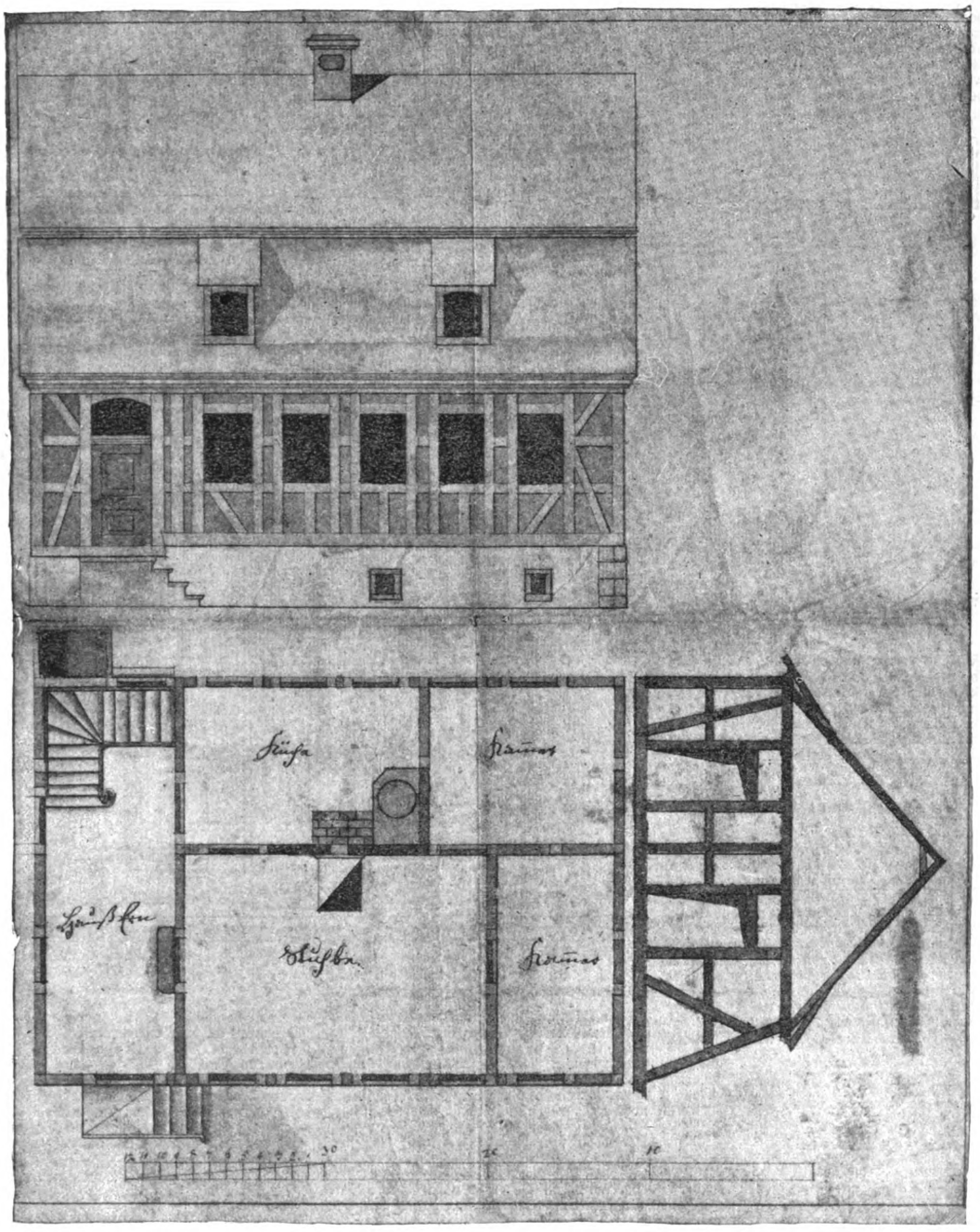
when it was laid away. An interesting feature is the scales which the author has employed in connection with the two drawings herewith illustrated. In one case the scale will be seen below the floor plan and timber framing of the end elevation, while in the other drawing there are two scales, one being shown at the right



Plan and Elevations of a German Cottage.

of the vertical section of the house, while the other, in the shape of a triangle, is found just above the left-hand portion of the roof plan. The small sketch at the extreme right indicates the end elevation of the roof. There are many other interesting features in connection with these drawings, as regards arrangement of rooms, framing, &c., but we leave our readers to study them out, feeling sure they will be entertained if not instructed thereby.

Foundations in Water.

In works which are exposed to the action of the sea or the current of rivers Rennie adopted the plan of bedding the outside joints, for about an inch deep in the face, with Roman cement of the best quality. The interior part of the stones, says an exchange, was bedded in mortar, composed of 2 parts of well-burnt stone lime, 1 part of ground puzzolano or calcined pounded iron stone and 2 parts of clean, sharp river sand, not too fine. The lime was used hot, for which purpose it was necessary that it should be burnt adjoining the works and mixed at once with its due proportion of sand and puzzolano or iron stone, previous to being slaked. It was afterward covered over with sand, water was then poured on the heap, and in this state it was left for a day or two, until completely slaked, after which it was taken from the heap as wanted. The unslaked particles were separated, and the other ingredients well mixed by being passed through a screen, after which the mixture was made into mortar, with the least possible quantity of water, by means of a pug mill prepared for the purpose. That part of it required for the day's use being taken away, the remainder was immediately covered up with sand, to prevent the action of the air upon it.

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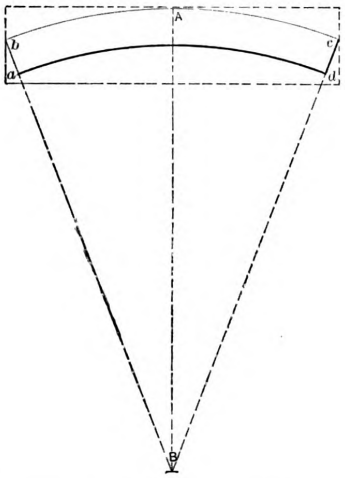
CORRESPONDENCE.

Planceer for a Conical Roof.

From F. C. L., *Manchester, N. H.*—I take it that "Yank," whose letter appears in the August number, wants to know how to cut the proper curves from a flat board. Take the radius equal to the slant hight of the surface (what the slant hight of the cone may be makes no difference with the curve) and the arc described will be the lower line of the planceer required.

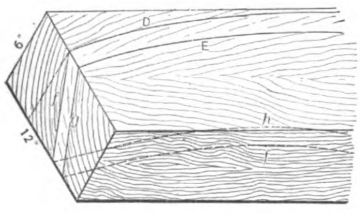


Planceer for Conical Roof.—Diagram Submitted by "F. C. L."

With the same center and a radius less the desired width of the planceer describe the other line. Connect the ends of the lines passing through the center used and the planceer will fit perfectly. In the accompanying diagram A B equals the slant hight of the given cone.

Splayed Church Seats.

From C. E. S., *Tacoma, Wash.*—In the August number, "Yank" of San Francisco desires to know something of splayed church seats, and in reply I submit a method of doing the work. Take a solid piece of timber of suitable size, say 6 x 12 feet, as these figures will serve to demonstrate the operation as well as any, and put a long rod in the trammel points; set off the proper radius on the rod; place one point on the center and with the other describe the arc D. Lower the point sufficiently to represent the distance DE and describe the arc E. Mark



Sketch Accompanying Letter from "C. E. S."

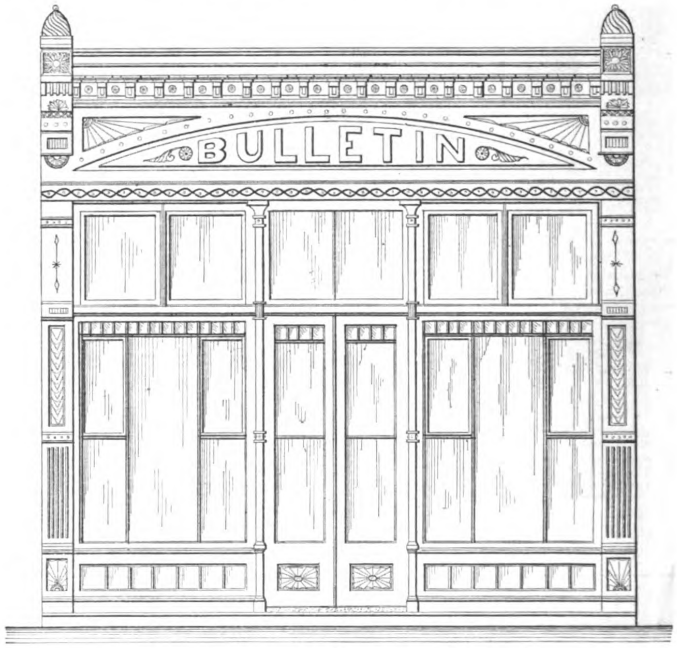
across the end of the stick the slant *f*, as desired; also *g*. Take it to the band saw and tilt the table until the saw comes to the lines *fg*. This requires a big timber and a heavy band saw. The same operation will cut splayed work of any size. Strike the circle on the face of the stick and the saw will follow the dotted lines *hf* at the bottom.

Designs for Row Boats.

From C. H. S., *Salesville, N. Y.*—I am glad to see in *Carpentry and Building* that the subject of row-boat construction is attracting a little attention. I am thinking of engaging in the industry, as there is a good demand for nice row boats in this section, and I should be glad to have some of the practical boat builders give designs of St. Lawrence row boats 17 or 18 feet long. I think if full details were given they would be of interest not only to myself, but also to many other readers of the paper.

Design for a Store Front.

From E. A. P., *Carthage, Ill.*—In reply to a correspondent in the August issue of *Carpentry and Building*, who asks for a design for a store front, I take the liberty of inclosing a blue print which I think will prove interesting to him as well as to other readers of the paper. The drawing shows a neat front of a one-story brick building recently erected at Warsaw, Ill., from designs prepared by Geo. W. Payne, architect, of this place. The building, which was designed for a printing office, is 20 feet 5 inches by 70 feet in the plan. The hight of the story is 14 feet 6 inches, and the basement, which extends under the entire building, has a hight of 8 feet. The cornice is of galvanized iron, and the roof is covered with gravel.



Design of a Store Front, by George W. Payne, Architect.

Holes in Belting.

From W. J. H., *Rocksboro, Philadelphia.*—I would like to ask if any of the readers of *Carpentry and Building* can give me any information as to the manner of laying out belt holes.

Note.—In a general way, we would say to our correspondent that in making belt holes it is desirable to weaken the belt as little as possible. There is no cast-iron rule which he can follow with regard to this matter, as it is one which depends largely upon practice and experience. There should be a sufficient number of holes to carry enough belt lacing to make the lace as strong as the weakest part of the belt. In running in the lacing care should be taken that the lace is straight on the side of the belt which comes in contact with the pulley. It is possible that some of our practical readers may have opinions to express upon this point, and if so we should be glad to hear from them.

Architectural Perspective.

From L. R. S. *Chicago, Ill.*—The article on "Architectural Perspective" by F. Jerman in the August number of *Carpentry and Building* shows either carelessness or ignorance on the part of some one. First, referring to Fig. 10, we read, "Measure 4 feet on each side of it (the upright line) and draw from 6 to the V. P.'s furthest away." For the "V. P.'s" we should read "M. P.'s." Second, referring to Fig. 11, the article reads, "Measure off 8 feet (meaning 6 feet), to left on the G. L.; mark the point A and vanish to V. P2." This is what should have been done, but instead lines are drawn first from A to M. P.2 and to V. P.2; other errors also occur. The article was evidently written for beginners, and to such persons errors of the above sort are doubly dangerous.

Miter for an Octagon Joint.

From H. J. C., *Volant, Pa.*—I agree with "C. P." in the statement that 5 inches on the tongue and $12\frac{1}{8}$ inch on the blade of the steel square will give the miter for an octagon joint.

Width of Shingles.

From C. H. S., *Salesville, N. Y.*—I would like to answer "F. K.," Keiler, Wis., whose letter with regard to the matter of shingling appeared in the July issue for this year. Here in Central New York most of the shingles are 18 inches, and my practice is to lay them $5\frac{1}{2}$ inches to the weather. In this way the top of

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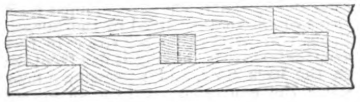
the shingle comes under the third course a sufficient distance to prevent a leak in case of shrinkage, but I never allow a nail to come in under a joint. In connection with the 16-inch shingles the rule would be to lay them 4½ inches to the weather. I consider it an excellent plan to break joints on the third course, as well as on the second.

I think if some of my brother chips would make more of the things illustrated in *Carpentry and Building* they would be well paid for their trouble. I made a wall bracket from patterns published in the September number of the paper for 1888. It was of white oak with beveled glass, and I consider it a beautiful piece of furniture.

Splicing in Framing.

From J. H. C., *Volant, Pa.*—I inclose several sketches representing different methods of splicing timber common to this section of the country, and which may be found of interest to "H. B. M.," Lincolnia, Va., whose letter of inquiry appeared in the August issue of the paper. The methods indicated in Figs. 1 and 2 are those generally used where the greatest strain is endwise, while the method



Splicing in Framing.—Fig. 1.—Method Employed by "J. H. C." where Greatest Strain is Endways.

represented in Fig. 3 is employed on posts where the weight is directly upon them. The members should be well pinned with some tough wood. I should be glad to hear from others on this subject, as it is one of no little importance to carpenters and builders generally.

Note.—In the June number of the first volume of *Carpentry and Building* will

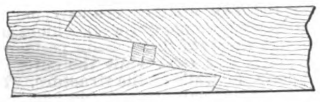


Fig. 2.—Another Method for the Same Purpose.

be found an interesting article on this general subject, fully illustrated. Those of our readers who have the back numbers of the paper, and care to look up the subject may be interested in what is there presented.

Designs for Beach and Boat Houses.

From W. E. C., *Manchester, N. H.*—I would like to hear from some of the practical readers of the paper with regard to the building of cheap houses for beach or boat house purposes. There is a great deal of boat-house building going on around the shores of Lake Winnipiseogee, and I am interested in learning the ideas of boat-house builders in other parts of the country.

Board Measure.

From P. H., *Paterson, N. J.*—I would like to know what the numbers in the center of the blade of a 2-inch steel square are for.

Note.—We assume that the steel square to which our correspondent refers is that generally known to the trade as No. 100. The parallel rows of figures along the blade constitute what is called board measure and the manner of using it is as follows: Under 12 of the inch marks along the outer edge of the blade are found the figures 8, 9, 10, 11, 12, 13, 41 and 15, which represent the length of the board or plank to be measured. The contents in feet and inches will be found under the several inch marks along the outer edge of the blade, corresponding to the width of the piece being measured. We can make this plainer by a simple illustration. Suppose we desire to ascertain the contents of a board 14 feet long and 10 inches wide. Find 14 under 12 of the inch marks along the edge. Follow the space in which it is placed back to the figures under 10 of the inch marks, where



Fig. 3.—Method Employed on Posts when Weight is Directly on Them.

will be seen 11.8, which is read 11 feet 8 inches. In like manner if the board is 16 inches wide the result (under 16 of the inch marks) is found to be 18.8, or 18 feet and 8 inches. In the same way the measure of boards of any width from 2 inches up to 24 inches, and of either of the lengths above enumerated, may be quickly and accurately determined. By combining figures, lengths may be calculated which are in excess of those above given. For example, if we have a board 20 feet long, we double the answer in the 10 feet row, and for a piece of timber 25 feet long we add the figures in the 12 and 13 feet rows together. This rule is calculated, as its name indicates, for board measure or for surfaces 1 inch in thickness. It may be advantageously used, however, upon timber by multiplying the result of the face measure of one side of a piece by its depth in inches. To illustrate, suppose it be required to measure a piece of timber 25 feet long, 10 x 14 inches in size. For the length we will take 12 and 13 feet; for the width we will take 10 inches, and multiply the result by 14. By the rule a board 12 feet long and 10 inches wide contains 10 feet, and one 13 feet long and 10 inches wide 10 feet 10 inches. Therefore, a board 25 feet long and 10 inches wide must contain 20 feet 10 inches. In the timber above described, however, we have what is equivalent to 14 such boards, and, therefore, we multiply this result by 14, which gives 291 feet 8 inches, the board measure.

The Tangent System of Hand Railing.

From W. G. P., *Toronto, Canada.*—In the July number of *Carpentry and Building* "A. L.," of Napa, Cal., says he

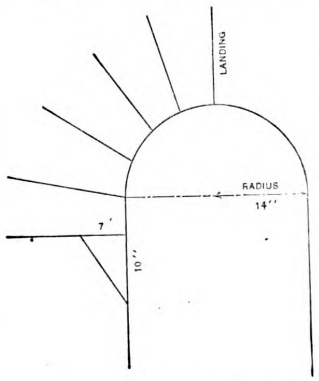
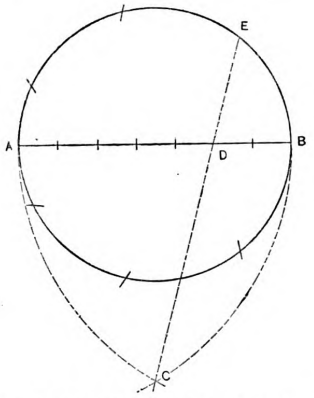


Diagram Submitted by "W. G. P."

would like to hear from others on the subject of the tangent system of hand railing. Now, it is almost useless to discuss the question, since he is not open to conviction. He says "The tangent system of hand railing will, in the hands of an experienced man, get over any case that can be solved by the falling-line theory." He may get over it, no doubt, but is it right? The same may be said of the rail over equal winders. The tangent system will get over it, but is it right? The tangent system gives a wavy, falling line, whereas it should be a pure helix, which in development is a straight line. Again, "A. L." says: "When a man presents a plan of stairs which a stair builder of any judgment would not entertain for a single moment," &c. Now, I was going to present one, but I do not suppose it would be of much use, as "A. L." would only repeat the same words again, and so, in his estimation, settle the matter. Now, we are all on this continent given to blowing, and "A. L." is no exception. The propensity still clings when we migrate to other climes, for, if I remember rightly, the English correspondent was an American, but in England the rule seems to be "Yours not to reason why, yours but to do or die. Noble stair builder, "A. L.!" This I know for a fact, so do not repeat it. I inclose a problem which I should like to have "A. L." solve, and if he can do this correctly by his system, I shall be glad to give him a harder one.

Dividing a Circle.

From F. C. P., *Petoskey, Mich.*—A correspondent signing himself "E. H. G.," Sierra Madre, Cal., asks in the July issue how to divide a circle into any number of



Method of Dividing a Circle, Suggested by "F. C. P."

parts. In reply, I offer the following solution, having reference to the accompanying drawing: Establish a diameter, A B, and divide it into as many equal parts as it is desired to divide the circle; we will say, for example, seven. From A and B, with an opening of the compasses equal to A B, describe two arcs intersecting at C. Through the second point of division D draw a straight line from C intersecting the circumference at E. It will be found that the distance B E is one of the seven parts.

From J. H. D., *Knoxville, Tenn.*—In answer to "E. H. G.," who asks how to divide a circle into any number of parts, I send the following: Let D be the diameter and N the number of parts into which it is desired to divide the circle; then $\frac{D \times 3.14159}{N}$ = one of the parts. That is, multiply the diameter by 3.14159 and divide by the number of parts. One of these parts is called an arc. To find the chord that subtends this arc divide 180° by the number of parts and take the natural sine of the angle thus obtained and multiply by the diameter. The result gives the length of the chord. The chord is always shorter than the arc it subtends, and the fewer parts into which the circle is divided the greater is their

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difference. For instance, let the diameter of the circle be 1; divide it into ten parts. The correct formula is given below:

Arc = 0.314159 Chord = 0.309017

The first decimal place in each case is the same. Then divide the same circle into 100 parts, and arc 0.031415 and chord 0.031411, the two results being the same to five places of decimals. From this it will be seen that the first rule given above should be used to divide the circle into a large number of parts, while the second rule should be used to divide the circle into a smaller number of parts—that is, anything less than 100.

From E. K., *Adrian, Mich.*—In reply to "E. H. G.," Sierra Madre, Cal., asking how to divide a circle, I would say divide the circle with compasses into 360 equal parts, which will give the degrees. In order to avoid so many places around the circle, take one-eighth or one-quarter of the circle and divide it into 45 or 90 parts each and the degrees are the same.

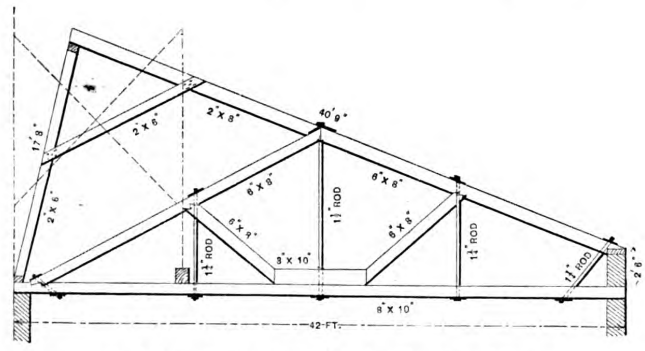
Note.—Every set of drawing instruments is provided with what is known as a protractor. It is in effect a semicircle or a complete circle, as the case may be, divided into degrees and in some cases fractions of degrees. These divisions are common to circles of any diameter, and therefore a plan to abbreviate the work indicated by "E. K.," would be to lay the protractor in proper position on the drawing—that is, with the center of the protractor coinciding with the center of the circle it is desired to divide—and then with a straightedge running from the center through the divisions in the periphery of the protractor, carry lines which shall cut the circumference of the circle to be divided. In this way as many points may be established in the circumference as desired.

Perimeter of an Ellipse.

From W. F., *Yardley, Pa.*—Will some of the practical readers of *Carpentry and Building* tell me how I can find the conjugate and transverse diameters of an ellipse whose perimeter is 10 feet? That is to say, the given line is 10 feet, and I want to know how to construct an ellipse whose perimeter is 10 feet on any length.

Roof Truss Construction.

From C. B. A., *Augusta, Ga.*—In the February number of *Carpentry and Building* I notice a problem relating to roof construction, the author of which, "J. L. F.," invites criticism from practical readers of the paper. In explanation of my ideas on the subject I send the inclosed sketches. Fig. 1 represents a truss, which requires no explanation, while Fig. 2 is a tie beam composed of four 2 x 10 inch pieces bolted as indicated in the cut. The bolts are placed 2 feet 6 inches apart. A close examination of the cut will also show the several joints. The correspondent, "J. L. F.," does not give the size of the timbers used in the tower, nor does he give the approximate weight. I do not, therefore, know how much strain to provide for. I think, however, the truss is sufficiently strong to answer all purposes. The dotted lines shown in Fig. 1 indicate the posts and braces of the tower. The braces are to be on the inside of the posts and bolted at the top, center and bottom.



Roof Truss Construction.—Fig. 1.—Elevation of Truss.



Fig. 2.—Tie Beam, Showing Manner of Construction.

Design for a Round Barn.

From J. T., *Madison, Wis.*—In the August number of *Carpentry and Building* for 1889 was printed a communication from a correspondent requesting some information with regard to the erection of a round barn. At that time I was engaged in planning one, which has developed into the building described on the printed leaves which I inclose. I would like very much to see the barn illustrated and described, as I feel sure that it will be of interest to many of the readers, and no doubt call forth valuable discussion.

Note.—The leaves inclosed by our correspondent are taken from the Seventh Annual Report of the Agricultural Experiment Station in Wisconsin, and present an illustrated description by F. H. King of a barn for a dairy farm. From it we learn that the structure was designed to accommodate 98 cows and 10 horses, and to be so arranged as to permit of driving behind the cattle in cleaning and in front of them in feeding. The barn was built in the spring of 1889. Fig. 1 of the accompanying illustrations represents a general view, and shows the main entrance to the two stories of the barn, while Fig. 2 indicates the arrangement and construction of the first story. The letters A A A A, are wagon drives for cleaning the barn, B B the feed manger, C C the platform for the cattle, 2 2 4 indicate the method of ventilation, while 5 shows the manner of placing the joists. In Fig. 3 of the engravings is shown the arrangement and construction of the second story. The letters A A represent the barn floor, B the hay mow, T the tool room, C workshop and granary, 1 1 purlin plates and the method of placing them, 2 2 the method of placing the rafters, while H represents the entrance drive. From an inspection of the engravings it will be seen that in form the barn is cylindrical, and is covered with a conical roof surmounted by a cupola of the same form. The description by Mr. King continues as follows:

The barn is 92 feet in diameter, and 28 feet from sills to eaves. A cylindrical silo 24 feet outside diameter and 34 feet deep, having a capacity of 14,126 cubic feet, occupies the center. Around this silo, in the first story, 98 adult cows are accommodated in two circular rows facing a common feeding alley 9 feet wide, and behind each row of cattle is a wagon drive 6 feet wide for cleaning the barn, which leaves and returns to the common single broad entrance. Extending entirely around the silo, in the second story, is a barn floor 18 feet wide, from the outer edge of which, through shutes leading to the feeding alley in front of the cattle, green fodder can be delivered to them from the wagon, or dry fodder from the storage space above. This floor also permits of driving around the silo and out at the entrance after unloading, even when the ensilage cutter is being run to fill the silo.

On the outside of the barn floor, on the right of the entrance, is stable room for 10 horses, 16 feet from front to rear, 34 feet frontage on the barn floor, and 55 feet from end to end at the outside. On the left of the main entrance is a workshop and granary, whose combined floor space equals that occupied by the horses. In the rear of the silo is a space 16 feet deep for farm tools, having 32 feet frontage on the barn floor, and possessing a floor space the equivalent of 16 x 40 square feet. Between the tool room and the horse barn on one side and the granary on the other are two hay bays, which, together with the space above the barn floor, tool room, granary and horse barn, furnish ample storage space for dry fodder. The silage is delivered to the cattle barn from the silo through a triangular shute shown in Fig. 2, extending up the inside of the silo. In one side of this shute there are doors, and attached to the other is a fixed ladder, by which any desired level in the silo may be reached.

The foundation of the barn consists of four concentric stone walls, the inner one carrying the walls of the silo, and through them the central portion of the floor and roof, the two middle ones carrying the stationary uprights of the stanchions, and through them the floors, main posts, purlin plates and roof, while the outer one supports the walls of the structure. The laying of the walls to a circle and leveling them was a simple matter, and accomplished with the aid of a straightedge, one end of which was fixed to a post in the center, with the lower edge at the level desired for the top of the walls. The movable end of the straightedge rested on a ring of boards tacked to stakes driven in the ground outside the wall being built. The inner wall was built first, and the straightedge lengthened as necessary. The frame of the barn consist almost wholly of 2-inch stock, and the only long timbers are the 11 posts carrying the purlin plates. No mortise and tenon work was used in its construction, all work being done with the hammer and saw. The first story sills of the barn are single 2 x 10 inch plank, sawed in 4-foot sections and bedded in mortar on the walls, the sections having been sawed on a bevel determined by the direction of the radii of the barn. On the sills 2 x 10 inch studding are set 2 feet apart and constitute the outer frame of the basement; 2 x 12 inch studs set flatwise on the two middle walls, at the right distance apart to serve as the uprights of the stanchions, and 2 x 12 inch studding in the walls of the silo, as shown in Fig. 2, constitute the vertical supports for the second story. The silo of the second story consist of short pieces of 2 x 10 inch plank, spiked down upon the ends of the three outer circles of studding, as shown in Fig. 2, and of three thicknesses of 6 inch boards bent around the upper ends of the side studding and resting on the shoulders sawed for them. Two thicknesses of plank rest on the stanchion sup-

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ports, but the outer sill is single; upon these 2 x 10 inch joists are distributed, as shown at 5, Fig. 2, and these carry the floor of the second story.

Each of the posts carrying the purlin plates rests on four 2 x 10 inch joists spiked together and resting on the sills rest, spikes being driven upward into them to hold them in place.

The rafters and studding for the second story are 2 x 6 inch stuff, the latter being set 3 feet apart, and the lower ends of the rafters are carried by two layers of 2 x 6 inch pieces spiked to the tops of the studding, the upper layer breaking joints with the lower. Fig. 3 shows the manner of placing the rafters. The rafters were cut so that their ends, when in place, were vertical, and the fascia was formed by springing a board to them. The lower one or two rows of roof boards were sawed in short sections reaching from rafter to rafter, and then fencing was used, full length, and sprung to the rafters over the remainder of the roof. It was not necessary to cut shingles in laying, except on the cupola, and in laying them each man was provided with a horse, made by driving spikes through one edge of a short piece of 2-inch plank, which served as legs and prevented sliding. A mark was filed in the edge of the shingling hatchet, at a distance from the nailing face equal to that which the shingles were laid to the weather, and this served as the only guide in placing them, which was done rapidly and readily, the men following one another round and round.

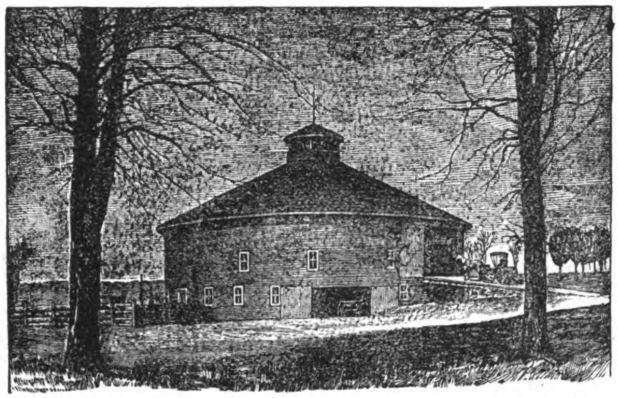


Fig. 1.—General View, Showing Main Entrance.

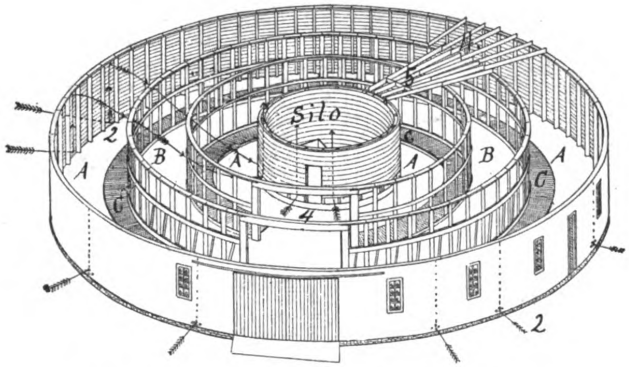


Fig. 2.—Showing Arrangement and Construction of First Story.

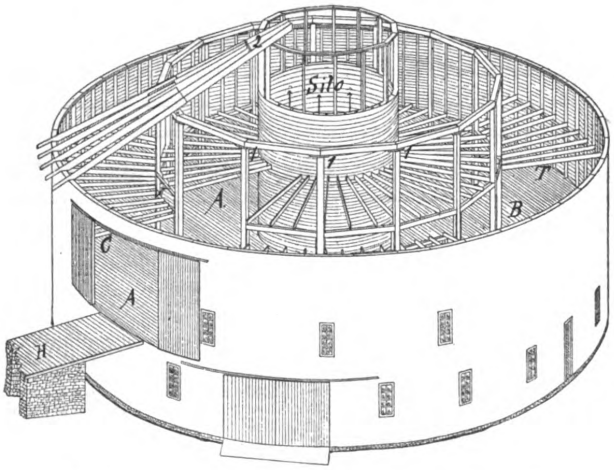


Fig. 3.—Showing Arrangement and Construction of Second Story.

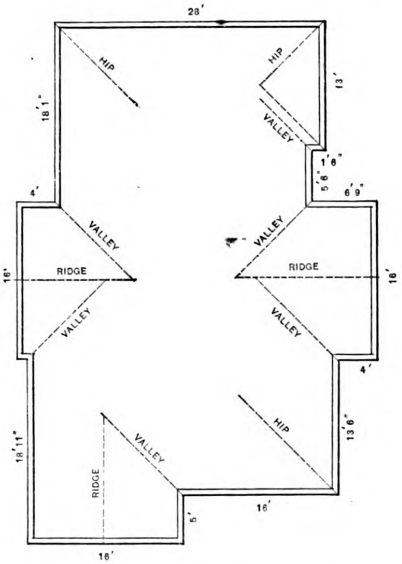
Design For a Round Barn.

This barn is covered outside with drop siding sprung and nailed to the studding so as to break joints, and on the inside of the cattle barn, horse barn and granary with shiplap. In the construction of the silo 2 x 6 inch studding was used above the basement, these being spiked side by side to form the 11 long ones which extend to and help support the roof. The lining of the silo consists of three layers of ½-inch lumber, formed by ripping common fencing in two, and between these are two layers of tarred paper. The same kind of lumber forms the outer covering of the silo, and the spaces between the studding act as ventilating flues for the cattle barn.

The large doors slide open, and are made of matched fencing nailed to cleats, having the same curvature as the sides of the barn. These cleats are made by springing the boards into the desired curvature and then fastening them securely together while in that attitude. When this is done they remain bent, as if they have grown in that form. The feeding mangers in the cattle barns are made by forming the earth in the shape of a shallow, round-bottom trough in front of each row of cattle, raising the earth between them into a broad rounded ridge. This earth after being thoroughly firmed was plastered with a coat of water lime, and has thus far proved very satisfactory.

Problem in Half-Pitch Roofs.

From A. W. H., *Los Angeles, Cal.*—I have been very much interested in the last few numbers of the paper, especially in the subject of roofing and rafters,



Problem in Half-Pitch Roofs, Submitted by "A. W. H."

With the permission of the editor, I submit a plan of roof for the consideration of the practical readers, and will ask some of them to give the best method of

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carrying a half-pitch roof over the plan submitted herewith. I have located all hips and valleys by means of dotted lines.

Artificial Stone.

From J. V. R., *Tampa, Fla.*—I would like very much to have some of the readers tell me through the columns of *Carpentry and Building* how to make artificial stone. I want to know the kind of cement best adapted for it and the proportion of sand to cement.

Floor and Roof Truss.

From R. C. B., *Orangeburg, S. C.*—In the July issue of the paper, "C. M. J." of Ontario, Ohio, asks how to construct a floor and roof truss for a balloon framed hall 36 x 50 feet in size. He states that the floor and roof are to be self supporting and that the first story is to be 10 feet and the second story 12 feet in the clear. In reply to this inquiry, I submit the following sketches and description: Fig. 1 shows the elevation of the building indicating the manner of supporting the roof and the trussed floor framing. Some of the details are indicated in Fig. 2, while in Fig. 3 is shown a plan of the floor joists. The rafters are of the ordinary size and cut. At a point 6 feet above the level of the plates spike on to the rafters a piece 1 x 12 inches 20 feet long, and from its center run other boards 1 x 8 inches by 20 feet to the foot of the rafters. Spike them at their points of contact with the rafters and center cross boards, having them on opposite sides of the center board. The floor truss indicated in Fig. 3 is made of 2 x 8 inch joists 18 feet long, spliced together by nailing on them a board 1 x 8 inches by 6 feet. Take two of these boards, leaving about 1 inch opening between them, through which to pass a 1-inch rod iron with nut and washer on both ends. This rod is long enough to allow 8 inches deflection. Put the double joists every 8 feet on the wall plate. The girder to support the intermediate short joists is made of stuff 3 x 8 inches by 20 feet long spiked together and inserted under the truss joists between the bottom edge and the deflected iron rod. Tighten on the bolts at the ends of these joists sufficiently to have the center 1 inch higher than the ends. In this manner a truss is formed, carrying the girder, on which the intermediate joists are spaced at regular distances. The next step is to bridge the joists and everything is ready for flooring. In Fig. 2 of the sketches B represents the rafter on the wall plate, while the other small cuts show the ends of the joists with the iron plates in position.

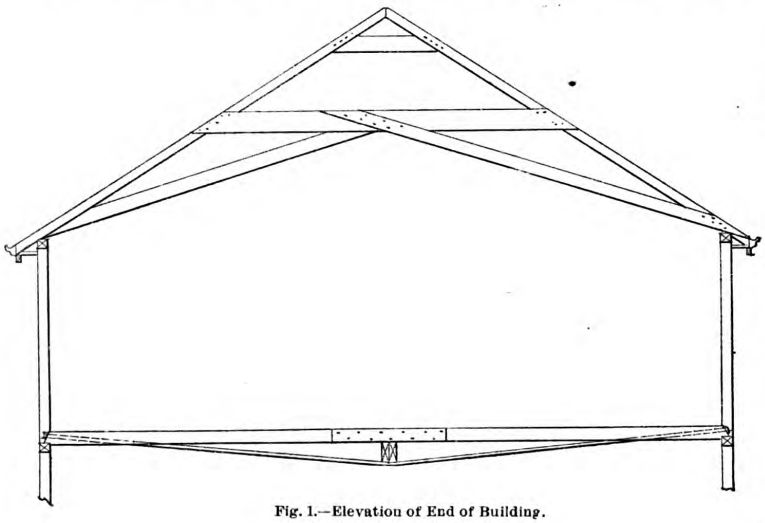


Fig. 1.—Elevation of End of Building.

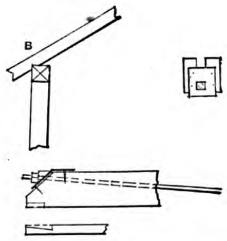


Fig. 2.—Some of the Details.

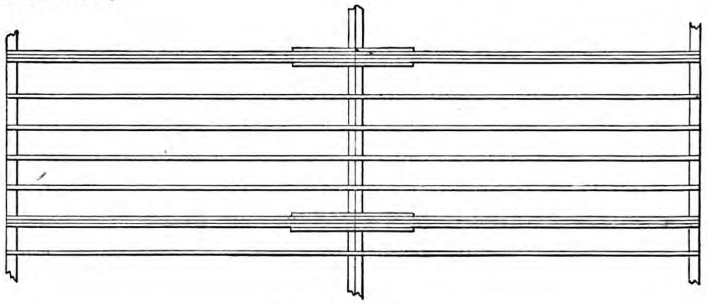
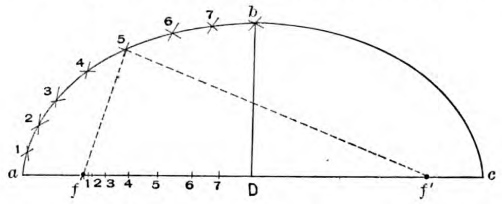


Fig. 3.—Plan of Floor Joists.

Diagrams of a Floor and Roof Truss, Submitted by "R. C. B."

Describing an Ellipse.

From O. L. W., *Dallas, Texas.*—For the benefit of "Constant Reader," Denver, Col., whose letter of inquiry appears in a recent issue of the paper, I offer the following method of describing an ellipse with the compasses. It is neither new nor perfect, but has the advantage of being correct so far as it goes, and I have never seen it in any of our publications: Referring to the sketch which I inclose, draw the long diameter or width of opening, *a c*. From this center set up the rise D*b*. With *b* as a center and *a*D as a radius describe a short arc, cutting *ac* in *f*; also *f'*. Divide *f*D into any number of parts, as 1, 2, 3, 4, 5, &c.; the closer they are together the better. Then, with *f* as a center and any division, as for example *a*5, for a radius describe another short arc at 5. Their intersection will be a point in the circumference. In like manner find the other points 1, 2, 3, 4, &c., using on the line *a c*, respectively, *a*1, *a*2, *a*3, &c., from *f*, and *c*1, *c*2, *c*3, from *f'*. Through the points thus found trace a curve with a bent strip or free hand. The result will be the ellipse sought.



Describing an Ellipse with Compasses, as Suggested by "O. L. W."

Acceptance of Work.

From A. J., *Rockford, Ill.*—I would like to have some of the readers of *Carpentry and Building* express their opinions on the following question: Is it evidence that the work is accepted if the owner of a house, which is being erected by contract, moves in before the work is paid for?

Bill of Material.

From P. H., *Paterson, N. J.*—I am a reader of *Carpentry and Building* and find in its columns much that is valuable to me. I desire to ask the practical readers of the paper if they will tell me if there is any way to easily determine the amount of material required in the erection of a building. For instance, how many feet or bundles of shingles of various kinds are necessary to cover the building? How many feet of timber is required, and other things of a similar nature?

Strengthening the Gable End of a Building.

From W. G. C., *Providence, R. I.*—Will some reader of *Carpentry and Building* tell me how to strengthen the gable end of a building, the size of the end being 25 x 40 feet, constructed of 2 x 4 studding, clapboarded outside and plastered inside? In windy weather the end sags 2 inches or more. The owners object to stay rods outside or any supports inside. I should be glad to have the practical readers of the paper discuss this question and suggest some remedy for the trouble.

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MASONRY AND STONE CUTTING.*

SKEW RAKING VAULT INTERSECTING HORIZONTAL BARREL VAULT.

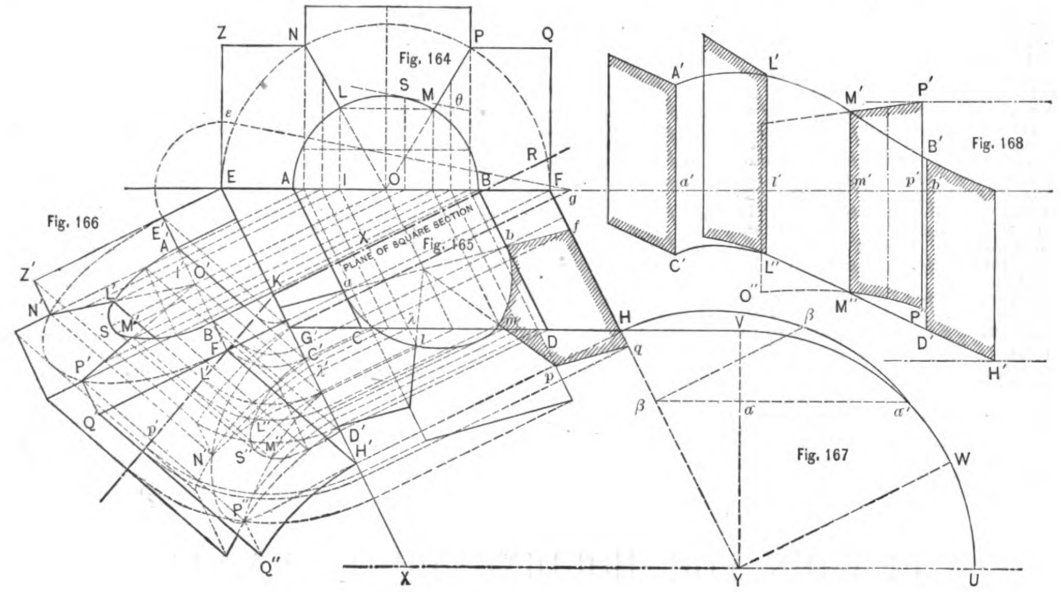
LET A L M B, Fig. 164, be the face arch placed in the elevation plane of our drawing. Let E G, A C, B D, F H be the horizontal projections of the two raking imposts of the vault. The jambs of the arch not being at right angles with the wall face, the arch is therefore skew.

Let G H be the springing line of the horizontal barrel vault, and let it be at the level of the plane of our plan, in which arrangement we should have drawn A B of the elevation at a hight, E *e*, above the ground line; but as the projections required for the working of the stone will not be on this elevation, we keep it down at the lower level in order to render the drawing more compact.

Let the bed joints be planes taken through the radii O L, O M, . . . and through the corresponding generators of the cylindrical soffit, although these planes are not normal to the intrados.

Now select a new vertical projection plane parallel to the sides of the oblique arch, and make thereon another elevation. Let E X, Fig. 166, be the ground line of that new elevation plane, and place above it the springing line E′ F′ of the arch at its proper level = E E. Then E′ G, A′ C′, B′ D′, F′ H′ will be the elevation of the raking imposts of the arch. To draw the joint line starting from L, project I in I′, Fig. 166, then make I′ L′ = I L. From the point L′ thus found draw L′ L″ parallel to E′ G. All the other arrises of the stones are drawn in the same way. In the new elevation of the face arch the joint lines N′ L′, P′ M′ prolonged must pass through O′.

To find the points where the joint lines L′ L″, M′ M″, . . . cut the soffit of the barrel vault, draw X Y center line of that vault; cut the vault by two vertical planes Y V, Y H, the one perpendicular



Masonry and Stone Cutting.—Figs. 164 *to* 173 *Inclusive.*

* Continued from page 172, July issue.

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to X Y, the other parallel to the sides of the raking arch. The first section will be the circle U V; the second is an ellipse, which laid down on the drawing round the line Y H takes the position H β' W. This elliptical section can be delineated as follows: Cut the vault by a vertical plane parallel to its center line, it will give a horizontal line; the level of that line is a a in the square section, it is therefore the same for β β' in the elliptical section.

Once the elliptical section is drawn, cut it out in cardboard or zinc; then if you were to place it in the structure vertically on the line I γ (Fig. 165), with its foot λ on the springing line, the cardboard section would necessarily cut the joint starting from L. We draw this operation on the elevation, Fig. 166, by laying the cardboard section on that elevation with the bottom of the section in λ' and its ground line H Y coinciding with λ' X. Where the section meets, L' L'' gives the point of intersection L''. The same operation will give every other point of the intersection of the raking arch with the soffit of the barrel vault. The bedjoints N'' L'' and P'' M'' are arcs of ellipses, and may be delineated by finding, by the same method, intermediary points between the two extremities.*

To develop the soffit of the arch we require the square section. To find the square section, cut the raking arch by the plane F' K R, Figs. 166, 165, at right angles with the generators of the arch. This plane will cut the joint line L' L'', I λ, in a point, the elevation of which is l', and which is placed in a vertical plane, of which I λ is the trace. When we turn down the section round K R, the horizontal trace of the section plane, the point will come in l on the line I λ, and the distance of l to the hinge of rotation is equal to K l', Fig. 166. Thus all points of the square section can be found. The section of the right-hand arch stone which we shall consider in the cutting is b m p q f.

Soffit and Bed Molds.—On any straight line, Fig. 168, carry the distances a' l', l' m', m' b', equal to the arcs a l, l m, m b of the square section; then draw, at right angles with the base line, the lines a' A' and a' C', l' L' and l' L'', m' M' and m' M'', b' B' and b' D', respectively, equal to the lines of the same name on Fig. 166. Then draw the curves A' L' M' B' and C' L'' M'' D', which are the outlines of the developed soffit, and which give you the soffit molds. For the bed molds, take m' p', equal to m p of the square section, and make p' P' and p' P'' equal to the same lines on Fig. 166. The side M' P' will be straight; the side M'' P'' will be a portion of an ellipse, the curve of which can be delineated by a few supplementary points found by the same method. We can also turn down the center line for each bed, and get the points O' and O'' where the joint lines would pass if prolonged. We see in this drawing also that the greatest length of the right-hand stone is contained between the dotted lines starting from P' and H'.

Working the Stones.—The safest way is to cut first a prism having the square section for its base, and of the length of the stone, as shown in Fig. 168. Then by applying on that prism the several molds found, the outline of the stone is delineated. The wall face is easily worked to a plane. The cylindrical face belonging to the soffit of the barrel vault is worked with a straightedge, guided by marks easily obtainable from our drawing, and then placed on the stone.

Second and Shorter Method of doing the same Problem.—In the former method we have used the usual orthagonal projections; in this one we take the second elevation plane on F H, Fig. 170, and we project the raking arch thereon parallel to the generators of the barrel vault. Then all the joint lines are limited on one side by the straight line F' Z', which represents the wall face, and on the other side by the elliptical section of the barrel vault.

To find the square section, cut the raking arch by the plane F' R K, perpendicular to the generators of the arch. This plane will cut the joint line M in a point situated in the vertical plane, Tμ. When the section is turned down, the point of intersection m will come somewhere on that line. The distance of that point to the hinge of rotation is equal to that of a line drawn at right angles from δ to the joint line M. The elevation of δ is δ', Fig. 171; the length required is therefore δ' m', which, carried from δ, gives us m of the square section. Thus all other points of the square section are found.

For the soffit and the bed molds, the developments are made on the same principle used in the former method; but we must remember that the distances to be carried are a' F' and a' H', l' M' and l' M'', m' M' and m' M'', b' F' and b' H of Fig. 171. The stones are worked as before.

*To obtain the line S' S'' tangent to the curves of the face arch and groin, take a plane tangent to the cylinder and perpendicular to the second elevation plane. To do this, draw G q perpendicular to E X, and take a plane through the lines G q and G E'; the vertical trace of that plane, Fig. 164, is e g. Draw tangent S θ parellel to e g; S is the point from which the required generator will start.

FRAMES FOR HOLDING PHOTOGRAPHS.

THE carpenter and builder is often called upon to make ornaments or bric-a-brac for the household, and an idea of how an article of this description may be easily and inexpensively made will, without doubt, prove of interest. A correspondent, writing under the *nom de plume* of "Semper Fidelis," contributes to an exchange an interesting description of the method of constructing two frames for holding photographs, one being a double and the other a triple frame. The former is designed to hold two large-sized pictures, while the other will take three pictures, each of different size. The frames shown by means of the accompanying illustrations are intended to be stained in imitation of walnut, although, of course, more expensive woods may be employed if desired. Those in the cut are made of well-seasoned beech, which may be obtained from the stock of a cabinet maker or other establishment where well-seasoned wood is kept on hand. In the first place, it is desirable to have the wood cut into lengths $\frac{7}{8}$ inch in section, so that the pieces may be cut to the various lengths required, as the work of construction proceeds. For the sides of the double frame four pieces are required, each of which are 14$\frac{1}{4}$ inches long and $\frac{3}{4}$ inch square when planed. For the cross bars two pieces $\frac{3}{4}$ inch square and four pieces $\frac{5}{8}$ x $\frac{3}{4}$ inch are required. These should be exactly 7$\frac{1}{2}$ inches long and $\frac{1}{2}$ inch allowed at each end for the tenon. This will give 6$\frac{1}{2}$ inches in the clear, which is the width of the frame, inside measurement. When all the pieces are squared up, the centers are marked on the ends of the uprights, then the heads are turned and fitted on the solid. Fig. 1 of the illustrations is an elevation of the double frame, Fig. 2 represents the head, Fig. 3 the feet and Fig. 4 one of the spindles. When the head and feet are turned, the places are marked on them for the small mortise joints, which, though not required to be very strong, must be accurately fitted. The next step is to make the mortise and tenon joints. These are placed in such a position as to allow the length of the glass to be 8$\frac{1}{2}$ inches and the breadth 6$\frac{1}{2}$ inches. The tenon being only $\frac{1}{2}$ inch in depth will prevent the mortise from going through the sides. For the joint $\frac{1}{8}$ inch will answer. It is necessary to exercise due care in marking the work, so that the edges will be exactly flush.

When the sides and cross bars are fitted the next step is to form the rebate to keep them in place. This is made of strips of wood glued and tacked into position. The correspondent referred to states that the quickest method of making them is to plane down a strip of board on both sides to the thickness required, say about $\frac{3}{4}$ inch, then plane the edge and cut off with a tenon saw the width required, say about $\frac{7}{16}$ inch. Cut clear of the pencil mark and plane up the remaining side, making the strip exactly $\frac{3}{8}$ x $\frac{7}{16}$ inch. Now round one edge like a bead and miter the corners to fit into the frame. These will be of the same size as the opening, and in fitting them it is better to cut them at first a little longer then necessary and gradually trim them down a little at a time, until an accurate fit is secured. There now remains only the spindles to be turned and inserted in their places. Care should be exercised when boring the holes to take the lugs of the spindles, that they are exactly over one another. Next glue them and finish off with sandpaper, stain with burnt umber and water and give two coats of spirit varnish. The backs are made of $\frac{1}{4}$-inch boarding, planed and chamfered and held with sprigs, there being a piece of brown paper pasted over the joints to keen out the dust. The construction of this frame is such that it may be used as a printing frame if desired, and when so used the backs are hinged and provided with springs. A pair of brass hinges are used to join the two parts of the frame together.

In the construction of the triple frame shown in elevation in Fig. 7 of the illustrations there is likely to be experienced a little more trouble than was the case in connection with the double frame just described. More care is necessary in marking out, but no difference in jointing up or in rebating and backing. For the sake of economy the sizes are made 10 x 8, 8$\frac{1}{2}$ x 6$\frac{1}{2}$ and 6$\frac{1}{2}$ x 4$\frac{3}{4}$ inches, which are the sizes of imperial, whole plate and half plate respectively. This frame is provided with small screen hinges, which are necessary, as the frame is heavier than the one above described. A novel feature of this photograph holder is found in the treatment of the corners. These are fitted with fretwork or carved ornaments, samples of which are shown in Figs. 5 and 6 of the illustrations. The frame may be enameled with the fret work corners, but if carved pieces are used a better effect is produced by leaving the frame in the natural wood or staining or varnishing. We think the illustrations so clearly indicate the general construction of these photograph holders that those of our readers who are interested in ornaments of this kind will be able to make them without trouble.

Strength of Water-Proof Bricks.

Recent experiments on the strength of bricks, says *Specialties*, have resulted in demonstrating a resistance to crushing of from 5000 pounds to 22,000 pounds per square inch, according to the quantity of the bricks. The average of ten varieties was 7150 pounds per square inch. As the standard of strength for bricks given by most engineering text books is only from 500 pounds to 5200 pounds, it is supposed that great improvements in the manu-

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facture of bricks must have been made since these books were compiled. Bricks impregnated with coal tar are to be rendered hard, durable and perfectly waterproof. The process of impregnation is extremely simple, the bricks, which should be good, being boiled in tar for 24 hours, then taken out and allowed to drain. Bricks thus treated are stated to be especially adapted for paving stones, &c. They are also particularly recommended for the construction of sewers, cesspools, damp-proof foundation walls, and other similar work for which a water-proof brick is obviously desirable. There are many purposes for which water-proof bricks secured in cement are highly convenient; and these tar-soaked bricks are the cheapest that can be procured for such uses.

A RECIPE FOR USE in connection with waxing floors is to stir 25 parts of shredded yellow wax into a hot solution of 12 parts of pearlash in soft water. Keep the mixture well stirred until the effervescence ceases, then remove it from the fire, and stir in 12 parts of finely ground yellow ochre. It may now be poured into cans to cool. When wanted for use, one part of it is dissolved in five parts of boiling water. Apply warm with a paint brush. It dries in a few hours, when the floor is polished with a floor brush, and afterward wiped with a woolen cloth. This wax coating will last for six months with ordinary use.

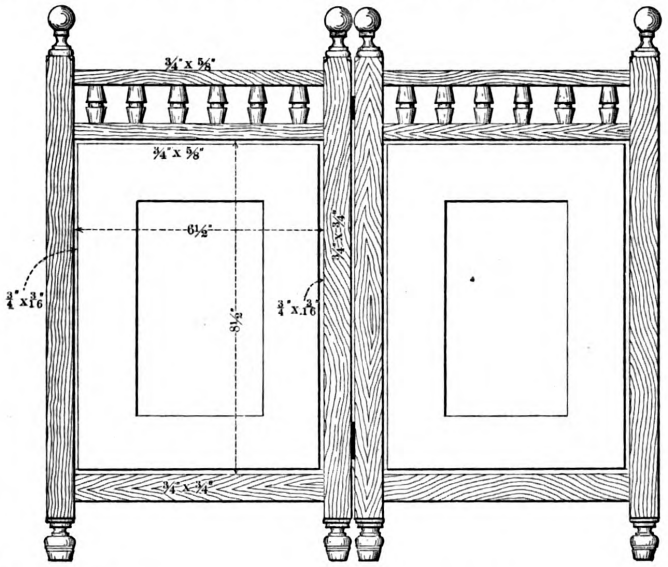

Fig. 1.—Elevation of Double Frame.



Fig. 2.—Head of Post.



Fig. 3.—Foot of Post.

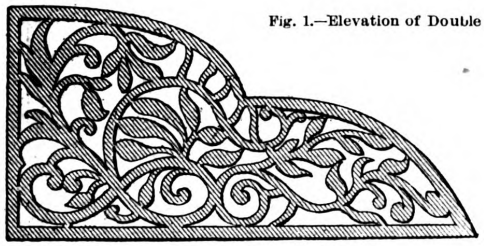

Fig. 5.—Corner Piece of Fret Work.



Fig. 4.—Spindle.

Fig. 6.—Wool Carved Corner Piece.

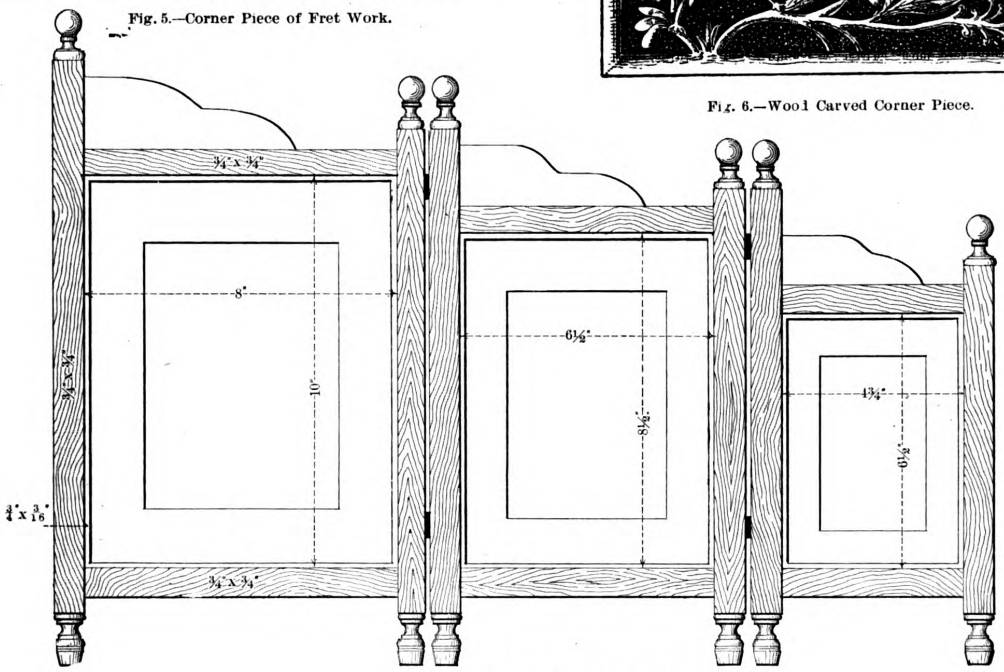

Fig. 7.—Elevation of Triple Frame.

Constructing Frames for Holding Photographs.

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WHAT BUILDERS ARE DOING.

Baltimore, Md.

Mr. E. D. Miller, secretary of the Builders' Exchange of Baltimore, had an interview recently with Supervising Architect Elbrook of the Treasury Department, which resulted in an arrangement whereby plans and specifications of all buildings to be hereafter erected by the Government will be sent to the Exchange. By this means Baltimore builders will be able to bid on Government work without the trouble and expense attendant thereupon that existed in the past.

During Mr. J. H. Windom's term of office repeated effort was made by the secretary of the National Association of Builders to have each exchange supplied with a set of plans and specifications of Government work, but although Mr. Windom was personally in favor of the step, he was unable to comply with the secretary's request.

Boston, Mass.

Affairs among the builders are in a very satisfactory condition at present, with plenty of building in progress, fair prices and no prospects of disturbances in the labor market.

The Mason Builders' Association and the Bricklayers' Union are preparing articles of agreement in regard to the apprenticeship question and the result of their action will be in shape to give to the public before the next issue of *Carpentry and Building*.

A full description of the altered and remodeled building owned by the Master Builders' Association of Boston will be given in an early number of this journal, showing all changes and improvements that have been made.

Buffalo, N. Y.

The building being erected by the Builders' Association Exchange of Buffalo is progressing in a most satisfactory manner. The stone work of the basement is all completed and the first story is under way. It is clearly apparent, even at this early stage, that the building will be a credit to the Exchange and to Buffalo.

The beneficial effect of the project is already plainly evidenced in the increased interest in the Exchange and the number of applications for membership. Builders are beginning to recognize the advantage of being identified with an association that is active and progressive by nature, and that has the welfare of the builder as its motive.

An outing was taken by the members of the Exchange on Labor Day, and over 100 participated in a trip on the water. Dinner was served on the boat, and a very pleasant day was spent by all.

A meeting of the stockholders of the Exchange is to be held on October 1, for the purpose of voting on the proposition to double the capital stock, making it $10,000; 200 shares, at $50 each.

The object of this proposed action is to enable the Exchange to accept more members in the corporate class, which, being limited to 100, is already full; and as each corporate member must hold a share of stock, it has been considered advisable to increase the number of shares.

Chicago, Ill.

Building affairs are moving along about as usual in Chicago, with nothing of an unusual nature having occurred in the Builders' and Traders' Exchange during the past month.

There is a surplus of carpenters in the city, which is attributed to the prospects of work in connection with the World's Fair.

The real estate men of the city are taking steps to restrict the hight of buildings that are hereafter to be erected.

The combined trades unions of Chicago have a plan on foot for the erection of a large bnilding to be devoted to the uses of the workmen. A stock company is proposed, the capital of which is to be $500,000, the estimated cost of the entire property. The building is to be 100 x 125 feet and 10 stories high.

Denver, Col.

The Master Builders' Association is about in its normal condition, with nothing of unusual note to report in the building trades.

A point of much interest to architects, contractors and parties owning buildings was recently brought up by the case of William Atkinson *vs.* E. J. Hodson in the County Court. The plaintiff was having a large building put up on Gallup avenue in Highlands. When the building was well on toward completion the contractor threw up the job. The plaintiff wanted to go on and finish the building, but the defendant would not let him have the plans. The former contended that he had paid $1100 for the plans and was entitled to them until the building was finished. The latter claimed that they were his private property.

The jury found for the plaintiff and awarded him damages to the amount of $300, because of the delay through the withholding of the plans. The defendant was not at all satisfied with the result and threatens to appeal the case.

The point at issue has never been settled among the architects, and a final decision is looked forward to with much interest.

Omaha, Neb.

Building interests have been somewhat disturbed during the season and a feeling of uncertainty has prevailed as to the actual condition of affairs between employers and workmen.

The attempt to force the adoption of the State law making eight hours a day's work has created more or less trouble and for the benefit of those who may not have seen the law, it is given herewith in full:

House Bill No. 104—An act to regulate the hours of labor of mechanics, servants and laborers.

Be it enacted by the Legislature of the State of Nebraska:

Section 1.—That eight hours shall constitute a legal day's work for all classes of mechanics, servants and laborers throughout the State of Nebraska, excepting those engaged in farm or domestic labor.

Sec. 2.—Any officer or officers, agent or agents of the State of Nebraska or any municipality therein who shall openly violate or otherwise evade the provisions of this act shall be deemed builty of malfeasance in office and be suspended or removed accordingly by the Governor or head of the department to which such officer is attached.

Sec. 3.—Any employer or corporation working their employees over the time specified in this act shall pay as extra compensation double the amount per hour as paid per previous hour.

Sec. 4.—Any persons or parties contracting with the State of Nebraska, or any such corporation of private employer, who shall fail to comply with or secretly evade the provisions hereof, by exacting or requiring more hours of labor for the compensation agreed to be paid per day than is herein fixed and provided for, shall, on conviction thereof, be deemed guilty of a misdemeanor, and be punished by a fine of not less than one hundred ($100) dollars and not more than one thousand ($1000) dollars. And all acts and parts of acts inconsistent with this act are hereby repealed.

W. S. Wedge the new secretary of the Builders' and Traders' Exchange appointed to succeed D. J. Collins, who retires, writes that so far as building operations are concerned everything is about in a normal condition.

Philadelphia, Pa.,

The Master Builders' Exchange has recently completed an addition to the Exhibition Room by extending it over the area on both sides and putting in a skylight at the first story. The improvement in the room is very marked, and the most satisfactory feature of it is that the increased space has already been let to exhibitors.

Another and entirely new feature that is being undertaken by the Philadelphia builders is the establishment of a restaurant in connection with the Exchange. A story is being added to the building fronting on Seventh street in which the restaurant is to be located. Work on this addition, which has been under way since August 20, is progressing rapidly, and will be pushed to completion as soon as possible.

A caterer has already been secured and preparations are being made to open the restaurant as soon as the rooms are completed.

The officers and directors of the Exchange, and such members as are fully impressed with the benefits to be derived from a well established 'Change hour, are at work considering some plan whereby the custom of meeting for business purposes during the hour fixed can be more firmly established.

Nearly all the prominent contractors are already in the habit of being in the rooms during 'Change hour, but the material dealers who would derive the greatest benefit from the Exchange seem to prefer to see the contractors at their offices. All the travel and inconvenience thus entailed could be avoided if they would form the habit of being in the Exchange during the time fixed for the purpose.

There is an always increasing desire on the part of the contractors to transact as much of their business as possible in the Exchange, and it is not unlikely that they will, for the purpose of more thoroughly establishing the "'Change hour" custom, decline to grant personal interviews, except in the Exchange during the 'Change hour.

The facilities for the speedy and comfortable transaction of business are unexcelled. Private rooms are provided for consultations, with desks, stationery, maps and books of reference close at hand. Just how the object sought will be acquired is not known, but some action to that end will be taken at an early date.

At a recent meeting of the Master Painters' Association, held in the rooms of the Builders' Exchange, a paper favorable to strengthening organizations of employers was read by F. A. Ballinger. The paper dwelt upon advantages resulting from unions of this kind, and argued incidentally against the system of inviting too many bidders to estimate for one job. Where three or four general contractors were invited, he said, sometimes as many as 50 sub-contractors were asked to estimate, only one of whom was to get the job, and then at such a low competitive price as to discourage good work.

The trade schools in connection with the Exchange reopened for the second year on September 1. The number of applications for instruction in bricklaying, carpentry and plumbing has made it necessary for the management to consider some plan for enlarging the facilities for handling classes in the branches mentioned.

The $3000 so generously donated by Col. R. T. Auchmuty of New York has permitted the introduction of several practical improvements suggested by the first year's experience.

Classes in carpentry, bricklaying, blacksmithing, plastering, stone cutting, house painting and plumbing will be instructed every week-day evening except Saturday.

While there are three trades mebtioned as overcrowded, there are others in which it is difficult to secure a full quota of pupils, owing to the antagonism exhibited by unions in these branches to graduates from the schools.

The members of the Master Builders' Exchange have recently been called upon to perform the saddest duty of their membership—to attend, within a comparatively short space of time, upon the obsequies of four of their most highly esteemed brother builders: John J. Weaver, William Gray, Thomas Little and William Peoples. The death of these gentlemen following upon each other in so short a time has been most deeply felt in the Exchange, and the expressions of sincerest regret and sympathy that are heard are but faint indications of the depth to which the members have been stirred.

Pittsburgh, Pa.

One of the beneficial results to the trade of the bricklayers' strike of Pittsburgh, Pa., is the establishment by the Builders' Exchange of a trade school for the instruction of apprentices in bricklaying.

The Exchange has had the subject of a trade school, after the plan adopted by Philadelphia, under consideration for some time, and the recent difficulty among the bricklayers has forced the subject to an issue so far as this branch of the business is concerned.

A fund for the support of the school has been raised, and a suitable building has been erected for the accommodation of the classes. The building is one story in hight and ample in size for the purpose for which it has been built, and is well located.

It is the purpose of the Exchange to give instruction in bricklaying only at first, and to add classes in other branches of building when circumstances will warrant their so doing.

Young men of from 17 to 19 years of age will be given instruction free; the only requirement will be that they become indentured to serve an apprenticeship until they are of age at a certain stipulated rate of wages, which rate increases each successive year of the term of service.

The school, it is expected, will be in running order by the time this issue is off the press, and a very satisfactory number of pupils is already enrolled.

Reports of the condition of the labor market in Pittsburgh are very conflicting, but the members of the Builders' Exchange have secured a sufficient number of non-union men from other cities to carry on the most pressing of the contracts on hand.

The bricklayers still maintain that the strike is in force and union men will not work for less than $4.50 per day.

It is reported that an independent builders' exchange has been formed from among those of the strikers who are capable of carrying on the business of contracting, and such material dealers as are not members of the Builders' Exchange.

Owing to the present labor disturbance the members of the Builders' Exchange have con-

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cluded to postpone for a time any action in regard to securing a building of their own.

San Antonio, Texas.

The latest affiliation with the National Association of Builders is that of the Builders' Exchange of San Antonio, Texas.

This Exchange has been in existence about a year and a half, and is in a flourishing condition, representing the best building interests of the metropolis of the State.

The secretary, Mr. Martin Bradin, writes that the builders of San Antonio are endeavoring to establish better defined relationship between themselves and the architects, and that their prerogatives have been somewhat ursurped by the latter.

Building interests are generally in an active condition, though this season's work has been visibly affected by the long-continued drought. The prospects promise to improve after October 1, and builders are looking forward to more activity in building operations during the winter.

Mr. Bradin says that the city has been steadily increasing in population during past years, and there is every indication that it will continue to grow, not only in size, but in importance as a business center. The frontier aspect of the city has long since passed away, and San Antonio is to-day one of the best cities in the South.

Syracuse, N. Y.

The Master Builders' Association of Syracuse, N. Y., has recently moved into new and much more desirable quarters than those formerly occupied at 211 Warren street.

The new rooms are located in the Bastable Block, up one flight, and are admirably arranged for the uses of the Association. The present location is more central than was the former and is in the very heart of the business portion of the city. The change has proved very satisfactory to the members and will doubtless result in benefit to the Association.

Mr. C. F. Wischoon, Jr., the secretary, writes that Mr. John A. Isley, one of the most active and prominent members of the Association, recently met with an accident which resulted in his death. Builders who were in attendance at the Fourth Convention of the National Association at St. Paul will pleasantly recall Mr. Isley as a delegate from Syracuse and will learn with regret of his sad death.

The members of his Association will miss his presence and earnest interest in all that relates to the welfare of the builder, and have passed fitting resolutions expressive of the regard in which he was held by all who knew him and the sincere regret his death has occasioned.

Worcester, Mass.

The Builders' Exchange of Worcester is at work upon the problem of extending its influence and increasing its membership.

An evening meeting was held on September 15 in its rooms in the Knowles Building, for the purpose of considering ways and means to secure a full recognition of the value of the Exchange by builders who were not yet members.

The Board of Trustees was constituted a committee to co-operate with the secretary in securing new names for membership in the Exchange.

The president, vice-president and secretary were appointed a Committee to Revise the By-Laws.

Everything, as relating to the interests of builders, is moving along without any disturbance, and contractors are generally busy.

Sub-Contracting.

The secretary of the Builders' Exchange of St. Paul, H. R. P. Hamilton, states that there has been for some time a feeling of general dissatisfaction prevailing among sub-contractors with the methods and customs under which their business is conducted, but up to the present time no concerted action has been taken to remedy the evils of which they complain. One practice to which they object is that of being "placed," without their consent or previous knowledge, under a general contractor. The architect, for instance, solicits a number of sub-bids, and after selecting the lowest in each branch, lets the whole job under one contract without consulting either the person who becomes by this method the general contractor or the sub-contractors. This practice has been so strongly objected to that it is rapidly falling into disuse.

The most objectionable feature of the business is that of trading in bids by general contractors. A general contractor, after obtaining a contract on a basis of solicited sub-bids, for purposes of his own, sets one sub-contractor to undercutting the bid of another. The sub-bidders are greatly in fault for not maintaining their original bid instead of reducing the amount thereof in the hope of securing a contract which they are led to understand rightfully belongs to another. This practice cannot be too strongly condemned.

The sub-contractor is almost invariably made to wait too long for his money; often until long after the building has been completed, even though his work may have been finished months before. The sub-contractors are generally in favor of having all principal branches let direct, but under the present system they think that payments by the general to the sub-contractor should be made on the same basis as the payments by the owner to the general contractor. For example, if the general contractor receives every two weeks 85 per cent. of the value of labor and material furnished up to date, and the balance 30 days after completion of the contract, then the sub-contractors think that they should be paid on the same basis, receiving balance of money due 30 days after their sub-contract is completed.

Several efforts have been made to organize the various sub-contracting trades, but although they have begun well, interest has never been sufficiently aroused to make the organizations of any value.

E. D. Miller, secretary of the Builders' Exchange of Baltimore, is authority for the statement that the sub-contractors generally in that city are satisfied with the methods that prevail in the conduct of their business.

About the only direction in which they would advocate change is in regard to contracts with general contractors; they desire more definite understanding as to conditions of payment, when they should be made, &c. The relationship between general and sub-contractors is satisfactory, and no complaints are heard on either side.

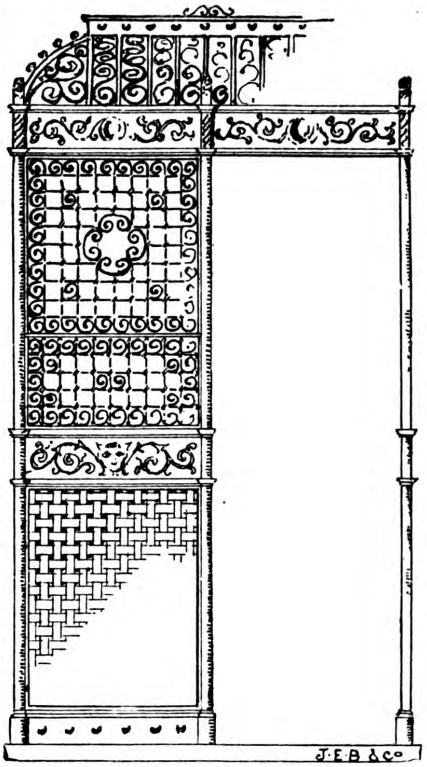
Steel Chimneys for Mercantile Buildings.

Steel chimneys are being erected in connection with some of Chicago's tall buildings. The Fair building has at present the tallest under construction. The chimney, when completed, will be 250 feet high, being considerably higher than any other in the city, the highest at the present time being the one at the Gottfried Brewing Company's plant at Archer and Stewart avenues, which is 175 feet. The outside diameter is 9 feet 5 inches, while the steel varies in thickness from $\frac{5}{16}$ at the top to $\frac{3}{8}$ inch at the bottom. The lower 75 feet of the chimney is lined with fire brick 8 inches deep, formed to fit the shell compactly all around. Above this it is lined with hollow tile. This lining is supported at intervals of 25 feet by angle iron riveted to the steel shell; in other words, the chimney is lined in a manner similar to blast furnaces and foundry cupolas, and no expansion by heat can lessen its strength. The joints are all hot riveted. The steel shell is carefully protected from corrosion and from any attacks by the weather by painting inside and out. The weight of the chimney is spread to the foundations in the same general way as that of the columns of the building, the base or foundation on which it rests being constructed in the same manner. The ground is first covered with a layer of cement, then two layers of steel rails in cement and one layer of I-beams, on which the cast-iron shoe which takes the shell of the stack rests. The capacity of the chimney is 12 60-inch boilers 20 feet in length.

This is the first time this material has been used in the construction of the chimneys of mercantile buildings. The magnitude of the building and the necessity of economizing in space, the foundations for the columns occupying about all the ground, led the architects to adopt steel as the material for this purpose. Brick has been used almost entirely heretofore, but upon investigation it was found that the weight of a brick chimney of this size would be almost 700 tons, while of steel construction it would weigh, including the linings, a little less than 250. The outside diameter of the present chimney is 9 feet 5 inches, while were it constructed of brick it would be 16 feet 6 inches, thus making a great saving in space. Another consideration was the time consumed in construction. A brick chimney of this hight, 250 feet above the sidewalk, should not be built faster than 2½ feet a day on account of the settlement and the setting of the mortar, while of steel it can be erected at the rate of 20 feet a day. Another important consideration is that it costs only about 60 per cent. of what a brick chimney would cost. Steel has been used in the construction of chimneys for iron mills and factories.

Elevator Car.

J. E. Bolles & Co., Detroit, Mich., are showing various designs of iron work for buildings, of which they make a specialty. The accompanying illustration represents an elevator car which has recently been made by them. The lightness of design



Elevator Car.

carries with it requisite strength and is pleasing in effect. The car is made in wrought iron, dead black or electro bronze finish. It can also be made in brass, polished or antique finish.

MR. THEODORE BENT, who was sent to investigate the famous Zimbabye ruins in South Africa, writes home that these ruins are undoubtedly of Phœnician origin, and that the inscriptions and other evidence he has found unmistakably indicate the form of worship, the manner of decoration, and the system of gold smelting practiced by the vanished people who erected the structures.

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The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

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Committee on Uniform Contracts.

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JOHN J. TUCKER, 37 West Twelfth street, New York.
IRA G. HERSEY, 166 Devonshire street, Boston.

Legislative Committee.

EDWARD E. SCRIBNER, Chamber of Commerce Building, Chicago.
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B. F. SWAIN, Builders' and Traders' Exchange, Kansas City.

Committee on Resolutions.

J. MILTON BLAIR, Builders' Exchange, Cincinnati.
J. B. WARE, 157 Ottawa street, Grand Rapids.
CHAS. F. KINDT, 1 Grand avenue, Milwaukee.

Committee on Statistics.

JOHN DE CLUE, Ninth street, St. Joseph.
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Committee on Building Laws.

Appointed for conference with committees from the National Association of Fire Engineers, the American Institute of Architects, National Association of Building Inspectors and the National Board of Underwriters.
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W. H. SAYWARD, 166 Devonshire street, Boston.
STACY REEVES, Philadelphia.
JOSEPH DOWNEY, Chicago.
J. B. LEGG, St. Louis.
W. H. GORSLINE, 247 Powers Building, Rochester.
WARREN A. CONOVER, Building Trades Club, New York.

Directors and members of committees whose personal address does not appear in the foregoing may be addressed in care of the Builders' Exchange of their city. Addresses of all filial bodies will be found in the directory of Exchanges as published in the appendix of the report of the fifth annual convention.

For discussions of Builders' Exchange questions and articles from Mr. Sayward's pen see preceding pages.

Announcement.

The sixth anual convention of the National Association of Builders will be held in Cleveland, Ohio, beginning January 18, 1892.

The Mid-Year Meeting.

The mid-year meeting of the officers, directors and committees of the National Association of Builders will take place at Cleveland, Ohio, while this issue is in the hands of the printer, beginning September 28, and therefore too late to be reported before the November number.

Many subjects of importance are to be considered, and the meeting will doubtless result in presenting much important matter to the exchanges for consideration previous to action at the next convention.

The Uniform Contract.

The offer of the secretary of the National Association to furnish a copy of the standard form of contract as approved and adopted by the American Institute of Architects and National Association of Builders has been productive of a much more satisfactory result than was anticipated. Not a day passes without one or more requests for a sample contract, and in complying therewith the secretary asks for an expression of the inquirer's opinion upon the form. The answers are exceedingly satisfactory, and indicate that a standard form of contract is considered by builders as a most valuable adjunct to their business.

The offer still holds good, and the secretary will gladly supply any person with a copy of the contract who may desire the same.

A Request from the Secretary.

The secretary requests all individual members of filial exchanges and persons interested in the work of the National Association to address him upon subjects that come within his jurisdiction. He particularly requests that suggestions be forwarded as to work that can be accomplished by him in the interest of the builders of the country.

The secretary is desirous of making the work of his office valuable to the individual builder, and to do so he must be placed in contact with individuals, which can only be accomplished by communication from the individual in the first instance.

To Exchanges and Their Members.

Filial bodies and their individual members are reminded of the importance of sending to the secretary of the National Association any and all suggestions that may occur to them as being subjects for consideration and action in the national convention.

The work of preparing matter for the convention cannot be begun too soon, and all the work should be distinctly blocked out and ready to be given its proper place in the programme of the meeting in plenty of time.

Questions that are issues, are issues today just as much as they will be a week previous to the convention, and should be submitted to the secretary at once.

Notes.

The builders of Australia are at work trying to secure an arbitration clause in their standard form of contract.

Workmen on the Government reservoir at Hot Springs, Ark., are working ten hours and have appealed to Secretary Noble for shorter hours; his reply was that the contract had been awarded, and that there was no law in the United States to compel the contractors to make their men work only eight hours.

The builders of Halifax, N. S., are alive to the work being done by the National Association and the various exchanges, and have applied to the secretary for information as to methods, &c., and a sample of our Uniform Contract.

The Master Carpenters' Association of Albany has filed articles of incorporation with the Secretary of State, and is now a full-fledged corporation.

A member of the Indianapolis Builders' Exchange is making a tour of the Eastern Exchanges in the interest of securing as good an industrial exhibit as possible at the World's Fair.

The secretary of the United States Granite Producers' Association, Mr. D. E. Swan, Room 65, No. 125 South Clark street, Chicago, is issuing a monthly circular to members, which embodies a collection of facts as existing in various parts of the country that relate to matters of interest. The information, which is secured through correspondence, may be considered as authentic, and every member of the association should assist Mr. Swan in an effort that is so manifestly advantageous to themselves.

The master carpenters of Haverhill propose to organize.

The aldermen of Bridgeport, Conn., have voted in favor of nine hours as a day's work for workmen employed by the city.

The painters of Halifax, N S., are struggling with the apprenticeship question. The masters are endeavoring to establish the custom of employing as many apprentices as they see fit, or as their work demands, and the unions would fix a limit on the number allowed each employer.

The Builders' Exchange of Cincinnati, Ohio, has recently issued a hand book containing a list of officers and members, together with its constitution, by-laws, rules and regulations, Ohio lien law, and the city ordinances regulating the use of streets during the erection of buildings, and sanitary conditions in construction, and also tables of general interest to builders. The book contains 120 pages, is neatly bound and presents a creditable appearance.

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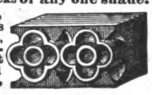



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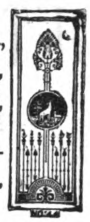

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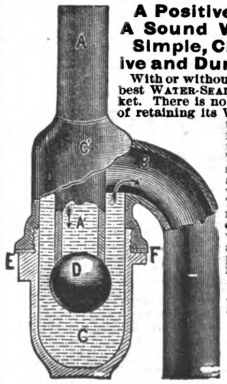

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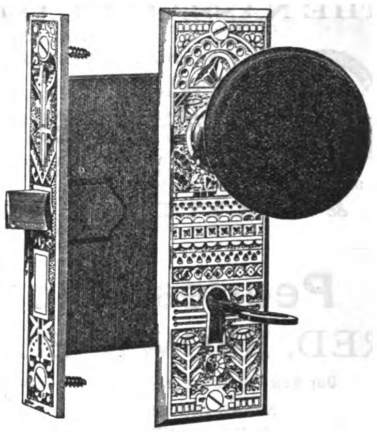

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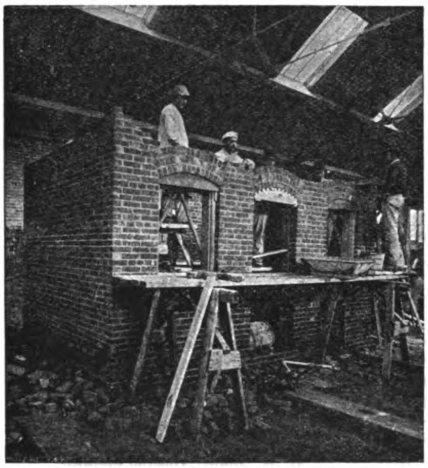

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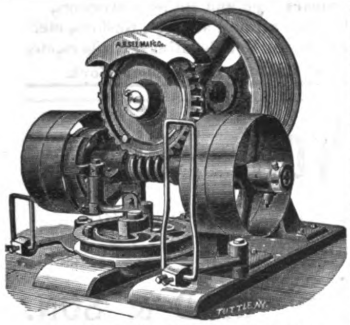

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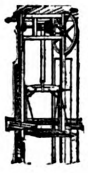

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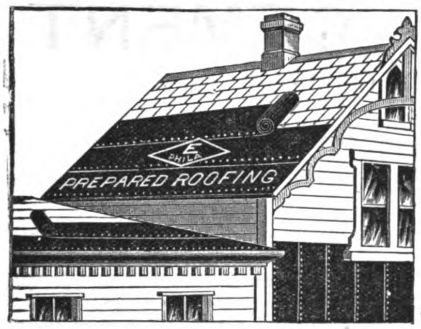

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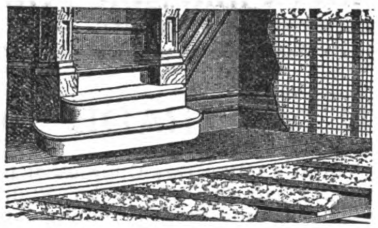

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SECRETARY NATIONAL ASSOCIATION OF BUILDERS,
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NOVEMBER, 1891

Lack of Interest in Association Work.

In alluding to the lack of interest among members of many of the local associations of builders throughout the country, the director for an exchange in a prominent Western city made some interesting statements at the mid-year meeting regarding the condition of affairs in his own association. He said that at the directors' meeting of his exchange, called for the purpose of instructing their delegate to the mid-year meeting, not one of the seven gentlemen present had a single suggestion to offer for consideration. It transpired that only one of the seven gentlemen had read a word of the last report of the National Association, and that one had only glanced over it. These men are in every case persons of good, sound business judgment, holding office as directors in the local exchange, and yet have not sufficient interest in the affairs of that exchange to read the annual report of the National Association, in order to learn if any recommendation had been made that would be of benefit to their organization. How much value can the exchange be to these men if this is an example of their interest in its affairs? How much value to its members is an exchange in which this is a sample of the interest that prevails?

The Remedy.

Such an exchange as this is worse than none at all, for by its very existence it increases the difficulty in establishing an organization that would be of benefit to its members. Builders in that locality have grown to look upon all exchanges in the light of the example before them, and upon being told the advantages of proper organization, argue that in their exchange there are plenty of rules and regulations to establish a proper organization if interest enough could be created to enforce the same. They have become so imbued with the idea that there is no such thing as an interest that will be permanent enough to establish an exchange on a firm and satisfactory basis that they put up with the existing situation and perpetuate a condition of affairs that yields no genuine benefit to any one. The remedy is always at hand. Organization is a benefit beyond any question, and the remedy in this case is reorganization upon a basis that will make a membership worth something, and hence create a vital interest, or the establishment of a new body, in which only such elements shall be incorporated as shall produce the same result—that is, the making of the membership a thing of value.

The Building Trades Club.

The beneficial effects of establishing organizations of a purely social character among communities of builders are being demonstrated by the Building Trades Club of New York City. The advantages of institutions of this character are distinctly manifest in that they create a basis of friendly social relationships, upon which can be built closer and more satisfactory business connections. Some time ago a *café* was established in connection with this club under the name of The Grill Room, where members could obtain service equal to that of any restaurant in the city and at prices only sufficiently high to make the venture self-sustaining. This feature has been successful in promoting the objects of the club, and has added perceptibly to the attractiveness of the institution. The value of providing opportunities for business men of a common calling to meet together informally for social intercourse is plainly shown by the fact that similar clubs exist to great advantage in other branches of business in nearly all large cities, and there is no question that builders will derive equal benefit from such institutions.

Advantages of Organization.

One of the best indications of the advantages of organization and the absurd lengths to which resentment will lead humanity at large has recently been exemplified in the case of the strike on the new Columbia Theater in Boston. The work was being done by the day by non-union labor, and the theater was opened before the completion of other portions of the building. On the opening night a souvenir programme was distributed which contained the names of all persons prominently connected with the construction of the building, and in which appeared the name of G. W. Brown as foreman of bricklayers. Mr. Brown considered himself superintendent of construction, and, therefore, highly aggrieved that he should have been reduced by an unfeeling management to a simple foreman of bricklayers. Mr. Brown at once stated his case (?) to the workmen, and suggested that they vindicate his belittled reputation by striking, and out of a lofty motive of regard and self-sacrifice over 100 men laid down their tools. The owner of the building, not being in sympathy with any movement which delayed the completion of his building, at once secured the services of a well-known firm of contractors to complete the work, and as a result the 100 or more non-union striking workmen are out of employment. The absurdity of allowing the recklessness of one man to throw out of employment over 100 workmen because of a mistake of this kind is as manifest as are the advantages that would have accrued to the workmen had they been members of a properly organized and conducted union, existing under joint agreement with the employers, as advocated by the National Association of Builders. Cases such as this, where the many yield to the desires of one, must of necessity result disastrously to the many, as it is evident that no equitable adjustment can be reached under such conditions. This case is a further proof of the practical value of the relationship between employers and workmen, as recommended by the National Association of Builders.

Architecture at Brooklyn Institute.

The winter course of the Department of Architecture, Brooklyn Institute, was inaugurated October 27, and will continue for a period of 24 weeks. The sessions are from 7.30 to 10 o'clock on Tuesday, Thursday and Friday evenings. On Tuesday evenings the instruction is in free-hand drawing in its various branches, including drawing from cast, drawing of ornament, shading in pencil, pen and ink, sepia and India ink. On Thursday evenings the instruction is in water-color painting and the more technical part of drawing, including perspective, shades and shadows, descriptive geometry and stereometry. On Friday evenings instruction is given in algebra and geometry for the first hour, while the rest of the time is devoted to lectures on technical topics by architects and others. The courses are given in the rooms of the Brooklyn Art Association. A moderate tuition fee is charged.

The Question of Sub-Estimates.

The necessity for establishing some uniform code of practice to govern the submission and treatment of sub-estimates is being continually manifested in many ways. One of the strongest indications of the existence of this necessity is to be found in letters addressed to the secretary of the National Association of Builders on the subject, asking for information that can be used to correct existing methods in various localities. Many different plans for securing uniformity of practice in this direction have been adopted by local builders' exchanges, but none of them, however, seem to offer such equitable conditions as are contained in the code of practice adopted and recommended by the National Association at its fifth convention. This code is more comprehensive in its nature than the "rules and conditions for estimating work" adopted at the third convention held in Philadelphia in 1889, and presents the result of the work of a standing committee, as amended and adopted by the full convention. The use of this code is recommended to all builders' exchanges and to all builders individually as being well calculated to bring about the establishment of more equitable practices.

Methods of Business.

Members of a trade or profession are frequently in the habit of conducting their business upon what seems to be the impression that the customs which govern it are correct simply because they are in existence. The fact that a method or custom prevails to a sufficient extent to control the conduct of any particular vocation is no positive indication that the method or custom is the best that could be established for the general control of

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that business. Men who are engaged in any branch of business are too apt to see only the profits in that business, to the total exclusion of all thought of methods for improvement in its transaction. All are contented to go on in the groove that the years have established and that is followed by their neighbors and competitors without considering that the constant progress of the times may have provided better methods outside those which have been followed so long. Builders particularly are in this condition. In the majority of cases they are conducting their business under practices that have been in existence without material change for the past hundred years. Once in a while some builder finds fault because the custom which governs in his locality gives him no standing with the architect, and he sees a contract that is rightfully his slip away from him because, in following the customs that have existed for so long, he has never stopped to think they might be changed so that right and justice should not only be right and justice, but should prevail.

General and Sub contractors.

The sub-contractor has gone on from year to year submitting his bid to the general contractor and then allowing the general contractor to trade on that bid, contenting himself with simply finding fault because some men are unprincipled, without the fact ever occurring to him that the existing customs might be changed and his bid protected. The general contractor has conducted his business so long under existing customs that he goes on allowing the owner to exact from him a bond for being permitted to place certain of his materials and capital in a building, which upon being so placed pass out of his control and ownership, simply because such exaction is customary and he has never given more than a passing thought to the fact that although such is the custom it is not necessarily just. Builders need something to set them thinking—something that will awaken them to the fact that the mere existence of a custom or practice does not indicate that such custom or practice is the best that could be established or that it should be tolerated at all.

Work of the National Association.

The National Association of Builders by its efforts to establish new and better conditions in the building business, by demonstrating that many existing customs are inherently wrong and that the workman must be recognized as one of the principal elements in the adjustment of the builder's affairs is of a character to set every builder in the country to thinking. The work of the National Association appeals to every individual builder in the country by action that improves his facilities for conducting his own individual affairs. He knows perfectly well that he does not read one-fourth of the contracts which he signs, but he does know that if he signs a uniform contract he is bound by an instrument with which he has been given every opportunity to become thoroughly familiar. Through the handling of the "McNeil" case by the National Association a greater number of builders than would have been possible by any other means have been placed in possession of the fact that the law has at last granted protection for the lowest bid submitted under certain conditions. Conscientious criticism of the methods adopted by the National or any local association of builders is the best thing that can happen for the welfare of both the individual and the association, for it not only indicates that the critic has been thinking, but others are set to thinking, and earnest consideration of any subject is bound to bear fruit. The exchanges offer excellent opportunities for the consideration of subjects of interest, and builders should take advantage of the facilities thus afforded for mutual benefit. The consideration of subjects that benefit the individual benefits the trade, and action for the benefit of the latter benefits the former.

An Emergency Hospital.

An institution known as the Emergency Hospital has been recently established in Boston under a plan which recommends itself to all employers who have a large number of men at work, and especially to those engaged in constructive trades. This institution is thoroughly equipped with surgical appliances and facilities for treating emergency cases, and an ambulance is always in waiting to answer calls without a moment's delay. A competent corps of surgeons, assistants and nurses are attached to the hospital, and there are eight beds in the ward for the use of patients who are too seriously injured for immediate removal to their homes or to any of the other hospitals for further treatment and nursing. The hospital is located in the center of the business portion of the city, and offers excellent facilities for immediate attention to all classes of emergency cases. A surgeon always accompanies the ambulance, thus insuring skilled treatment for the injured much quicker than by the usual means. Under the ordinary provision made by the city for taking care of similar cases, an hour or more will often elapse between the time of injury and the delivery of the patient by the police department to one of the general hospitals, or the securing of surgical attendance at a police station. The time immediately succeeding the injury is the most valuable to the patient, and immediate attendance often saves life and lessens the shock of transportation by proper treatment.

Expenses.

The expenses of the institution were, in the beginning, partly provided for by subscription, but it is the intention of the promoters of the undertaking to make it self-supporting by an arrangement with employers of labor, whereby a fixed yearly sum is to be paid for the treatment of all possible accidents to their workmen. Nearly all of the railroads entering Boston have made an arrangement whereby all accidents to their employees are to be treated at the Emergency Hospital without expense to the individual. An institution of this kind is particularly valuable to builders in all large cities, as it provides an opportunity for the immediate treatment of all accidents to employees for a fixed sum per year. The benefit from a pecuniary standpoint is great, and from a point of humanity it is still greater.

Question of the Lowest Bid.

WM. H. SAYWARD.

The recent decision of a case in the Massachusetts courts where a verdict was given the plaintiff, a contractor, on his suit to recover damages because he had been deprived of a contract for which he was the lowest bidder deserves particular comment, to bring to the minds of all members of the National Association of Builders and the building fraternity generally certain facts in law affecting certain customs prevalent in the submission of bids. A *résumé* of the case was presented in the October issue of this paper, and the mid-year meeting of the Board of Directors of the National Association ordered the distribution of a large number of copies of this statement for the information of filial bodies and all persons interested.

The trial of the case developed a certain fact which should be carefully noted by all contractors as seriously affecting their interests—viz.: Although bidders may be selected and specially invited to estimate upon certain work, no bidder has a claim upon the contract by virtue of furnishing the lowest bid unless there be a special agreement to the effect that if the contemplated work is undertaken substantially as presented the contract shall be awarded to the lowest bidder. This agreement need not be in writing, but if verbal must be capable of proof. The introduction of the familiar clause "The owner reserves the right to reject any or all bids" does not hold against bidders if an agreement such as cited above, and upon which the decision of this particular case rested, has been made. The trial and decision of this case should awaken all contractors to the fact that if they wish to protect and insure themselves against loss of time in estimating and being deprived of possible profits upon work won in competition, they should be careful to secure an agreement of the nature above referred to. It is worthy of consideration whether, when bidders are selected and invited to offer estimates and are expected to hold themselves ready to contract for the work at the price submitted, there is any justice in the use and enforcement of the clause, "the owner reserves the right to reject any or all bids."

The owner has unquestionably the right to reject all bids, for the estimate may exceed the amount he is at liberty to expend, but it seems most unreasonable for him to reject any particular one of the bidders after having invited him to submit an estimate. The invitation to bid carries the inference that the person invited is considered a fit person to do the work, and unless there be particular stipulation that a preference will be made in favor of one of the invited bidders, so that all may know in advance the conditions affecting the awarding of the contract, it is manifestly unfair and unjust to throw out the person who has won the competition, on the plea that the owner has reserved the right to reject any bid. It would seem that a different wording should be used in cases where all the bidders are selected, so that it would be clearly stated that if any of the bids were accepted it should be the lowest bid.

There is manifestly a great deal of obscurity in the minds of contractors generally as to their true relation as bidders, and this trial is of great value in settling certain points. The duty of the National Association of Builders is to disseminate the information so that the greatest good to the greatest number may be secured. It is to be hoped that filial bodies will take particular pains to discuss the questions brought into prominence by this trial, as it will more than likely be a topic for discussion at the annual convention in January, in the hope that a broader and fuller comprehension of contractors' rights and relations may result.

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THE APPRENTICESHIP QUESTION.

ONE OF THE subjects brought up for discussion, after the appointment of the joint committee of arbitration between the Mason Builders' Association of Boston and the Bricklayers' Union No. 3, the details of which have been given in these columns, was the apprenticeship question. The necessity for formulating and adopting rules for the government of all parties concerned has long been apparent, and the matter was referred, after considerable discussion, to a sub-committee, consisting of one member of each organization, with instructions to prepare a plan for the establishment of a system of apprenticeship in the bricklaying business in Boston.

The work of the sub-committee extended over a considerable period of time, and was very thorough in its dealings with all aspects of the subject. Nothing of a satisfactory nature ever having been formulated on this subject, the committee endeavored to prepare a system that would offer a solution of the question for all branches of the building business.

The report of the sub-committee, as adopted by the joint committee, is given herewith in full as being one of the most complete and practicable plans for the settlement of the apprenticeship question in existence.

To the Joint Committee on Arbitration appointed by the Mason Builders' Association of Boston and Vicinity and the Bricklayers' Union No. 3 of Boston and Vicinity:

GENTLEMEN.—Your sub-committee, to whom was referred the subject of apprentices and an apprentice system, beg leave to report as follows:

The opinion of your committee is—

1 That the question of how apprentices shall be taken, taught and graduated as journeymen is a subject in which the employers and the workmen are equally interested.

2. That the best results in this or any other question in which the interests of employers and workmen are involved cannot be attained if the matter is left to individual judgment, and that the only safe course is to define plans for the guidance of the individual through the combined action of many individuals through properly organized associations.

3. That it would be ineffectual for either an association of employers or an association of workmen in any trade to attempt to carry out any system of this character on an *ex parte* definition of the same.

4. That the only practical and safe manner in which a system governing the apprenticeship of individuals to a trade can be secured is through the joint adoption of the system by the organization of employers and the organization of workmen in that trade and by their united action in carrying the system into operation.

Your committee therefore recommend that the following system of apprenticeship in the bricklaying business be adopted by the joint committee of the Mason Builders' Association and the Bricklayers' Union No. 3 as the rules for guidance of the two bodies in this matter.

TIME OF BEGINNING AND TERM OF APPRENTICESHIP.

To prevent the taking of apprentices at an immature age, when they may be considered, on the average, as physically unfit for such laborious work, and not sufficiently educated to warrant leaving school, and to discourage the beginning of apprenticeship at a time when the individual may be considered, on the average, as having passed that period when the faculties of mind and body are in that condition which is most receptive of instruction, and most readily adaptive to the requirements of a trade, the following time and terms are fixed:

No individual shall be taken as an apprentice who cannot read and write the English language.

No individual shall be taken as an apprentice until he is 16 years of age.

No individual shall be taken as an apprentice after he is 21 years of age.

An apprentice taken under 18 years of age shall serve until he is 21 years of age.

An apprentice taken at 18 years or over shall serve three years.

AGREEMENT OF APPRENTICE.

No individual shall be taken as an apprentice unless he shall agree to serve the time fixed by these rules and abide by other conditions and requirements herein set forth.

AGREEMENT OF EMPLOYERS.

No member of the Mason Builders' Association shall take an individual as an apprentice unless he will agree to keep him under legitimate instruction as such for the full term comprehended in these rules, and will otherwise comply with the conditions and requirements herein set forth.

REGISTERING APPRENTICES.

When any member of the Mason Builders' Association is about to take an individual as an apprentice he shall immediately notify the secretary of the association to that effect, giving name, age and term for which he is taken.

The secretary of said association shall then immediately notify the clerk of the joint committee and also the secretary of the Bricklayers' Union, and a record shall be kept by both associations, and by the joint committee, so that a complete registry of all apprentices shall be available.

A card shall be issued to each apprentice by the joint committee, which he shall hold during his term as evidence that he is properly registered as an apprentice.

All members of the Mason Builders' Association shall file as soon as practicable after the adoption of these rules a list of the apprentices in their employ, giving name, length of term for which they are taken and date of expiration of term.

SUPERVISION BY JOINT COMMITTEE.

The joint committee of the two bodies hereto shall have general supervision of all matters pertaining to the apprenticeship system under the rules herein defined and established, and shall have authority to settle all questions in relation to the same, and give judgment in any appeals that may be made to it by either employers or apprentices. It shall have authority to terminate or cancel the apprenticeship of any individual for cause.

It shall have authority to place an apprentice for an unexpired term with a new employer should his original employer die, or from any other cause fail to give him opportunity to complete his term with him.

It shall have authority to prepare blank graduation papers for apprentices, and to approve and sign the same when the employer has certified thereon that the apprentice has satisfactorily completed his term.

RIGHTS OF EMPLOYER.

An employer shall have the right to appeal to the Joint Committee to terminate or cancel an apprenticeship when there are evidences of incapacity on the part of the individual under instruction, or when he shall be insubordinate or be addicted to idle or dissolute habits, or in any other way fail to carry out his agreement with his employer.

RIGHTS OF APPRENTICES.

An apprentice shall have the right to appeal to the Joint Committee should his employer fail to keep him under legitimate instruction or to keep his agreement with him in any other respect.

He shall have the right, also, to appeal to the Joint Committee and secure through them opportunity to complete his apprenticeship should his original employer die or from any other cause fail to give him opportunity to complete the same.

PAY OF APPRENTICES.

Apprentices shall be paid at the rate of 11 cents per hour during the first year, 12 cents per hour during the second year, 13 cents per hour during the third year and 15 cents per hour for any additional years they may be obliged to serve under these rules. These sums to be paid weekly.

Deduction may be made from the above mentioned pay for absence from work without sufficient cause, or the apprentice may be required to work beyond the stipulated term to the extent of double the time of absence, at the choice of his employer.

No deduction from the pay of an apprentice, however, shall be made provided he report for duty at proper times, but is unable to work because of weather or failure of his employer to provide work.

In addition to the pay above stipulated, each apprentice shall have an allowance of $50 for the first year and $75 for every additional year, payable in quarterly installments.

Each apprentice shall be entitled to one week's vacation each year without loss of pay, or two weeks with one week's loss of pay, but shall not be allowed more than two weeks vacation each year.

GRADUATION OF APPRENTICES.

When an apprentice shall have completed his term his employer shall certify the same upon blanks provided for the purpose by the joint committee, and transmit the same through the secretary of his association to the joint committee. The joint committee shall then consider the same, and, upon approval, its clerk shall attach the official seal and signature of the committee, notifying both associations of this action, that the record of the apprentice may be complete upon books of record which must be kept by the secretaries of each body.

The certificate thus signed and approved shall be accepted as evidence that the apprentice has properly graduated and is entitled to recognition as a journeyman, and he shall not be eligible to membership in the bricklayers' union until he has such certificate.

DEPARTMENT OF INSTRUCTION.

Recognizing the fact that special instruction in the fundamental features of the bricklaying trade (which instruction shall comprehend education of both mind and hand, so that the individual shall gain a proper knowledge of quantity and strength of materials and of the science of construction) is of as much importance as special instruction in other trades or professions, and realizing that the chances of an apprentice to get as much instruction as he is entitled to, while at work on buildings, is necessarily limited, the parties to these rules agree that they will join in an effort to establish an institution in this city where all the trades shall be systematically taught; that when such school is established they will unite in the oversight and care of the same, and will modify these rules so that a reasonable deduction shall be made from the term of an apprentice by virtue of the advantage gained through instruction in said school.

A Substantial Office Building.

Among the new buildings which are being put up in Erie, Pa., that owned by J. F. Downing is worthy of mention. It covers a plot 82½ x 165 feet, and when completed will be six stories in hight. The plans were prepared by D. K. Dean & Son, architects, of Erie. The first floor of the building will be 18 feet in hight and each of the others 12 feet: The exterior is mainly of brick and terra cotta, with copper and galvanized-iron decorations. The stately front entrance at the center of the block will be flanked on either side with magnificent piers of polished red granite The office entrance and elevator lobby will be floored and wainscoted in slate. There will be two water risers for fire protection, one at the front and one at the rear of the building. The entire structure will be heated by steam. An ample vestibule entrance on the north side of the State street front will lead to the upper stories. A swift-running passenger elevator will run to the upper floors, and another elevator will take patrons to the storeroom in the basement. There will also be a freight elevator. A skylight on the north side of the building 25 x 80 feet will help light the storeroom. On the second floor heavy prismatic sidewalk plate glass covers the whole area of the light shaft, to further assist in lighting the store. The area of the sidewalk, 7 feet wide and the full length of the front of the building, is covered with reflecting sidewalk lights, arranged to give light to the basement. On the Ninth street side is an area containing seven windows, each 8 feet high and 10 feet wide, to light the basement. The basement will be fitted up with boiler room and toilet rooms for employees. There will be a large room for packing goods and for duplicate stock. The counters, shelving, offices and ladies' waiting rooms on the first floor will be finished in quartered oak and the balance of the building in black ash. There will be a fire-proof vault in the basement for the storage of waste paper. Each story will have a fire-proof vault for the accommodation of tenants. The building is erected on the slow combustion principle.

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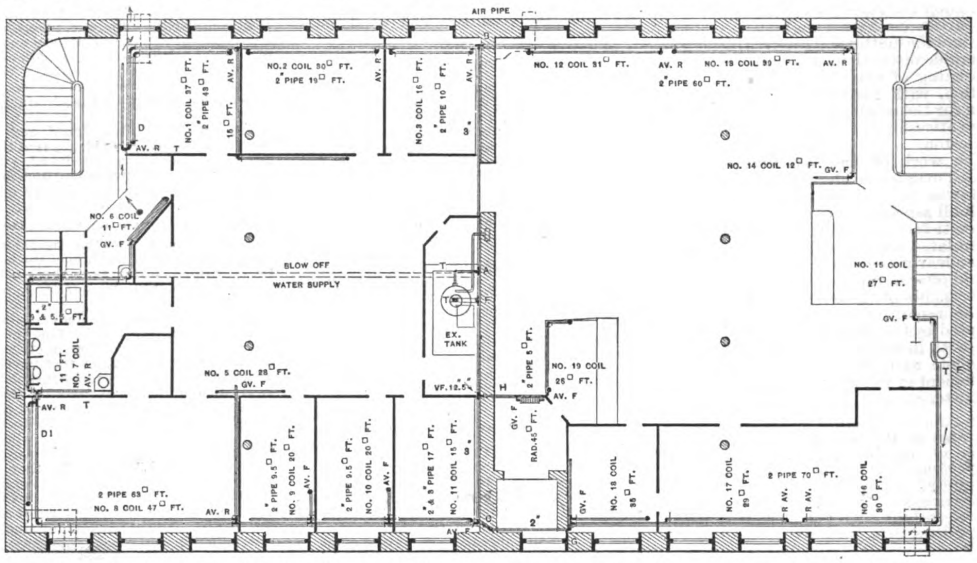
OUR OFFICE HOME.

By A. O. KITTREDGE.

THERE are no doubt very many of our readers who will be interested in learning something about the arrangement and appearance of the office from which *Carpentry and Building* is issued. Not that it is so peculiar in its appointments as to be singled out from among a large number of offices, but because the readers of periodicals in general like to know something about the way their favorite papers are housed, and how they are manufactured. Again, the office referred to is occupied in common by *The Iron Age*, *The Metal Worker*, *Business*, the *Pharmaceutical Record* and this journal. These considerations would warrant a little space devoted to a description of the office, and if it should transpire in the account that there are certain features about it which are new to many people, there will appear still other reasons for a description of our office home. Our location, as the reader already knows, is 96-102 Reade street, New York. We occupy what in local parlance is known as the second loft. The premises named were first devoted to publishing offices not quite a year since, and when taken were in the condition that characterizes so many business rooms in the city. They required to be adapted to the purpose in view. This, in the present instance, meant putting in place such partitions, counters, railings, &c., as were required to locate our different departments, and last, but not least, installing such a system of heating and ventilating as would be serviceable and satisfactory to the large office force employed. What was done in the latter case, marking, as we think it does, a new feature, or at least an advance step, in work of this kind, is, we believe, sufficiently notable to warrant careful description, apart from mere office facilities.

When the premises were secured the accommodations consisted of two adjacent rooms on the same floor of the building, separated by a brick wall. There were two stairways from the ground, one communicating with each room, also an elevator, with a lobby of its own, out of which were doors to the two rooms. Our business naturally divides itself into two general departments, known as the business office and the editorial office. One of the special attractions that this building had for our purpose was that in it these two departments could be accommodated on the same floor. In fitting up, therefore, one of the first things to do was to cut through the dividing wall and put in an arch, as shown in the plan view, Fig 1 of the engravings. At the same time, we closed the opening through the wall from the elevator lobby leading to the room on the left, and also closed up the stair entrance to the same room. This virtually



Our Office Home.—Fig. 1.—Plan Showing Partitions, Archway Connecting the Two Rooms, Heater, Coils, &c.

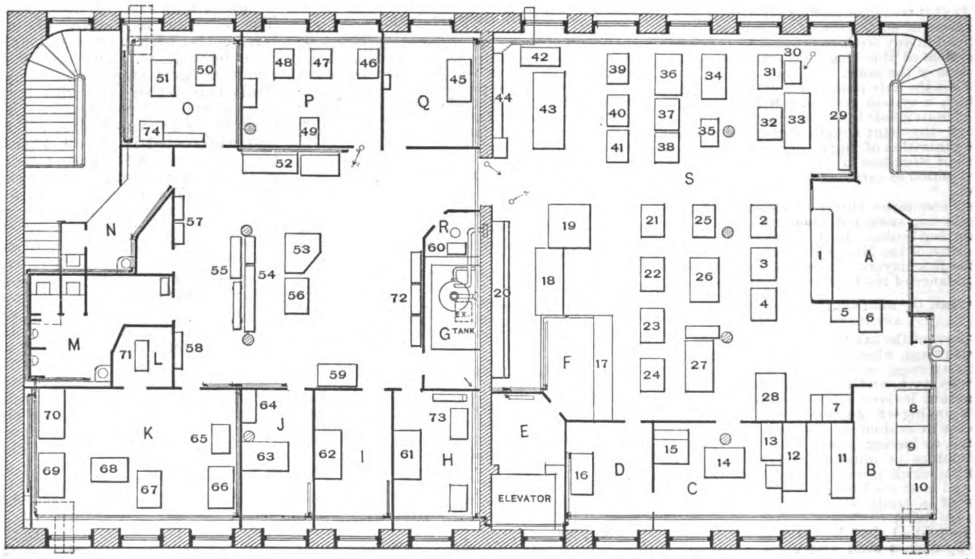


Fig. 2.—Desk Plan, Indicating Location of Different Departments.

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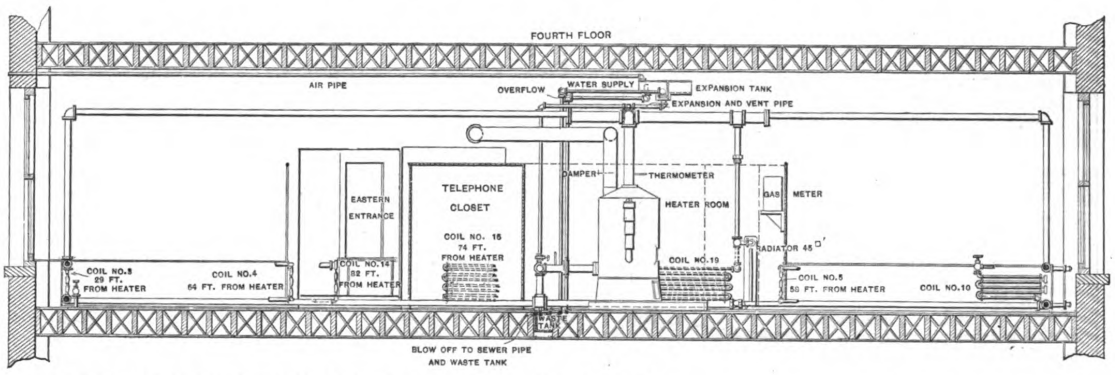
made the two rooms one, with entrances through the business office only. The next step was subdividing and arranging the space for the accommodation of the large number of desks required and for the different lines of work to be done. At the same time, there was the planning of the heating system already referred to. Partitions were run as shown in the plan, view, Fig. 1, submitted herewith, and pipes and coils, together with the heater, were located as also shown in that view. Finally, when all of our desks were installed and we were settled down to work, be dispensed with one of the greatest dirt producers in an office would be removed, and there would be freedom from the dust of ashes—something greatly to be appreciated wherever office work is conducted. Why not burn gas? The mere suggestion of heating some 60,000 cubic feet of space by burning city gas, employing hot-water circulation as the medium, was so radical as to cause great interest in various directions. It naturally raised the question of the probable cost. If the apparatus we were considering would do what had been demonstrated with coal, which certainly was far in excess of our needs, why should it not perform satisfactorily with gas? And why should it consume so much gas as to make the expense more than could be afforded? The result was a determination to make the experiment. The apparatus was installed in the way indicated in the plan, Fig. 1, and in the section, Fig. 3. the brick lining, as shown in the cut. The burner finally adopted embodies principles long used by H. Q. Hawley in apparatus which he has manufactured, with improvements added by John J. Hogan in the light of experiments made in connection with the work here shown. A narrative of our experiments in gas burners will, no doubt, interest many of our readers. When we set out to burn gas in an apparatus of the size here shown, the grate diameter being 26 inches, we undertook to do that which was new in the art. The gas stove manufacturers could not help us. They had not undertaken to burn gas in such quantities, or, rather, over such a large space. Some English gas engineers, who happened to be in this country at the time that we were looking for a burner, were consulted. It is generally supposed that our English cousins are far in advanced of ourselves in the use of gas apparatus. They were able, however,



Our Office Home.—Fig. 3.—Vertical Cross Section, Showing How the Circulating Apparatus is Arranged Within the Story Hight.

the rooms assumed the form indicated in Fig. 2 of the illustrations.

A few words with reference to the heating and ventilating of a loft that is being adapted to office purposes are appropriate. Our requirements were the same as those very commonly existing. In the case under consideration steam might have been secured from either of two sources—the mains in the street from the steam company, or from a private firm across the street through a pipe under ground. Prices, however, in both cases, seemed unreasonable, and therefore we looked about for some other means. From former experience we were not unconditionally in favor of steam heat. In fact, we wanted something better. We thought the heat from the circulation of hot water would be preferable. A form of hot-water apparatus that was yet in an experimental stage seemed to promise what we required. Its leading peculiarity is rapid circulation—a circulation that is forced by the heat and rendered unusually powerful. Further, it maintains its efficiency under conditions which are ordinarily fatal to systems of hot-water circulation. To install the apparatus upon the floor to be heated was necessary, for, in common with all loft tenants, we had no basement privileges. This in turn made it necessary that the coils, pipes, radiators, &c., through which circulation was to be maintained should, for the most part, be placed below the line of fire. These are conditions that are not considered good practice in hot-water heating. In fact, in the majority of cases where hot-water systems are installed great care is taken to secure almost opposite conditions. With the expansion tank as close to the heater as is necessary with the hight of a single story alone to work in, it is ordinarily considered impossible to secure satisfactory circulation under the conditions named, employing an open system. On the other hand, a close system is not to be desired. The peculiar features of the apparatus referred to, however, have secured satisfactory results under the difficult conditions recited.

Having decided upon hot-water circulation, and further, from experiments which had been instituted, having been fully assured that the apparatus would work satisfactorily under the conditions named, the questions of storage of fuel, disposition of ashes, &c., to say nothing of dust in the office, came into view. If coal could

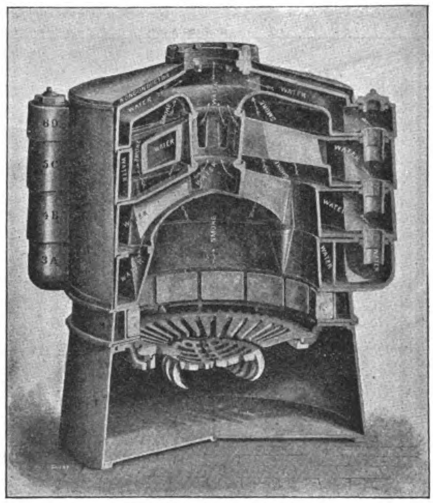


Fig. 4.—Vertical Section Through Circulator Arranged for Coal.

As a matter of precaution it was arranged so that we could burn coal if gas should not prove satisfactory. We hoped that coal would not be necessary, for every one was anxious to avoid the dust and dirt which coal insures, and in the end our hopes were fully realized.

The boiler, or circulator, as it is preferably called, shown in section in Fig. 4, is arranged for coal. This is what we may describe as the normal form of the apparatus, and the changes we have made in it consist simply in taking out the grate, dispensing with the fire-brick section and putting in place a burner, the top of which corresponds very nearly with the top of to suggest nothing that proved of advantage. They did encourage us by saying that the amount of gas necessary to heat the 60,000 cubic feet of space which our office contains would cost $5 per day and upward, taking it at ordinary prices. We sent to Pittsburgh and to the natural gas regions without finding anything there that was of real help. Finally we bought a natural gas burner of a kind that is now pretty generally used in and about Pittsburgh and undertook to adapt it to our requirements. The openings were found too large, the in-take of air was too great for the kind of gas we were burning and the air mixers were al-

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Our Office Home.—Fig. 5.—View in the Business Office.—Engraved from a Photograph with Camera at 30, as Shown in Plan, Fig. 2.

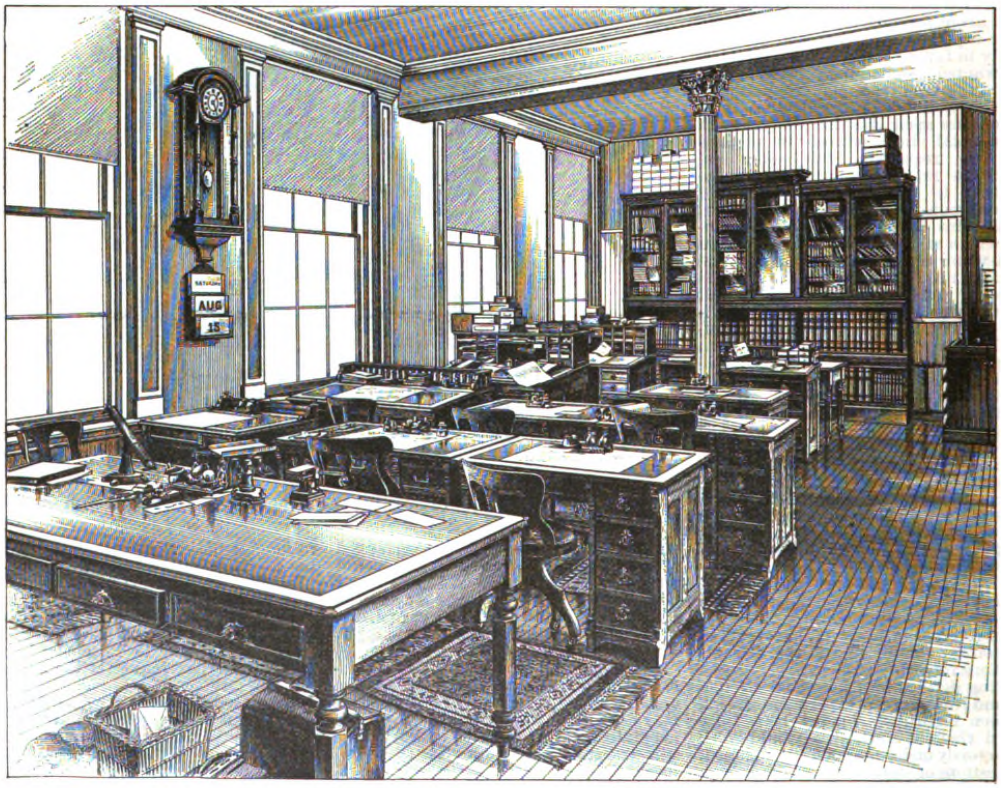

Fig. 6.—View in Business Office.—From Photograph with Camera at 20, as Shown in Plan, Fig. 2.

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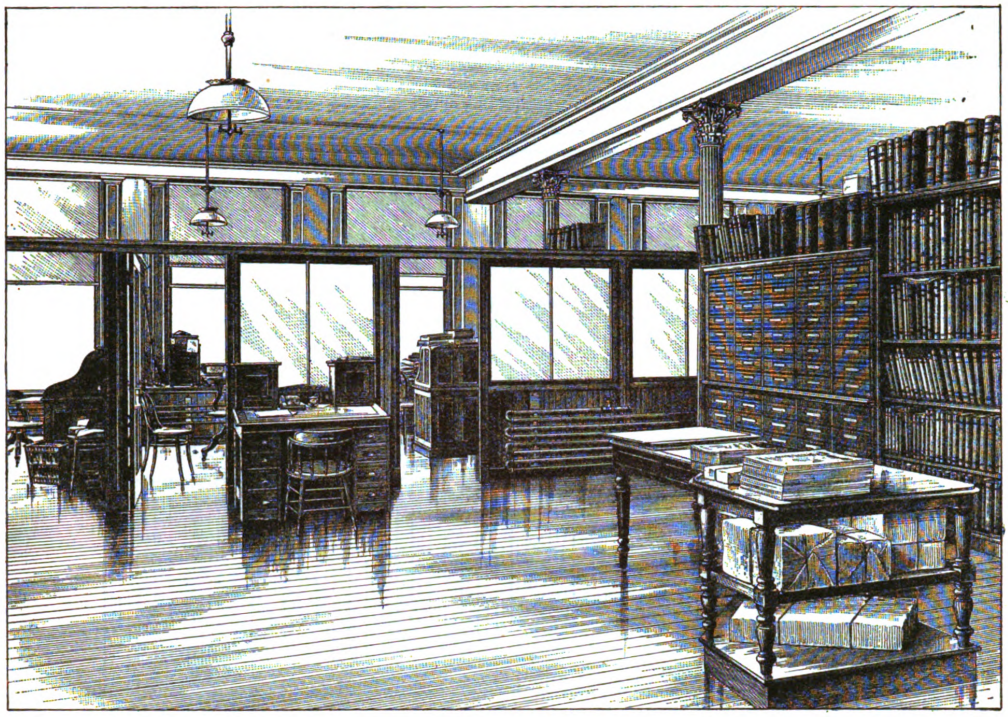

Our Office Home.—Fig. 7.—View in Editorial Rooms.—From Photograph with Camera at Entrance to P, Fig. 2.

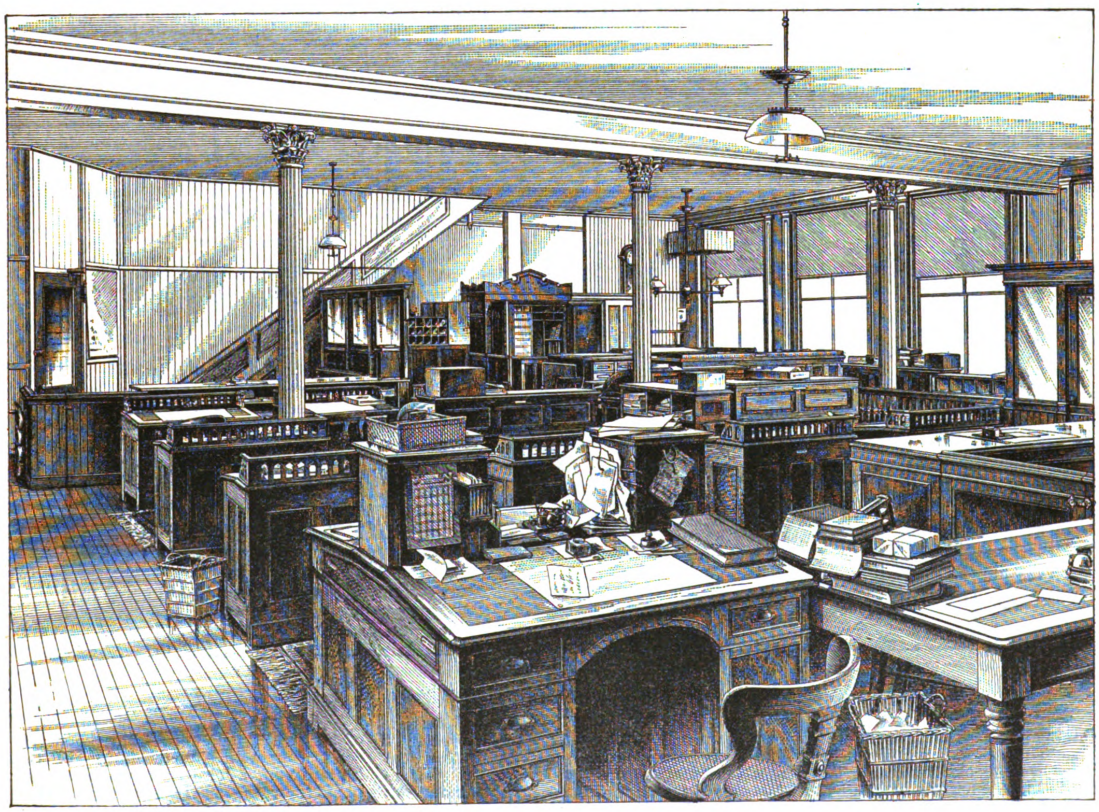

Fig. 8.—View in Business Office.—From Photograph with Camera at 44, as Shown in Fig. 2.

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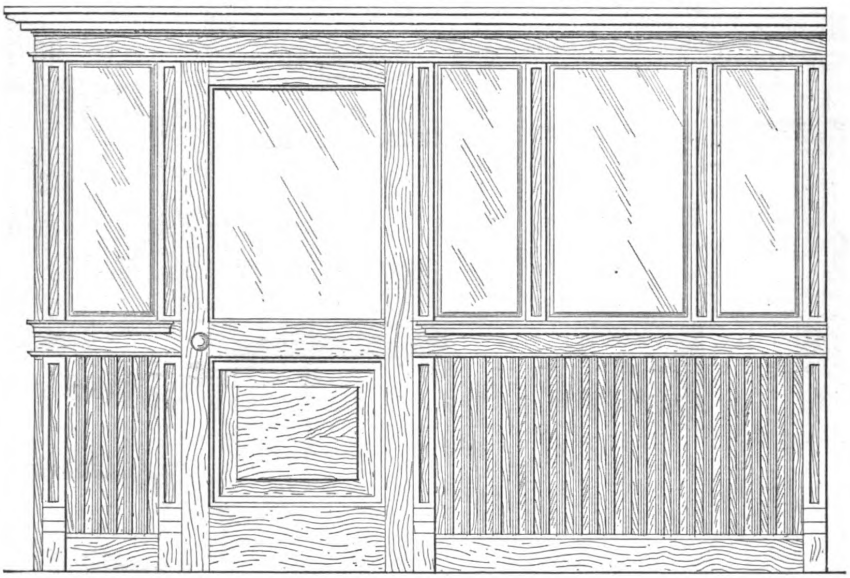
together inadequate. Some of these parts were repeatedly changed in our experiments until we got that which was measurably satisfactory. The first burner was placed in the apparatus at the line of the grate. The fire pot was then filled with broken fire brick, and after the gas was lit the whole mass became incandescent, so that our visitors were often disposed to think we were trifling with them when we insisted that we were burning gas and not burning coal. Fire brick above a gas burner, as above described, used for the purpose of conserving the heat and consuming any gas that fails to burn directly upon admission, is a favorite expedient. Some of the books go so far as to say that gas in large quantities cannot be satisfactorily burned by any other means. Mills, in his celebrated work entitled "Heat for the Warming and Ventilating of Buildings," says brick is an absolute necessity. One of the leading sanitary papers, highly respected for its technical excellence, is also quoted as maintaining the necessity of brick. Our experiments, however, lead us to opposite conclusions, and our belief is that the ideal way of burning gas, whether in a small gas stove for domestic use or under a heating apparatus of the kind here shown, or for making steam in a power boiler, is to use a Bunsen mixer for combining air and gas in proper proportions and to exclude all other air from the fire chamber save only the little that is needed for combustion and to supply that little directly to the burner and not in a way to allow free circulation. At least these are the results which we have secured by using the Hawley burner already referred to, with the various improvements suggested by the engineering experience of Mr. Hogan. Another point to be mentioned in connection with gas is that there is a direct connection to the chimney from the furnace, the up-take being regulated by a damper. In case of the flame going out, or of the gas being turned on when not lighted, or any accident whatever occuring, a direct passage up the chimney is afforded—something which insures a degree of safety not otherwise possible. Again, all noxious vapors from the gas are carried away and are not thrown out into the room, as is the case with the small gas apparatus in common use.

Gas fuel is supplied to the boiler by means of a special 2-inch pipe from the street, connecting with a meter inside of the heater room, as clearly shown in the sectional view, Fig. 3. This supply was that recommended by the gas company after they had been made cognizant of our plans. Evidently they thought a libera supply of gas for the work we intended to



Our Office Home.—Fig 9.—Elevation of Partition of Private Office, Scale, ½ Inch to the Foot.

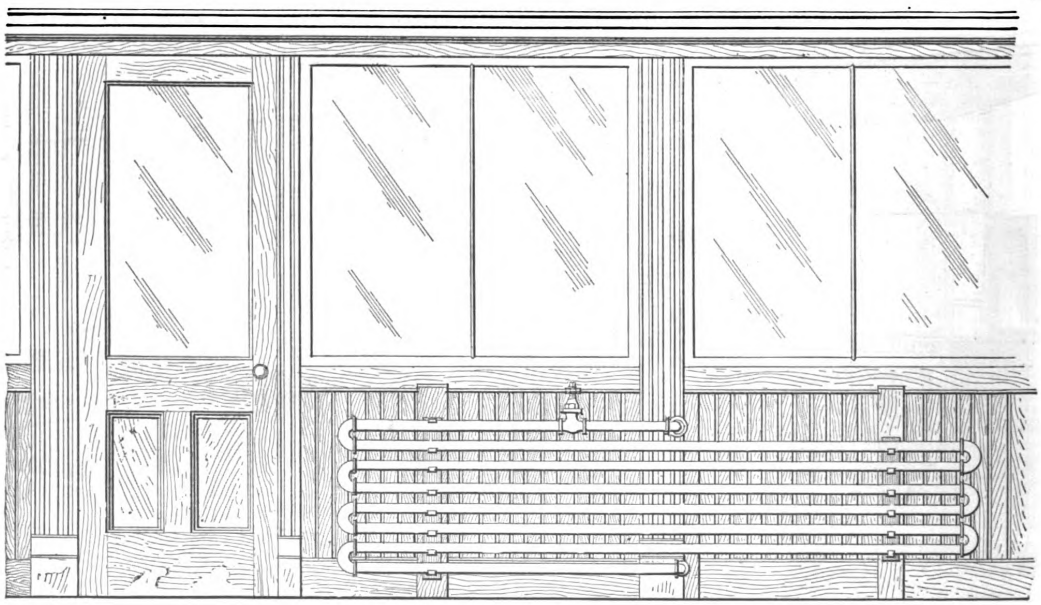


Fig. 10.—Elevation of Partition of Editorial Rooms, Shown in Fig. 7.—Scale, ½ Inch to the Foot.

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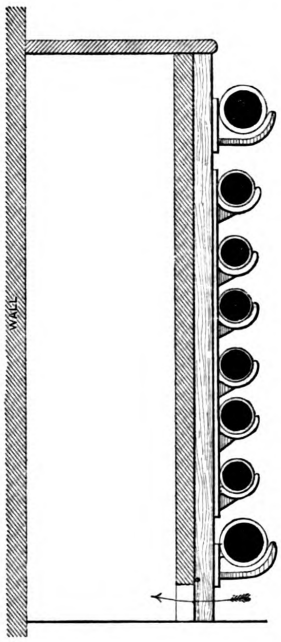
do was absolutely necessary, and with the enterprise for which gas companies are noted in vending their product, they proposed to give us all that we wanted. A very large meter was also installed. This precaution in the way of supply has proven quite unnecessary, for experiments which have been conducted here and elsewhere, using the burner described, have clearly shown that a ¾-inch branch from an ordinary gas main would be quite sufficient. The amount of gas that we burn, averaging less than 1000 feet per day, shows that a very small pipe would answer every purpose. It is generally supposed that the injector principle, using the Bunsen mixer, is that upon which dependence is to be placed in getting the mixture of air and gas into a burner. Our experiments have demonstrated that it is the draft of the chimney which draws air and gas together into the burner that is to be depended upon. There is little or no pressure to the gas on the floor on which this apparatus is employed. If we did not have the draft mentioned it would be very difficult to get the gas into the burner in a satisfactory manner.



Our Office Home.—Fig. 11.—*Section Through Ventilating Duct.—Scale,* 1½ *Inches to the Foot.*

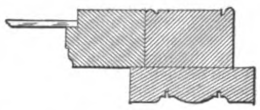


Fig. 12.—*Section Through Door Frame, Shown in Fig.* 9.—*Scale,* 3 *Inches to the Foot.*

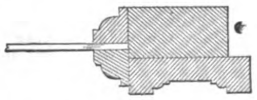


Fig. 13.—*Section Through Door Frame, Shown in Fig.* 10.—*Scale,* 3 *Inches to the Foot.*

Turning to the cash account, we find that our heat for this large space—and the rooms were comfortably and satisfactorily heated in all respects—cost less than $1 per day during last winter. Still greater economy is anticipated with the improved burner at present installed.

The ventilating duct indicated on the floor plans was run under and in front of the windows, with openings at the floor. (See Fig. 11.) This forms the base on which the circulating pipes are fastened and also serves to increase the width of the window ledges, as shown by the plan views, Figs. 1 and 2. It adds to rather than detracts from the useful space in the office. This ventilating duct connects with what we may call "chimneys" carried upward in the rooms, and extended out from the top of a window in each of four corners. These chimneys were arranged to be fitted with electric exhaust fans in case an exhaust was found necessary for perfect ventilation.

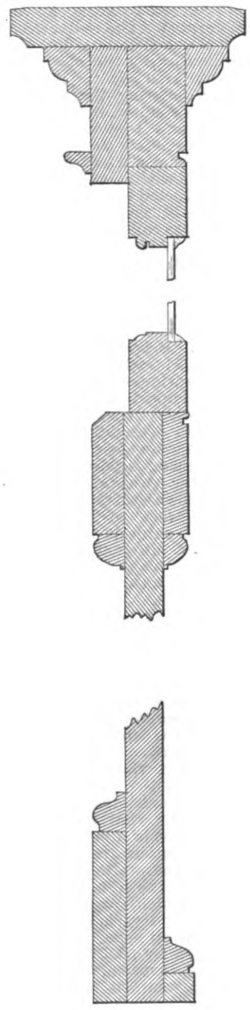


Fig. 14.—*Vertical Section Through Partition, Shown in Fig.* 10.—*Scale,* 3 *Inches to the Foot.*

One or two interesting problems arose in installing this apparatus. With the boiler located in the center of the building, as shown in the floor plans, the system naturally divides itself into four parts. The flow pipe taken from the center of the boiler is carried up, and then by branches is extended a short distance under the ceiling to the side walls, then carried down to the line of the top of the coils. Here each part branches again and the flow is taken through the brick wall on one side to the business office, while the other branch on each division goes around one side of the

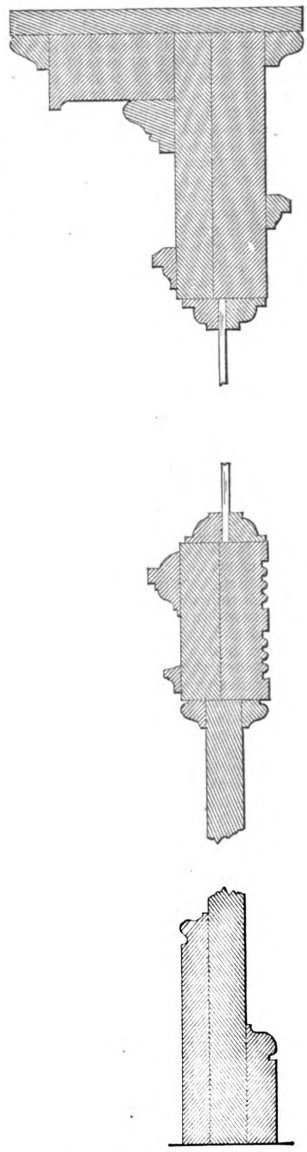


Fig. 15.—*Vertical Section Through Partition of Private Office, Shown in Fig.* 9.—*Scale,* 3 *Inches to the Foot.*

editorial office. It was necessary to avoid crossing the doors leading to the stairways, and while one stairway is kept closed, as already mentioned, it is still required by law to be left in such condition as to be instantly opened in case of fire or other emergency. Carrying the pipe around in this way in four systems made it necessary to end on either side of the openings to the stairways referred to. To get around on the front of the business office it was necessary to carry the pipes across the elevator shaft. This was easily arranged and by incasing them in mineral wool no appreciable loss of heat occurs. The return from the quarter section representing the front of the business office was also brought back across the elevator shaft to the floor of the editorial room and then carried along to the boiler, as shown in the sectional view, Fig. 3. A

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special obstacle, however, was encountered on the opposite side of the building in going across the archway that had been cut through the brick wall dividing the building. The underwriters' requirements in New York are very strictly enforced. Where a division wall is cut through, as in this case, it is necessary to provide a fire door on each side. Again, it is necessary to have a solid stone sill extending above the floor several inches, forming a base against which the fire doors may close. Sliding doors, of course, were preferred. But how to get the return pipe across this space? It was finally decided to lay it on the floor, just far enough away from the stone sill referred to to allow the door to slide between it and the sill. Then a wooden extension of the sill was made to cover the pipe. We should have said before this, however, that the stone sill was made high enough to allow the pipe to lie on the floor and leave space enough between the top of it and the surface of the sill for the thickness of a plank necessary to make the extension. The result when these parts were in place was, therefore, a stone sill the thickness of the wall, say 16 inches, then an extension beyond of wood, level with the sill, of 8 or 10 inches. This wooden sill was hinged to swing upwardly away from the opening, so that when it is desired to close the door the step is thrown up, allowing the door to operate. When the door is open the step closes down, holding the door back and making a passageway, a low step in hight, which in a year's use has been entirely satisfactory.

The features of the boiler or circulator which secures the remarkable results mentioned are shown in Fig. 4. The apparatus in question is the invention of John J. Hogan, an engineer of experience, and a writer for some time past connected with *The Metal Worker*. It is now being manufactured for the trade by the Abram Cox Stove Company of Philadelphia, and the sectional view here shown is from an advance illustration prepared for a book on "Water and Air Circulation in Heating and Ventilating," which they will have ready for distribution not long hence.

A word with reference to the ventilating duct built around the four sides of the room and communicating with chimneys in the corners, as already described. This ventilating duct, as shown by the section on page 269, forms the foundation for the coils, and in a sense justifies its existence by reason of this service. It is good construction to line a wall to receive pipes in any event. Better results are thereby secured than come from placing the pipes against occasional cleats put in place. Increasing the width of the window sills, as well as providing a ledge between the windows, has not detracted from the convenience in the various offices. The little floor space occupied has been fully replaced by the table space, so to speak, afforded by the ledge and the widened window sills. We regard such a feature, therefore, from our experience, as desirable in offices, while also contributing to the accomplishment of the special object for which it was installed.

Architects and builders will be interested in the fact that this apparatus was installed under the conditions that have been named without cutting any floor beams. By inspection of the section it will be seen that there is a waste tank placed between two of the floor joists back of the boiler. The apparatus and entire system is emptied through the blow-off pipe, which runs under the floor between joists, as shown in the floor plans, and connects with the sewer at the left hand end of the building. In making this sewer connection, to avoid cutting the timber it was necessary to bring the pipe up to the level of the floor and to go over the timber. Accordingly, opening this pipe drains the system to the level of the trap formed by the pipe passing over the beam. The object of the waste tank then becomes evident. By opening another plug the pipe under the floor is drained into this waste tank, and what little water it carries is then readily removed by a hand pump and a bucket. This waste tank was an extra precaution, for it is scarcely to be supposed that it would ever be necessary to empty the pipe under the floor, and yet the desire was to provide for every possible emergency.

An air pipe, it will be seen, is run from the top of the expansion tank, just under the ceiling, out through the back wall. This pipe has proven an unnecessary precaution. If vapor were produced, it would be revealed against the ceiling directly over the expansion tank. In the use of this apparatus no vapor has ever been discovered and there has been no overflow. The city water is connected directly with the expansion tank and is controlled by a ball cock.

The reader will perhaps be interested in knowing to what purposes some of the desks and general divisions shown in the plan are devoted. The visitor has the opportunity of entering the office, as already explained, either by the elevator at E or stairway at A, in Fig. 2. In either case he finds on entering the office a space bounded by a counter, indicated by 17 in the one case and 1 in the other, which suffice for transacting such business as is usually done across a counter. Convenient gates lead within, and ordinarily the visitor is conducted to the desk of the person in charge of the particular business on which he has called. D is the private office of the Publisher, Fig. 9 representing an elevation of the partition. C is the General Manager's office, 14 being his desk and 15 the desk of the Assistant Cashier and Mail Clerk, who receives and opens all mail and keeps the account of cash receipts. B is the Bookkeeper's Department, 10, 11 and 12 being stand-up desks. The various desks in the general office S are occupied by clerks who keep the subscription lists and by others charged with special responsibilities. Twenty-eight is the desk of the Manager of the Advertising Department, and 27 is the desk of the Assistant Business Manager. The Book Department, from which are supplied books on various business and technical subjects required by the readers of the different periodicals published from the office, is indicated by 18, 19 and 20, the latter being book cases against the wall. The Correspondence Department, where letters are copied and filed, is indicated by 42, 43 and 44. The general view of the office shown in Fig. 5 is from a photograph with the camera placed as indicated by the arrow near figure 30 in the plan view, Fig. 2. The view shown in Fig. 6 represents the interior of the business office as seen with the camera at the arrow at 20, and Fig. 8 is a view taken with the camera at 44 in the plan, Fig. 2.

Passing through the archway, the visitor comes to what is known as the Editorial Division of the office, although various other matters are attended to on that side of the wall. The telephone closet is close to the arch, as indicated by R. The editorial library, racks for files of catalogues and various other records occupy the central space in this department, as shown by 53, 54, 55 and 56. Q indicates the private office of the Editor of the *Pharmaceutical Record*, P is the Stenographers' Room, O is the Engraving Department, where are made the illustrations the several papers employ; H is the office of the Editor-in Chief of *The Iron Age*, I is the office of the Hardware Editor of *The Iron Age*, J is the office occupied by the Editor of *Carpentry and Building*, *The Metal Worker* and *Business*, while K is the general editorial room, in which a number of desks are located. A dictation closet, L, with desk 75, is shown in this connection, which proves a great convenience where several desks are in one inclosure. Two toilet rooms are provided, as shown by N and M respectively, in Fig. 2. Plumbing in these was done by Edward J. Brady, of No. 58 Warren street, New York City. In Fig. 7 is presented a general view in the editorial rooms, and is made from a photograph with the camera standing as indicated by the arrow at the entrance to the stenographers' room. It shows on the right a part of the library and files already referred to. The door in the partition near the center of the picture looks into the room of the Editor of *Carpentry and Building*, while the next door to the left looks into the room of the Hardware Editor of *The Iron Age*, and the door to the extreme left into the room of the Editor-in-Chief of *The Iron Age*. Fig. 10 represents an elevation of the front partition of these rooms, the particular part shown being that at the right in Fig. 7.

The well-known builders, Morris & Sellover of Brooklyn, did the wood work, including the office partitions, private office, counters, &c. With the exception of the private office, the partitions and screens are in Georgia pine finished in the natural color. As will be noticed from the details, very attractive profiles were chosen, and the fine lines worked upon the wood, together with its bright color, give an appearance of light and cheerfulness to the office that could scarcely be secured by any other means. The details shown in Figs. 12, 13, 14 and 15 are self-explanatory. The private office, elevation of which appears in Fig. 9 of the cuts referred to, is done in black walnut, the panels being filled with glass decorated by the Matthews Decorative Glass Company of New York. The glass in the partitions inclosing the editorial rooms is a pleasing variation from ordinary ground glass, and is of a pattern known as the Daisy. It was supplied through the firm of Holbrook Bros. of New York. The installation of the heating apparatus, including coils, pipes, &c., was done by the well-known steam-contracting firm, Blake & Williams of New York. As appears by the plan, only one radiator is used, that being located in the elevator lobby. This is of the Perfection pattern, made by the Michigan Radiator and Iron Mfg. Company, Detroit. Pipe coils were used for radiating surface through the offices on account of economy of space and preference of the management. There is nothing in the heating system, however, that would prevent the use of radiators throughout had they been desired. The floors are of hard pine, finished in what is known as the Boston hard wax polish, by E. D. Stair, No. 7 West Fourteenth street, New York.

THE ECCENTRICITIES of the draft in a chimney are often unaccountable on any theory, however ingenious or profound. There is do doubt, however, that the form of the roof has a great deal to do with the behavior of the chimney, says an exchange, and that many gables and valleys running in different directions cause eddies and currents of air which reveal themselves in a shifting and contrary draft. A flat roof, if other roofs are not close by, avoids most of the difficulty, and every departure from the plain flat surface tends to complicate the problem. The remedy, where there is a confusion of roofs, is to increase the hight of the chimney, clearing it from these disturbing influences and at the same time strengthening the draft.

MARBLE QUARRIES were first worked at Marbledale, Conn., in the year 1800. Sandstone quarrying was first undertaken in the vicinity of Portland, Conn., opposite Middletown. The quarries were considered common property, and no tax was imposed until 1665, when the citizens of Middletown voted "that whoever shall digg or raise stone at ye rocks on the east side of the river (now Portland) for any without the towne, the said digger shall be none but an inhabitant of Middletown, and shall be responsible to ye towne twelve pence per tunn for every tunn of stones that he or they shall digg for any person whosoever without the towne."

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DESIGN FOR AN IRON ROOF.

IN OUR OCTOBER NUMBER, it will be remembered, we presented the prize design for a timber spire to which was awarded the Grissell gold medal in one of the competitions lately conducted under the auspices of the Royal Institute of British Architects. In this issue we take pleasure in showing, by means of the double page engraving and other illustrations, the prize design for an iron roof in a competition lately conducted under the same auspices, the medal being awarded to Robert J. Angel, Borough Surveyors' Office, Town Hall, Birkenhead, England. The requirements in the present Grissell medal competition called for a roof covering an area devoted to the purposes of a volunteer drill hall, lighted entirely from the roof and measuring 140 feet in length by 70 feet in width. From an inspection of the engravings it will be seen that the author has chosen the hipped type of roof as offering the least resistance to the wind, and also serving to converge the vitiated atmosphere from all parts of the hall to the central ventilating apparatus. The principal bent is composed of two L-shaped members, each formed of an $8\frac{1}{2}$ x $\frac{5}{8}$-inch plate, and a $3\frac{1}{2}$ x $3\frac{1}{2}$ x $\frac{5}{8}$-inch angle iron riveted on. The principal rafters are placed 14 feet apart, and are each held down in their places by two $1\frac{1}{4}$-inch rods secured to a plate built in the wall. The cast iron chair at the foot of the principal rafter rests on a $\frac{1}{2}$-inch wrought-iron plate so as to distribute the pressure, the surfaces in contact being planed to assist during expansion and contraction. Between each principal rafter is a common rafter fixed of H-section $5\frac{1}{2}$ x 5 x $\frac{3}{4}$ inches. It is supported on the wall in a manner similar to the main rafter, but instead of continuing up the entire length to the ridge, it stops at and is bolted to a continuous plate, which is carried by the main rafter. The common rafter is supported at intermediate points by trussed purlins of T-section, $3\frac{1}{2}$ x 3 x $\frac{1}{2}$ inch. The hips are constructed similar to the principal rafters, but, with the addition of a plate $\frac{5}{8}$ inch thick, riveted to each L-shaped member. Jack trusses and jack rafters are framed into the hips in the usual manner. Cast-iron standards are employed as rain-water conductors to the gutters. A space, 3 inches deep, is designed under the gutters for the escape of foul air and an upper pressure of wind from the interior. All danger of rain gaining admission is obviated by an ornamental cast-iron gutter fixed on the inside directly under the opening, and treated as an architectural feature, in the shape of a cornice or string course. The upright glazing is in cast-iron frames, which are fixed from the outside. The remainder of the glazing is done without putty in specially designed bars, so constructed as to retain and carry off the water of condensation. The portions of the roof not glazed are covered with small green slate placed on $\frac{3}{4}$-inch roof boarding supported by $4\frac{1}{2}$ x 3-inch rafters. The underside is paneled in picked pitch pine, double framed. The panels are filled in with diagonal tongued and grooved matched boarding, all stained and varnished. The exposed timbers of the ventilating turret are of English oak, while the interior portions are of red pine. The engravings which are presented indicate in a very comprehensive manner many of the details of construction, Fig. 1 showing the stress diagram; Fig. 2, a transverse section of the main truss; Fig. 3, a cross section showing trussed purlin, and Fig. 4 a diagram of loads, while the double-plate engraving shows the timbering of the roof, construction of the turret and elevations of the finished structure.

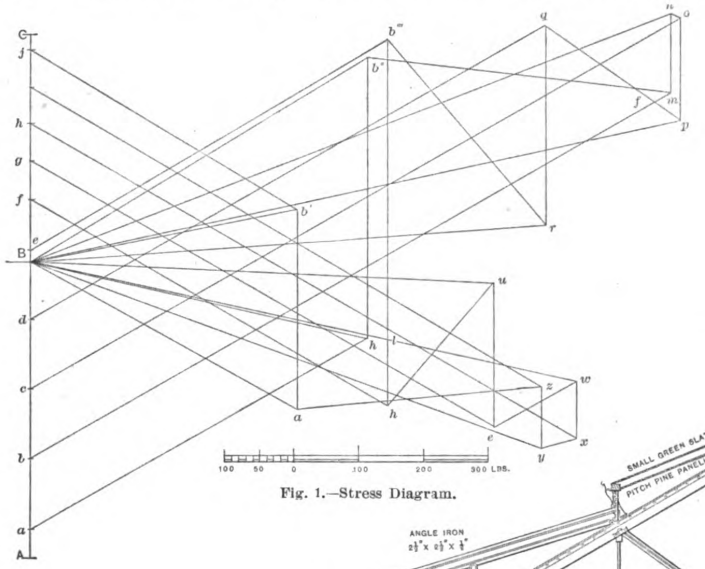

Fig. 1.—Stress Diagram.

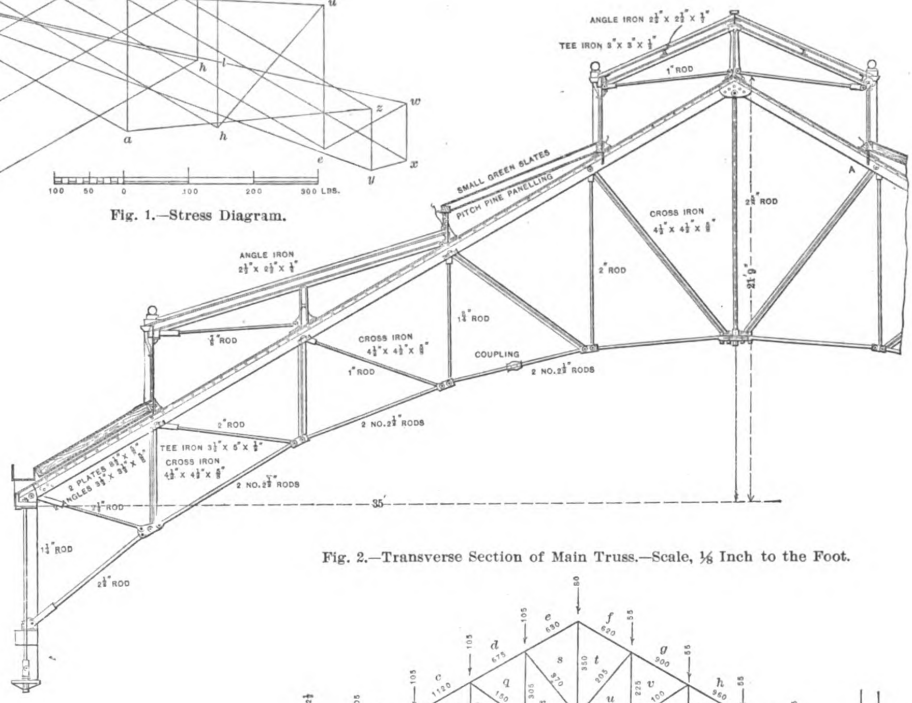

Fig. 2.—Transverse Section of Main Truss.—Scale, ⅛ Inch to the Foot.



Fig. 3.—Cross Section, Showing Trussed Purlin.—Scale, ⅛ Inch to the Foot.

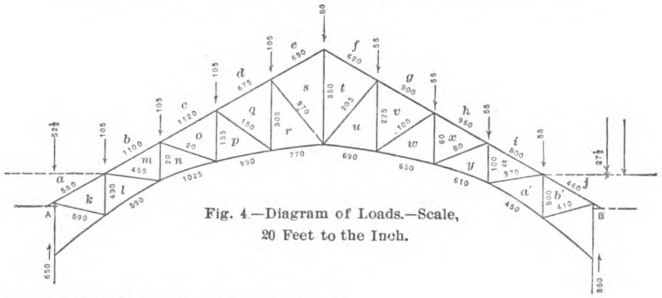

Fig. 4.—Diagram of Loads.—Scale, 20 Feet to the Inch.

The Grissell Gold Medal Prize Design for an Iron Roof.

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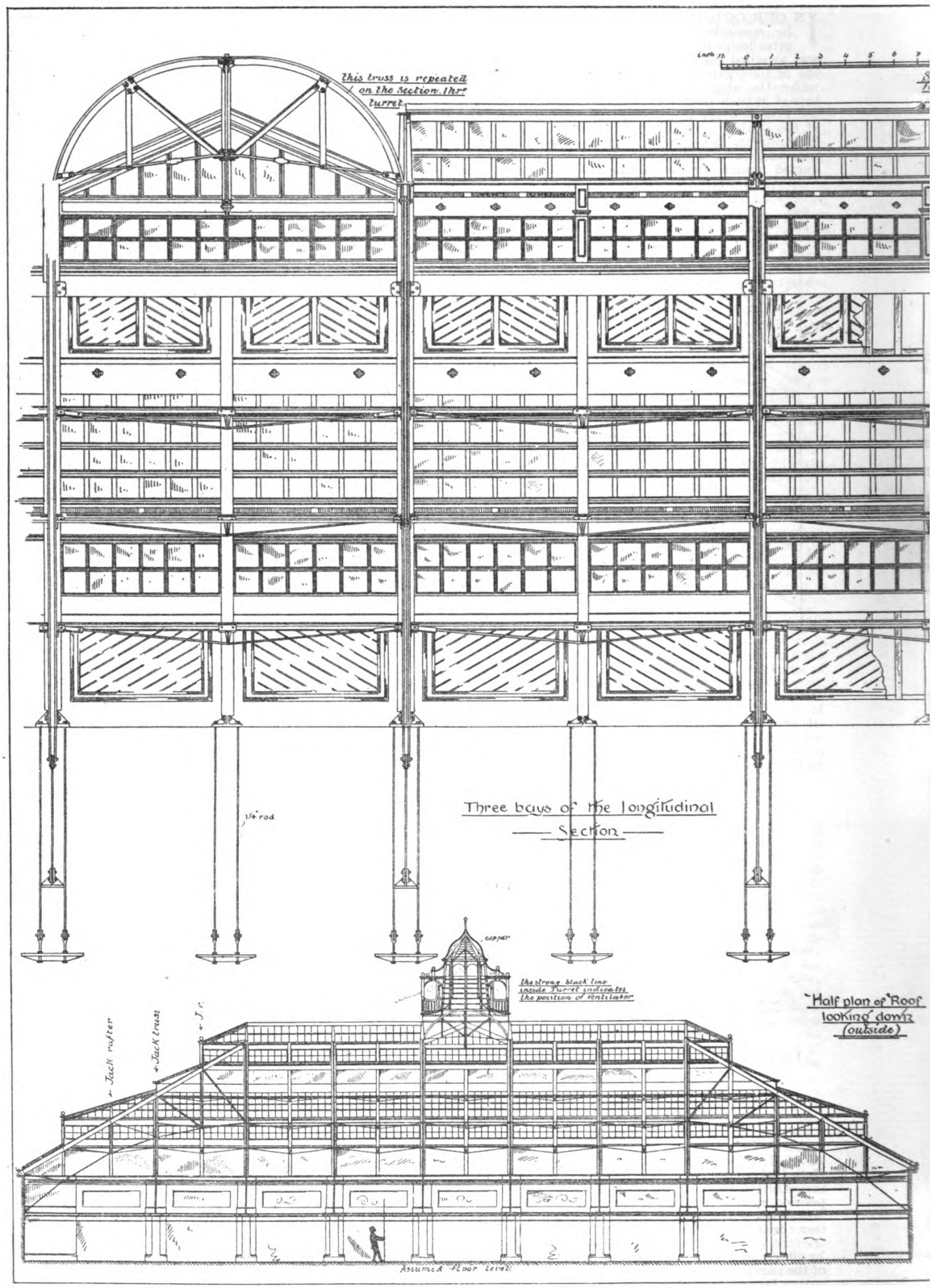

Design for an Iron Roof.—Awarded the Grissell G

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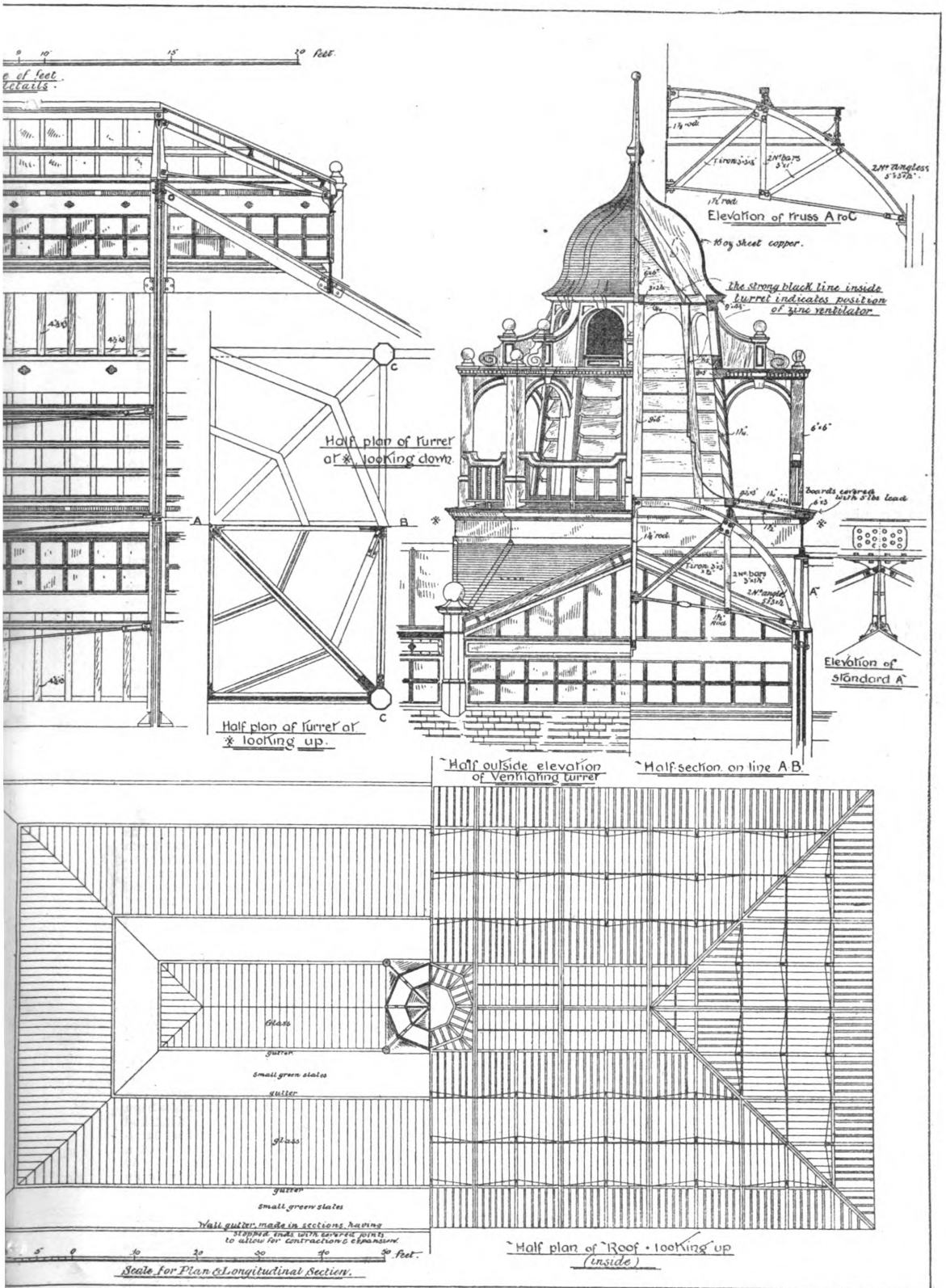

dal by the Royal Institute of British Architects.

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LAW IN THE BUILDING TRADES.*

MECHANIC'S LIEN FOR PAPER DECORATING.

A MECHANIC'S lien may be established for papering a house. It is not necessary in order to sustain a lien that the price of the work should have been agreed upon, but it is enough if it appears that the work was ordered, as that implies a promise to pay the reasonable worth and value of the work—La Grille *vs.* Mallard, Supreme Court of California, 27 Pac. Rep., 294.

RIGHT TO REJECT LOWEST BID.

Where the statute governing the letting of contracts for public works provides that such contract shall be let to the lowest responsible bidder, and the advertisement for bids reserves the right to accept or reject all bids as the best interests of the city may demand, all the bids may be rejected and another advertisement made without in any manner incurring any liability to the lowest responsible bidder under the first advertisement.—American Artificial Stone Pavement Company *vs.* Wagner, Supreme Court of Pennsylvania, 21 At. Rep., 160.

CONSTITUTIONALITY OF LIEN LAW OF TENNESSEE.

The mechanic's lien law of Tennessee, providing that mechanics and material men may have liens, that where material is furnished for a building on the land of married woman who has not signed the building contract, and the material was furnished in ignorance of her claim or right, and she refuses to recognize a lien, on notice given he may remove the material furnished; that the property owner may demand an indemnity bond, and providing for its enforcement, is not unconstitutional as embracing more than one subject, nor does it provide for taking property without due process of law, nor is it class legislation. The act is valid and constitutional.—Cole Mfg. Company *vs.* Falls, Supreme Court of Tennessee, 16 S. W. Rep., 1044.

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LIABILITY OF CONTRACTOR FOR SAFETY OF SCAFFOLD.

Where a contractor provided his workmen with proper material in sufficient quantities to construct a scaffold to be used in work on which they were engaged for him, he is not liable for damages resulting from en error of judgment by the foreman in selecting a particular piece for a particular place in which it proved to be insufficient, by reason of which the scaffold fell and a workman was injured.—Ross *vs.* Walker, Supreme Court of Pennsylvania, 21 At. Rep., 156.

SUFFICIENCY OF AFFIDAVIT FOR LIEN.—EFFECT OF AMENDMENTS TO STATUTE.

Where the affidavit for a mechanic's lien is entitled at the head as of the county in which it was sworn to, it is a sufficient description of the property to say it is "located in said county," though the name of the county does not appear in the body of the affidavit. Where an amendment to the lien statue is passed, lessening the the time within which a lien may be filed, the old provision remains in form as to contracts performed prior to the enactment of the amendment.—Nyston *vs.* London and N. W. Am. Mortgage Company, Supreme Court of Minnesota, 49 N. W. Rep., 394.

DISTRIBUTION OF ASSETS AMONG LIENS AND MORTGAGES.

When there are several liens upon the same property and a mortgage as well, and some of the liens are prior to the mortgage and some subsequent, the proper method of distributing the assets is to first set aside the amount of those liens which are prior to the mortgage, then satisfy the mortgage, and then add the residue to the amount first set apart, and divide it pro rata among all the liens, as there is no priority among them as between each other—Tinlayson *vs.* Crooks, Supreme Court of Minnesota, 47 N. W. Rep., 398.

PRIORITY OF LIENS IN CALIFORNIA.

Under the section of the California Code providing that mechanics' liens shall be preferred to any lien that may have attached subsequent to the time when the materials were furnished, materials furnished to a person in possession under a contract of sale constitute a prior lien to a mortgage subsequently given the seller for the price. Where materials are furnished under a contract, and part of them are procured from another, who refuses to deliver them unless paid for by the contractor, the latter, having paid for them, can include their cost in his claim of lien.—Avery *vs.* Clark, Supreme Court of California, 25 Pac. Rep., 919.

NEGLIGENT EXCAVATION.

Excavation by an owner on his own land adjoining another's building, causing damage, without his knowledge or previous notice to him, is evidence of want of care in doing the work.—Schultz *vs.* Byers, Court of Errors and Appeals of New Jersey, 22 At. Rep., 514.

UNIFORM SPECIFICATIONS FOR COMPETITIVE BIDDING.

Where the law requires all contracts for public work to be let to the lowest responsible bidder, the same specifications must be submitted to all bidders, as there can be no real competition unless the competing bids are based upon the same data, and a law which requires that plans and specifications and bids for the work shall all be advertised for at the same time is therefore unconstitutional.—Fones Bros. Hardware Company *vs.* Erb, Supreme Court of Arkansas, 15 S. W. Rep., 7.

PAINTERS' TOOLS AND APPLIANCES.

AT THE FIRST annual convention of the Master House Painters' and Decorators' Association of New Jersey, held in Paterson a short time since, a number of interesting papers were read, among them being one by Edward M. Addaman of Jersey City, on the subject of the best tools to use for the various kinds of work executed by the craft. The paper was illustrated by means of models and was published in full in *Painting and Decorating*, to which we are indebted for the use of the engravings presented herewith. The paper is as follows:

Having been asked by the Executive Board to prepare a paper on the above subject, I desire to present to you this afternoon a few practical thoughts on what I have found to be some of the best methods of doing work. When I shall have finished the reading of my paper and partly illustrating the same, do not be disappointed if you find but little ground has been covered, for please remember that the subject assigned to me is a large one, requiring much thought, study, and a large amount of practical experience—a subject that I would much rather have seen given to some other member of our association who was more competent to deal with it than your humble servant. But I feel that it is the duty of every member to do what little he can for the benefit and upbuilding of our trade and association, and that even my feebly effort may have a tendency to arouse within the breast of every master painter in our association a desire to put forth his best endeavors for the advancement of our trade, so that when we meet in our next convention a paper shall be offered on this subject that will teem with ingenuity, wisdom and practical intelligence.

In the performance of good work not only suitable tools and appliances are needed, but the proper use of them is also necessary. Experience has taught us that an hour spent in selecting the proper tools for a job and the adjusting of the same has been time well spent and of great advantage; for how often have we seen valuable time wasted and the misuse of appliances cause not only delay, but serious accidents. We find a number of men all right in their work when they get there; but to get there—that's the rub. In commencing a job one of the first things to be considered is what tools are necessary; what length swing, falls, ladders, steps, &c., will be required; for it is not a good plan to cart a lot of things that will not be needed, but perhaps lost. Neither is there much gain derived by having to go to the shop a dozen times for things which should have been taken in the first place.

I have found it a good plan where we have more than one set of falls to use those whose length comes nearest to the hight of the building on which they are to be used. Not only do we save the extra weight, but we will find that the tail end of the fall is worn out more by dragging on the ground than when in actual use. With each set of falls I would recommend a separate set of roof lines, and that they be kept with them, thus guarding against their being lost as well as having to hunt around for them when they are needed. In reference to roof irons, there was a time when a roof was a roof and the ordinary L irons fitted them all; but architecture has changed and with this change we find it necessary to have our irons conform to the style of the roof and gutter now in use, and for that purpose I wish to call your attention to a few models of irons which I have found, after practically testing them for some years, to be of great service. (At this stage of the paper Mr. Addaman showed models of the various appliances, which are illustrated in Figs. 1 to 8 inclusive.)

One of the things in painting a building that takes time, and, if not thoroughly done, is sure to cause trouble in the end, is the removing of the rosin from the joints of the tin work. The old method is a tiresome one and has never been satisfactory. We have here a model of a scraping brush with which a roof 25 x 50 can be thoroughly cleaned of rosin in an hour and a half or two hours. In painting piazza cornices or other low stretches it is customary to hang the falls from the main cornice and let them chafe against that of the piazza. This method needs no comment; the danger and folly are too plain. As a substitute and a remedy I have found a drop rope with hooks to be of great value in doing such work. The subject of step ladders is one we think we have given too little attention, if, indeed, any at all. How often do we use a 6 or 7 foot step to reach a piece of

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work 7 or 8 feet high, when a 3 or 4 foot one would answer the purpose much better and not be quite so heavy to carry. I have found it a good plan to have them in sets of each hight, as many sets as one may need, lettered and numbered so we may be able to keep track of them.

Twisted Iron in Floor Construction.

At a recent meeting of the American Society of Civil Engineers, a paper by E. L. Ransome, on "Concrete Beams Reinforced by Twisted Iron for Floor Construction," was read. The system referred to consisted in imbedding twisted bars of iron in the concrete beams, by which it was claimed a very strong floor can be made at small cost. The California Academy of Sciences, San Francisco, has five floors of the museum portion, or about 50,000 square feet, so constructed, and estimated to carry with safety 250 pounds per square foot. The museum building of the Stanford University at Palo Alto, Cal., is being constructed as a monolithic structure, the foundation, walls, two floors and roof being of concrete and twisted iron. The building is 300 feet by 50 feet, with spans of 45 feet and less. The depth of beams ranges from 7 inches to 45 inches, with floors 3 inches thick. The concrete is of hard trap rock and Portland cement, in the proportions of 1 to 14 for walls and 1 to 6 for floors. The paper, says an exchange, give rise to considerable discussion, evincing a sceptical feeling as to the advantages claimed. Mr. Seaman thought the twisting would be an injury rather than a gain, and that in case of fire the iron would stretch, and owing to the difference of expansion of the concrete and iron, the effect of the latter would be lost. A visitor described a system of concrete floor construction in which a network of wires 1½ inches apart was hung from the top of the beams and a flat floor of concrete made, extending a little above the beams and below the bottom of the curve of the wires, the thickness being about 4 inches for a span of 6 feet 3 inches. The wires are No. 12 gauge, and those from beam to beam are double. A thin, flat concrete ceiling protects the lower part of the beams, and the beams are also coated with the concrete mixture. This construction can be built by unskilled labor. Mr. Fouqué thought the use of sawdust in concrete or plaster for fire proofing material to be a mistake, experience on the West Shore Railroad having shown that it is completely destroyed by fire. Gauge mortar on wire lath gives very satisfactory results.

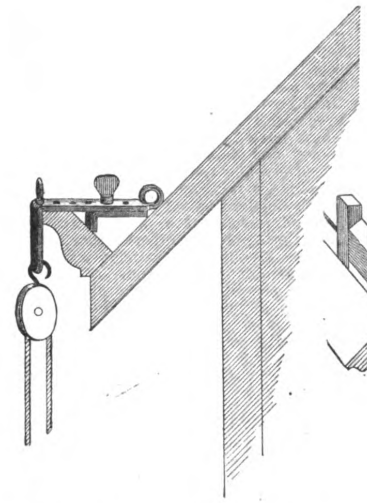

Fig. 1.—Iron for Edge-Gutter.

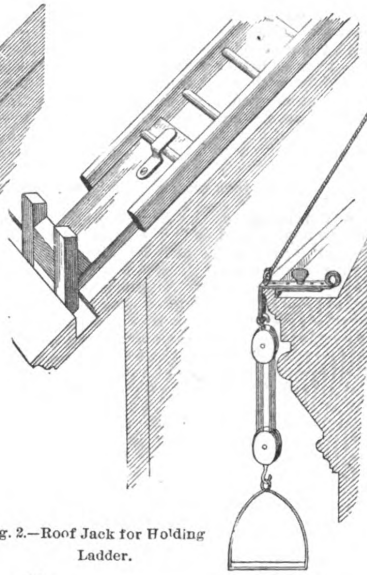

Fig. 2.—Roof Jack for Holding Ladder.

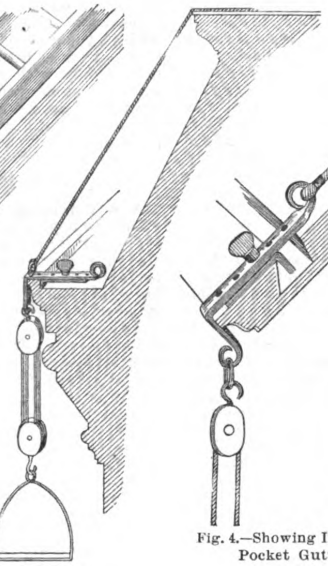

Fig. 3.—Gutter of French Roof.

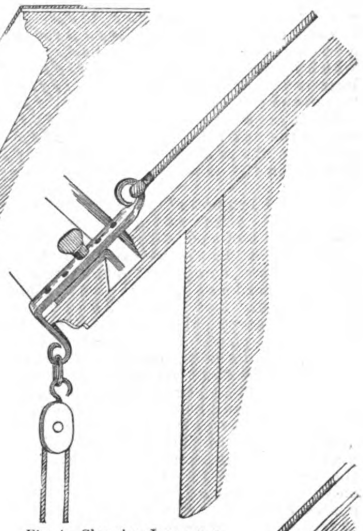

Fig. 4.—Showing Iron on a Pocket Gutter.

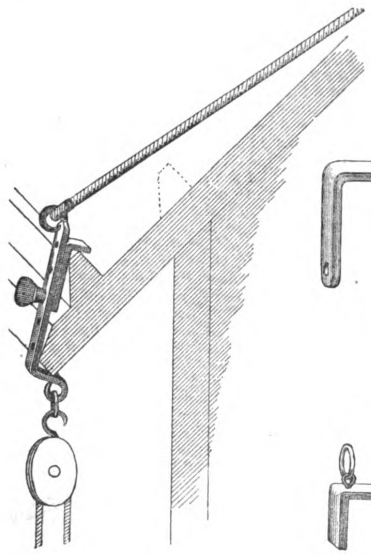

Fig. 5.—Position of Iron on Overhanging Gutter.

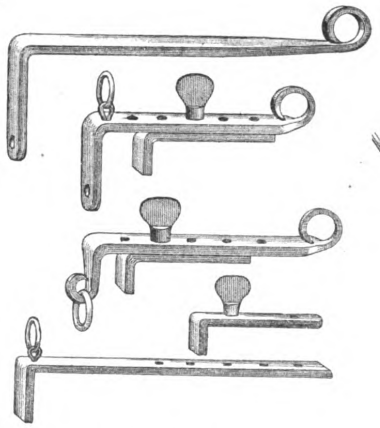

Fig. 6.—Details of the Irons.

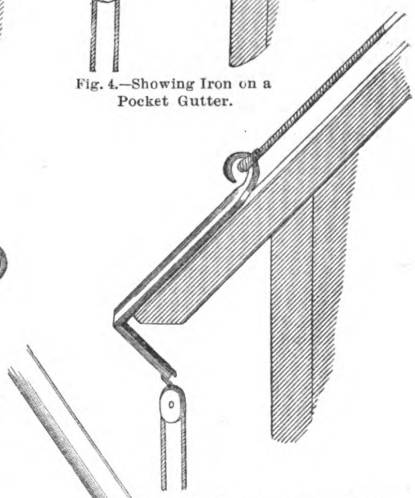

Fig. 7.—L-Iron for Flat Roof.

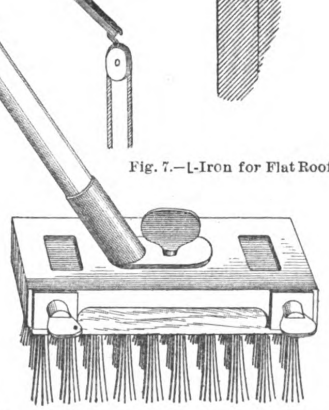

Fig. 8.—Wire Scraping Brush for Removing Resin from Tin Roofs.

Painters' Tools and Appliances.

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CEMENT AND ITS USES.*

By LA ROY GRIFFIN.

ONE STEP MORE prepares the cement for the market. As the rock comes out of the kiln its color is found changed from blue to a light gray or ash color, and its weight is diminished very much. Indeed, it weighs only about two-thirds as much as when it was put in. But it is still in lumps. To be used it must be reduced to a powder. So it is once more loaded on to cars, carried to a mill, passed through a cracker, very much like a bark mill, which breaks it up into pieces about as large as a walnut, and finally it is ground to powder by burr stones. It is then ready to be packed in bags or barrels and sent to the market. To insure uniform quality in the product, the largest manufactory in the country carefully tests every lot.

A small "briquette" made by mixing the cement with water, has two side planes, and is of such a shape that it looks much like a flat hour-glass. It is 1 inch in area across its smallest place. This is hardened for a short time in the air and then left under water for seven days, after which it is taken out, placed in a clamp which presses upon its sides, and then stretched until it is broken. Its quality is shown by the weight required to pull it apart. Good cement will hold about 125 pounds. If left longer before breaking, it will hold more. Such a briquette which had been made nearly six months was tested in the presence of the author and broke only when stretched with a force of 636 pounds. Such a material is certainly strong enough for any use.

KINDS OF CEMENT.

Cement, as now furnished to the market, is of two distinct kinds—Portland cement and the common article produced directly from the stone. The properties of the two are very much alike, the main difference being found in the rate of hardening, the Portland setting quickly while the other sets somewhat slowly. Both harden in time under water, but owing to its slower rate the common cement is more liable to crumble before hardening. The cause of the difference is the magnesia found in common cement. When that is present the cement hardens slowly. If the cement is free from it it hardens quickly, though it does not form nearly as hard a body when the process is completed.

Here, then, the most important property of cement is apparent. When mixed with just enough water to form a thick mortar it hardens to about the consistency of the original stone. This it does in part quickly by a process called setting, which is really the union of a small amount of the water withthe other materials, mainly the lime, to form a new substance. This begins the hardening process, but it does not end it. The air always has carbon dioxide present, and some of it is dissolved in water. As soon as this comes in contact with the moist lime and magnesia of the cement it is absorbed and the stone once more turns to a carbonate. Commencing on the outside, this process continues, particularly as the stone becomes more and more porous through the escape of the water, until every particle is ultimately turned back to its original condition. Another process accompanies this which probably still further adds to its strength. Minute crystals of chalk and magnesite are formed all through the hardening stone. But although this process commences just as soon as the cement sets, it is not complete for a long time, probably not for many years, so a structure formed of cement, or one in which cement forms a large ingredient, instead of growing weaker with age, increases in strength during the whole period of hardening. It only lacks pressure to render it ultimately as hard and firm as the original blue stone.

One more property of cement needs attention, one that adds much to its value for building purposes—its great adhesion. Applied to brick, it adheres so firmly that the brick will break before the cement gives way. If a piece of iron is covered with it, the cement when hardened holds to the iron so firmly that it can be removed only with a hammer and chisel, just as a stone would be cut. So a beam built up of iron surrounded with cement becomes essentially a stone beam, but one possessing the tenacity of iron.

USES OF CEMENT.

Now it remains to consider the uses to which cement has already been put, and for which it seems admirably adapted. The most important of these is making concrete or grout for foundations of buildings, piers of bridges, and other structures exposed to the action of water. For this purpose the pure cement is commonly mixed with two or three times its own weight of sharp sand and coarse gravel. Perfectly mixed, every piece of gravel is entirely surrounded with the cement and they adhere so as to form a single mass. Then the strength of the mixture when fully hardened is the strength of the cement, for it adheres to an extent nearly or quite equal to its cohesive strength. Such a mass, if broken, breaks with a very irregular fracture, the cement being usually torn apart between the separate stones. Sand acts in the same way. Such mixtures commonly add nothing to the strength of the cement, only cheapen the structure.

The caissons which are constructed for the foundations of bridges and wharves are now commonly filled with such a mixture of cement and sand or gravel. After the hardening process is complete, such a caisson sunk in a river bottom becomes practically a foundation of solid stone. The introduction of such an artificial stone renders the construction of bridges and large buildings possible in many places where the unsuitable character of the soil would otherwise forbid their erection. Thus structures of 12 stories high and upward are rendered possible upon the marshy soil underlying Chicago, for by joining great masses of concrete by iron beams imbedded in the same material the whole structure rests practically upon a single rock. Settling then must be as one mass, and simply lowers the structure as a whole.

FORMATION OF ARTIFICIAL STONE.

Another use of the material which has already become a great industry is the formation of "artificial stone." Of course this is nothing more than the cement mixed with sand, molded into the desired form and allowed to harden in the usual way. It may be used in blocks for the walls of a building; in flat pieces for paving and sidewalks, or indeed of any other form desired. Vast quantities of it are used for sewer pipes and culverts. The previously molded and hardened pipe is better than the cement itself for such uses as these, because the hardening process is already far advanced and the strength is rendered sufficient to bear the earth filled in above the pipe.

But why should not such a material, showing as it does so many desirable qualities, be used for walls, floors and ceilings of buildings themselves, and so remove the danger of fires? No one fact is more noticeable in modern times than the great loss of property each year through fires. One of the most important and extensive financial businesses of the country, that of fire insurance, has arisen and takes its importance because of this loss. It does not in any way diminish the loss or restrict the evil, if the co-operative insurance of the cotton mills is disregarded, but only distributes the burden of the loss, making every man bear his proper proportion of the destruction each year. There does not seem to be any good reason. Indeed, structures have been already erected in many places composed of such materials. Houses have been built largely of cement, and some of them have stood well. Many small structures with thick walls have been erected. These have to a large extent uniformly shown one defect. The porous wall allows the water to creep in to some extent. So long as it remains water no harm is done; but let the water freeze and its expansion pushes off a piece of the wall. But it must be remembered that this defect is not confined to cement walls. All stone is more or less porous, so all building stones in a variable climate will crumble to some extent. The less there are of the pores, the less the defect. Filling the pores of the cement largely diminishes the difficulty, but plastering over the outside of the concrete with cement alone is the best remedy.

CEMENT STRUCTURES.

A house was described in the *Popular Science Monthly* of September, 1883, which seems to indicate that cement will largely solve the question of cheap and permanent houses. The experiment there described also indicates that the great defect of most concrete buildings has been the thickness of the walls; that the very means to secure stability has proved a source of weakness. The house there described was made entirely of concrete, good cement, sand and sharp gravel in the most approved proportions. The walls were made hollow, the outer wall 7 inches thick and the inner 3. An air space was thus left between the two parts. The outer portion was strengthened by iron rods $\frac{1}{16}$ inch in diameter placed both ways about 1 foot apart and set as nearly as possible in the middle of the cement, while the two walls were tied together at intervals of about 3 feet by similar rods laid in cement. The partition walls were constructed in the same way except that both parts of the walls were 3 inches thick. The only plastering required was a coat of smooth finish laid directly upon the walls. The floors were of a similar construction, save that in them the rods were replaced by iron beams about 3 inches deep and $\frac{1}{8}$ inch thick, and even the roof was made of cement. The outside was simply finished with a coat of unmixed cement spread with a trowel and formed into blocks, and the floors were finished in the same way, with a strip of wood inserted around the edges to which to tack carpets. The building, which has stood some 17 years, seems unaffected by frosts, and certainly it has solved the question of fire-proof construction of dwellings, for it cannot burn. Its cost was only a little more than that of an ordinary frame building, and since that day the market price of cement, the most important ingredient, has been reduced one-half. Such, then, is the cement, and such are the uses to which it has already been applied. It seems admirably adapted for the building of permanent structures. The field for its application is already extensive and rapidly widening, and as improvements in its constitution and uses are made, it appears likely to have still more important applications. The only objection to its general employment seems to be its somber hue, but this certainly can be ultimately remedied and the material made to take a pleasing variety of color. Some paint or color will no doubt be found for this purpose.

* Concluded from page 240, October, issue.

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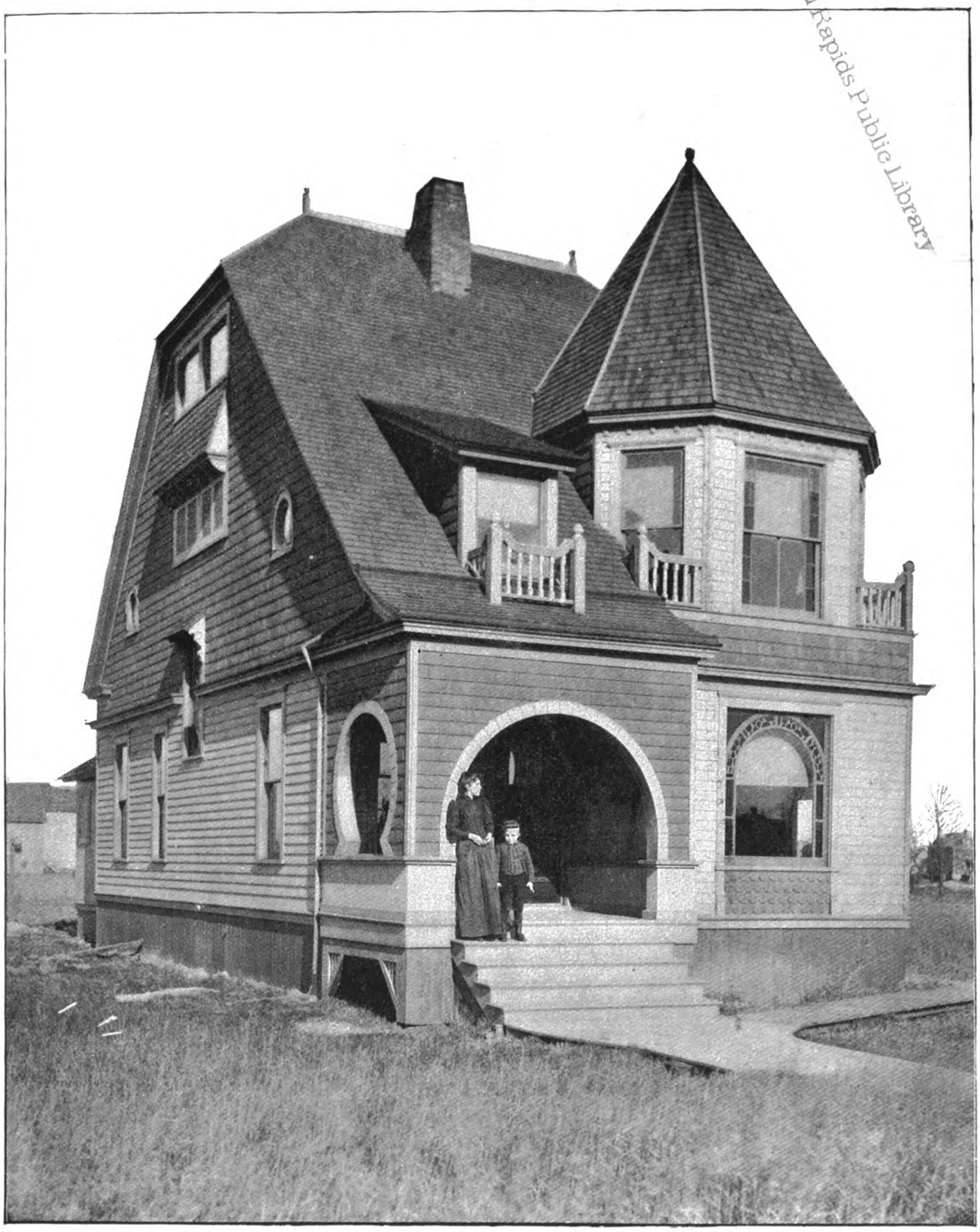
Grand Rapids Public Library



COTTAGE AT OAK PARK, CHICAGO.

W. IRVING TILLOTSON, ARCHITECT,

ONEIDA NEW YORK.

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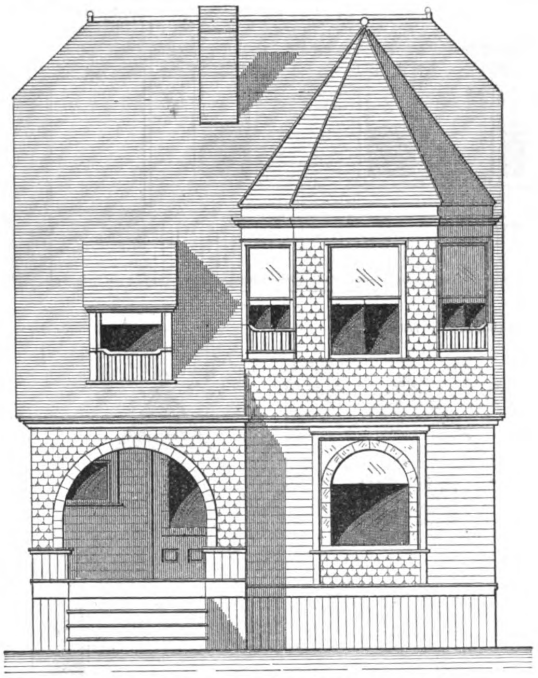
COTTAGE AT OAK PARK, CHICAGO.

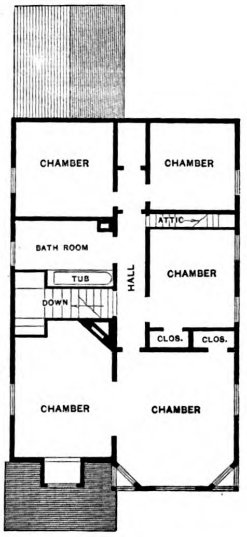
THE COTTAGE which we illustrate upon this and the following pages, and which forms the basis of our supplement plate this month, was erected not long since at Oak Park, Chicago, from designs furnished by W. Irving Tillotson, architect, of Oneida, N. Y. The outside dimensions of the building are 23 feet in width and 38 feet 4 inches in depth, the lot upon which it was erected having a frontage of 50 feet. The frame is of pine, and rests upon a foundation of large posts, the sills being 2 feet 6 inches above the grade line. The outside of the building is sheathed with matched pine, upon which is laid building paper, which in turn is covered with beveled pine clapboards. The gables are covered with dimension shingles of California red wood. The roof has pine shingles, stained with creosote. The first story is 9 feet in the clear and the second story 8 feet. An inspection of the general view of the house shown in the supplement plate and of the elevations, floor plans and details presented in connection herewith will enable the reader to form a very good idea of the construction and appearance of this cottage.

Upon the first floor are four rooms in addition to a commodious hall, the arrangement being such that communication between the kitchen and the front door is possible without the necessity of passing through any of the other rooms. The hall is fitted with an angle fire place with an ash pit below. The position of the library, dining room and parlor is such that they may be thrown into practically one room by opening the communicating doors. The front parlor window is of plate glass with border of cathedral glass set in lead sash. The kitchen is reached from the dining room through a commodious pantry, fitted with the modern conveniences. In the rear of the kitchen is a covered space, opening out of which is a coal bin and water closet. On the second floor of the cottage are five sleeping rooms of good size, ample closet room and a bathroom. The position of the main stairs is such that the landing on the second floor is in the center of the building, thus rendering all the rooms on that floor convenient of access. The floors throughout are laid double, of matched pine, while the trim is of the same material with natural finish. The architect states that the entire work has been substantially done and the materials furnished at a cost of $1800.

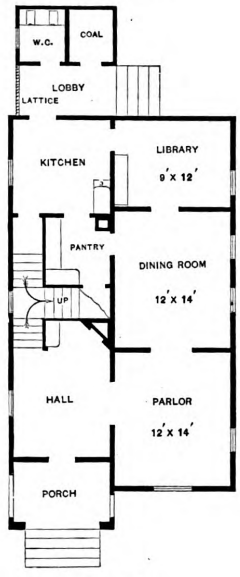


Front Elevation.—Scale, ⅛ Inch to the Foot.

Cottage at Oak Park, Chicago.—W. Irving Tillotson, Architect, Oneida, N. Y.



Second Floor.



First Floor.

Scale, 1-16 Inch to the Foot.

Discouragement in Association Work.

WM. H. SAYWARD.

The history of associations, if completely written, would show in all cases that two stages or phases are certain. The first phase is one of enthusiastic belief that all known and unknown good is to be speedily obtained through the medium of the newly organized body; the second phase is one of discouragment and readiness to avow that all effort is useless. This first phase is perhaps unavoidable, for it is natural, and perhaps necessary to the inception of any movement, to clothe it with powers and possibilities greater than can ever be realized, but the latter phase can certainly be avoided, and should be It would be much the wiser to temper our imagination when the work of an association is blocked out, so that a line of retreat may be secured of which the conservative and the enthusiastic alike may take advantage when necessary. It should be a recognized axiom in associated work that a large percentage of endeavor must apparently go to waste, and yet that such waste is only apparent and not real. It seems to be a law of nature that much material is produced from which return is not perceptible, yet a close study of all that nature does shows that nothing is really wasted.

What I desire to make plain is this: It is not to be wondered at that in our endeavors to create better conditions by working with others toward that end, many steps are taken, many words uttered, and many methods adopted which are ineffectual, and that we ought to anticipate this, not forgetting, however, that the efforts made, the action taken, the discussions held, though unproductive of the immediate results desired, contribute toward the end in view by educating and enlarging the faculties, so that good may follow more surely from effort continued in spite of failure.

It is not working up to a very high level when we permit ourselves to be discouraged; let us be disappointed if we must, but not discouraged. In associated work there is perhaps more chance for disappointment than in almost any other field, but we are too apt to forget the great good which has been accomplished,

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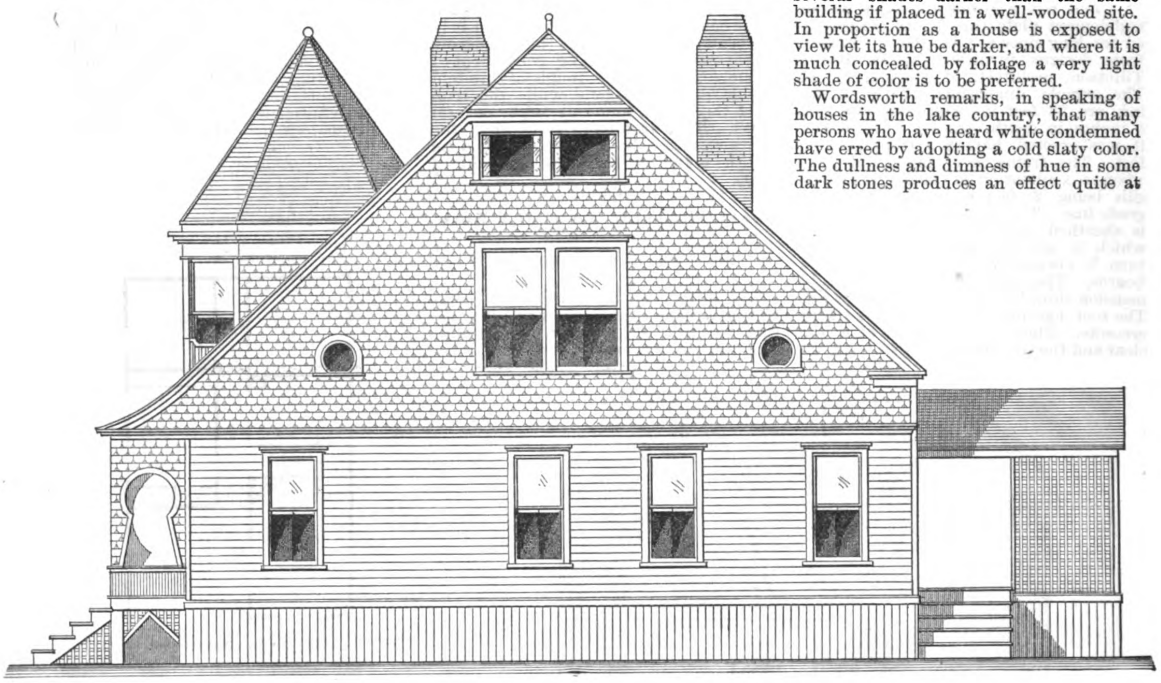
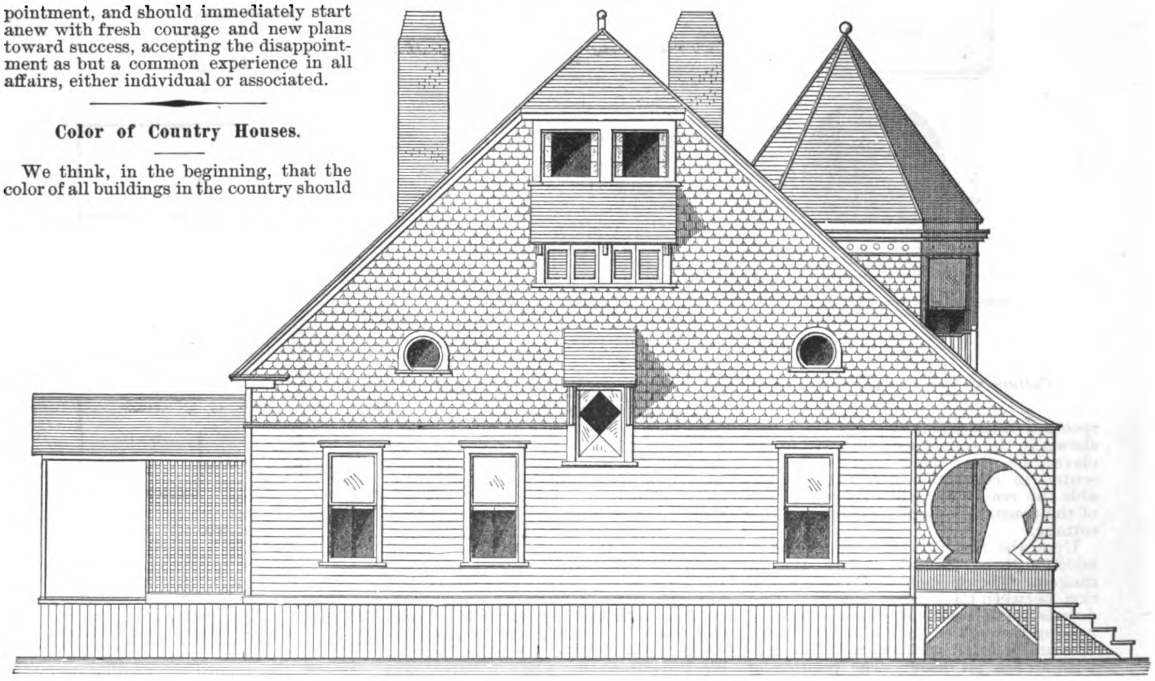
in the darkness of some present defeat or the postponement of a desired end. If local bodies of builders fail to accomplish quickly all or any of the things they set out to do, they should not permit themselves to get beyond the stage of disappointment, and should immediately start anew with fresh courage and new plans toward success, accepting the disappointment as but a common experience in all affairs, either individual or associated.



Side (Right) Elevation.



Side (Left) Elevation.

Cottage at Oak Park, Chicago.—Elevations.—Scale, ⅛ Inch to the Foot.

Color of Country Houses.

We think, in the beginning, that the color of all buildings in the country should be of those soft and quiet shades called neutral tints, such as fawn, drab, gray, brown, &c., and all positive colors, such as white, yellow, red, blue, black, &c., should be avoided, neutral tints being those drawn from nature and harmonizing best with her, and positive colors being most discordant when introduced into rural scenery, says a writer in an exchange.

In the second place, we would adapt the shade of color, as far as possible, to the expression, style or character of the house itself. Thus a large mansion may very properly receive a somewhat sober hue, expressive of dignity, while a country house of a moderate size demands a lighter and more pleasant, but still quiet, tone; and a small cottage should, we think, always have a cheerful and lively tint. Country houses thickly surrounded by trees should always be painted a lighter shade than those standing exposed; and a new house entirely unrelieved by foliage, as it is rendered conspicuous by the very nakedness of its position, should be painted several shades darker than the same building if placed in a well-wooded site. In proportion as a house is exposed to view let its hue be darker, and where it is much concealed by foliage a very light shade of color is to be preferred.

Wordsworth remarks, in speaking of houses in the lake country, that many persons who have heard white condemned have erred by adopting a cold slaty color. The dullness and dimness of hue in some dark stones produces an effect quite at variance with the cheerful expression which small houses should wear. "The flaring yellow," he adds, "runs into the opposite extreme, and is still more censurable." Upon the whole, the safest and best color for general use is something between a cream and dust color.

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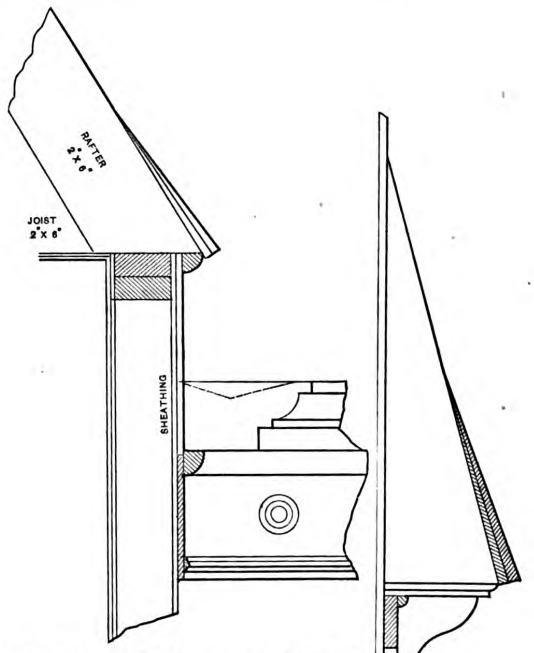
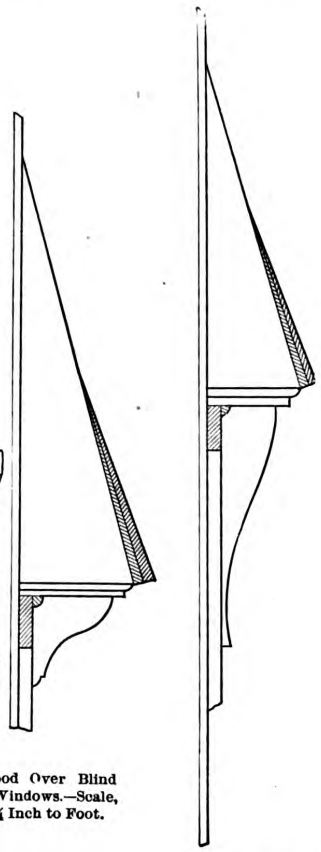
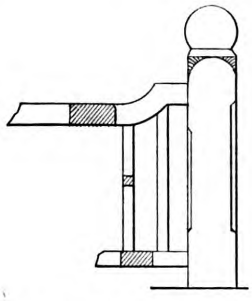


Details of Tower Cornice.—Scale, 1 Inch to Foot.



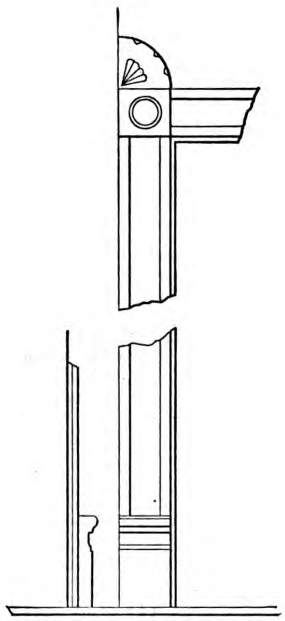
Hood Over Blind Windows.—Scale, ¾ Inch to Foot.

Hood Over Staircase Window.—Scale, ¾ Inch to the Foot.

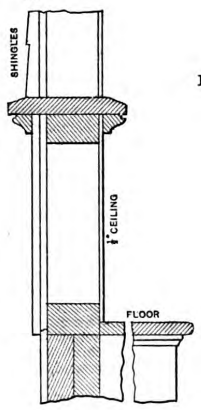


Detail of Balcony Rails.—Scale, 1 Inch to Foot.

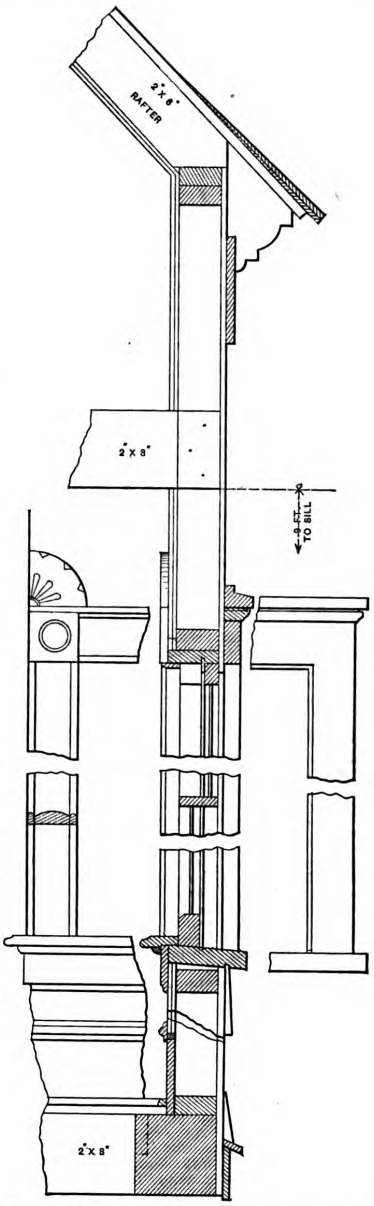




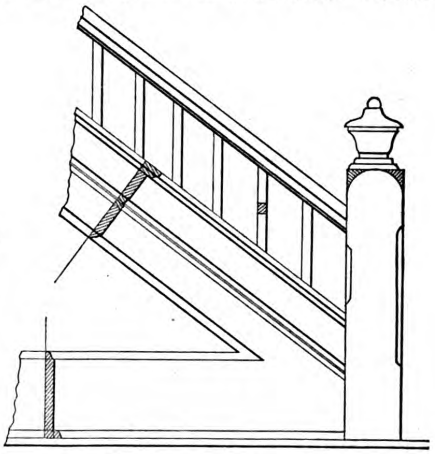
Detail of Door Trim.—Scale, ¾ Inch to the Foot.



Details of Front Porch.—Scale, 1 Inch to the Foot.



Details of Cornice, Window Trim, etc. -Scale, ¾ Inch to Foot



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

Details of Cottage at Oak Park, Chicago, Ill.

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WHAT BUILDERS ARE DOING.

THE MEMBERS of the Master Builders' Exchange of Lowell, Mass., recently held their annual outing at Mountain Rock Grove, which is a beautiful spot near the city. The principal sports engaged in were base ball and foot ball, and a thoroughly enjoyable day was spent. In the evening a dinner was served, at which between 60 and 70 members of the Exchange participated.

Building interests have been active throughout the entire season, and builders are very well satisfied with the summer's work. Many large contracts that were undertaken in the spring are well along toward completion, and work will be continued late into the winter.

Pittsburgh, Pa.

One of the results of the strike of May 1 in Pittsburgh is the large number of uncompleted building contracts in the hands of the builders. The contractors say that the fall season will be the largest that the city has known for years, and workmen in all branches of the trade are in demand.

The recent pleasant weather has greatly aided operations in the building trades, and rapid progress is being made on all jobs contracted for before and during the two months' strike of carpenters.

The demand for bricklayers still continues, and contractors who will not pay the union price, $4.50 per day, are obliged to obtain workmen from outside the city. Philadelphia has supplied a large number of workmen who are being paid $4 per day.

The Builders' Exchange Training School for the instruction of apprentices in the bricklaying trade has been in operation for about a month, having been opened on September 30.

The school is under the supervision and control of the Builders' Exchange, and apprentices are at present being instructed free of charge, the condition being that they become indentured for a period of three years.

W. P. Lupton, who has been one of the prime movers in the undertaking, and to whom much of the credit for the establishment of the school belongs, is of the opinion that the school will be enlarged in the near future in order that pupils in all branches of the building trades may be given instruction. Mr. Lupton has been for years an earnest advocate of the establishment of a trade school in Pittsburgh, and in speaking of the present undertaking says: "Our start has been humb'e, but we expect to arouse sufficient interest to warrantthe early establishment of a school in which all branches of the business may be taught."

Philadelphia, Pa.

The members of the Master Builders' Exchange of Philadelphia are at work upon a project to establish a building exhibit at the World's Fair. The matter is in the hands of a committee for formulation. Another subject that has been agitated for some time past is a plan for awarding prizes by the Exchange to workmen for good workmanship. To make this enterprise one of national importance the Philadelphia Exchange proposes to bring the matter before the next convention of the National Association of Builders.

Colonal Richard T. Auchmuty, the New York philanthropist, has been elected an honorary member of the Master Builders' Exchange. Secretary William Harkness, has prepared a series of resolutions which will be properly engrossed and forwarded to Colonel Auchmuty by the Board of Directors of the Exchange. The particular cause for this action is to show that the Exchange fully appreciates the donation of $9000 made to the School of Mechanical Trades by Colonel Auchmuty.

The trade schools have recently been highly complimented by the secretary of the National Association of Master Steam and Hot Water Fitters, George H. Reynolds, who expressed, for his association, a high appreciation of what has been done in this direction by the Exchange.

The prominence and influence of the Philadelphia Exchange has recently been very flatteringly attested. The advice of the secretary has been solicited by Robert P. Porter, Superintendent of the Census Bureau, as to the possible effect of the establishment of a permanent census bureau upon future collections of statistics relating to the commerce and industry of the country.

A syndicate of Cuban business men have sent a representative to Philadelphia for the purpose of securing information in relation to building materials that can be imported into Cuba advantageously under the new reciprocity treaty. The permanent exhibit of builders' supplies in connection with the Exchange offered unexceptionable facilities for supplying the information desired by the representative, who was greatly pleased with the manner in which the exhibit is conducted.

The co-operation of the builders of Philadelphia has been asked by those interested in the steamship enterprise to the Mexican and Cuban ports. Ex-United States Consul to Mexico James W. Porch has addressed the following letter to the Master Builders' Exchange, which will receive careful consideration:

"We count on your co-operation in our steamship enterprise, and hope to be able to advance the interests of your Exchange in Mexico and Cuba.

"We think that an exhibition such as you have would be an excellent thing to establish in the City of Mexico. The tendency there now is to do away with the old style of Spanish architecture and adopt more modern methods. During the last four years a number of houses were built on the American plan, and a great many which combine both the Spanish and American styles have been erected and have met with the approval of Mexicans. There is no doubt but that a large trade could be worked up in building materials and fixtures of all kinds, especially in interior furnishings and fixtures, in which Philadelphia beats the world."

The Exchange has taken up and is seriously considering two entirely new ideas for bringing the organization into greater prominence and usefulness. One of these consists of an invitation to be issued to the leading architects of the city to submit to the Exchange the best of their various plans. These will be placed in the commodious exhibit room, and cards will be sent out for an informal reception, so to speak, for the purpose of viewing these drawings. The other scheme embodies the construction of a complete set of small models of the various styles of dwelling houses, from the five-room one and a half story frame to the magnificent four or five story residence. Arrangements will also be made for viewing these models, by which it is claimed a better idea of price and style can be secured by the prospective house builder than by any other method.

Baltimore, Md.

The members of the Builders' Exchange of Baltimore have succeeded in effecting the passage of a code of building laws which they have been advocating for several years past.

In referring to the matter Secretary E. D. Miller states that the Exchange has been fighting for a building law for five years, and while it may be necessary to add amendments from time to time, the Exchange is proud of the fact that Baltimore, heretofore the only large city in the country without such a code, has passed laws which, for the present, will operate to the advantage of both builders and property owners.

The project for erecting a building has been quietly pushed ever since it was inaugurated and operations will be commenced in April next by which the Baltimore Exchange will be provided with a home in every way adequate to its necessities.

Boston, Mass.

Building interests generally are in a satisfactory condition in Boston, with plenty of work in the market and harmonious relations existing between employers and workmen. The apprenticeship system as adopted by the Mason Builders' Association and the Bricklayers' Union has attracted widespread attention and has already been adopted, almost word for word, by Master Mechanics' Association and Amalgamated Trades Unions of Halifax, N. S., upon the recommendation of a joint committee established under rules advocated by the National Association of Builders. The apprenticeship question has been the cause of differences between the contractors and workmen in Halifax for a number of years and was the principal bone of contention in the recent general strike that has seriously affected building interests for this season.

The Master Builders' Association is to offer the hospitalities of its building to visiting architects in attendance at the convention of the American Institute, which is to be held in Boston about November 1.

Chicago, Ill.

Every one is busy in Chicago, and the builders say this has been the busiest season they have seen for many years. There is a large amount of building in progress aside from the preparations for the World's Fair.

Relations between employers and workmen are, generally speaking, in a satisfactory condition, with nothing of a disturbing nature in prospect.

The Building Trades Council is working to secure a weekly pay day by the city and county and also to secure the enforcement of the Eight-Hour law on all city and county work.

Peoria, Ill.

C. H. Suess, the newly appointed secretary of the Peoria Builders' Exchange, writes that the building business is about as active as usual this year and about the usual amount of fall work on hand. Interest in Exchange matters has never fully recovered since the association was burned out about two years ago. Members have grown careless of the welfare of the organization, and but few are in the habit of attending the meetings

The 'Change hour never having been fully established, and there having been no cause for serious disturbance among the builders for some time, the value of the Exchange and its possibilities do not seem to be appreciated. Almost all exchanges have passed through this period in their history, and the future will doubtless prove the value of the Peoria Exchange to its members.

San Antonio, Texas.

Mr. Martin Bradin, secretary of the San Antonio Builders' Exchange, says that his Exchange is taking vigorous steps to prevent the infraction of the building laws and the occupancy of unsafe tenements.

Building has picked up very perceptibly since the break in the drought, and contractors are looking forward to a good winter season.

Omaha, Neb.

The building business in Omaha is reported as being dull, owing to a general quietness in all branches of business in that part of the country. W. S. Wedge, the secretary of the Builders' and Traders' Exchange, writes in regard to the law making eight hours a day's work that a case is now being tried in the courts for the purpose of testing its legality. The law will probably be declared unconstitutional on the ground of class legislation, as in its present form certain occupations are exempt. Through the instrumentality of the Exchange a thousand copies of the Uniform Contract have been brought into use in Omaha during the past year.

Indianapolis, Ind.

Builders have been fairly busy in Indianapolis during the season and the majority of the contractors are still at work, with the prospect of being occupied until late in the fall. Competition has been unusually sharp this year among the contractors, which has, no doubt, been due to the fact that but few large contracts have been placed in the market. Almost all of the building operations having been confined to small jobs.

Strikes and labor complications have been few and the season has been, so far, a generally satisfactory one.

Denver, Col.

Builders in Denver have felt the effect of the prevailing dullness in the trade that has existed throughout the West for the past six months. There is no immediate prospect of improvement, but contractors are confidently looking forward to increased activity in the spring. The Master Builders' Exchange is in a healthy condition, although no new members have been added for several months. It is expected that the annual meeting will stir the members up to more active interest in association affairs.

Cleveland, Ohio.

The Cleveland carpenters have recently made a peculiar protest against the action of the city authorities. The fire department not long since decided to fit up a new fire station, but upon investigation found that the funds at the disposal of the department were too low to admit of letting the work out by contract In order to secure the new station and at the same time not create additional expense, a dozen firemen who had been carpenters were detailed for the work. As soon as this fact became known the carpenters' union entered a vigorous protest against the action of the fire department as interfering with their rights.

The Building Trades Association very pleasantly entertained the directors of the National Association after the adjournment of the mid-year meeting, giving them a slight taste of the spirit with which the delegates to the sixth convention will be received and welcomed next January.

Nothing unusual has transpired lately in Cleveland that would interest builders in other

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localities. Business has been moderately active and the contractors have no fault to find.

Lynn, Mass.

The builders of Lynn have been taking action looking to the correction of the methods which prevail in the submission and treatment of sub-bids. Members of the Master Builders' Association are very much dissatisfied with the existing customs, and are making a determined effort to bring about better conditions. Lynn has a case similar to that which was so successfully tried by McNeil Bros. of Boston, and upon the precedent established in the McNeil case it is proposed to take the matter into court.

The report of the director of the National Association of the work done at the mid-year meeting was received with marked approval. P. S. Curry, the director, and also secretary of the association, gave a full account of all that transpired, and the members seemed much impressed with the value of the meeting and of the work being done by the National Association of builders.

Louisville, Ky.

The members of the Builders' and Traders' Exchange are taking steps to improve the conditions which exist in the lumber business in that city. The progress of the undertaking to establish a trade school similar to that of Philadelphia is meeting with some opposition on the part of the trades unions, but it is expected that the unions can be brought to see that the school will in no way antagonize their interests and that all opposition will be removed. Prior to the cyclone the Builders' and Traders' Exchange of this city had taken steps to erect a large building, part of which was to have been used as a manual training school, and a large amount of money was subscribed, but the great calamity caused such losses to the members that the project was temporaaily abandoned. Had it not been for the financial stringency, and had the present building season been as prosperous as the last, there is no doubt that the project would have been now well under way. The Builders' and Traders' Exchange takes great interest in the matter of manual training schools, and will do all in its power to forward them if they are to be properly conducted.

Cincinnati, Ohio.

Secretary Lawrence Mendenhall of the Builders' Exchange of Cincinnati writes that the subject of the lien laws has been very thoroughly considered by the members and as a result a resolution has been passed that the Exchange is in favor of an equitable lien law. This resolution has been placed in the hands of the secretary of the National Association for use in the consideration of the question at the coming convention. The Exchange has also recommended certain forms for compiling statistics in reference to the building trades, for general adoption by all the exchanges in the national body.

The building season has been a generally satisfactory one for the contractors and no serious labor disturbances have occurred recently.

A complete reorganization of the Exchange is contemplated for the near future, and the intention is to place the organization on a basis equal to that of the Chamber of Commerce.

So steadily and healthfully has membership and interest increased since assuming quarters in the Mechanics' Institute that there has been serious talk—in fact, actual steps have been taken—toward the erection of a building of its own. Something will have to be done, as its lease with the institute expires next spring and cannot be renewed. So there is every prospect of not only a new home in the near future, but also new conditions for the Exchange i self.

Milwaukee, Wis.

The building business in Milwaukee has been undisturbed since the settlement of the general strike in nearly all the trades that occurred early in the season, and the principal topic of interest at present among builders is the new building being erected by the Builders' and Traders' Exchange The foundation is all in and the first story nearly completed and work will be pushed forward as rapidly as possible.

A photo-lithograph of the building as it will appear when finished has been issued by the Exchange and presents a view of a very handsome structure. A full account of the proposed building has already been given in these columns, but it is not too much to say that the Exchange will ultimately own one of the finest office and store buildings in the city of Milwaukee.

Providence, R. I.

The Builders' and Traders' Exchange of Providence has been recently considering the advisability of establishing more uniform methods of conducting the building business, as between contractors and architects and general and sub-contractors.

A committee has been appointed to draft a code of practice to govern in this connection and have been at work for some time having presented for the approval of both builders and architects before recommending it for adoption by the Exchange, a code that is based upon the "Rules and Conditions for Estimating Work" adopted at the third annual convention of the National Association of Builders', held in Philadelphia in 1889.

The code offered as obtaining between general and sub-contractors is identical with that advocated by the National Association, but the code that is to apply to the relationship between the contractor and the architect has been slightly changed, and the following added:

9. If an invited contractor cannot find time to sumbit proposal he must notify the architect or owner to that effect.

10. The plans shall be returned promptly at the time agreed upon. Bidders should be allowed reasonable time to make their estimates.

11. No payments on contracts shall be less than 90 per cent. of the work done; the balance of 10 per cent. to be paid within 30 days after the completion of the contract.

NOTICE FOR OPENING OF BIDS.

12. Before opening the bids, the bidders shall be notified of the time when and the place where the bids will be opened in the presence of the attending bidders, and awarded to the lowest invited bidder.

13. The uniform contract adopted by the American Institute of Architects the Western Association of Architects and the National Association of Builders shall be used.

The changes do not effect the intent of the code and the additions were evidently considered by the committee as being of local necessity.

In commenting upon the code one of the most prominent Rhode Island architects makes several criticisms, but is distinctly favorable to the establishment of uniform methods for the government of the business. The architect mentioned favors a universal code to be established all over the country, with the approval of the National Association of Builders and the American Institute of Architects, and asks why the code adopted at Philadelphia by the National Association was changed. In connection with the code the architect asks several questions of the committee. Is there no division of opinion in the Exchange as to the acceptance of the lowest solicited bid, if a request to bid by advertisement is considered a solicited bid? Do builders make no distinction between bids received in response to advertisement and bids received in response to personal invitation? Do builders consider it wise to invariably award a contract to the lowest bidder? In defining the architect's position he says that it would be much the easiest plan to always accept the lowest bid and that, in this case, if the owner invites cheap bidders he must employ them, making the smallest sum of money the sole test of cheapness. On the other hand, he asks would it be just to the owner to bind him under the test mentioned?

The committee have taken the proper course and will doubtless evolve a mutually satisfactory code in the end.

Notes.

New exchanges have been organized during the month of October at Columbus, Ga., and Salem, Ohio, upon lines recommended by the National Association of Builders. The secretary is constantly in receipt of letters from all parts of the country asking advice as to the best means for establishing associations of builders.

The strike which has been in force in Halifax, N. S., for some months past was finally settled by the establishment of a joint Committee of Arbitration, as advocated by the National Association of Builders, from data supplied by the secretary. The apprenticeship system as existing in the bricklaying trade in Boston, and which is a direct result of the creation of a joint committee under the recommendation of the National Association, has been adopted *in toto*.

The master builders of Brooklyn, N Y., have recently organized under the name of the Builders' League Social Association. The name is significant of the character of the organization, and it is proposed to establish a club that will be somewhat similar in character to the Building Trades' Club of New York City. A committee has been appointed for the purpose of selecting site for a permanent club house.

The secretary of the National Association of Builders recently received a request from M. P. Handy, chief of the Bureau of Publicity and Promotion of the World's Columbian Exposition, for the names of the presidents and secretaries of all filial bodies connected with the National Association. It is Mr. Handy' purpose to send illustrations of the work of the exposition buildings as they progress and to keep these officers thoroughly informed as to the progress of the work.

The directors of the National Association of Builders have instructed the secretary to print a large number of copies of the *résumé* of the suit of NcNeil Bros against the Boston Chamber of Commerce as it appeared in the October issue of *Carpentry and Building*. A copy will be supplied to any person desiring the same upon application to the secretary of the National Association. Further allusion to the case is made in another column of this issue from the pen of W. H. Sayward.

The Shoreham Apartment House.

The Shoreham Apartment House erected in Washington in the fall of 1889, and which some time after developed unique defects in both the principle and manner of constructing the floors, has been fully restored and refitted. At the request of the owner of the building, Vice-President Morton, a board was appointed consisting of James F. Windrim, architect, Director of Department of Public Works, Philadelphia; Bernard R. Green, Superintendent and Engineer of the Building for Library of Congress, and Thomas B. Entwistle, Inspector of Buildings for Washington, which has submitted a report covering a description of the building, the manner of its construction, the cause of the decay of the joists and the manner in which the work of reconstruction has been conducted. In the opinion of this board the building is now permanently strong, substantial and safe in every respect. The structure has a frontage of 125 feet on Fifteenth street and 110 feet on H street and is eight stories in hight. During the past year an extension of 28 feet was added. The superstructure consists entirely of brick walls and iron columns, girders and plates, which carry all of the light partitions and with the brick walls furnish the bearings for the wooden joists of the floors. The stairways are entirely of iron with marble treads. In the work of reconstruction every tiled floor was bodily removed from floor to floor and rebuilt with heavy joists of Georgia pine. The marble tiles were laid in the usual way, ceiled with iron lathing and Acme cement plaster and without any filling between the joists. All the wooden floors were stripped of the boards, the ash filling thoroughly removed, a complete new set of Georgia pine joists inserted beside the old ones with independent wall and iron beam bearings and the flooring relaid thereon, leaving the spaces clean and free for ventilation. The old ceilings were also permanently secured with new iron lathing overlaid and strongly spiked to the joists and then plastered with Acme cement. All the former plumbing fixtures were thrown out and replaced with new and much better ones with new connections, while the bathroom floors were laid with encaustic tiles. The work of reconstruction occupied about four months' time and a constant force of nearly 250 workmen employed by the day. The entire work was under the management and personal supervision of Col. I. Fleming, well known as a most capable, experienced and thorough architect and builder of Washington.

C. W. BERGNER is making some very extensive improvements at his country residence at Ambler, near Philadelphia, and among other things has contracted with Hitchings & Co. of New York City for the erection of a greenhouse, which is expected to cost about $15,000. It will contain all the modern conveniences for growing plants and flowers and will be built entirely of stone, iron and glass. The base will be of stone, pointed and laid in cement. The various apartments will consist of a rose house 22 x 40 feet, a potting and boiler house 22 x 36 feet, four apartments 18 x 40 feet; another 40 x 50 feet, and a palm house 26 feet in hight. The latter will be octagonal in shape.

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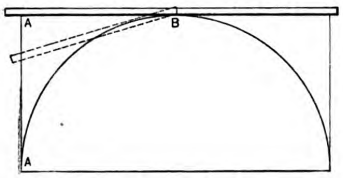
CORRESPONDENCE.

Rule for Making Kerfs.

From H. J. C., *Volant, Pa.*—I notice that "A. B. McD." of Harrison, Tenn., asks in the August number of the paper for rules on kerfing. In reply I would say that suppose the circle is 3 inches larger on the outside than on the inside, take



Rule for Making Kerfs.—Fig. 1.—*One Method Suggested by "H. J. C."*

out as many kerfs from the inside as will consume the 3 inches. These then being placed in position and bent the kerfs will come to a point. Another way is to saw one kerf out near the center of the piece to be bent, then place it on the plane of the frame, as indicated in Fig. 1 of the engraving, and bend it until the kerf at B comes together. The distance on the line AA will be the space between the kerfs. Again, suppose A B C of Fig. 2 is the circle to which the piece is be bent. take a strip as wide as the piece is thick and a few inches longer than the radius of the circle, saw a kerf in and tack the strip on, as shown in the diagram, so that the kerf will come at the point indicated of the line A C. Bend in the direction of B, and the distance from C to E will be the space between the kerfs. In kerfing always use the same saw and saw the same depth every time.

From E. A. P., *Carthage, Ill.*—A correspondent signing himself "A. B. McD.," and whose inquiry was noted in the August issue, will find the following a good rule for making kerfs: Take a strip of the same length as the piece it is desired to kerf and make a kerf near one end. Lay the strip on the floor, fasten the end in which the kerf is made and bend the piece until the kerf meets. The distance the opposite end is from its first position will be the distance between each kerf.

Note.—We also have answers involving the same general principle from "G. T.

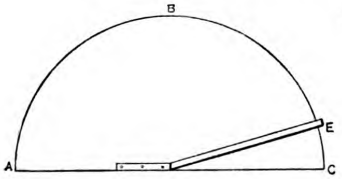
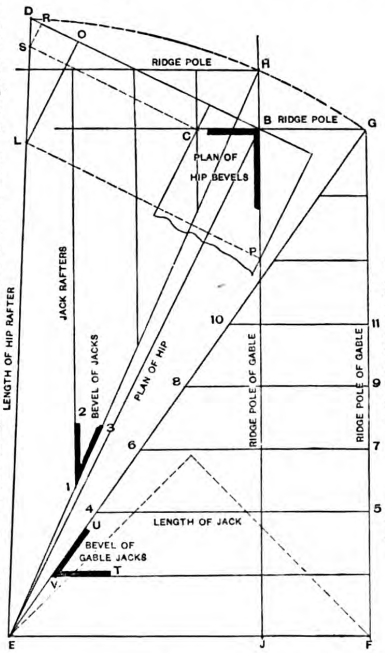


Fig. 2.—*Another Method for Finding the Distance Between Kerfs.*

W.," St. Louis, Mo.: "W. L. C.," Trinidad, Col., and "T. W. M.," Bradford, Pa.

Length of Jack Rafters.

From G. D. I., *W. Philadelphia, Pa.*—I have seen a great many plans submitted by correspondents of *Carpentry and Building*, but all or nearly all have been on the square plan—that is, falling from an angle of 45°. With the permission of the editor I would like to submit the following: Referring to Fig. 1 of the engravings, let E J B represent a triangle of which E B is the hypothenuse, forming the plan of the roof. Erect B D perpendicular to E B and join D E, which is the length of the hip. B D represents the plumb cut and E B the bottom cut. Carry E D to H and square H indefinitely, which gives the length of the common rafters and jacks, terminating at the line E H, and also gives the side cut for the jacks on the main roof 1, 2 and 3. To get the gable, carry from E H to G and connect G E, which is the valley of the gable. Take the run and rise of the first gable rafter, as shown Draw G B, which is the ridge pole. Draw parallel to E J F, and of a distance apart equal to that required for the rafters, a series of lines such as 4, 5, 6, 7, 8, 9, &c., which give the length of the jacks on the gable. T V U is the side bevel required. The next thing is to find the side bevels for the hip, which is the most important. Space on each side, and to the plane of H E D, one-half the thickness where the lines cut B C and B P. Square on to the elevation E D, then in Fig. 2 square from the plumb cut 13, 14, making O P equal to O L of Fig. 1, and S D of Fig. 2 equal to S R of Fig. 1. Square S to C and join



Length of Jack Rafters.—Fig. 1.—*Plan of Roof.*

D C and B P, which gives the cut of the hip to fit C B P. All jacks must be cut for the thickness of hip and ridge lines.

Pay for Making Estimates.

From W. N. H., *Sterling, Ill.*—Answering "S. & R.," Delphi, Ind., whose inquiry appeared in the September number, would say that the usual custom here in estimating on new work is for all who wish to bid for the job to take their chances. They do not expect any pay if their bids are not low enough to secure the contract. We think, however, parties who have contracts to let would not run wild in allowing everybody to bid if they had to pay those who were not successful. Estimating on fire losses, we think, should come under a different head. We have done no little amount of that kind of estimating, both for the insurance companies and also for those who had to stand the loss, but always with the understanding that if we secured the contract for repairing there should be no charge for estimating. With the single exception of an estimate made on a large paper mill last December for an adjuster of an insurance company, we have never failed to receive our pay. In the case named the adjuster went away without settling for the work, and has persistently refused to do so ever since. We did not get the contract, but it was done by the owners of the building. Generally speaking, our acquaintance and dealings with insurance adjusters lead us to believe that they are honorable

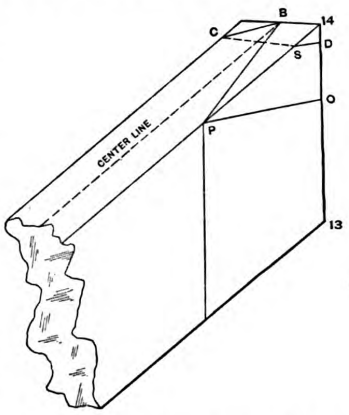
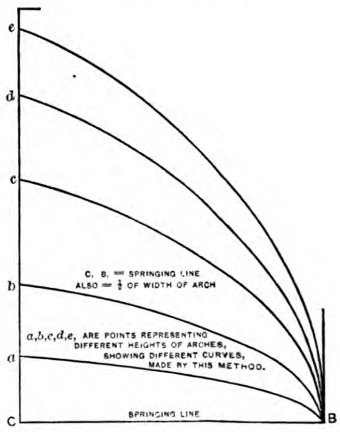


Fig. 2.—*Diagram for Obtaining Cut of the Hip.*

business men, but occasionally we find one who is not, just as "S. & R." did. This makes a pair, if it should happen to be another person than our man, but the distance is not so great but what it might be the same person. We have come to the conclusion that it is best to be sure of your man and not wait until the end, as one dishonest adjuster has placed all the rest under difficulties.

Curves for a Pointed Arch.

From R. H. G., *New York City.*—I send herewith a method of obtaining the curves for a pointed arch which may prove of interest to the readers of the paper. It is



Curves for a Pointed Arch, by "R. H. G."

not the gothic elliptical arch by A. S. Jennings, an arch in which the hight is controlled by the width, published in the January issue of *Carpentry and Building* for 1890, but is one nearly like that given by "E. D. E." in the April issue of 1891. His curves are portions of circles and his

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method of obtaining them in some cases would be very unhandy, as, for example, when the hight of the arch equaled or exceeded half the opening. His points 3 and 4 would be obtained with great trouble. I am of the same opinion as that expressed in the September issue for 1888 in answer to "O. A. H.," "that some mechanical construction would answer the purpose better." By reference to the sketch which I send it will be noticed that there are various lines drawn with the purpose of showing the curves for five different hights of arches, they being all one width. I should like very much to have an expression of opinion concerning the method of obtaining the curves, and also on the curves themselves.

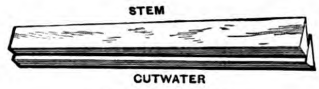
Note.—We have reproduced the sketch of our correspondent, and from an inspection of it our readers will observe that what he has done has been to make use of a well-known plan for drawing elliptical figures. Each half of the arch as it has been drawn is equal to one-quarter of a figure resembling an ellipse. The half of the width of the arch on the spring line would be half of the shorter diameter, while the half of the arch measuring from the spring line to the point would be half of the longer diameter. We, however, lay the diagram of our correspondent before our readers for such expressions of opinion as they may see fit to give it.



Fig. 9.—Section at A of Fig. 1.



Fig. 2.—A Knee.



Stem and Cutwater.

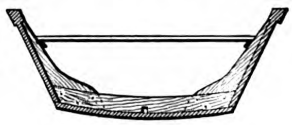


Fig. 10.—Section at M, Fig 8.

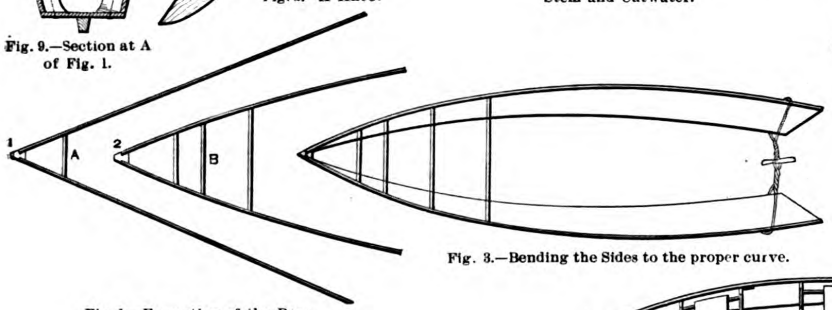


Fig. 3.—Bending the Sides to the proper curve.



Fig. 11.—Section at B, Fig. 1.

Fig. 1.—Formation of the Bow.

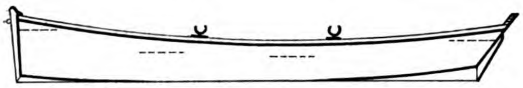


Fig. 4.—Side, Showing the Skeg

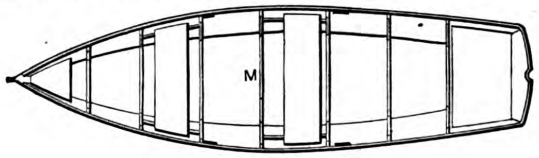


Fig. 8.—Interior View.

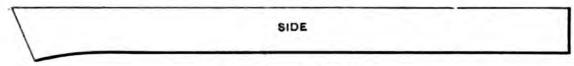


Fig. 5.—One of the Sides.



Fig. 7.—A Piece of the Timber.

Design for a Skiff.—Contributed by "W. S. M."

Design for a Skiff.

From W. S. M., *Tampa, Fla.*—In answer to "T. C. S.," Vox Populi, Texas, for a method for constructing a good skiff, I send herewith sketches of one I have used and found satisfactory. To describe the skiff in detail would, I fear, occupy too much space, therefore I will make my remarks very brief. After working the stem and sides nail them together, as shown in Fig. 1 of the drawings. Give the sides some flare or twist, and nail in the section at A. Draw the stern ends of sides together a little, the lower edge more than the upper one. In order to do this it may be necessary occasionally to put in a temporary brace, placed near the top. The amount of strain given will depend upon the conveniences for manipulating, strength of material and the eye, backed by good judgment, to decide when the proper shape is approximately reached. When the model is decided to be satisfactory nail in the timber and then the two knees shown at B of Fig. 1. A general view of a knee is shown in Fig. 2 of the cuts. Draw the sides together again, and proceed as before. Fig. 3 shows the manner in which the sides may be drawn together and held in position. In nailing the knees to the timber use wrought nails, in order that they may be clinched. For the sides ¾-inch stuff is heavy enough; for the knees and timbers use 1-inch material, and make the bottom of ¾ or ⅞ inch stuff. After the end board is nailed in, turn the boat over and cut off the sides ¼ inch longer than the end board. Cut the stem on the line of the timbers. Cut a gain in each timber 1½ inches wide and ½ inch deep. After dressing the knees, sides and timbers, so that the bottom will touch at all points; nail on the middle board and scribe one to each side, as three ought to cover the bottom. Miter the cutwater with the skeg, as shown in Fig. 4. Turn the boat over again and nail in the ribbing, which should be 7 inches down from the top. The waling should be ½ x 3 inches, clinched through and through, and covering the top ends of the knees. Fig. 5 of the drawings represents one of the side pieces; Fig. 6, the stem and cutwater; Fig. 7, one of the timbers; Fig. 8, an interior view of the boat; Fig. 9, a cross section at A of Fig. 1; Fig. 10, a section taken at M of Fig. 8, while Fig. 11 represents a section taken at B of Fig. 1. Calk all the seams with oakum or cotton batting, and cover the bottom with cold tar applied hot, or use wax made of rosin and tallow. The balance of the boat should be painted. When the skiff is not in use it should be, if possible, kept in the shade.

Dimensions of an Octagon.

From R. P. B., *Wightewright, Texas.*—Will some of the many readers of the paper give me a rule for finding the length of the side of an octagon when the diameter is known?

Miter for an Octagon Joint.

From L. V. V., *San Francisco, Cal.*—I notice in the August issue of the paper that "A. B. McD." of Harrison, Tenn., received very full information in regard to the cut for an octagon joint. I take the liberty, however, of sending a little table which I think will prove interesting in this connection, as well as of advantage to the correspondent named:

No. of sides.	Name of polygon.	Angle of polygon.	Factor of area.	Point on blade.	Point on tongue.
3	Triangle.	60°	0.4330	4	7
4	Square.	90°	1.	12	12
5	Pentagon	108°	1.7204	9 7-12	7
6	Hexagon.	120°	2.5981	10⅜	6
7	Heptagon.	128⅝°	3.6339	10⅞	5
8	Octagon.	135°	4.8284	17	7
9	Nonagon.	140°	6.1818	11⅛	4
10	Decagon.	144°	7.6942	12	4
11	Undecagon.	148°	9.3656	10¼	3
12	Dodecagon.	150°	11.1962	11⅛	3

Angles of Polygons.

Take column five on the blade and column six on the tongue, and the tongue will give the cut. For the area multiply the square of the side by the factor in column 4.

Design for a Brick House.

From A. B. C., *New Westminster, B. C.*—Will some of the readers of *Carpentry and Building* sketch out for me a neat design for a brick house 20 x 36 feet in size and two stories in hight? Such a house as I desire should have two square bay windows, a good heavy cornice and a neat portico over the front door. I would like to have sketches of the details for each part throughout the house, the entire cost to reach about $2000.

What Constitutes a Day's Work.

From A. B. C., *Blaine, Wash.*—In reply to the inquiry by "L. M." of New York, published in the September number of the paper, I would say that a man can lay from five to six squares of 4-inch soft flooring per day, very much, of course, depending upon the size of the room. If it is a small room he will certainly lay less than would be the case if the room were a large one. For hardwood flooring a day's work will average two and a half

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squares. With regard to trimming openings in block casing a man can trim ten openings per day both sides, and can hang and mortise lock eight doors per day. It takes half an hour to hang one pair of sash. The above amounts allow for average work and a day of nine hours.

Combination Book Case and Secretary.

From E. K., *Adrian, Mich.*—I have been a reader of *Carpentry and Building* for nearly nine years and during that period have received much valuable information from its pages. Noticing in the July issue a letter from "J. A. M." of Washington asking for a design of a book case, I take pleasure in presenting herewith drawings of one I made for myself. This, I trust, will fill the requirements of the correspondent, although the expense of it may be more than he would like, as it cost me nearly $50, counting time of dovetailing, making out the bill of materials, building and finishing complete. The book case is made of bastard sawed oak, finished antique and trimmed with polished brass. As will be seen from an inspection of the drawings, there are five spaces for books. Each shelf will contain 12 books 2 inches thick by 10 inches long. There are three drawers of good size and a cupboard under the writing desk where I keep my copies of *Carpentry and Building* and other periodicals. The space for writing material is ample for the purpose and can be divided to suit the taste. The lid being hinged, as shown, rests on a ledge when down and needs no chain or ruled joint to keep it from breaking when leaning on it in writing. The carving on the door is raised and planted on. The carving on the lid of the desk is designed to be sunk into the raised part of the panel. A beveled plate mirror forms the panel above the writing desk. The whole hight of the case when on casters is 6 feet 4 inches. Fig. 1 represents the end elevation of the combination book case and secretary; Fig. 2, the front elevation; Fig. 3, a vertical section through the desk; Fig. 4, a section taken at C of Fig. 2, while Fig. 5 represents a detail of the pilaster and casing at F, and Fig. 6, a section at D. The details which are given herewith will, I hope, be sufficient for any one to clearly understand the construction, so that further particulars are unnecessary.

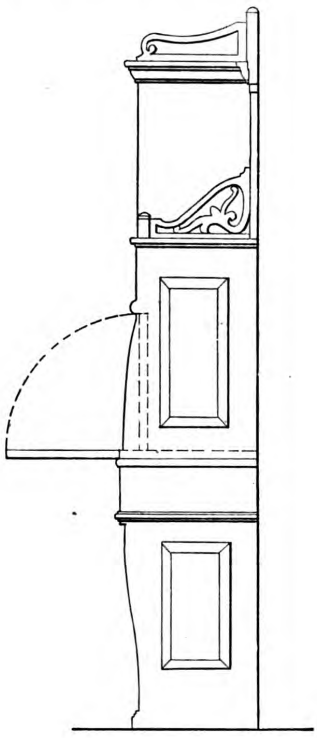

Fig. 1.—End Elevation.

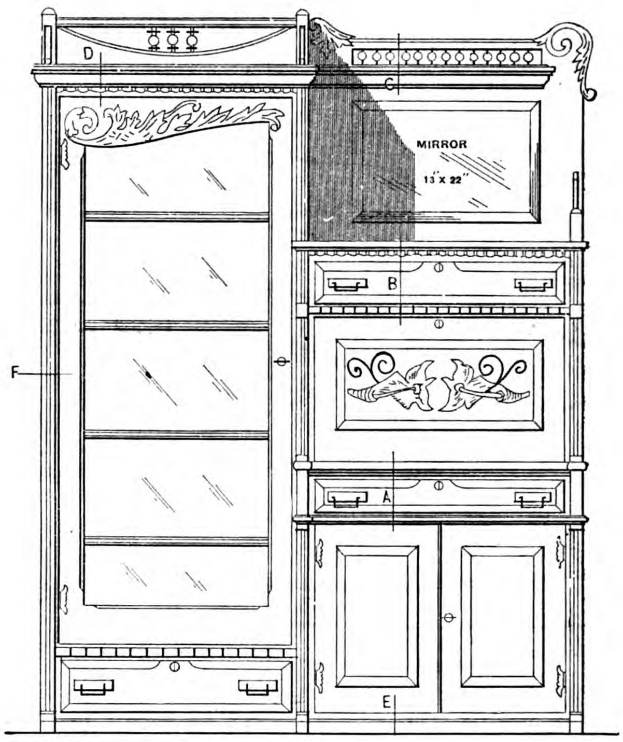

Fig. 2.—Front Elevation.

Design for Book Case and Secretary, Submitted by "E. K."—Scale, ¾ Inch to the Foot.

Perimeter of an Ellipse.

From F. C. P., *Petoskey, Mich.*—In the October number of *Carpentry and Building* "W. F." of Yardley, Pa., asks how to construct an ellipse when the length of the perimeter and one axis are given? In reply I offer the following rule: Divide the length of the perimeter by 1.6 and the the quotient will be the sum of the major and minor axes. When the length of one axis is given the other may be found by subtracting the given length from the sum of the two axes. For example, let it be required to strike an ellipse whose perimeter is 10 feet and the major axis 4 feet. 10 feet ÷ 1.6 = 6 feet 3 inches, the sum of the major and minor axes. 6 feet 3 inches − 4 feet = 2 feet 3 inches, the minor axis, hence the major and minor axes are 4 feet and 2 feet 3 inches respectively. These being known it becomes an easy matter to strike the ellipse by means of a trammel, or by the common method —two pins and a cord.

Cleaning Drawing Instruments.

From F. T. T., *San Francisco, Cal.*—I would like to ask through the columns of the paper how I can clean drawing instruments which have become blackened from disuse?

Note.—Our correspondent does not say whether the instruments have become tarnished or rusty, but in either case we think he will be able to clean them by the use of very fine emery paper. If any of our readers have suggestions to offer touching this point, we should be glad to have them make use of our columns for the benefit not only of the correspondent above, but also for others who may be interested.

Box for Laying Out Sash.

From A. B. C., *Owen Sound, Ont.*—I would like to have some one explain to me how to make a box for laying out sash as used in sash factories. A few sketches on this subject may prove of much importance to other readers of the paper, as well as to myself.

Designs for a Refrigerator.

From T. D., *Havelock, Iowa.*—Will some of the practical carpenters who read the paper kindly give me plans and explain how to build a refrigerator measuring about 10 x 10 x 9 feet? The subject is one which, I think, will interest others as well as myself.

How Granite Columns are Turned.

According to the census reports, granite for columns, balusters, round posts and urns is now worked chiefly in lathes, which for the heaviest work are made long enough to handle blocks 25 feet long and 5 feet in diameter. Instead of being turned to the desired size by sharp cutting instruments, as in ordinary machines for turning wood and metal, granite is turned or ground away by the wedge-like action of rather thick steel disks, rotated by the pressure of the stone as it slowly turns in the lathe. The disks, which are 6 or 8 feet in diameter, are set at quite an angle to the stone, and move with automatic carriage along the lathe bed. Large lathes have four disks, two on each side, and a column may be reduced some 2 inches in diameter the whole length of the stone by one lateral movement of the carriage along the bed. The first lathe

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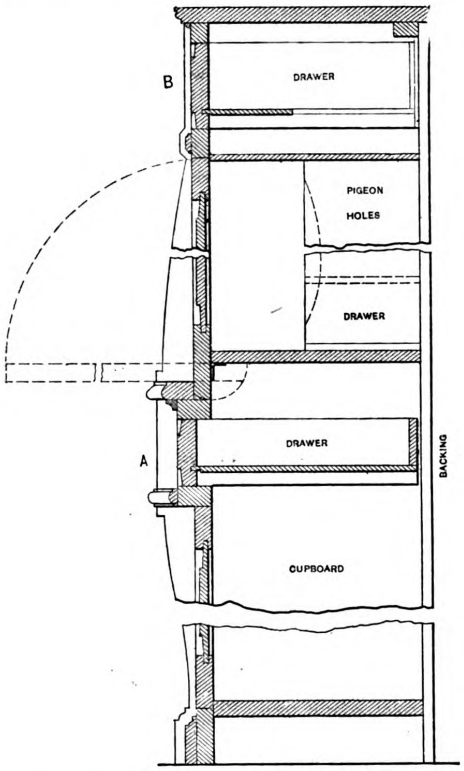
for turning granite cut only cylindrical or conical columns, but an improved form is so made that templets or patterns may be inserted to guide the carriages, and columns having any desired swell may be as readily turned. For fine grinding and polishing the granite is transferred to another lathe, where the only machinery used is to produce a simple turning or revolution of the stone against iron blocks carrying the necessary grinding or polishing materials.

Blocks are prepared for lathe work by being roughed out with a point, and by having holes chiseled in their square ends for the reception of the lathe dog and centers. This principle of cutting granite by means of disks revolved by contact with the stone has been applied to the dressing of plane surfaces, the stone worked upon being mounted upon a traveling carriage and made to pass under a series of disks mounted on a stationary upright frame.



Design for Book Case and Secretary.—Fig. 3.—Section of Desk.—Scale, ⅛ Inch to Foot.

NEW PUBLICATIONS.

THE METAL WORKER ESSAYS ON HOUSE HEATING by Steam, Hot Water and Hot Air, with Introduction and Tabular Comparisons, Arranged for Publication by A. O. Kittredge. 288 pages; 7 x 9½ inches; bound in cloth. Published by David Williams, New York. Price, $2.50.

The essays comprised in the volume are some of the results of a prize contest conducted by *The Metal Worker* some time since. They include the prize essays and selections from the best of the others. The foundation of all the essays is a house the floor plans and elevations of which were the result of previous competitions conducted by *Carpentry and Building*. The elevations and plans of this house were printed on separate sheets, adapted to receive at the contestants' hands lines indicating the position of heater, runs of pipes, location of radiators, &c., thus insuring a uniformity in presentation, and also holding different competitors to exactly the same conditions. The result, therefore, is a book in which are shown, 1, different means of heating the same house, between which may be instituted various comparisons, and, 2, several different interpretations of each of the several methods, between which also instructive comparisons may be instituted. The work is not a mere theoretical consideration of principles and a statement of facts gained by inquiry in the trade, but, instead, a collection of essays by practical men, each showing how one man would go about heating the building in question, using those means with which he is best acquainted in practice. Features of the book which are not the least important among its numerous merits are the lists of items and statements of cost accompanying the different essays. Never before in the history of the heating trades has there been such a collection of information directly from the practice of those who are actively in the business as is contained in this volume. The essays in the volume are arranged under four sections. The first relates to combination systems and includes two essays, one on a steam and warm air and the other on a hot-water and hot-air system. The second section relates to steam heating systems and covers four essays. The third treats of hot-water circulating systems, including three essays, the latter being followed by a summary of the steam and hot-water heating competition. The fourth section relates to hot-air systems, and in it are printed six essays. At the end of the volume are chapters on the location of furnaces, size of heating pipes with tables, and comparison of estimates with tables. The book is illustrated with 82 full-page plates showing the arrangement of apparatus and the runs of pipes, while marginal notes on the pages serve to index the volume and facilitate reference.

Pitch of Roofs.

Another warning to architects is to be found in a story related in the *Schweizeriche Bauzeitung*. A school house lately completed near Leipsic was roofed with "Falzziegeln," or large tiles, having the edges turned alternately up and down, so as to lock over each other. Tiles of this sort form a light, cheap and durable roof, and are very much used all over Europe, besides being exported by millions to South America. In this instance the tile roofing leaked in rain storms, and, after vain efforts to keep it tight by puttying the lock joints with a sort of cement employed for the purpose, experts were employed by the town authorities to determine whose fault it was that the roof would not keep out the water and who should be made to pay the damages. The experts decided that the contractor could not be made to pay, as the tiles were of good quality, and well put on, and that the responsibility must fall on the architect, who had designed his roof without sufficient pitch to carry the water away. It is true that the pitch of the roof was one-fifth to one-sixth of the span, and that the text books say that a pitch one-eighth to one-tenth is permissible with such tiles, but the experts concluded that one-fifth pitch was not sufficient to keep water from penetrating such roofing, and that the architect ought to have known this, no matter what the text books said.

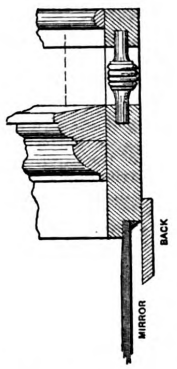


Fig. 4.—Section at C of Fig. 2.—Scale, ¼ Inch to the Foot.

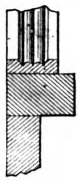


Fig. 5.—Pilaster and Casing at F.—Scale, ¼ Inch to the Foot.

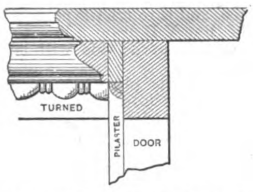


Fig. 6.—Section at D.—Scale, ¼ Inch to the Foot.

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MASONRY AND STONE CUTTING.*

CORBEL ARCHES.—I give the name of Corbel Arches to the arches called in French *trompes*—that is, arches which carry structures projecting beyond the face of the wall. They are of three sorts: Those placed within an inside angle of two walls, connecting, for instance, the parapet of a bridge with the embankment wall by a splayed angle, as in Figs. 180 and 181; those which support the projecting angle of two walls, where a splay has been formed below; those which support a semicircular turret projecting beyond the face of a wall.

Skew Corbel Arch in the Interior Angle of Two Battering Walls.—In Fig. 174 we have the plan of a battering wall, of which the trace of the exterior face is the line Y A B. A triangular space, A S B, is out of that wall, and we are asked to cover this space by a corbel arch in order to carry a wall above.

The soffit of the corbel arch will necessarily be conical, and although the triangle to be covered is not isocele, yet we can adopt for the soffit a cone of revolution or right cone. To do this take S C = S A, describe on diameter A C a semicircle placed in a vertical plane; let this circle be the directing line of a cone of which S is the apex. This cone has only to be prolonged until it be cut by the face of the wall to obtain the outline of the face arch.

We give the batter of the wall on a section, Y Z, taken on the line Y Z at right angles with the wall face. Now any point, d', taken on the base circle of the cone, will have its plan, d, on the line A C; and on the section, Fig. 175, its elevation, d'', will be at the same hight above the ground line Y X as d', Fig. 174, was above the ground line A C. S'' d'' will be the projection on the section of a generator of the cone; that generator prolonged cuts the wall face in D'', Fig. 175, the plan of which is D, Fig. 174, on the generator Sd. Similarly, a series of points are found which give the intersection of the wall face by the soffit of the arch.

Instead of drawing the elevation of the raking wall face, we turn down the wall face itself around its horizontal trace, so as to get the real shape and dimensions of what is delineated on its surface. In doing this the points, D D'', E E'', describe arcs of circles, of which the radii are D'' Y, E'' Y . . . . the planes of these circles being at right angles with the hinge of rotation A B. This gives us D' E', ... the real shape of the face arch is, therefore, the curve A E' D' B, Fig. 176.

The tangent to any point, D', of this curve is the intersection of the plane of the wall face with the plane tangent to the cone in that point. To find this intersection, draw the trace of the tangent plane to d' on the base of the cone; where this trace cuts the line A C the horizontal trace of that plane will pass another point, being the apex S. Then draw the horizontal trace, and through the point where it cuts the line Y B draw a line to the point D' on the curve; this will be the tangent required.

In the point A, the plane tangent to the cone is vertical, its intersection with the wall face is A S on plan, and Y Z on the section, Fig. 175. To draw it on the turned down wall face, Fig. 176, take a point, x on plan and Z on elevation, and draw its position in Fig. 176; A x', Fig. 176, is the tangent to A. The tangent to B is found in the same way. These two tangents must necessarily intersect one another on the vertical drawn from S.

To find the highest point of the curve, the one where the tangent is horizontal, note that the trace of the tangent plane will pass through S, and be parallel to the ground line A B. Draw the trace till it cuts A C, and from the point of section draw a tangent to the circular base of the cone; this will give u'. on the generator of which is U', the highest point of the face curve. As the point of section may be too far, we need only find the mid point, ω, which we would use to draw the tangent according to Fig. 182. This would give us the point U' on the circle.

A still shorter method of finding the highest point of the curve is based on the following property of conic curves: The two tangents A S and B S, taken through the extremities of the chord A B, must intersect one another on the diameter conjugate to A B; and the tangent in that point of the curve will be parallel to A B. Therefore, join S to the mid point, W, of A B, and S W will be the diameter which will contain the point U.

The bed joints are taken through the center line S O I; but the joint lines of the arch must neither be equidistant on the face arch nor on the circular section of the cone. In the first case the soffits of the arch stones would be of strikingly different widths. In the second case the joints on the face arch would be too irregular. The best way is to draw both systems of division, and then take intermediate points which give a sightable division. Then the arrises of the bed joints on the face arch will be I D' H', I E' F', . . which are stopped by the horizontal joints of the wall. The face mold of one of these arch stones is, therefore, D' E' F' G' H', Fig. 176, from which the horizontal projection can be drawn by taking down perpendiculars to A B, until they meet the lines I E and I D. It will be safer to bring the points back by arcs of circles on the section, X Y, and then deduce from this the plans of the points.

The Eye of the Corbel Arch.—If the bed joints were carried back to the apex of the cone, they would present an unsafe feather edge in that point. It is usual to stop them at a distance of 8 to 10 inches from the apex, and form the remainder of the vault out of one stone; this is the eye of the arch. To make the joint line of the eye parallel to the face arch, cut the conical soffit by a plane, $z\,y\,a\,b$, parallel to the wall face. On Fig. 175 the generators of the cone are cut in n'', m'', . . . of which the planes are n, m, . . . This gives the projection $a\,n\,m\,b$ as the joint line of the eye where the soffits of all the arch stones will stop. The surface of the joint itself must be normal to the soffit of the arch. Therefore, find the normal in the point m by turning down the generator $s\,m$ on S B; the point m will then come to m'''. The normal m''' L will be the turned-down normal, and as L is on the center line, the normal itself will be projected in L m. Similarly, normals through any number of points can be found, and thus the skew surface of the eye joint will be defined.

To complete the eye stone we must let it be comprised from front to back between the vertical planes $a\,b$ and V P (without yet determining its lateral faces), and then find the intersection of the top plane of the stone with the skew surface of the eye joint. Use as elevation plane the circular section of the arch, for on that plane the normals are projected on the radii of the circle. Let the upper face of the eye stone be on elevation the line R' M'; then the intersections of that line with the radii of the circle give us the elevations of points of the intersection required, from which we deduce their horizontal projections on the plans of the normals, and draw the curve M N R. In case the projecting lines met at too sharp an angle to be able to define exactly the point, as is the case for the point N, then turn down N' round center line O S, and get N''' on the turned-down normal Kn'''; then turn back to N on Kn.

To avoid a break in the joints of the arch stones where they come in contact with the eye, make each of the side arrises of the eye coincide with a bed joint. Therefore adopt M P and R V, drawn parallel to the center line O S, as lateral faces of the eye. To finish the eye stone we have to find the intersection of these lateral faces with the skew joint of the eye. The normals $a\,a$ and r R are cut by the lateral face in the points a and R, the last of which, when turned down on the mold, comes to R_2. Constructing several intermediary normals, and finding their intersection, we obtain the lateral mold $a\,R_2\,V_2$ V. Similarly we obtain the other lateral mold P $\beta\,M_2\,P_2$; lastly, to cut the eye stone, the real shape of the joint line $a\,r\,n\,m\,b$ is required, for which turn down plane $z\,y\,a\,b$ round $a\,b$, as we have done for the curve A E' D' B.

Now, to cut the eye stone, form the prism that contains it; then cut off the front plane with the help of a bevel of angle, $z\,y$ X. On that face mark the outline of the curve $a\,r\,n\,m\,b$, Fig. 177. On the upper plane place the mold V R N M P, and on the lateral sides the molds V $a\,R_2\,V_2$ and P $\beta\,M_2\,P_2$. Then work the skew surface of the eye joint by means of a straightedge guided by the outlines drawn and by guiding points, such as R r, N n, N m . . . . marked on the molds. On the lower plane place the triangle, a S b, taken from the plan, Fig. 174, and work the conical soffit with a straightedge.*

Bed Molds of the Arch Stones.—The arch stone abut partly on the skew surface of the eye joint and partly on the upper plane or the side planes of the eye. The bed joints will, therefore, be finished by portions of normals to the soffit, and by straight lines parallel to the center line S O. For instance, for the arch D'E'F'G'H' on the wall face, the projections of the beds will be F E n N Q f F and H D m M P h H. To get the molds thereof turn them down round, S O, and note: 1. That each point describes a circle perpendicular to the hinge S O. 2. That K and L, where the normals cut the hinge, remain unmoved. 3. That the lines I E F and I D H will always pass through the point I, and have their true lengths shown in the lines I'E'F' and I'D'H, Fig. 176. The molds are then F'''E'''n'''N'''Q'''f'''F''' and H'''D'''w'''M'''-P'''h'''H'''.

Soffit Operation Planes.—In cutting the arch stones, to avoid a great loss of material, we must begin by working an operation plane on the soffit of each stone, and start from this plane to work the bed joints and the wall face by means of bevels. Instead of developing the cone which forms the soffit of the arch, develop the pyramid formed by planes stretching from joint to joint. The easiest way to produce this development is to use the chords of the division to the base circle. Take, therefore, A S, Fig. 174, as radius, and draw a circle, Fig. 178, on which carry the lengths of the chords C d', d e', . . . , Fig. 174; connect these points with the center S, Fig. 178, and you have the direction of the joint lines. On these lines carry their real lengths S B, S D''', S E''', . . . , equal to the lengths given by the bed molds, Fig. 174, then connect the points B, D''', E''', . . . by straight lines, which will be found to be equal to the chords drawn on Fig. 176. From the joint lines will have to be left out the lengths Sb, Sm''', Sn''', . . . which belong to the soffit of the eye.

In order to work the skew surface of the joint where the arch stone abuts upon the eye, we must get the intersection of the soffit operation plane with that skew surface. To do this, cut both the operation plane and the cone by a plane passing through the center line and through a point γ' taken anywhere on the chord d' e', Fig. 174. The section of the operation plane will be S γ, and of the cone S δ, which meets the curve of the eye in ε. Produce the normal $\varepsilon\,\lambda$; the point ϕ where it cuts S γ is a point of the intersection n, ϕ, m of the operation plane with the eye joint. To draw this curve on the operation

* Continued from page 256, October issue.

* In the diagram the lines relative to the eye are shown full, as if the eye were drawn alone, uncovered by the arch stones.

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plane, Fig. 178, turn down the line S γ t o S γ'', Fig. 174; then the turned-dow normal $\lambda\ \varepsilon''$ will cut S γ'' at a distance φ'', which carry on the line S γ', Fig. 178, by which you obtain one point of the curve $n'''\ \phi''\ m'''$ required. In practice only these last operations are delineated, and the projection $n\ \phi\ m$ is not drawn.

To work the wall face of the stone with a bevel, the angle comprised between the soffit operation plane and the wall face must be found. These two planes and that of the bed joint form a triangular pyramid, of which the apex is the point E, and of which the angles comprised between the arrises are known; therefore we can find the angle comprised between the planes. In Fig. 178 draw the angle D''' E''' F' equal to the angle D' E' F' of Fig. 176, and another angle S E''' F''' equal to the same angle on the bed mold. When these triangles turn round their respective sides S E''' and E''' D''', the points E''' and F' meet on a vertical over ω; the vertical over ω forms with $\rho\ \omega$ a rectangular triangle, of which the hypothenuse is equal to ρ F'; this triangle, turned down round the line $\pi\ \rho\ \omega$, gives us the triangle $\rho\ \omega\ \zeta$, and the angle of the bevel is therefore $\zeta\ \rho\ \pi$.

To work the stone, Fig. 179, D' E' F' G' H' on face, select a stone that will comprise it, which must be judged from the projections on Figs. 174 and 175. Dress the face of the soffit operation plane, and with the help of the mold, Fig. 178, draw thereon the outline D $m\ \phi\ n$ E γ D, Fig. 179. Then with a bevel of angle $\pi\ \rho\ \zeta$, Fig. 178, work the wall face of the stone, one branch of the bevel sliding on the operation plane, while the other branch is held normal to the chord D γ E. On that plane of the wall face draw the outline D E F G H; then work the plane of the upper bed joint through the lines E n and E F marked on the stone, and draw thereon the mold E n N Q f F. The bed joint might also be dressed with the help of a bevel equal to the angle comprised between it and the soffit operation plane, an angle easily found in Fig. 178. The lower joint is worked in the same way as the upper joint, and its mold is also drawn thereon.

Now, guided by the lines of the bed joints, work the plane P M θ N Q gradually until the template M θ N, taken from Fig. 174, can be placed thereon. Then work the skew surface M $m\ \phi\ n$ N with a straightedge, guided by the curve M θ N and $m\ \phi\ n$, and passing by the connecting points M and m, θ and ϕ, N and n, taken from Fig. 174. On this skew surface delineate the curve $m\ \varepsilon\ n$ by carrying on each generator $\phi\ \theta$ the length $\phi\ \varepsilon$ equal to $\varphi''\ \varepsilon''$ of Fig. 174. Lastly, excavate the conical soffit of the stone guided by the lines $m\ \varepsilon\ n$ and D δ E, keeping the straightedge upon the corresponding points D and m, δ and ε, E and n.

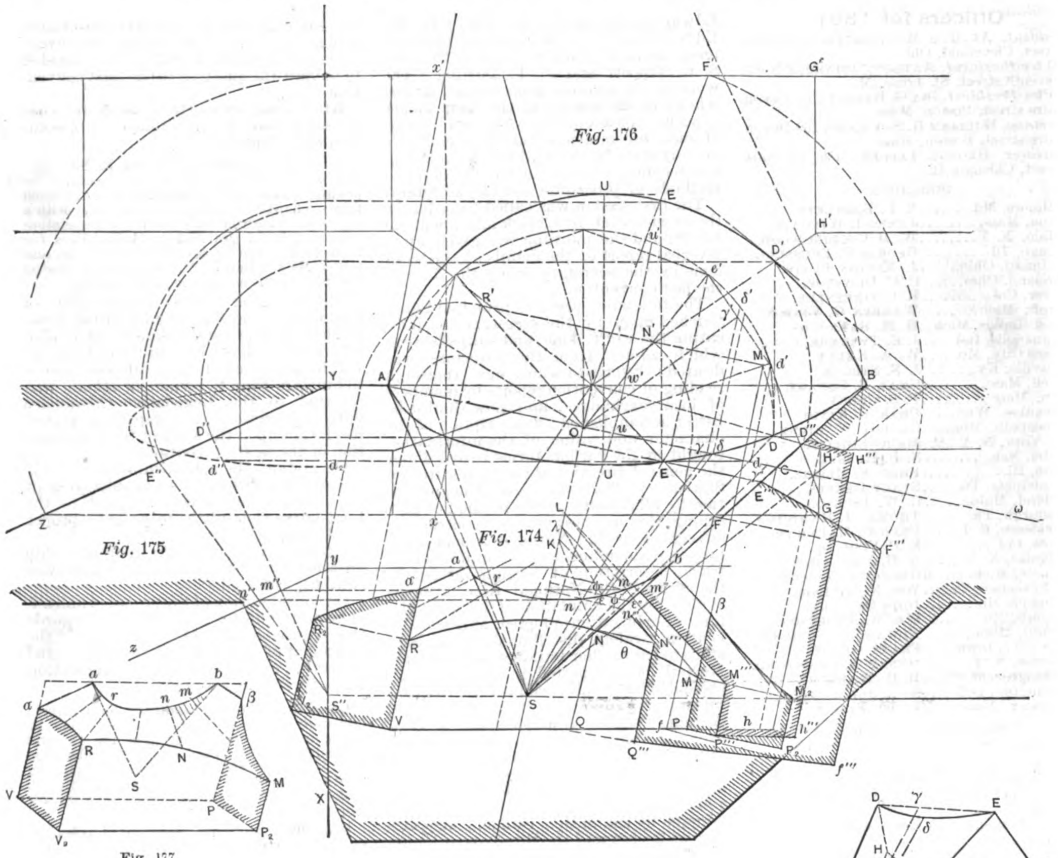

Fig. 177.

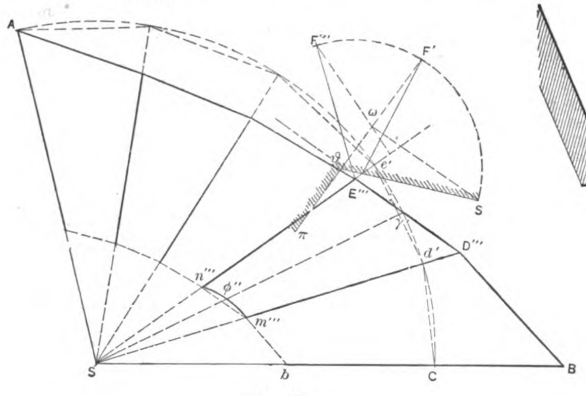
Fig. 178.

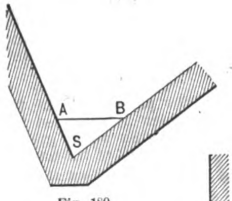
Fig. 180.

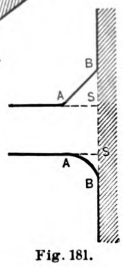
Fig. 181.

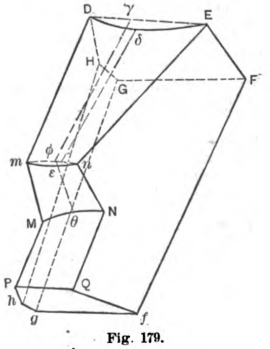
Fig. 179.

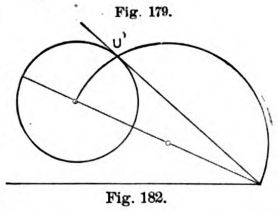
Fig. 182.

Masonry and Stone Cutting.—Figs. 174 to 182 Inclusive.

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Committee on Resolutions.

J. MILTON BLAIR, Builders' Exchange, Cincinnati.
J. B. WARE, 157 Ottawa street, Grand Rapids.
CHAS. F. KINDT, 1 Grand avenue, Milwaukee.

Committee on Statistics.

JOHN DE CLUE, Ninth street, St. Joseph.
W. D. COLLINGWOOD, Builders' Association Exchange, Buffalo.
VALENTINE JOBST, Builders' Exchange, Peoria.

The Mid-Year Meeting.

The mid-year meeting of the officers, directors and members of standing committees of the National Association of Builders was held in Cleveland, September 28 and 29, the following delegates being in attendance. Officers: A. McAllister, Anthony Ittner, Ira G. Hersey, Wm. H. Sayward, George Tapper. Directors: George C. Prussing, Chicago; C. C. Dewstoe, Cleveland; Warren G. Vinton, Detroit; P. S. Curry, Lynn; Chas. F. Kindt, Milwaukee; George W. Libby, Minneapolis; N. B. Hussey, Omaha; Stacy Reeves, Philadelphia; Thos. J. Hamilton, Pittsburgh; F. C. Markham, Providence; H. H. Edgerton, Rochester; Wm. M. Anderson, St. Louis; Edward E. Scribner, St. Paul; H. W. Eddy, Worcester. Members of Committees: John J. Tucker, John S. Stevens, S. D. Tippett and J. T. Darling. The work of the meeting was confined almost wholly to discussions of the best means to secure the adoption, by the local bodies, of such recommendations as have been already made by the National Association, and recommendation by the directors of methods of procedure for the secretary.

The first session was called to order by the president at 10 o'clock a.m., September 28, and the morning was given up to a verbal report of the details of the work done by the secretary since the date of the last convention.

The following are the principal topics touched upon by the secretary, as indicating the work done and subjects upon which advice from the directors was desired: Efforts to secure more thorough reading of convention reports by members of local exchanges, and how shall it be better accomplished; a description of the character and value of the information sought by the various forms issued under the general direction of the Committee on Statistics; efforts to secure the application by filial bodies of the method of governing the business of sub-contracting advocated by the National Association; proposed amendment to the uniform contract; description of foreign interest in the affairs of the National Association as evinced by the emulation of its example; form of arbitration adopted at fifth convention, widely distributed among both affiliated and other builders' associations; McNeil case (reported in October issue) presented in detail; conditions existing in new exchanges, Chattanooga and San Antonio; *résumé* of happenings in local exchanges since last convention; description of work done in the Builders' Exchange; suggestions received from local associations for consideration at the convention; details of apprenticeship system adopted by the Mason Builders' Association of Boston and the Bricklayers' Union No. 3.

The foregoing subjects, with others of a distinctly clerical nature, were presented as briefly and succinctly as possible, in order that the ground might be rapidly covered.

The first business of the afternoon was the passage of the following resolution, which is intended to be the means of bringing about greater familiarity with the work of the national body:

Resolved, That the secretary be instructed to request filial bodies to hold special meetings at which the business of the National Association shall be discussed.

The secretary spoke at some length upon the desirability of securing the adoption of the code recommended by the National Association for the government of subcontracting by filial bodies, and the general consideration of the subject was full and thorough. The secretary was finally directed to recommend to all filial bodies that they hold meetings at least as often as once each month, for the purpose of definitely considering such subjects as are recommended by the National Association as well as its general proceedings.

The secretary was allowed full discretion regarding whether or not reduced rates of fare for delegates attending the next convention should be procured from his office, although such an effort on his part was deemed unwise, owing to the fact that all delegates would be forced to use the Lake Shore road connections, and would doubtless be able to secure reduced fares from local points to advantage, if the same should be considered desirable. The subject of entertainment at conventions was discussed, and it was decided to submit the question to the next convention.

After considering the "McNeil" case at some length, the following resolution was adopted:

Moved, That 5000 copies of the McNeil case, as presented to the mid-year meeting, be printed, and a sufficient number be sent to each filial exchange to supply every member with a copy, and also that the National Association owes a debt of gratitude to McNeil Bros. for undertaking the prosecution of the case, and to the Master Builders' Association of Boston for its valuable assistance in the matter.

The question of the desirability of formulating some recommendation looking toward the establishment of a plan whereby dealers in building material will be influenced to give different prices to builders than to owners or others, was referred to the Legislative Committee with instructions to prepare a proper resolution upon the subject for consideration of the next convention.

On motion the establishment of trade schools as a subject for consideration at the next convention was referred to the Legislative Committee to prepare proper resolutions.

The consideration of the apprenticeship question at the next convention was similarly referred.

On consideration of the proposed amendment to the uniform contract, as regards the clause in Article 2 reading, "the judgment of the architect *being* fair and impartial, &c.," the following resolution was offered and adopted:

Resolved, That the Committee on Uniform Contract on the part of this association be instructed to secure a meeting of the General Committee in order that special consideration may be given to the desirability of changing the twelfth word in the sixth line of Article 2, from "being" to "if," or some other clearer word.

The request of the Cincinnati Exchange that the establishment of equitable lien laws be a subject for discussion at the next convention was referred to the Committee on Lien Law. Adjourned.

TUESDAY MORNING.

The treasurer reported $4311.21 in the treasury. It was voted, upon consideration, that the National Association assume the traveling and hotel expenses of directors and committeemen in attendance at the mid-year meeting.

The Committee on Lien Law reported progress and presented a list of questions on the subject that are to be asked of each exchange.

The greater part of the session was devoted to the consideration of the lien law, the discussion being principally upon the question whether a lien law is desirable or not.

The following resolution was proposed and adopted:

Resolved, That the Board of Directors of the National Association of Builders hereby express their appreciation of the efforts of the publishers of *Carpentry and Building* to disseminate the special work, news and information of the National Association, and it is hoped by the Directors that members of filial bodies will subscribe for this periodical, and they are urged to carefully read the "Builders' Exchange" matter therein contained and prepared for their particular information and instruction.

The remainder of the session was devoted to the consideration of methods for procuring statistics relating to the building trades.

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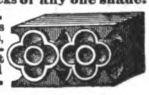

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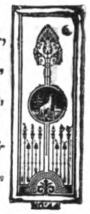

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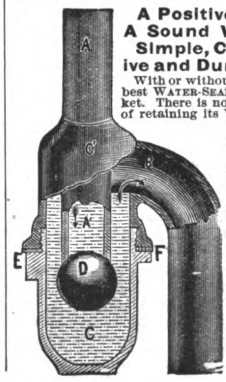

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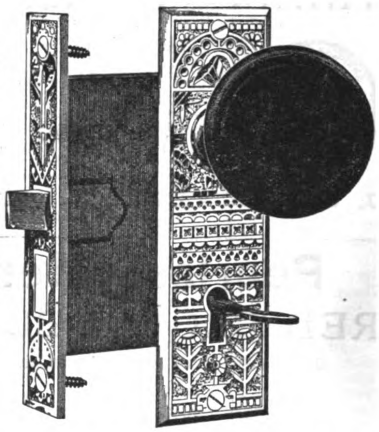
Emerick and Cannon's patent and other Dumb Waiter Fixtures.



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A special feature of this Lock and Knob with combined Escutcheons is that the **Screw** in the Escutcheons goes above and below the **mortise,** making a strong and durable trimming at a moderate cost.

The above in all Styles and Finishes.

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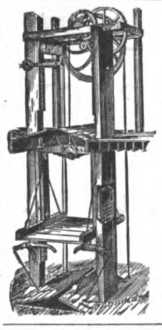

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AN EIGHT-YEAR-OLD CHESTERFIELD.—A little eight year old Irish boy in one of our public schools was reproved by his teacher for some mischief. He was about to deny his fault when she said: "I saw you, Jerry." "Yes," he replied as quick as a flash, "I tells them there aint much yous don't see wid thim purty black eyes of yourn." That was the soft answer that turned away wrath, for what lady could resist so graceful a compliment?

A Boston preacher, in speaking of the danger of permitting the Bible to be crowded out by the newspaper, perpetrated the following pun: "Men, nowadays," said he, "are like Zaccheus—desirous of seeing Jesus, but cannot because of the press."—*Printer's Circular.*

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TAINTOR SAW SET.

The bending of a saw tooth is not setting it, and those mechanics who only bend their saw teeth and do not set them would be surprised to find how much easier and cleaner their saws would cut if perfectly set.



Patented Oct. 9, 1888.
May 5 and 19, 1891.

Each Taintor Saw Set is put up in a separate wooden box as shown below.

In order to give mechanics an opportunity to try the set before purchasing, Narrow Saws are furnished to Hardware merchants.



Saws Furnished to Try Saw Set.



Method of Putting Up Saw Set.

Ask your Hardware man to show you the Taintor Saw Set and let you try it. You will then see the principle on which it is made and the perfection of its work.

WHAT EXPERT SAW SETTERS SAY:

WESER PIANO COMPANY,

524 West 43d St., New York, Oct. 19, 1891.

TAINTOR MFG. CO.:

I have been setting saws for 35 years and have never found a saw set to equal yours. It does all that is required for its use and believe it has no equal.

A. F. NYSTROM.
Fly finishing foreman of Weser Piano Co.

FROM A PATTERN MAKER.

330 East 58th Street, New York, September 18, 1891.

TAINTOR MFG. CO.:

Gentlemen: I am acquainted with and have used most of the Saw Sets on the market, but the only one that I would recommend or use is the Taintor.

Yours respectfully, JOSHUA D. DAY.

MORSTATT & SON,

Manufacturer of Shutters, &c.,
227-229 West 29th St., New York.

TAINTOR MFG. CO., New York:

We have used your Saw Set and I never found one that worked so well. We think it perfect. We have tried everything for setting saws, but we go no further. MORSTATT & SON.

E. U. KINSEY,

Manufacturer of Fancy Woodwork, &c.,
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TAINTOR MFG. CO.:

Gentlemen: The Taintor Saw Set came duly to hand, and during the three weeks I have had it I have submitted it to very severe tests, and I have not found it wanting in any particular.

I have seen a great many sets and am familiar with nearly all devices used for setting saws, and yours is the set I would use in preference to all other methods. The claims you make for it are fully met.

I predict that it will be a standard with the best of workmen as soon as it becomes known. *I cannot say too much for the Taintor Saw Set.* Yours truly, E. U. KINSEY.

FROM JOURNEYMEN CARPENTERS AND BUILDERS.

JOHN CAMPBELL, So. 4th Street and Bedford Ave., Brooklyn, says: "It is the most perfect set I ever saw. $2.50 should be the price, but you can't buy mine back for $5.00 unless I am sure of getting another."

W. H. BREWER, Elizabeth, N. J., says: "I have been surprised to find how much smoother and easier my saws have cut since I have been setting them with the Taintor Saw Set.

HOW TO GET THE TAINTOR SAW SET

Ask your hardware dealer to show you the Taintor Saw Set. If he hasn't t in stock he will know how to get it for you. If he is loaded up with the old kind of sets he may tell you that he has a cheaper set that is just as good.

INSIST on seeing the Taintor, after which if you want the cheap set you can buy it. But if the dealer thinks that he knows what you want better than you know yourself, send us $1.50 and we will send it to you, expenses paid, and if after a trial of not more than 30 days you are dissatisfied, return the set to us, you paying the express charges on its return, and we will send you the money paid us.

TAINTOR MFG. CO.,

WIEBUSCH & HILGER, Ltd., Sole Agents, 84 Chambers St., New York.

(Over.)

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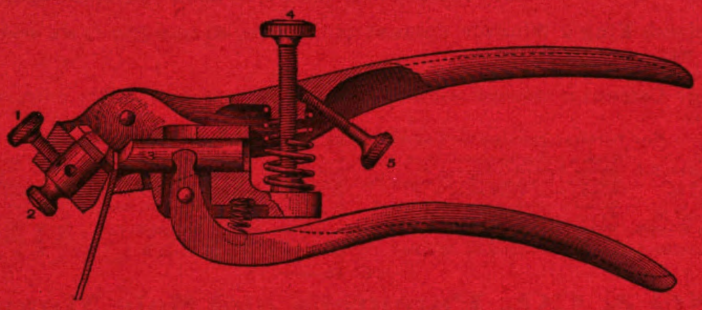
EVERY GOOD MECHANIC CAN SEE



That the TAINTOR SAW SET differs from all others;
That both of its handles move in doing the work;
That the lower handle first clamps the tooth;
That then the upper handle bends the tooth;
That the work is done by one compression of the handles;
That the Saw Set adapts itself to the tooth and saw;
That the points of the teeth are protected;
That they are bent as desired without rolling or curling;
That the Saw Set will not break the teeth;
That it will not slip from the teeth;
That it is not necessary to put the saw in a vise;
That the tooth is left in perfect shape;
That the teeth are squeezed in setting and will not spring back;
That the teeth are in plain sight while being set;
That teeth from 16 points to 4 points can be set;
That a saw as narrow as 5–16 of an inch can be set;
That it makes the saw cut smoother and easier then any other set;
That the adjustments are quickly changed;
That the gauges when set cannot move;
That it is made on correct principles;
That it is well made, with no shaky parts;
That every part is nicely fitted;
That all of these qualities are essential in a perfect saw set;
That it is designed for the best mechanics;
That it does not compete with inferior tools;
That it is well worth $1.50;
That every Hardware dealer should handle them.

TAINTOR MANUFACTURING CO.

WIEBUSCH & HILGER, Ltd., SOLE AGENTS, **84-86 Chambers St., New York.**

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The plastering does not chip or pit, and any mason can apply it.

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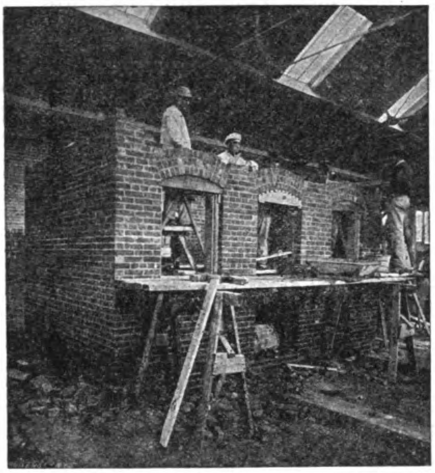

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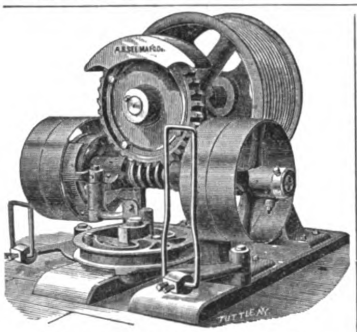

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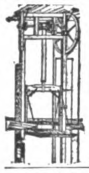

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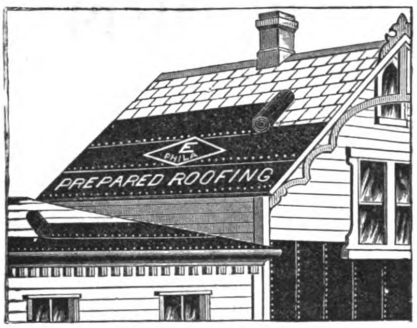

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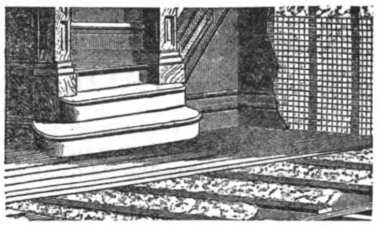

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The important features of our recent improvements, for which patents have been allowed in this Country and in Europe, are described in our new circular, which, with samples, will be sent free by mail.

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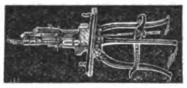

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CARPENTRY AND BUILDING

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The Builders' Exchange.
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96-102 READE STREET, NEW YORK.
W. H. SAYWARD, - - - - - SPECIAL.
SECRETARY NATIONAL ASSOCIATION OF BUILDERS,
166 DEVONSHIRE ST., BOSTON, MASS.

DECEMBER, 1891

The "Copper" House.

A prominent feature of this issue is an article descriptive of what has lately been called in New York and vicinity the "copper" house. The name was given to it during the time it was in process of erection and is the compliment which the public pays to something unusual in building construction and ornamentation. The exterior embellishment of copper, however, is not the only striking feature about the building. The frame work, the manner in which the floors have been laid, the fire-proof construction and the method of heating, as well as other features, command attention. Our illustrations and description are sufficiently complete to give the reader a very clear idea of the appearance of the house, as well as a conception of the construction in all its various details.

Carpentry and Building for 1892.

With this issue of *Carpentry and Building* is closed the thirteenth volume. Standing as we do at the close of one year and on the threshold of another, it is only natural that something should be offered concerning our plans for the future. It has long been the custom to issue prospectuses about this season, setting forth the leading features the new volume is to possess. We have never observed this plan as fully as some, for we believe that each volume finished is the best promise that can be made for that which is to come. We are conscious of some improvement in *Carpentry and Building* accomplished during the months of the year just closing, and we feel certain that the new year will witness still further advance. We have no important changes to announce, nor shall we in this place attempt to enumerate any special articles which we have arranged for publication. Such features more properly belong to the advertising pages, and in another part of this issue will be found a brief outline of what we have planned for 1892.

Subscriptions.

A large number of subscriptions expire with our December number in each year, and it is our custom to take names off the list as soon as the time is up. Therefore those who are tardy in renewing their subscriptions subject us to a considerable amount of work which promptness upon their part would obviate. There is in the first place taking the name from the list, and then when the renewal comes in a few days, or perhaps a few weeks, later, restoring it to the list. It would be a favor to us in the sense of lessening work and avoiding chances of mistakes to have all those subscribers whose time expires with the present number remit promptly. When sending in your order for the new year please remember that the editor will be very glad to have a word from you concerning any questions which have come up in your every-day business, your opinions concerning different features of *Carpenty and Building*, or a discussion upon some point that may seem to be of interest. Our wishes for a prosperous and happy new year are extended to all our readers

The New Unity Building.

Among the tall structures rapidly approaching completion in the city of Chicago and one which deserves more than passing attention is the new Unity Building, located on Dearborn north of Washington street. This structure is built with cast-iron columns and steel beams supporting the floors, with columns braced with iron diagonal rods. The foundations are made of steel beams and rails bedded in concrete. The supporting cast-iron columns are constructed with a factor of safety of ten, while the customary factor for cast-iron columns in buildings is said to be only six. All the floors are constructed of strong tile arches supported by steel beams. The partitions are of hollow tile and crystalline glass. The stairways are made of steel with marble treads. When completed the halls will be lined with white Italian marble, while the floors will be of mosaic and ornamental tile. It is said that every square inch of metal furnishing will glitter with a triple plate of silver. An open court 50 x 60 feet occupies the center north half of the building. Electric light, steam heat, plumbing and ventilation are also features of this structure. The building will contain over 500 offices furnished in antique oak and silver plate will be arranged around a Gothic-shaped hallway on the 16 stories of the building. Six passenger elevators inside the front entrance and a freight elevator in the rear will furnish rapid transit to the upper floors. The walls of the lower 2½ stories are of massive Bay of Fundy red granite, while the walls above are constructed of the finest quality of buff colored and pressed brick and terra cotta.

Advantages of Organization.

It has been a favorite phrase in the past with men in all branches of business to whom the advantages of organization have been suggested to say, "Oh! I can paddle my own canoe;" but that time has gone by, and the stream is too full of craft to-day to permit this independent action to have any great factor of safety in it, and the wise navigator will consider the safety of others as tributary to his own. The individual working from his own standpoint and representing no one but himself is virtually powerless to affect the issues of the day. In seeking to secure action upon the customs which affect the manner under which his business is conducted, he only becomes significant when he has joined with others, and others have joined with him, in a common purpose to modify and improve existing conditions and customs, and to create new ones, or develop plans for more sure advancement of the class or business to which he belongs. In the advancement and in the resultant better customs for general good, he participates and is benefited as an individual. The joining with others should not be a spasmodic outgrowth of some special danger or emergency, but should be a permanent, continual and purposeful amalgamation, based upon the certainty that as long as man exists communities, social and business, must exist, and the interests of certain individuals will be indissolubly connected with the interests of other individuals, within boundaries distinctly marked and defined by the particular callings in which they are engaged. The strength of organized action of many is clearly apparent as being infinitely greater than the utmost effort of an individual or of the disunited action of many, and it is from the judicious use of the power of united action that reforms are brought about and old customs are superseded by new and better ones. The work of the National Association of Builders has been to secure unity and harmony of action by the greatest possible number, selected from the principal business centers of the country, upon subjects that are live issues, and the value of its efforts is evidenced in the fact that it has five times gathered together representatives from the majority of the important cities in the United States, to consider the best means for improving the facilities for transacting the builders' business. This consideration has resulted in giving to builders at large feasible plans for correcting evil practices that obtain, and in the creation of a feeling of harmony that never before existed among the members of the trade.

Advice to Builders.

Members of local builders exchanges, we think, would do well to profit by the advice of Richard M. Hunt, ex-president of the American Institute of Architects, given to members of the local chapters of that organization. In commenting upon the importance of strong local associations, in order to confer benefit either upon the members or upon the general public, he says that "it is the duty of every member of a local organization to do all in his power to assist the work of the body, and if unable through professional engagements to give his personal time to the work for good, he should at least bear his share of the expense incurred in its vigorous prosecution."

Reception to Visiting Architects.

During the annual convention of the American Institute of Architects, which was recently held in Boston, the Master Builders' Association of that city tendered a reception to the visiting delegates and to the Boston Society of Architects.

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The entire building in which the exchange rooms of the association are located, being owned by the association and occupied by its members, was brilliantly lighted and presented a very attractive appearance. The exchange rooms were tastefully decorated with foliage plants, and in the committee room adjoining was spread an excellent collation. Several of the members offered additional entertainment in their offices in various portions of the building, and the whole affair passed off in a most gratifying manner. The facilities offered in the arrangement of the exchange rooms for the transaction of business were a revelation to many of the visiting architects, as many had never seen a builders' exchange where such complete and thorough attention is given to every need of the members and where the practical value of such organizations is so clearly demonstrated. The visitors displayed the keenest interest in the plan upon which the exchange is conducted and were unanimous in the opinion that a similar institution would materially assist in the transaction of the building business in every city of any importance in the country. The orchestra rendered the last number at a late hour, and the guests departed with expressions of appreciation of a delightful entertainment and a feeling that it is good for men to know each other, and that such gatherings create and foster friendliness and harmony among the members of a great calling.

New Railway Station.

The passenger depot of the Philadelphia and Reading Railroad, which is about to be put up at Twelfth and Market streets, Philadelphia, will be among the handsomest structures of its kind in the country. The building will be eight stories in hight, the first four of which are to be of pink granite, while the remainder will be of light brick and terra cotta. The main floor, with the exception of the entrance to the station, which is on a level with the sidewalk, will be a few steps below the street. The half basement below will contain six stores on the Market street front, and one on Twelfth street. On the first floor will be ticket offices, large passenger lobby and baggage rooms. The second floor will contain the general waiting room, 100 x 75 feet, with the ladies' room, 44 x 56 feet, to the right, and the dining room and restaurant to the left. The half story between the second and third floors will contain the offices of the operating department of the Terminal Company. The remaining floors of the building will be used for the general offices of the company. It is said that the structure is the design of President McLeod, and the result will be a structure in the late Italian Renaissance style of architecture.

Building Outlook in the South.

In writing of the change that is taking place in the building trade and the improvement in the character of the houses now being erected in that vicinity, a Roanoke architect contributes the following to a Southern journal: "Architecture and the building trade, in common with all other lines of development, have suffered severely from the financial depression, but indications now point to an active season immediately ahead, and by spring we may expect the greatest activity which our section has ever seen. One very marked improvement is in the character of the buildings. During the speculative fever hundreds of buildings sprung up and were sold before completed. The object of the owner was merely to sell or to enhance the value of adjoining property, and every other consideration, architectural effect, sanitary conditions and even safety of construction, were utterly ignored. Now more houses are being built for homes or for permanent investments, and more attention is paid to design and to constructive details. We have now on our boards a larger number of houses of this kind and first-class business buildings than at any time during the present year. There is a marked improvement, too, in churches and public buildings. We are looking forward to a time of great prosperity, and expect from now on to have our boards crowded."

Tall Buildings in Chicago.

The erection of more high buildings in Chicago is being opposed by a considerable number of the substantial business men of that city. Public sentiment in this case has undergone a curious change. The development of the Western metropolis from a collection of hastily constructed frame buildings to stately business houses of brick, stone, iron and steel was regarded with great pride by all the citizens. The capitalists who first had the nerve to run up structures six and seven stories in hight were lauded to the skies as men of remarkable enterprise. The era of nine and ten story buildings was hailed as an auspicious omen of the bright future for those who owned Chicago real estate. Then an advance was made to 12 and 13 story buildings without a word of disapprobation from the citizens, who were apparently prouder than ever of the manner in which their buildings were reaching skyward. But the 16 and 18 story buildings now being completed, and the still taller edifices contemplated, have induced the inquiry as to whether or not a limit should be established to the ambitious schemes of builders or capitalists. The effect of high buildings is discussed from a sanitary point of view, their probable safety from the standpoint of the engineer and their commercial value to the city in general from the real estate owners' and investors' standpoint. The possibility of the city authorities taking action to restrict future building operations to nine or ten stories is regarded by some real estate owners as sufficiently promising to lead them to take out permits now for high buildings to be erected next year. Meanwhile the manufacturers of structural material and contractors interested in building operations are rather unconcerned in the discussion of the question, as the limitation of hight merely means an increase in the number of business blocks.

The Majestic Hotel.

One of the largest hotels now in process of erection in New York City is the Majestic, located on Eighth avenue between Seventy-first and Seventy-second streets. It will have a frontage of 204 feet facing on Central Park and 139 feet on the side streets. It will be 12 stories in hight and will have basement, cellar and sub-cellar. It is being erected by a syndicate of New York capitalists and with the furnishings will cost about $3,000,000. The plans were prepared by Architect Alfred Tucker. The sub-cellar and basements will be fitted with complete steam and electric plants, ventilating apparatus, ice machines and other machinery necessary for the proper conduct of a hotel of this size and character. A ladies' billiard room will be a feature which we think has never before been incorporated in any other hotel. The first story of the structure will have a grand entrance from Seventy-second street, opening into a large lobby. The reception rooms, public parlors, libraries, drawing rooms and other public apartments will be on the first floor. A dining room beautifully decorated and measuring 150 feet square, having a capacity of seating 700 people, will also be located on the first floor. The remaining floors of the hotel will be divided into suites of from two to five rooms each, with bathrooms and private halls. There will be 600 rooms and 268 bathrooms. Three fast-running elevators will carry guests from the lower to the upper floors. The material employed in the construction of the building will be Gatelowbridge stone, brick and terra cotta. The style of architecture will be modern Renaissance. It is hoped to have the building ready for business in October, 1892.

A Costly Private Residence.

A private residence which will approach the French Renaissance in its style of architecture, and which will cost, when completed, $120,000, is about to be put up by Joseph D. Potts, at Wyebrooke, near Downingtown, Pa. The building will be constructed of Indiana limestone, and when completed will look, it is said, like a French chateau. The front will be imposing and in many respects unique. A handsome *porte cochere* will extend over the driveway that winds in and out through the grounds. There will be a porch 58 feet long by 11½ feet in width, the front work of which will be composed of stone colonnades, while the floor will be of marble. At each end of it will be an entrance through a vestibule, with a hallway 22 x 39 feet. The house will be a double one, and on the first floor will be two dining rooms, each 30 x 20 feet, finished in hard wood to correspond with the Elizabethan period. The hallways will be very artistic, finished in quartered oak with polished wood floors. The parlors will be finished in hard wood, with upholstering and dressing of Louis XV style in gold and white. Back of the parlors will be a library 32 x 20 feet, finished in the Italian Renaissance style. The second floor will contain six large bed chambers, two boudoirs and six servants' rooms. There will also be seven bathrooms on this floor, each finished in marble and tile. All the wood work on the second floor will be in cherry. Each room will contain a mantelpiece and an open fire place. On the third floor will be two large billiard rooms and nine bed chambers, besides a large storeroom and two bathrooms. The entire building will be lighted by gas and electricity.

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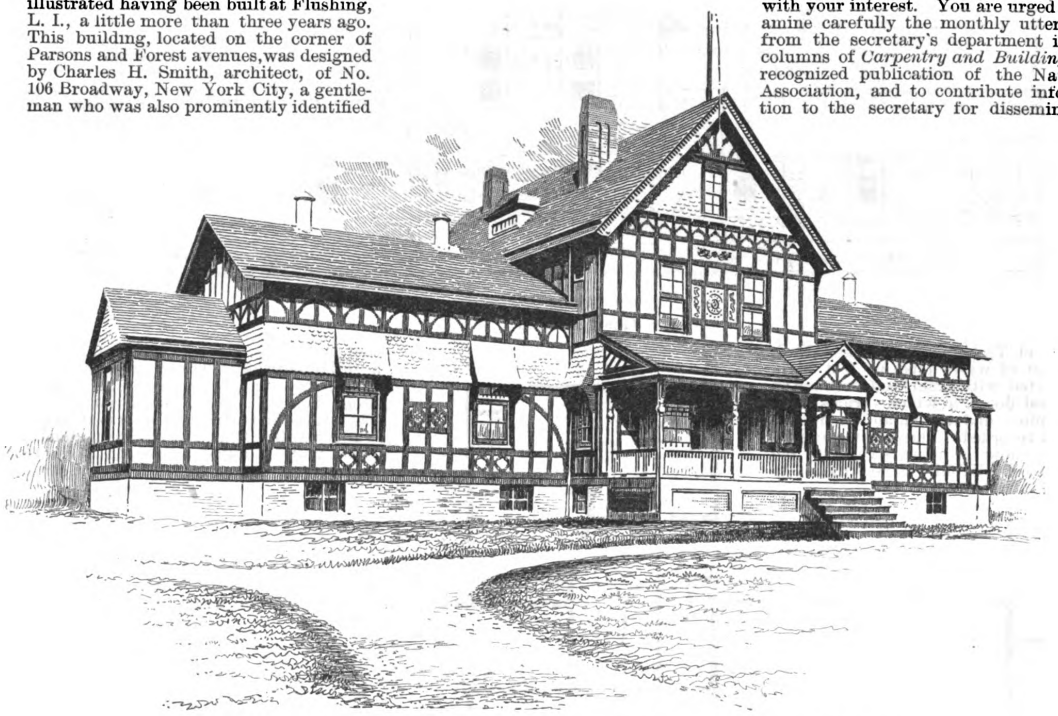
A COTTAGE HOSPITAL.

IT IS NOT so very many years ago that such a thing as a hospital in the smaller cities and country towns was unknown, and whenever a person met with an accident of any kind he was, as a usual thing, taken to the nearest house, or to his home, if close at hand, to be cared for. This plan had its objections, and as the needs of hospital accommodations became more urgent there were those to inaugurate a movement to secure them. The first attempts to establish small hospitals in country towns, however, were met with a great deal of opposition upon the part of the resident population, but when the advantages of such institutions were more fully appreciated, local prejudice was overcome and the work was carried to a successful issue. Since the first cottage hospital, as it may be termed, was established, a number of others have been erected in various localities, the one here illustrated having been built at Flushing, L. I., a little more than three years ago. This building, located on the corner of Parsons and Forest avenues, was designed by Charles H. Smith, architect, of No. 106 Broadway, New York City, a gentleman who was also prominently identified with the erection of the cottage hospital located at Plainfield, N. J.



A Cottage Hospital.—Perspective View.—Charles H. Smith, Architect, New York City.

The engravings which we present upon this and the following pages indicate the general appearance of the hospital at Flushing, while showing the arrangement of the rooms and the provision made for patients. The building stands back somewhat from the roadway, with drives and walks leading to it laid out in an artistic and attractive manner. It has a frontage of 106 feet and a depth of 51 feet, the main structure being three stories in hight, while the wings at the east and west are one story in hight. In the basement is the kitchen, 12 x 19 feet, ample closet room, pantry, sink, range, &c., a laundry 13 feet by 11 feet in size and a boiler and coal room 18 x 24 feet.

The main entrance to the ground or first floor is reached across a broad piazza on the south side of the building. At the left of the lobby is the reception room, nearly 13 x 17 feet in size. In the rear is the main hall, which opens at the right into the men's ward and at the left into the women's ward. The two wards are similar in their general arrangement, each measuring 28 feet 10 inches by 23 feet 4 inches. Each ward contains eight beds, although there is sufficient room for ten should occasion require the use of that number. Opening out of each ward is a linen closet, while at the extreme ends of the building are the rooms for the nurses. These rooms measure 9 feet by 10 feet, and opening out of each ward is also a bathroom measuring 6 x 11 feet. The extension at the rear of the main building is occupied by dining room, 12 feet by 14 feet, and also by an operating room fitted with all the necessary conveniences and measuring 12½ feet by 16 feet. On the second floor of the hospital are five bedrooms of good size, provided with ample closet room and also a commodious bathroom. The third floor is used for storage purposes.

The building has hard wood floors throughout and hard finished walls and ceilings. A great deal of attention has been given to the proper ventilation of the building and the sanitary arrangements are first class in every particular. The building is heated by steam and was erected at a cost of about $7000, all of which was raised through the energy of the ladies composing the Board of Managers. The cornerstone was laid on May 30, 1887, with Masonic ceremonies, and the building was finally completed and opened for the reception of patients in April, 1888.

Local Associations of Builders.

A few weeks ago W. H. Sayward, secretary of the National Association of Builders, issued a circular letter to members of exchanges in different parts of the country, reading as follows:

The strengthening of local bodies of builders is one of the fundamental features of the work of the National Association of Builders, for without the existence of strong local bodies the efforts of the central body to set up better methods and practices can be of little avail. It is therefore important that your co-operation be certainly secured in the interest of the association which you represent. None of the local associations is as yet so completely developed that there has ceased to be need of the persistent effort of the individual members in its behalf, and in all probability the time will never come when individual effort can be spared. You are therefore urged to continue in regular attendance upon all the meetings of your association, and to actively investigate, study and promote all matters that will tend to strengthen and improve it. You are also urged to correspond with the secretary of the National Association upon all matters that may encourage or discourage you or your association, to the end that he may inform or advise you, as the case may require, on matters of administration, questions of improved condition or any other affairs connected with your interest. You are urged to examine carefully the monthly utterances from the secretary's department in the columns of *Carpentry and Building*, the recognized publication of the National Association, and to contribute information to the secretary for dissemination through this channel. You are urged to devote as much time as possible to the careful examination of all the past work of the National Association and apply the principles therein contained for the development and improvement of your home association. You are urged to constant criticism of all that the National Association has done or may be doing, to the end that more perfect results may be secured. It is only by this personal, persistent, intelligent work that the ends sought for may be secured, and it is hoped that you may be counted upon as a constant correspondent and active helper in the great work undertaken.

A document covering one of the most important decisions ever reached by a court of law in matters concerning the interests of builders has been recently distributed from the secretary's office, and your especial attention is called to it and to the fact that it was largely through the influence and strength given by a thoroughly established association of builders that the plaintiff in the case was encouraged to proceed with the suit.

This illustration of the influence of well-organized bodies of builders and the

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further demonstrations of the usefulness of the National Association in advancing this and all other practical efforts for the protection of builders, in such fashion that all may be informed and benefited thereby, is convincing proof of the value of both local and national bodies, even if there were not a multitude of other facts and advantages which fix the necessity of both kinds of organization beyond doubt.

NEW PUBLICATIONS.

TRAP SIPHONAGE AND TRAP-SEAL PROTECTION. By Prof. J. E. Denton. 56 pages. (Reprinted from Vol. XVI of the "Transactions" of the American Public Health Association).

This pamphlet gives a detailed account of an extended series of experiments in trap syphonage conducted at the Stevens Institute of Technology, Hoboken, N. J. Two lines of waste pipe, 68 feet high, were erected, with branches from each on the several floors, to which various traps were applied and tested, and the results minutely recorded. These tests were intended to show the relative capacity and the degree of reliability to be attached to the several methods and means of preserving the trap seal now known in plumbing practice. The pamphlet contains much that will interest architects, plumbers and sanitarians.

As a result of the experiments and observations made, Professor Denton arrives at certain general conclusions, among which were the following:

1. That 13½ feet of 1½-inch wrought-iron pipe, with two elbows, will safely protect the seal of a three-quarter S trap, having only 1½-inch depth of seal, against the greatest suction syphonage influence which can be produced by any flow of water into a 2-inch waste pipe of any hight; but it is not a complete protection under certain conditions of back pressure.

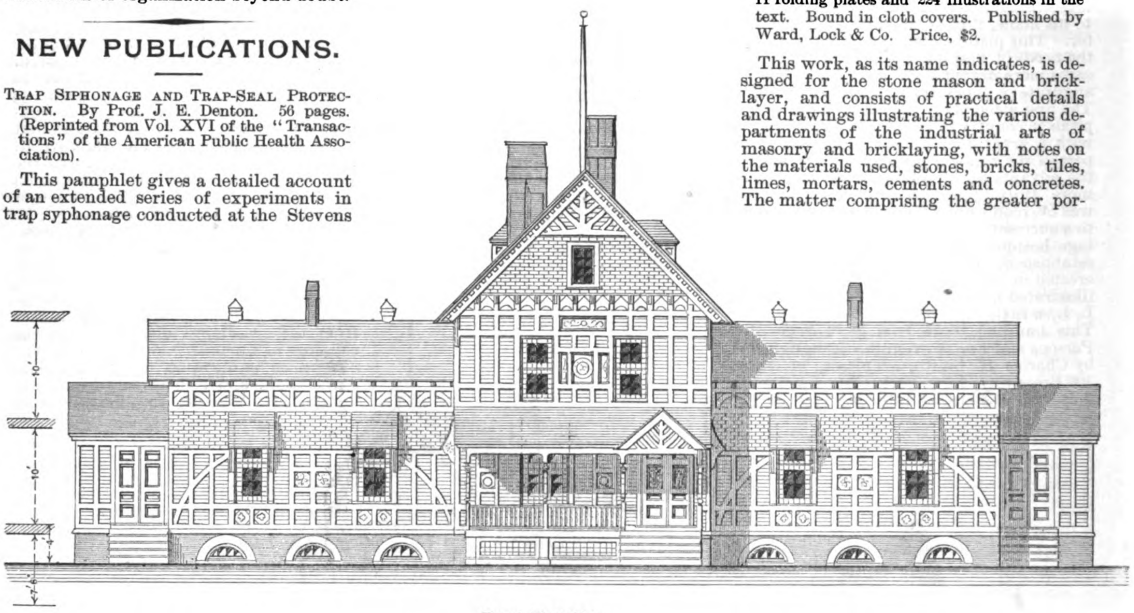
2. That a single 1½-inch McClellan vent affords the same protection as 13½ feet of 1½-inch pipe and two elbows against suction, and better protection against back pressure.

3. That either a 2-inch or a 1½-inch McClellan vent at each fixture connection on a 4-inch waste pipe, closed at the top, will protect a three-quarter S trap with a 1½-inch seal againt the greatest syphonage influence of any discharge occurring in plumbing practice in a 4-inch waste pipe.

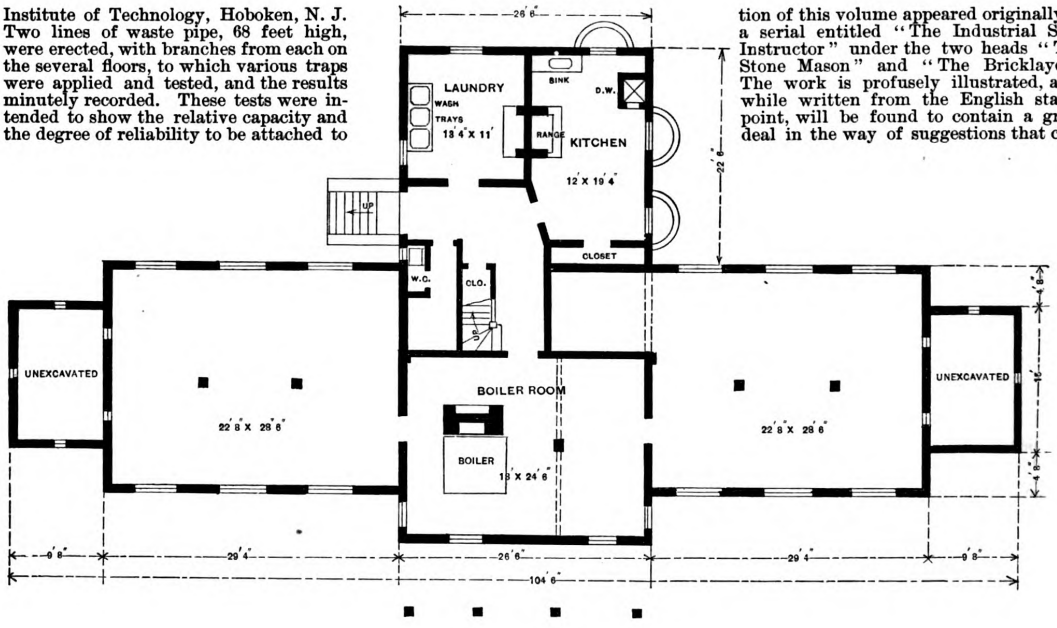
4. That the use of mercury in a McClellan vent can be relied upon to afford a reliable and indestructible seal.

THE STONE MASON AND THE BRICKLAYER.—By various practical writers; 271 pages; 11 folding plates and 224 illustrations in the text. Bound in cloth covers. Published by Ward, Lock & Co. Price, $2.

This work, as its name indicates, is designed for the stone mason and bricklayer, and consists of practical details and drawings illustrating the various departments of the industrial arts of masonry and bricklaying, with notes on the materials used, stones, bricks, tiles, limes, mortars, cements and concretes. The matter comprising the greater portion of this volume appeared originally in a serial entitled "The Industrial Self-Instructor" under the two heads "The Stone Mason" and "The Bricklayer." The work is profusely illustrated, and, while written from the English standpoint, will be found to contain a great deal in the way of suggestions that cannot fail to prove both interesting and valuable to the American reader.



Front Elevation.



Basement Plan.

A Cottage Hospital.—Elevation and Basement Plan.—Scale, 1-16 Inch to the Foot.

COMBINED BOOK OF SASH, DOORS, BLINDS, MOLDINGS, &C. 312 pages. Profusely illustrated. Bound in cloth. Published by Rand, McNally & Co. Price, $1.50.

This work gives attention to all kinds of interior and exterior finish; presents directions for ordering sash, doors, blinds,

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frames, moldings, &c.; gives designs showing the latest styles of embossed, ground and cut glass, brackets, scroll and turned work, wood drapery, store fronts, corner blocks and beads, plinth blocks, sawed and turned balustrades, door and window frames, pulpits, pew ends, &c. The engravings are well executed, showing in a very clear and comprehensive manner the prominent features of the work presented. Price-lists and other tables showing many of the sizes in which the designs are made are also presented, together with a revised edition of the "New Universal Molding Book," giving full size of moldings and the exact measurement in inches on each molding. A price-list of moldings is one of the features of the book.

Value of the Work of the National Association.

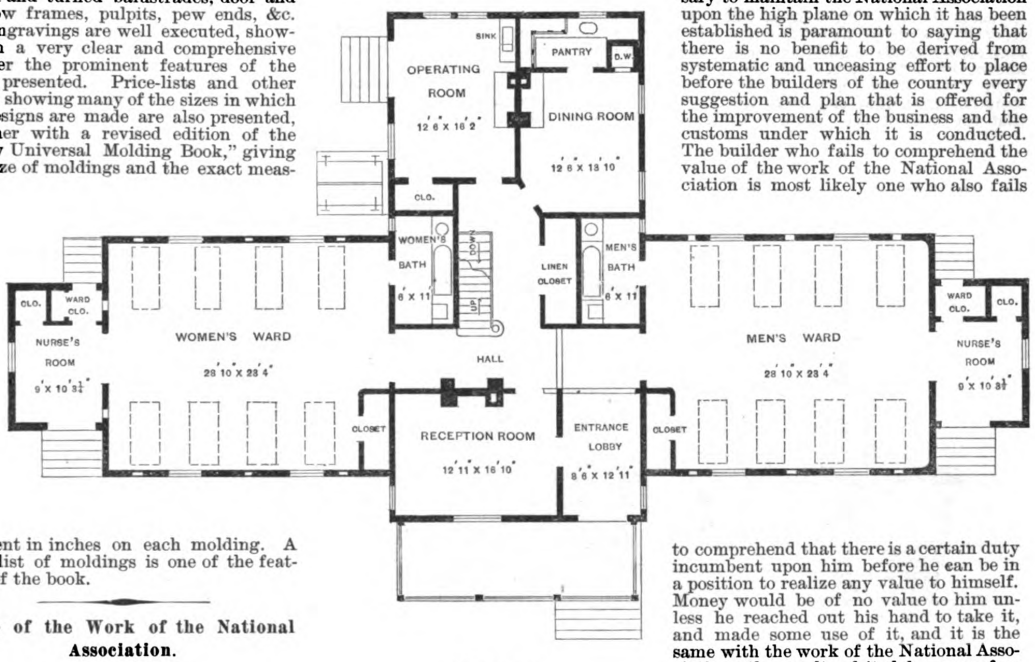
BY W. H. SAYWARD.

The question of the expense entailed upon a local exchange by its connection with the National Association of Builders is one that has been fruitful of more or less discussion, and in a recent consideration of the subject by a publication which claims to voice the sentiments of a certain filial body, but which is entirely without the sanction of the exchange, the question is asked, "Why should we (as an exchange) pay so large a sum to the National Association? What has it ever done for us?"

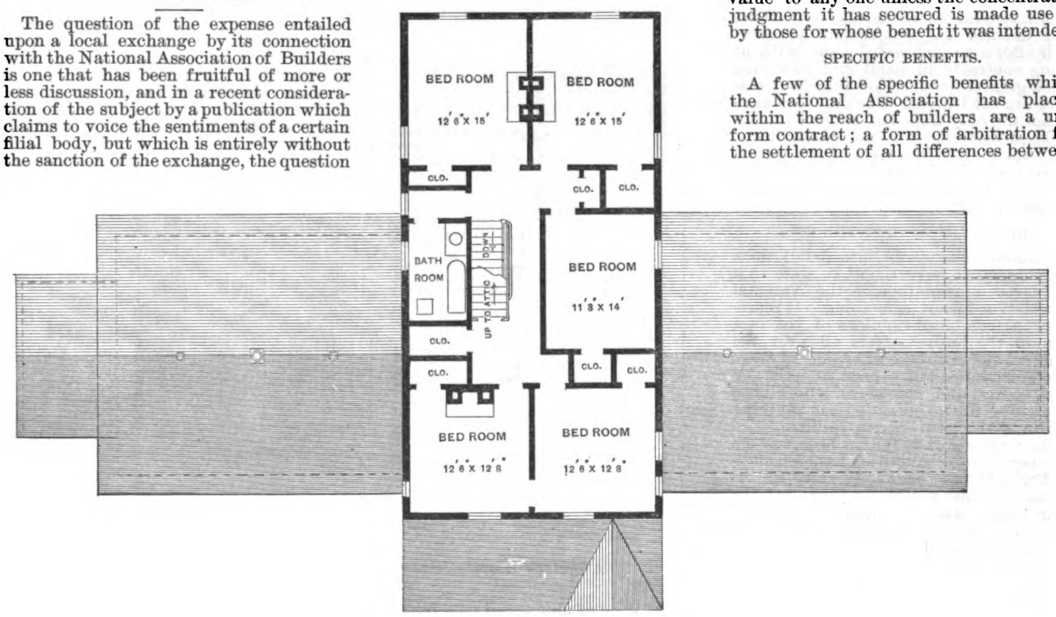
In the first place, the consideration of the subject from this standpoint is wrong; and in the next place, a very cursory examination of the annual reports of the National Association will indicate, in a measure, the work that has been done in which each filial body has shared the benefits.

THE QUESTION OF EXPENSE.

Members of local exchanges who have failed to comprehend the benefits that have accrued to their association, and hence to themselves individually, from the work of the national body, are apt to look at the lump sum paid by the exchange into the national treasury as being disproportionate to the value received. For instance, if their exchange has 100 members, under the assessment of 1891 the amount remitted by the treasurer would be $300, which they look upon as a large sum of money, failing to realize that no matter how great or small the total is, it is but the contribution of $3, once during the year, from each of a number of business men who are gathered into an organization for the purpose of improving the facilities for transacting their business and the betterment of the conditions by which it is surrounded.



First Floor.



Second Floor.

A Cottage Hospital.—Floor Plans.—Scale, 1-16 Inch to the Foot.

He must, indeed, be an egotistical person who is of the opinion that he can learn nothing from members of his calling throughout this broad land; and yet an objection to provide the funds necessary to maintain the National Association upon the high plane on which it has been established is paramount to saying that there is no benefit to be derived from systematic and unceasing effort to place before the builders of the country every suggestion and plan that is offered for the improvement of the business and the customs under which it is conducted. The builder who fails to comprehend the value of the work of the National Association is most likely one who also fails to comprehend that there is a certain duty incumbent upon him before he can be in a position to realize any value to himself. Money would be of no value to him unless he reached out his hand to take it, and made some use of it, and it is the same with the work of the National Association; the results of its labors are of no value to any one unless the concentrated judgment it has secured is made use of by those for whose benefit it was intended.

SPECIFIC BENEFITS.

A few of the specific benefits which the National Association has placed within the reach of builders are a uniform contract; a form of arbitration for the settlement of all differences between employees and workmen; a code of practice for the government of the business of sub-contracting; rules and conditions for estimating work; the establishment of legal precedent in favor of the lowest bidder (case of McNeil *vs.* the Boston Chamber of Commerce); the formation of lines upon which new exchanges can be successfully conducted; without mentioning the numberless specific cases where benefit has been conferred upon exchanges and individuals through advice and counsel; the persistent advocacy of betterment of all conditions in the building business and the intelligent en-

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couragement of every effort for the benefit of the builder himself.

PRACTICAL INSTANCES OF VALUE.

Two recent instances of the value of the work of the National Association are shown in the city of Pittsburgh. That city recently experienced one of the most stubborn strikes that the building trades have known of late years, and the statement of the director of the National Association from that city is to the effect that the use of the uniform contract with its strike clause is the only thing that enabled the contractors to carry their efforts to successful issue without losing contracts in hand and incurring much greater financial loss than they sustained in the trouble. The other instance is that the only trade not affected by the strike in that city was the stonecutters, who had adopted the form of arbitration as recommended by the National Association, and not a man lost a day's work during the disturbance.

THE RESULT AGAINST THE COST.

Without going more into detail upon the subject, it is pertinent to state that every recommendation of the National Association means something. It represents the combined opinions of the best men in the business from all over the country, and in no case where any of these recommendations has been adopted by filial bodies and consistent effort been made to secure its operation has anything but the most signal success resulted.

The total cost thus far has been, to each member of an exchange that has been affiliated with the national body since its organization, just $14 in six years for the maintenance of an institution that has been constantly at work for the benefit of the trade at large, and has been the means of bringing together the best minds in the country for the purpose of securing opinions and action upon the issues which most affect builders.

A Chicago Workingman's Hotel.

When the new seven-story building at School and Clinton streets, half a block south of Madison street, Chicago, is completed it will be opened up as the model lodging house of the country, under the name of the Friendship Hotel. The building is being constructed by John M. Clark, Collector of the Port, but all the interior work and finishing will be done by Alam Moris and W. J. Foy, who will be the landlords.

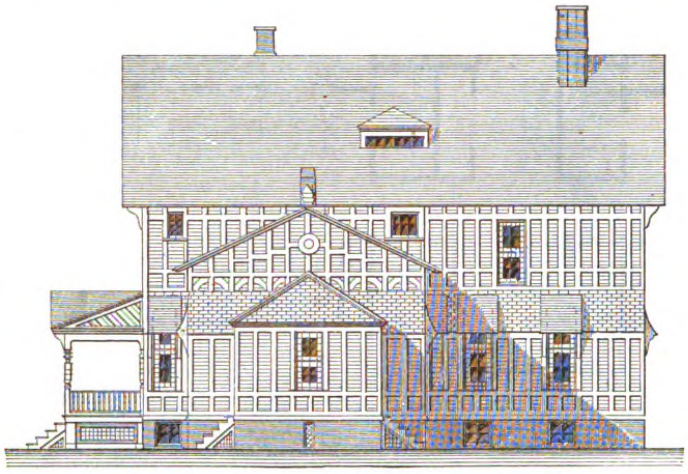
Prior to arranging the plans for the interior Mr. Moris went to Europe and inspected the lodging houses of all the great cities. He found those of England and Scotland superior to all others, and especially profited by his visit to the Seaman's Home in Liverpool. After his return he employed an architect, who followed out his ideas in planning the interior arrangement of the Friendship Hotel, Mr. Clark having previously agreed to erect the building, which covers two city lots and is a substantial structure, with fair architectural pretensions.

The hotel, which is intended for the accommodation of unmarried men from the ranks of mechanics and laboring classes, will have 540 rooms fitted up on the six upper floors of the building. Each room is intended for the accommodation of but one guest, and each will be furnished with an oak bedstead, with wire springs and moss matresses, a table, a chair and a wardrobe. The rooms will be 6 x 7 feet in dimension and be divided by partitions 8 feet high, and a clever device will be utilized to keep each guest's room sacred from intruders and thieves. The coping of the partitions will be covered with copper, under which will run a wire connected with an electric contrivance in the office. The weight of a finger placed on the copper band will be sufficient to send an alarm to the office and to notify the watchman on the floor that some one is up to mischief. By means of this contrivance Mr. Moris holds that every guest's room will be as secure as though it were surrounded by walls of steel.

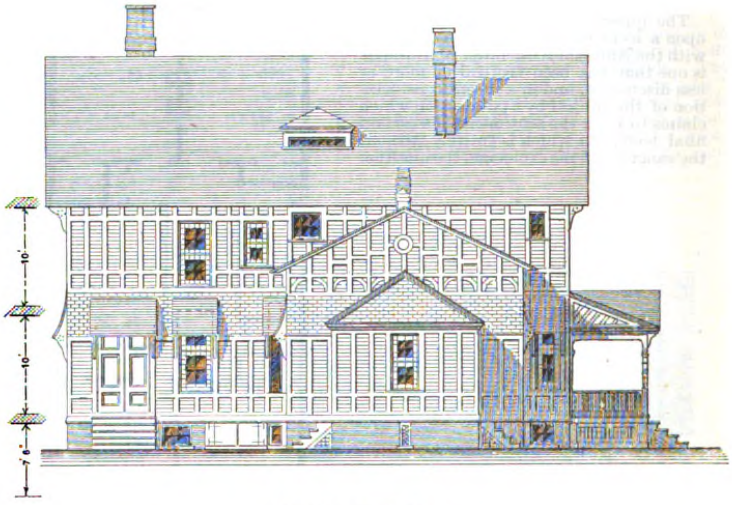
The office will be located on the first floor, on which also will be arranged a reading room and a library, which will be one of the features of the hotel. No liquor or card playing will be allowed in the hotel, but a room will be set apart for players of chess, checkers and dominoes. A barber shop, where the patrons of the house will be given special rates, will also find space on this floor. In the basement there will be a lunch room, with prices as low as possible, and also a bathroom with six tubs, which will be at the services of lodgers from 5 o'clock in the morning until midnight. New applicants for lodging will be required to use the bathroom the first day they are inmates of the hotel —just as a guarantee of good fath. On the six floors on which the rooms are located there will be a lavatory with marble basins and all the things necessary to promote cleanliness, including hot and cold water, soap, towels, shoe-blacking stands, clothes brushes, &c. The whole building will be heated by steam and lighted by gas and electricity.

In the construction of the building the subject of ventilation has received special attention, and on each sleeping floor will be 12 ventilators 12 x 18 inches and with a capacity of changing the atmosphere of each floor every 20 minutes. On the top floor will be a hospital ward of two rooms, which will be in charge of competent nurses and under the supervision of a regular medical practitioner, who will be retained by the owners of the hotel. This hospital will be open to all regular patrons of the house. Those who are able will be expected to pay for their treatment and the necessary medicines, but none will be refused admission to the hospital on account of lack of means. An elevator will be one of the luxuries of the establishment.

Rooms will be let at 15, 20 and 25 cents a night, or $1, $1.25 and $1.50 a week. The Friendship Hotel will be ready to receive lodgers September 1, when it will be formally opened with music, literary exercises and other big doings. Messrs. Moris and Foy are already operating three lodging houses on the West Side and are caring for 725 rooms. Mr. Moris said: "We will make the Friendship the model lodging house of the world. It will be a home for our men, and we expect to take our guests from the best classes of laboring men and single men with trades."



Side Right) Elevation.



Side (Left) Elevation.

A Cottage Hospital.—Elevations.—Scale, 1-16 *Inch to the Foot.*

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Convention of the American Institute of Architects.

THE TWENTY-FIFTH annual convention of the American Institute of Architects was held in Boston, beginning October 28, and adjourning on the 30th.

The attendance was larger than at any previous convention of the institute, and the meeting generally satisfactory, although the effect of the loss of the secretary, Jno. W. Root, by death early in the year, was plainly visible.

The first morning was devoted to the address of Richard M. Hunt, and the reports of the directors and various committees. Mr. Hunt made an interesting review of the affairs of the past year as they have appeared from an architectural standpoint, touching various events of interest to the profession. In passing he paid an appropriate tribute to the memories of John W. Root, O. P. Hatfield and other members who have died during the past year, referring to them in the highest terms.

In speaking of means for increasing the usefulness of the institute, Mr. Hunt said that "All members of the institute hereafter elected should be members of one of its chapters. Everything possible should be done to strengthen the chapters, for it is on them that the life and vigor of the institute depends, as without them it can accomplish little, if anything. Each chapter should be in constant touch with its surroundings, and should keep watch over all matters of interest to the profession, and should be ready to give warning or advice, as the case might be. How, otherwise, would it be possible to introduce the many needed improvements pertaining to the calling, the want of which is so sorely felt throughout the country, such as proper building laws, guidance and advice about the location and the designing of public buildings, &c., &c.? Such work cannot be done at the annual conventions; it can alone be accomplished by the local chapters, and such work, properly directed, would be beneficial not only to the general public, but to every member of the profession. I consider it the bounden duty of every member to aid the chapters in every possible way. If unable, on account of professional engagements or otherwise, to give one's time to such good work, one should at least bear his share of the expense incurred in its vigorous prosecution."

The address included allusions to architectural competition, architectural management and features of the World's Fair, an American style of architecture, regulation of the hight of buildings and other topics of interest. Mr. Hunt's address was one of the most interesting and instructive features of the convention.

The directors reported that there had been two meetings of the Executive Committee during the past year, which developed the fact that chapters and members generally were entirely satisfied with the condition of affairs in their profession and with the work of the institute. Two new chapters have been formed and 30 members have been elected.

The report of the treasurer showed the institute to be in good financial condition, with a balance of over $2200 on hand.

No reports were offered by the Committees on Education, Code of Professional Ethics, Clerk of Works, or Conservation of Public Architecture. The Committee on Uniform Contract reported that there had transpired several modifications which seemed desirable in the form, but that it was considered unwise to take action until it should be more thoroughly tested. The report of the Committee of Conference with the National Associations of Builders, Fire Engineers, Building Inspectors and Board of Underwriters was deferred until after the next meeting of the Joint Committee, which will be in January next at Cleveland.

The afternoon was devoted to routine work and to the reading of a paper by W. L. B. Jenny of Chicago on the Construction of High Buildings. The work of the committee appointed for the purpose of securing the passage of a law in New York State for the licensing of architects through an examination by a State Board of Architects, to be created, in order that legal status may be given the profession was approved. A bill to this end has been favorably reported on by the Legislature, but from some cause or other it has never yet been put to vote.

Second Day.

The first business of the second morning was the appointment of a committee, under preamble and resolutions, with instructions to prepare a bill for submission to Congress, authorizing the Secretary of the Treasury, in his discretion, to obtain plans, drawings and specifications for the erection of public buildings through competition by architects under such conditions as he may prescribe, and to make payment for the architects' services out of the appropriations for the respective buildings.

Papers on the following subjects were read: "Comparative Architecture," by Prof. Barr Ferree of the University of Pennsylvania; "Antecedents of Gothic Architecture," by Prof. Chas. H. Moore of Harvard University, and "Architectural Education," submitted by the Cleveland Chapter of the A. I. A. All of the papers were favorably received.

The afternoon was spent in sight seeing and in a trip down Boston Harbor.

Third Day.

The business of the last day was principally the election of officers and directors, with the following result:

President.—Edward H. Kendall, New York, N. Y.
Secretary.—Dankmar Adler, Chicago, Ill.
Treasurer.—Samuel A. Treat, Chicago, Ill.

VICE-PRESIDENTS.

First Vice-President.—Alfred Stone, Providence, R. I.
Second Vice-President.—E. C. Cabot, Boston, Mass.

BOARD OF DIRECTORS.

For three years.

Richard M. Hunt, New York, N. Y.
E. M. Wheelright, Boston, Mass.
James W. McLaughlin, Cincinnati, Ohio.
William S. Eames, St. Louis, Mo.
C. F. McKim, New York, N. Y.
William Worth Carlin, Buffalo, N. Y.
S. S. Beman, Chicago, Ill.
William C. Smith, Nashville, Tenn.

For two years.

W. M. Poindexter, Washington, D. C.
C. J. Clark, Louisville, Ky.
Levi F. Schofield, Cleveland, Ohio.
M. J. Dimmock, Richmond, Va.
George B. Ferry, Milwaukee, Wis.
George C. Mason, Jr., Philadelphia.
E. F. Fassett, Portland, Maine.
A. W. Longfellow, Boston, Mass.

For one year.

Charles W. Cummings, Boston, Mass.
James G. Cutler, Rochester, N. Y.
James H. Windrim, Philadelphia, Pa.
William Le Baron Jenney, Chicago, Ill.
Henry Van Brunt, Kansas City, Mo.
Charles E. Illsley, St. Louis, Mo
H. J. Hardenburgh, New York, N. Y.
Cass Gilbert, St. Paul, Minn.

The following is a list of the standing committees for 1892 and their members:

COMMITTEE ON FOREIGN CORRESPONDENCE.

Richard M. Hunt, chairman, New York, N. Y.
William Le Baron Jenney, Chicago, Ill.
Dankmar Adler, Chicago, Ill.
Charles F. McKim, New York, N. Y.
Henry Van Brunt, Kansas City, Mo.

COMMITTEE ON EDUCATION.

Prof. Russell Sturges, chairman, New York, N. Y.
Prof. William R. Ware, New York, N. Y.
Prof. N. Clifford Ricker, Champaign, Ill.
T. M. Clark, Boston, Mass.
Prof. C. Francis Osborne, Ithaca, N. Y.

COMMITTEE ON CODE OF PROFESSIONAL ETHICS.

Louis H. Sullivan, chairman, Chicago, Ill.
E. H. Kendall, New York, N. Y.
W. W. Carlin, Buffalo, N. Y.
Henry Van Brunt, Kansas City, Mo.
R. W. Gibson, New York, N. Y.

COMMITTEE ON CLERK OF WORKS

R. W. Gibson, chairman, New York, N. Y.
D. Adler, Chicago, Ill.
W. G. Preston, Boston, Mass.
J. W. McLaughlin, Cincinnati, Ohio.
J. G. Cutler, Rochester, N. Y.

COMMITTEE ON UNIFORM CONTRACT.

O. P. Hatfield, chairman, New York, N. Y.
D. Adler, Chicago, Ill.
Alfred Stone, Providence, R. I.

COMMITTEE UPON CONSERVATION OF PUBLIC BUILDINGS.

The presidents of chapters.

COMMITTEE ON COMPETITION CODE.

(To be appointed by the Board of Directors.)

On the evening of the 28th a reception was tendered the visitors by the Master Builders' Association, which proved a thoroughly enjoyable affair, and on the next evening a banquet was given at the Hotel Thorndyke by the Boston Society of Architects.

Definition of the Term Bay Window.

A case came up in the Chicago courts recently which necessitated expert testimony in the matter of a definition of the term "bay window." A definition was formulated and agreed to by some of the most eminent members of the architectural profession, says the *Inland Architect*, and this definition was the one accepted by the court. As it will be of interest to the profession generally, we give it: "Bay window, an adjunct of any shape that is designed to be an enlargement to a room, and which projects beyond the exterior face of a main wall of a building, and does not extend above the main cornice. It may have its foundation in the ground, or be supported on corbels or otherwise." It is probable that this was not intended as a "dictionary definition," but was made with special reference to this case, but that it may not be regarded as final it would seem well to comment upon it. It is a fair definition of bay, though not in the generally accepted architectural signification of that term, and it is equally applicable to niche, or to alcove, but it does not define "bay window" at all. Would not "glazed" adjunct shed a little light on the subject? Even thus modified the definition would not cover bay window alone, but would include a bay with a window in it, which, we take it, is not necessarily a bay window. A bay window should be a more than one-sided affair. It would seem well, also, to remove the definition beyond the limits of a special case by striking out the adjective "main," which, applied to a building with a broken ground plan, would cause some confusion. Without impeaching the astuteness of the court, or questioning the wisdom of the eminent professional gentlemen, we would submit this revised definition for their consideration: Bay window, an adjunct to a building that is designed to be an enlargement to a room, which is of any shape, which is glazed on a curve or on two or more sides continuously, which projects beyond the wall to which it is attached, and which does not extend above the cornice or coping of that wall. It may have its foundation in the ground, or be supported on corbels or otherwise.

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HINTS FOR THE SLATE ROOFER.

AN INTERESTING little work of a convenient size, entitled "The Slate Roofer," has recently been compiled by D. Auld, Jr., and will be found to contain a great deal of valuable and instructive matter relating to slate and its application to the roofs of buildings. The volume comprises among other things, roofing slate tables, rules for measuring slate work, designs for ornamental work, the number of nails required for a square of roofing, rules and information for beginners and other facts which are of value to the slate roofer. It has been issued for the use not only of roofers but also of architects, quarrymen and dealers, all of whom are likely to find in it such information as is necessary in the every-day transactions of persons who are in the slate business. A great deal that is contained in this volume is of so much interest and value to a large class among our readers that we take pleasure in presenting herewith some portions of the matter, together with the accompanying illustrations, for which we are indebted to the publishers, Messrs. Auld & Conger of Cleveland, Ohio. After giving attention to the general subject of slate for building purposes, the manner in which it is quarried, sources of supply, &c., the questions of piling, nailing and punching slate are taken up. Concerning these and other points of interest the volume has the following :

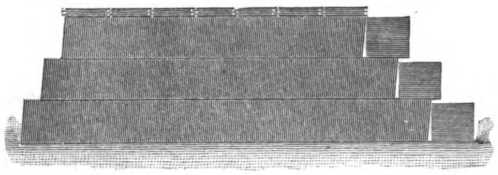

Fig. 1.—Proper Way to Pile and Cover Slate.

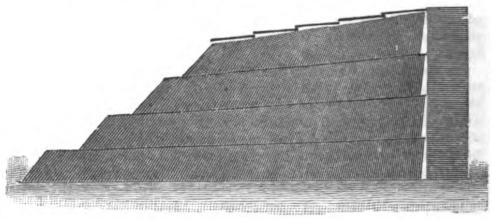

Fig. 2.—Improper Way to Pile and Cover Slate.

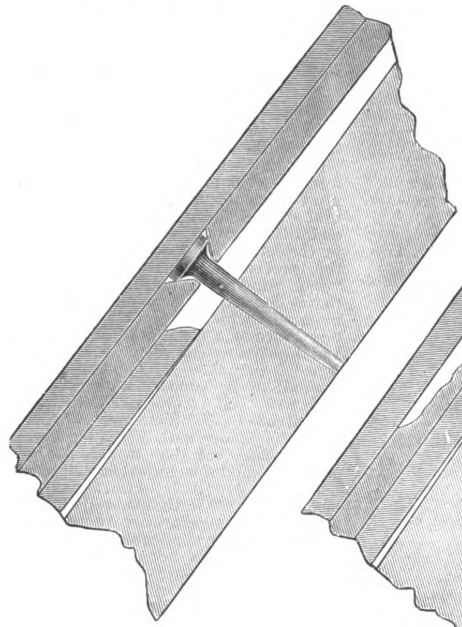

Fig. 3.—Machine Punched Slate.

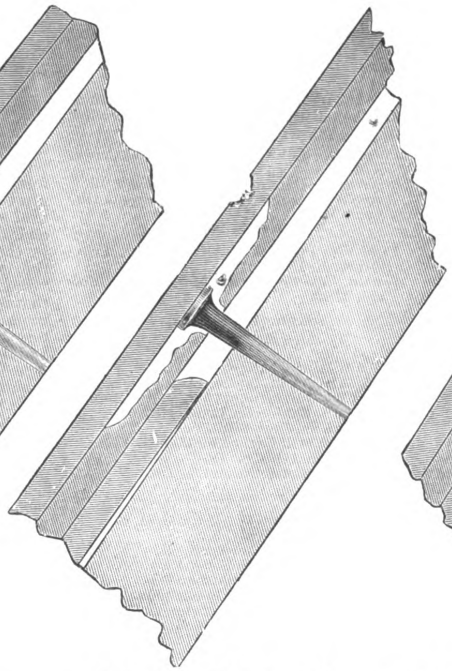

Fig. 4.—Slate Punched by Hand.

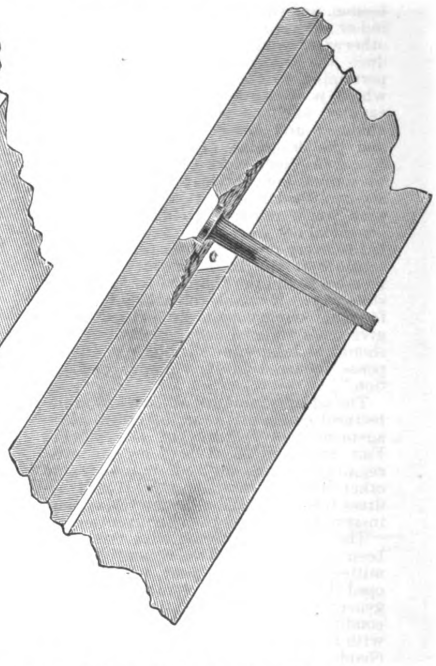

Fig. 5.—Showing Effect of Driving Nails too Tight.

Hints for the Slate Roofer.

PILING SLATE.

It may appear to a casual observer of very little consequence how roofing slate are piled, either at the quarry or when hauled to the building ready for use. It is not necessary to tell quarrymen how to pile slate except to caution them not to pile so high as is usually done, especially where room on the banks is scarce. The piles should in no case be more than 3 feet 6 inches high. If piled more than this hight and allowed to stand over winter there will be a heavy loss in breakage in the bottom rows of the piles. These remarks are intended more for beginners than for old hands, whether quarrymen or slaters, and should be carefully studied and followed. It is necessary to have a solid dry place to pile slate; then a plank or strips should be laid down (the first named being preferable), and there should be lath or strips between the piles. Where there is no wall to pile against there should be bulkheads built, as shown in Fig. 1 of the illustrations. The above method of covering is intended for use in the fall, when much rain or snow is expected, to prevent the slate freezing together, which makes it very disagreeable work handling, besides causing much waste. I am sorry to say the plan shown in Fig. 2 is the one more often followed than the first. This plan is very expensive in broken slate, the piles very often falling down or getting out of shape. The slate in a pile exert a great pressure in the direction of the slant at the top, and the more they settle the heavier the pressure.

SELECTING SLATE.

Much time can be saved in laying slate by carefully selecting when punching. Where there are corners off, thin corners or other imperfections, the slate should be punctured so the imperfect part will be the head of the slate when laid, unless the imperfection is of such a nature that it will damage the roof; in which case the imperfect slate should be laid out to use on hips or valleys. The slate should be selected in two thicknesses; the thick slate to be laid at the eaves and the thin ones at the top of the roof. Finishers, however, should be thick and all perfect slate. It is a great advantage in dressing to use a machine, as it makes a very much stronger job and neater hole.

PUNCHING.

Slate punched by hand is more liable to come loose than machine punched, for the reason that in punching by hand the slate is only supported on one side of the hole

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at the time the point of the hammer strikes the slate, and in consequence a large piece usually scales off, often leaving not more than one-half of the thickness of the slate to hold the nail. The result is the slate is so weak the nail head pulls through and the slate comes off.

In Fig. 3 of the cuts is shown a section through the slate at the nail hole when punched with a machine. It can readily be seen that this form of nail hole gives the greatest possible strength to the slate and the least possible chance for the nail pulling through, while the slate punched by hand are greatly weakened, as nearly every slate is scaled off around the hole, reducing the slate nearly, if not one-half its thickness. This is the principal cause of so much repairing being required on roofs put on before the introduction of machines for punching.

Fig. 4 shows a section through the nail hole in hand-punched slate. A comparison with the other cuts will quickly convince any man with reasonable judgment which method is preferable, and that as a matter of economy and durability the first is far in advance of the latter.

NAILING.

Nails driven too tight produce the effect shown in Fig. 5, and should be carefully avoided by slaters; this applies more particularly to slate punched by hand, as the slate does not have much strength to hold the nail and consequently pulls through and allows the slate to slide out. Nails not driven far enough are nearly as bad and produce the effect seen in Fig. 6, While it does not allow the slate to slide off, it punches holes through the slate above the nail. This is caused by the weight of the bracket or walking on the roof. Nails should be driven down until the head is level with the top surface of the slate, but not tight enough to draw or spring the slate.

During the last few years there has been a change in the use of nails for slating purposes from cut nails to wire nails. The principal reason for this has been the poor quality of the cut nails, nearly all makers producing clumsy, heavy nails with thick, ragged heads, while the wire nail, as shown in Fig. 7, is generally clean cut, well made, with countersunk head. A clean, well made, cut steel nail with countersunk head is better than wire nails for the purpose of laying slate, for the reason that it is almost impossible to cut or break a wire nail in repairing, while a cut nail readily breaks or cuts with the ripper, making it much easier to repair. Another advantage in cut nails is that it requires more force to start a cut nail than a wire, although the wire nails hold more after starting to pull than the cut. Both make a good job. Galvanized or tinned nails are less liable to rust. Either cut steel or steel wire nails rust much less than iron nails. Copper nails are often used on fine work, but they cost much more and pull out of the sheathing very much easier than steel; 8d. nails are large enough for all sizes of slate up to and including 20 inches; unless the slate are extra thick above 20 inches 4d. should be used.

LAYING SLATE AND FELT.

Before starting the slater should be sure the roof is ready. The carpenter should put on a cant strip about ¼ inch thick, nailed about 2 inches above the eave line of the slate, Fig. 8. Carpenters often refuse to do this, saying it is the slater's work. This is not true. It is as much a part of the carpenter work as the sheathing. There should be cant boards put in behind all chimneys before the chimney back or gutter is put in. The cant board should fall to each end so that no water will stand in the gutter, as is the case where no cant board is used. This is the cause of more bad leaks on slate roofs than any other one thing; it is worse than broken slate, as the water will, where the end of a chimney gutter is higher than in the center, run over and follow along the under side of the tin to the lowest point, then drop off and run down, often allowing gallons of water to run into the building in a few hours. It is a good plan to keep small sea-green slate on hand for under eaves, as they are cheap and strong, making the very best for the purpose. When chimneys require braces they should be put on where practicable so that the end that is fastened to the roof will be higher than the end fastened to the chimney; this will prevent water from following the iron rod down through the slate, but where the braces must be lower at the end next to the roof, then the brace should be built so that there will be a drip formed near the roof.

(To be continued.)

Hints for the Slate Roofer.

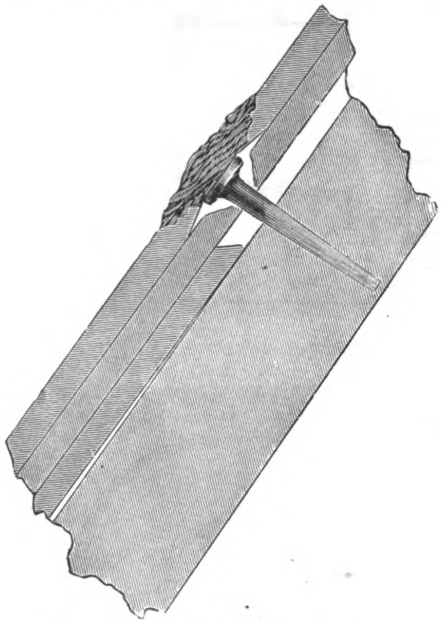

Fig. 6.—Results of Improperly Driven Nails.



Fig. 7.—Steel Wire Slating Nail.

Fig. 8.—Showing Finish at Gutter.

Yucatan Architecture Reproduced.

It is stated in the Chicago *Inter-Ocean* that one of the most interesting and striking representations at the World's Fair will illustrate the architecture of Yucatan in casts taken from some of the ruins. To make the molds for a complete cast of any single building will not only be a gigantic operation, but will cost several thousand dollars. Such works of this class as may be produced will belong to Chicago as permanent acquisitions. The selection of subjects is not determined with absolute certainty. Some of the buildings of Chichen-Itza and of Labna will be probably the preferred types. The great expense of this form of reproduction will limit the number of examples. The great portal from the court at Labna is one of the subjects approved for the series. Others are the Temple of the Sun at Chichen-Itza, portions of others at Uxmal, showing recesses and cornices, the House of the Nuns at Uxman and an old house at Merida (1549), with richly carved ornamentation. As the Mexican Government may reproduce some of the most important works of the kind in that country the buildings of Yucatan are first considered in reference to a place in the archæological section. The entire collection of casts recently arriving at the museum from Paris, made from the molds taken by M. Desire Charnay during the Lorillard expedition to Yucutan and other southwestern parts of the continent, will be exhibited. About 80 representations are contained in this series. All are taken from stone structures with the exception of one which is colored to imitate the original carved zapote wood, much resembling mahogany. One series of great slabs represents the border around the Aztec sacrificial stone, which was 7 feet in diameter. The carving is curious and elaborate. Until exhibited in Chicago this collection will not be shown publicly.

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THE "COPPER" HOUSE.

THE HOUSE which we illustrate in our plate supplement and upon the following pages embodies features of construction and ornamentation which cannot fail to prove highly interesting not only to builders and architects, but to various craftsmen as well. What has been done in connection with this building might almost be said to mark a new era in both construction and ornamentation. The ornamentation is at least a departure from common practice, for while something of a similar nature in the way of decorative effects may have been attempted before, the expense has been so great as to prove discouraging. In this case it is claimed the cost has been kept at a reasonable figure. We sum it all up when we say copper, brick and cement have been so happily combined as to produce a warm, dry and attractive dwelling, and one that commands the attention of all who visit it. The methods employed represent the ideas of the owner in an effort to secure fire-proof construction and to make use of galvano-plas

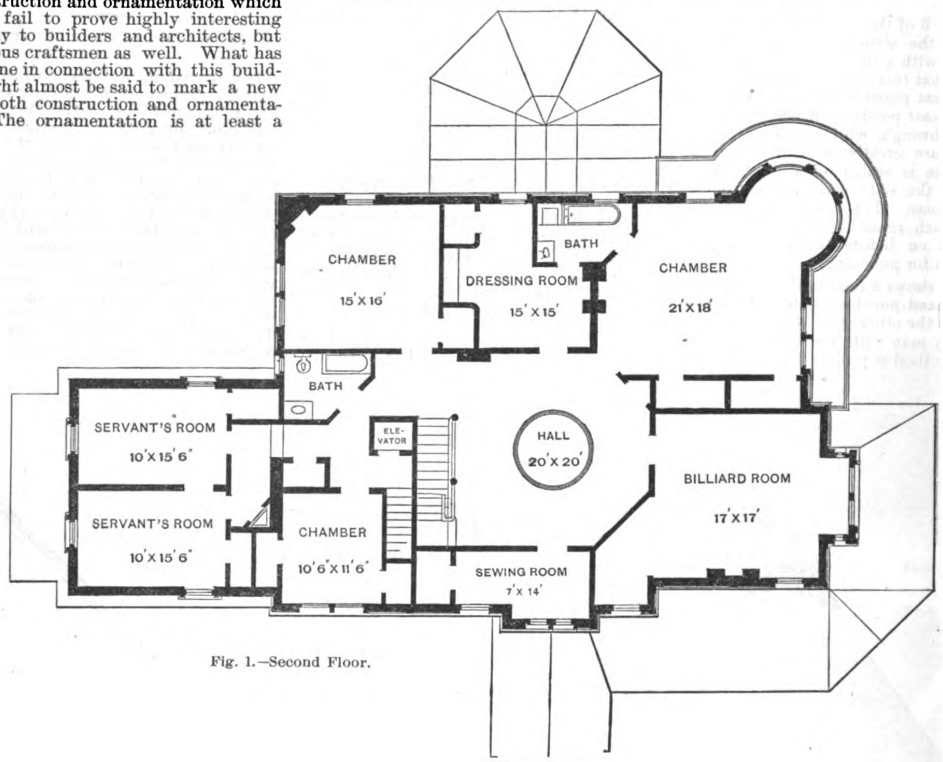

Fig. 1.—Second Floor.

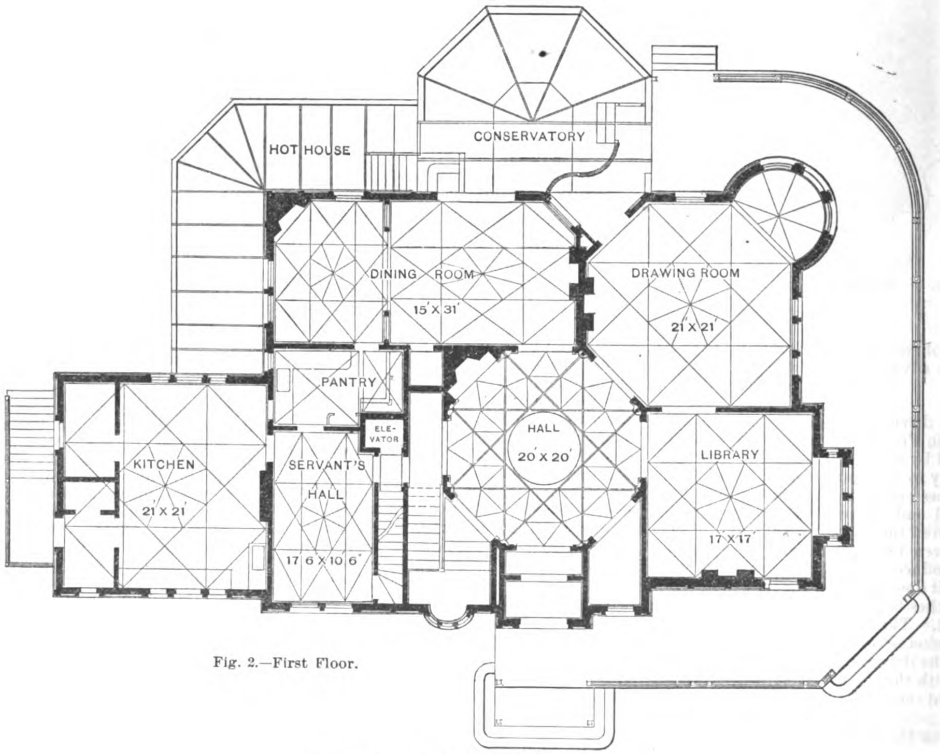

Fig. 2.—First Floor.

Floor Plans.—Scale, 1-16 Inch to the Foot.

The "Copper" House.—James M. Farnsworth, Architect.

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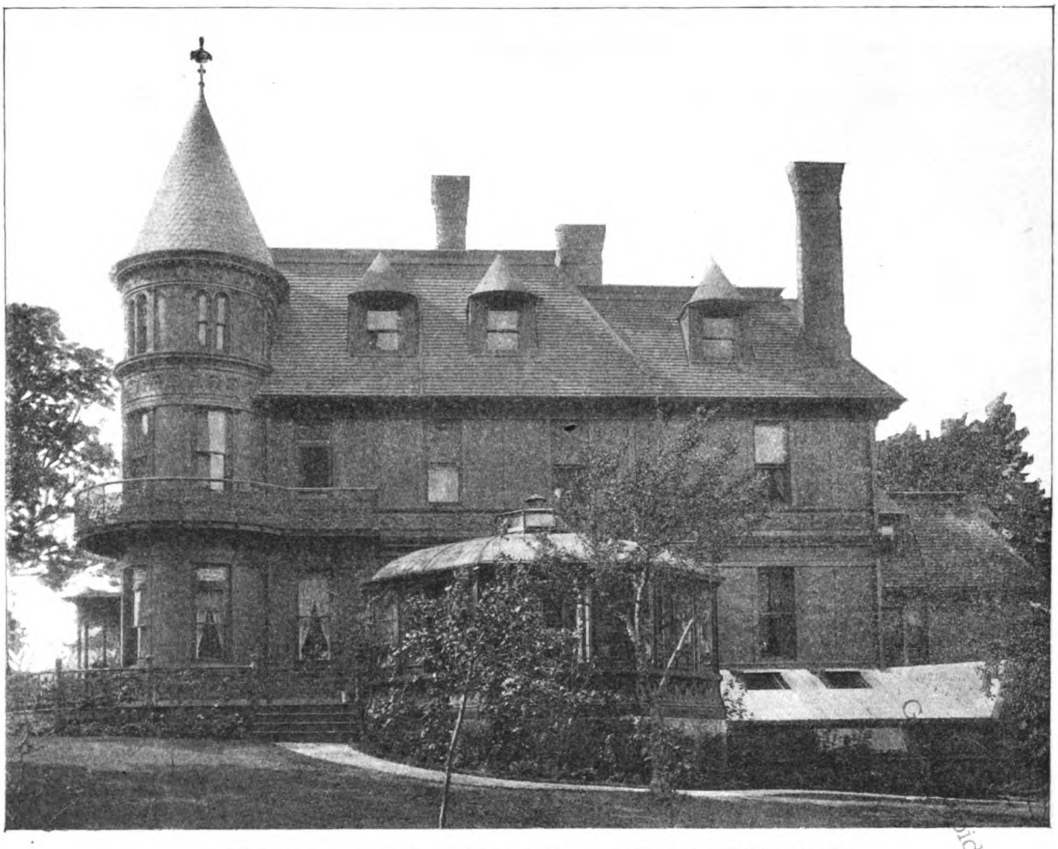

The "Copper" House.—Fig. 3.—Side Elevation, Showing Tower and Conservatory.

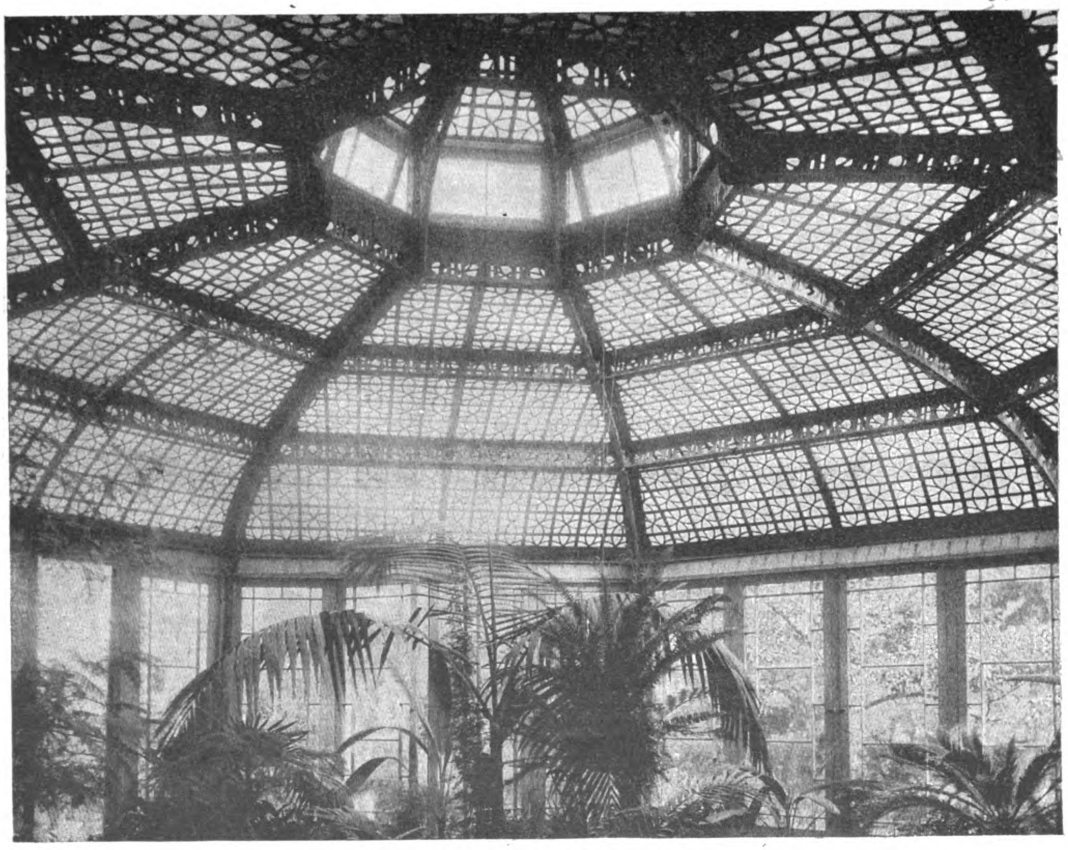

Fig. 4.—Interior View of Conservatory.

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"The Copper House."—*Fig. 5.—Decorated Ceiling in Parlor.*

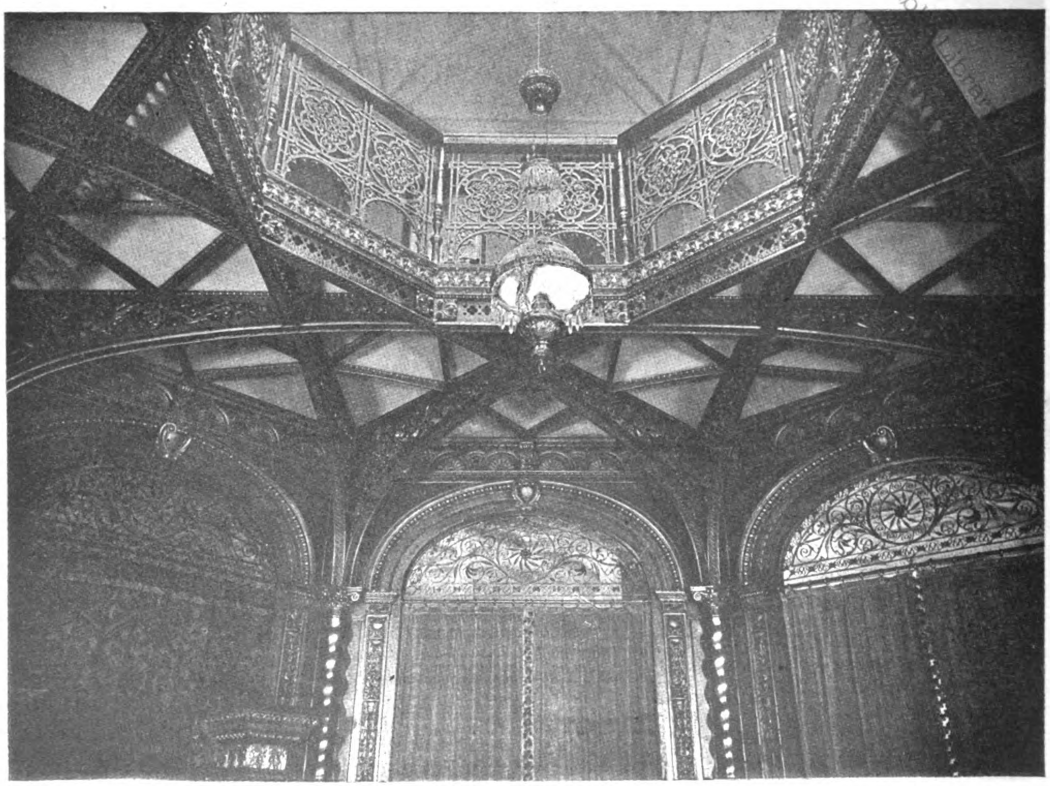

Fig 6.—View in Main Hall, Showing Ceiling and Ornamental Railing About the Circular Opening at Second Story.

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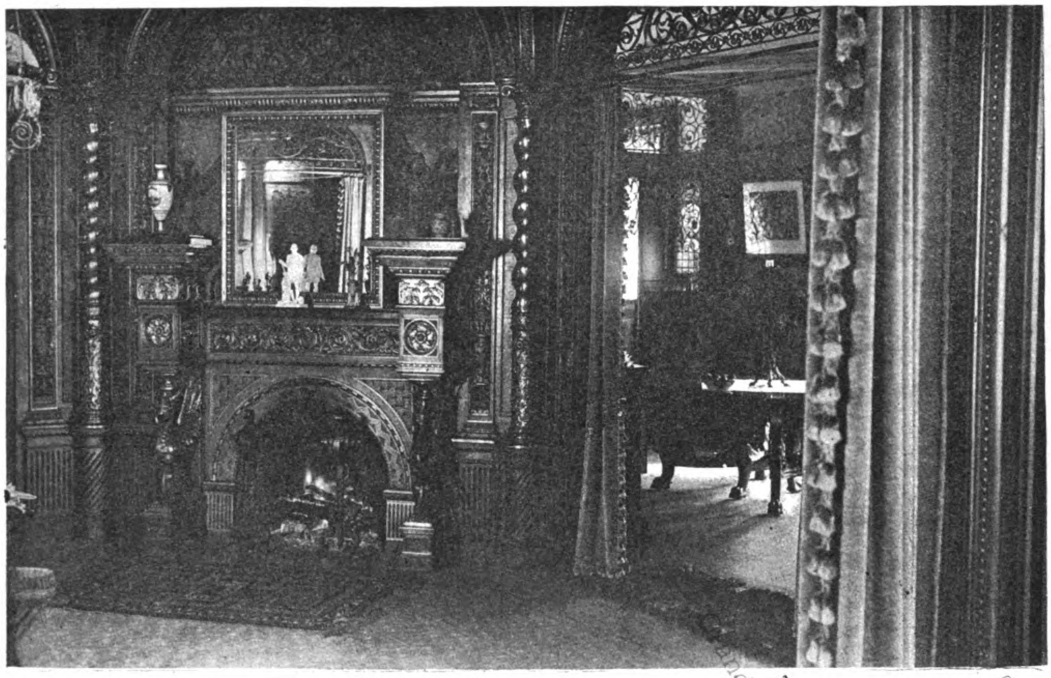

"The Copper House."—Fig. 7.—Mantel and Grate in Main Hall, with View of Dining Room at the Right.

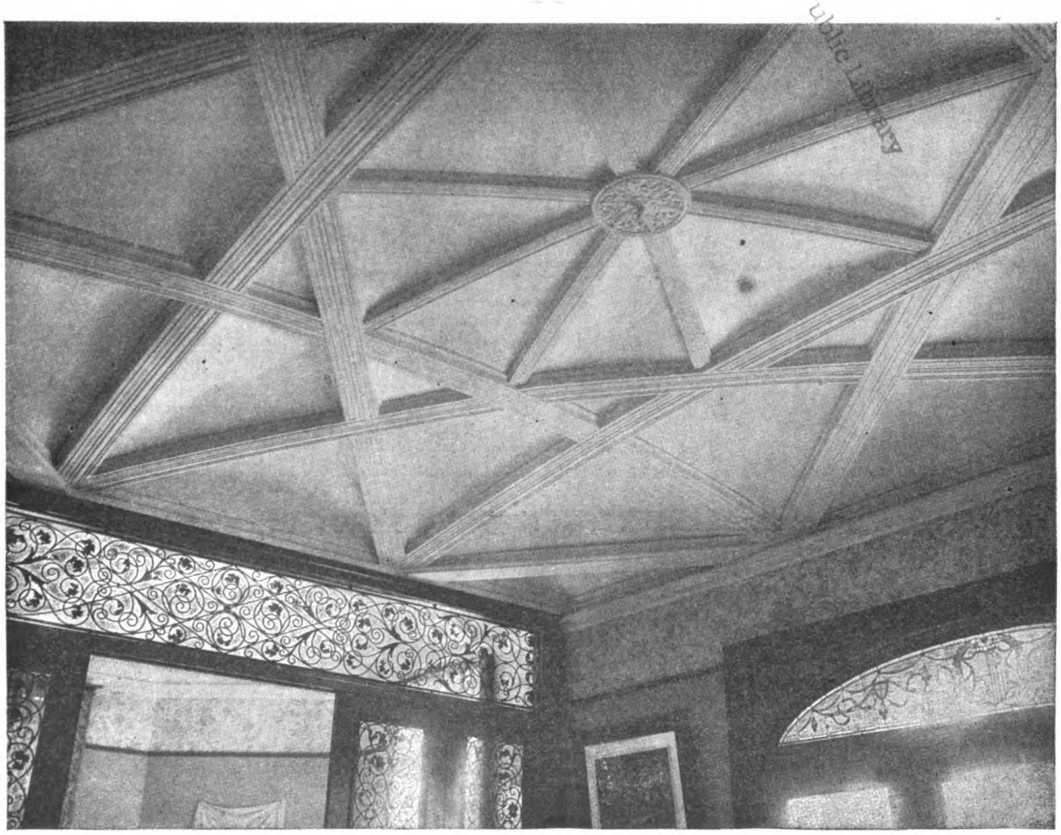

Fig. 8.—View of Plain Ceiling in Dining Room.

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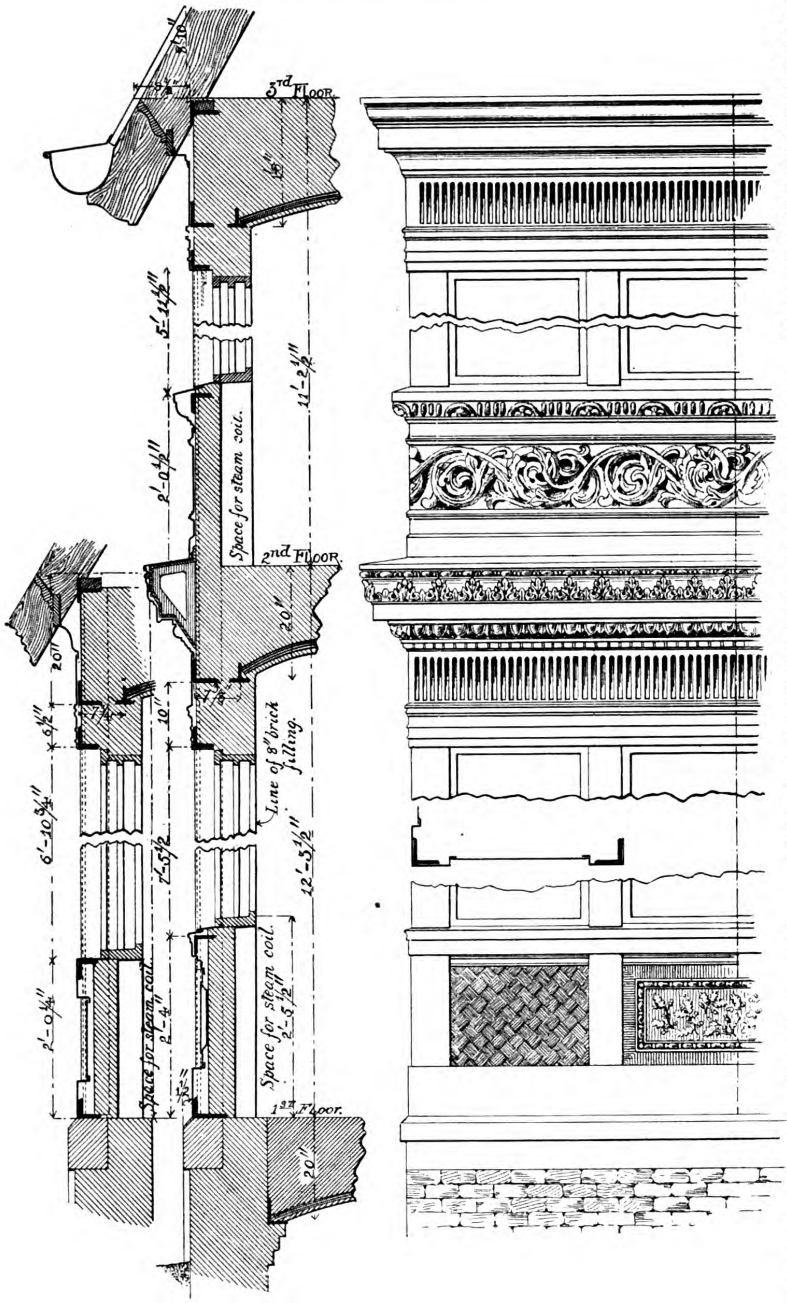
tic metal in a way to produce striking effects. The work as it stands represents the results of long and careful study on the part of the owner, and in its execution many novel methods have been employed.

The house, which is the home of Niles Poulson of the architectural iron firm of Poulson & Eger of this city, stands upon the bluffs near Fort Hamilton, Long Island, N. Y., and commands a beautiful view of the Narrows, Staten Island, Forts Wadworth and Hamilton and a broad expanse of water. The picture in the supplement plate represents the house as it appears from the street, which separates it from the edge of the bluffs. The drawings of the structure were prepared by Architect James M. Farnsworth of No. 5 Beekman street, New York City, and were carried into effect under the personal supervision of that gentleman and the owner.

The floor plans, which are shown in Figs. 1 and 2 of the illustrations, indicate in a very clear and comprehensive manner the size and location of the various rooms upon the first and second floors of the dwelling. It will be seen that the main hall, octagonal in general shape, is entered through a vestibule from a broad veranda extending across the front and partially on two sides of the house. Opening from the main hall are the library, some 17 feet square, the parlor or drawing room, 21 feet square, and the dining room, which is 15 x 31 feet in size. The openings are covered by rich heavy *portières*, and above each is a semicircular piece of wrought-iron work of graceful design. The stairway is at the left as one enters the hall and extends to the third story. A portion of the dining room is partitioned off into a breakfast room by folding doors carrying wrought-iron panels of beautiful design, made by Winslow Bros. of Chicago. At the extreme end of the house is the kitchen, from which the dining room is reached through the servants' hall and pantry. Beyond the dining room is a conservatory made of cast-iron rafters and supports, and covered with ¾-inch glass. At one side and to the left of the conservatory is a hothouse. These are more clearly indicated in Figs. 3 and 4, which represent a side elevation of the house and an interior view of the conservatory. Upon the second floor of the dwelling are three sleeping rooms, billiard room, sewing room, bathroom and two servants' rooms. Opening out of the principal chamber is a bathroom and dressing room. The rooms of the house are finished with plaster applied directly to the brick walls, and then covered with paper of artistic shade and design.



The "Copper" House.—Fig. 9.—Section and Elevation, Showing Details of Construction of Sheet Metal Work.

One of the first things to impress the visitor upon entering the main hall, views of which are shown in Figs. 6 and 7, is the liberal use of metal work and the peculiar formation of the floor and ceiling. The floor finish is of delicately tinted tile so arranged as to constitute an elaborate design of striking effect. The decorated cast-iron ribs, arched across the ceiling, the bronze treated columns between the openings into the different rooms, the rich and elaborately decorated mantel, the wrought-iron work over the *portières*, and the iron railing about the circular opening on the second floor, combine to produce an effect which is peculiarly striking. The ceiling of the main hall, as well as that of all the other rooms in the house, is of novel construction, and is of great interest to the building trades. It involves the use of ordinary flat bar iron and cement, and represents the ideas of the owner of the building as to what constitutes absolutely fire-proof construction. The plan pursued is such that the ceiling of one room is the basis of the floor of the apartment above. The ceiling is made by placing upon the four brick walls of which a room is composed an octagonal frame made of angle iron. From each corner of the octagon are sprung two arches or ribs of flat bar iron, and where the bars cross each other they are clamped together with U-shaped bolts, all as shown in Fig. 10 of the illustrations. This arrangement leaves a small octagonal space in the center of the ceiling formed by the intersection of the bars already referred to. This space is covered by shorter bars, which are arched across from corner to corner of the central octagon, as indicated in Fig. 10. These are also clamped to the main bars by U-shaped bolts, thus forming a complete dome of wrought iron. The construction is such that any pressure from above only tends to make the construction more secure, the strain on the bars being taken up by the octagonal frame. After the latter has been put in place the four corner spaces and the triangular spaces between the bars are filled by domed panels of plaster of paris and cement, 1 inch thick. These panels were formed by means of an india rubber bag inflated with air and stretched on a frame a trifle larger than the size of the panel desired, This was then pressed from the underside up against the iron ribs, permitting the air of the cushion to form a perfect dome to the opening in which it was placed. Plaster of paris was then poured over this cushion and allowed to set. The bag or cushion was then used in the same way in connection with the other spaces until the ceiling was complete, giving a groined arched ceiling of strong and attractive construction, as seen in the case of the dining room, Fig. 8. After the under side of the ceiling was finished, what may be termed ribs of cement were built up

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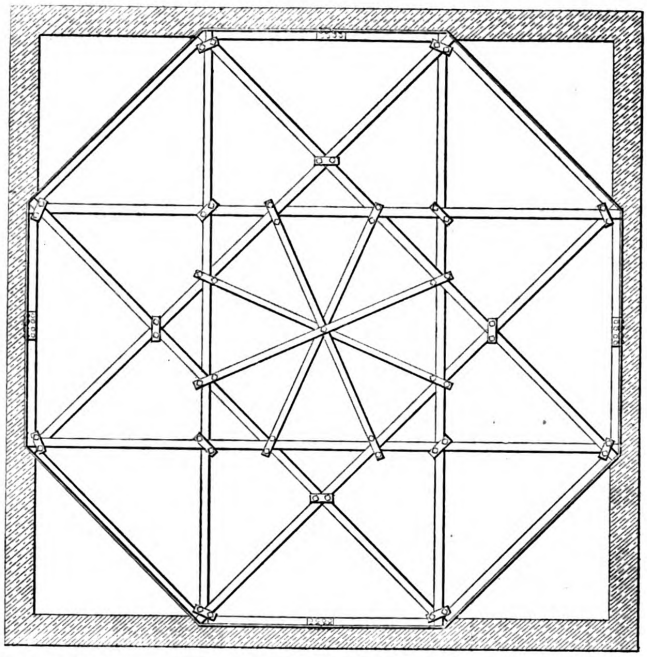
on top of the flat iron bars, as shown in section in Fig. 11. These cement ribs were made by placing two boards parallel cement. The little arrows indicate the direction of the hot air beneath the floor after it leaves the furnace pipe.



The "Copper" House.—Fig. 10.—*Plan of Bar Iron Frame for Floor and Ceiling Construction.—Scale,* 3-16 *Inch to the Foot.*

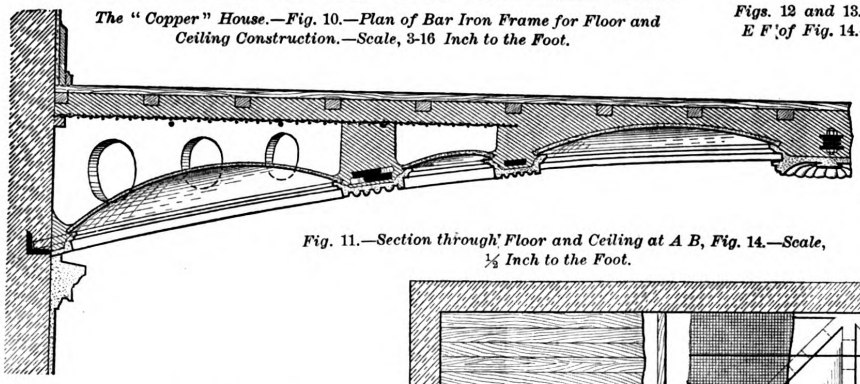


Fig. 11.—*Section through Floor and Ceiling at A B, Fig.* 14.—*Scale,* ½ *Inch to the Foot.*

and filling in between them with cement and concrete. Before the cement, however, was put in, round wooden blocks slightly tapering were placed at intervals between the boards, so that when the cement was set, the boards removed and the round blocks taken out, there was left a series of openings in the cement ribs. These openings, or portholes, as they are called, are made use of in connection with the heating and ventilation of the house, and will be referred to later on. After the ribs were built, heavy wire was stretched over them from all sides of the room. These wires were designed to support a layer of wire cloth, upon which in turn was placed a layer of cement or concrete, 3 or 4 inches thick. Fig. 11 represents a cross section through the flooring and ceiling of a room, taken at A B of Fig. 14, the plaster of paris panels, concrete ribs and openings through them all being clearly indicated. Figs. 12 and 13 represent sections through the floor and ceiling, being taken at C D and E F, respectively, of Fig. 14. If, instead of the cement floor, as used in this case, it should be desirable to employ wood, the sleepers could be imbedded in the cement, as indicated in Fig. 11, and the flooring nailed to them in the ordinary manner.

Fig. 14 shows the manner in which the wire is stretched across the concrete ribs, the position of the wire cloth for supporting the cement and a wooden flooring placed upon sleepers imbedded in the

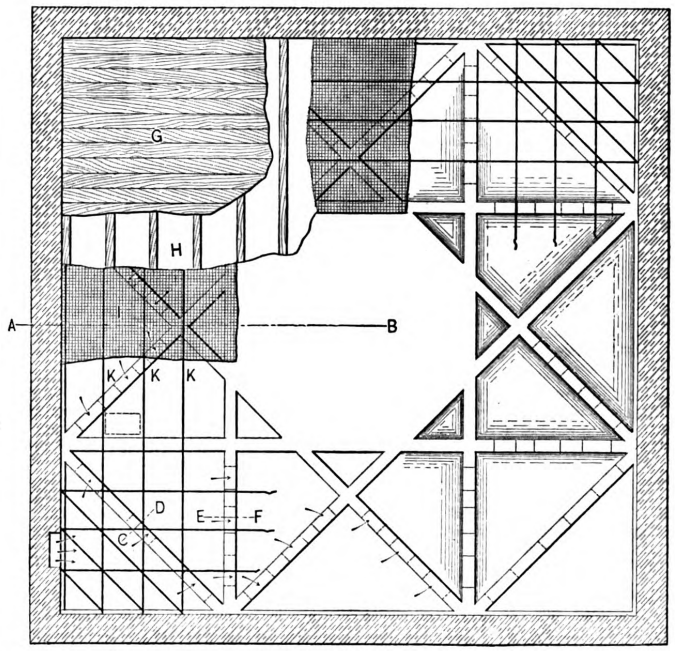
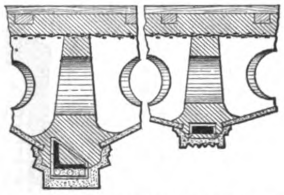


Fig 14.—*Showing Manner of Constructing Floor.—Scale,* 3-16 *Inch to the Foot.*

In some of the rooms of the house the ceiling is of an ornamental character, as, for example, that in the parlor, illustrated by Fig. 5. This is produced by placing on the under side of the flat iron bars forming the wrought-iron dome, moldings made of plaster of paris or *papier maché*, which are fastened by suitable hooks and cement. On these moldings rest the ornamental arched panels, which are made in plaster over an air cushion on which has been placed a gelatine cast of the ornamentation desired. After the panels are put in position the construction is the same as that employed in connection with the plain ceiling. The center of the ceiling of the various rooms in the house has a thickness to the level of the floor of the rooms above of 5 or 6 inches, while at the sides the thickness runs up to 18 and 20 inches.

Another very interesting feature in connection with this house is the method employed for the heating and ventilation, already alluded to. In the basement is a hot-air furnace provided with a coil, so that both hot air and steam can be used in warming the rooms. The air is taken in from the outside of the building and distributed to the floor of the various rooms by the ordinary method. The peculiar construction of the floor, with



Figs. 12 *and* 13.—*Sections through C D and E F of Fig.* 14.—*Scale,* ½ *Inch to the Foot.*

the portholes in each rib of concrete and cement, allows the hot air to pass from the furnace pipe through the various spaces formed by the plaster of paris panels, and thus circulate under the entire floor before entering the room through the register placed in the floor or side wall. The result is to make the cement floor a huge radiator, thus keeping the apartment at a comfortable temperature at

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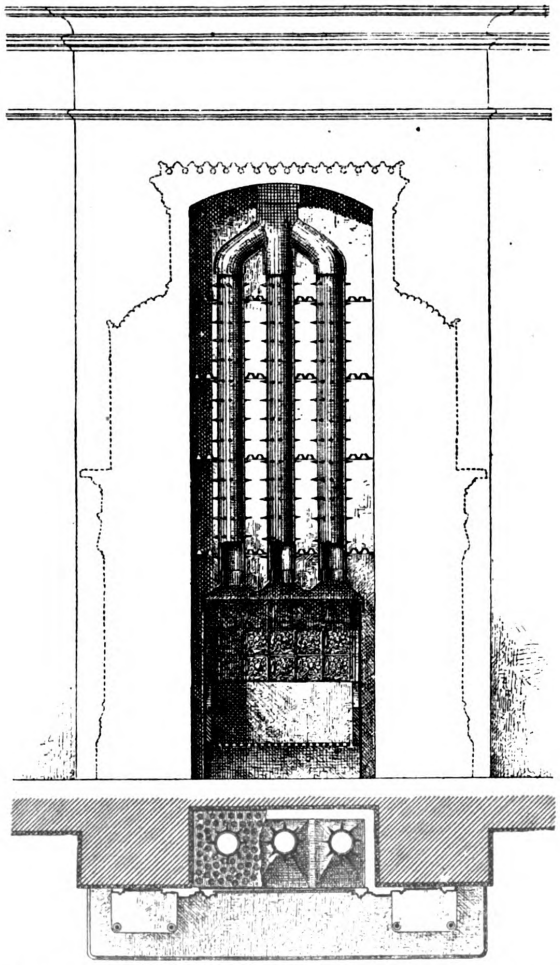
all times. In the main rooms on all the floors are open grates or fire places of rich and artistic design, finished in electro bronze, brass, silver and nickel, and provided with blowers which may be folded up in such a way as to occupy very small space at the top of the grate opening. A view of the fire place, with its wrought andirons, in the main hall, is shown in Fig. 7. These ventilating fire places are so made that fresh air is brought in from the outside of the house to a point behind the grate and then carried around the fire box and the three vertical cast-iron flues which convey to the chimney flue the products of combustion. Fg. 15 represents a plan and elevation of one of the fire places employed, while Fig. 16 is a vertical cross section, the arrows indicating the direction of the air currents. At intervals above the fire are perforated plates, which extend across the air flue in such a way as to retard the flow and cause the air to become highly heated before it enters the room through openings just over the mantel. Fig. 16 also gives an idea of the construction of the blower used and the manner in which it folds up out of the way. The house may be further heated by steam by the indirect plan. In the basement is a Gold's heater, consisting of a series of radiators surrounding a fire pot. These are contained in a brick chamber, in the upper portion of which are also suspended a number of radiators. The cold air is taken in from the outside of the house, circulates about the radiators, which are filled with hot water, and is distributed to the various rooms of the house in the usual manner. This serves to keep the house comfortable in mild weather. In case of very cold weather, when it is still desired to maintain a warm temperature in the house, the fire in the furnace is increased and steam generated in the coil already mentioned. The steam is carried to radiating coils placed in recesses just below some of the windows, the spaces being indicated in the sectional elevation, Fig. 9. In this way it is possible, as we are informed, to readily raise the temperature in the house as may be desired.

Externally the house is very attractive and involves features of construction which are also novel. The entire exterior surface is covered with copper, the fact which gives the structure its name, the "copper house." Many of the panels are ornamented with designs of a unique character. Conspicuous features of ornamentation are four circular panels representing America, Europe, Asia and Africa, which are copied from the celebrated Albert Memorial. Each of these panels is 3 feet in diameter, there being two upon the front and two upon the side of the house. Three of these panels are quite clearly indicated in the picture forming our supplement plate. The entire copper work was done by what is known as the galvano-plastic process, which permits of the execution of the most intricate designs. Some idea of the results obtained by this method may be gathered from an inspection of the supplement plate and also of Fig. 9, which shows sectional elevations. The design to be obtained is first produced in wax by a very simple method, and the mold thus formed is placed in a battery. The frieze extending entirely around the house, between the first and second stories, was made in this way in lengths of some 12 feet, and fastened to the angle-iron frame by means of flanges and rivets.

It may be interesting in this connection to describe the manner in which the exterior walls of the house are constructed. In the first place, the foundation was prepared in the usual manner, and topped with a stone belt course extending entirely around the house. Upon this was erected a wrought-iron skeleton, made of tee and angle irons placed some 4 or 5 feet apart. At proper intervals from the belt course to the main cornice were placed 4 x 4 angle irons, which were secured to the upright framing. At each sill and lintel course was placed a horizontal angle iron, extending entirely around the building, and above the window sill was another for receiving the floor construction, all as indicated in the sectional elevation, Fig. 9. The angle irons were covered with pilasters made of deposited copper, embellished with designs of an attractive character. The pilasters were first riveted to the angle irons in such a way as to leave at each edge a flange, to which were riveted the copper panels carrying ornamental designs in bas relief. Two of these panels are represented in the lower portion of Fig. 9. After the copper panels were put in position the entire copper work was backed up with an 8-inch brick wall, extending from the foundation to the roof. The latter is covered with red tile, and the tower, which is covered with the same material, terminates in a copper finial. The roof of the veranda, extending across a portion of the front and side, is supported by cast-iron columns, while the balcony, partially encircling the tower, is made of cast iron, and heavily plated with copper so as to withstand the action of the weather.



The "Copper" House.—Fig. 15.—Plan and Elevation of Ventilating Fire Place.

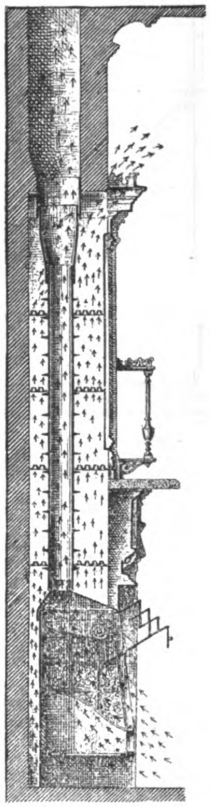


Fig. 16.—Vertical Cross Section of Fire Place, with Arrows Indicating Course of Air Current.

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CORRESPONDENCE.

Problem in Trestle Work.

From M. J., *Minersville, Pa.*—I would ask for a little space in the columns of the paper for the purpose of submitting a question which I have not as yet seen presented. It relates to trestle work and is illustrated in the sketches which I present. Fig. 1 is an inclined plane the pitch of which is 4 inches to the foot. There are braces framed from post to stringer and, as will be readily observed, the runs of these braces are not at right angles with each other. I would like very much to have the readers explain the method of obtaining the length of such braces, as well as their cuts, both practically and theoretically, irrespective of the runs or the pitch. Fig. 2 is another trestle of the same general nature, the posts of which stand on a batten with a girt framed into them and braced. Another question I would like to ask is, How would the practical readers of *Carpentry and Building* go about framing trestle work where it is necessary to have a curve of any given radius? Also, how they would obtain the proper elevation of such a trestle to correspond with the outer rail of a railroad? How is the length of both inside and outside girts obtained for such bents?

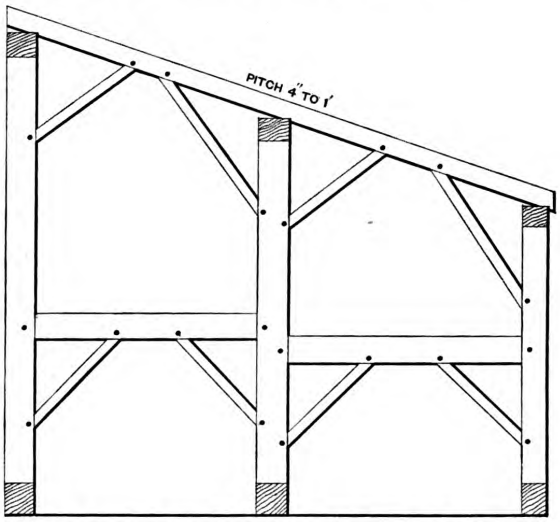

Fig. 1.—Sketch of an Inclined Plane with Pitch of 4 Inches to the Foot.

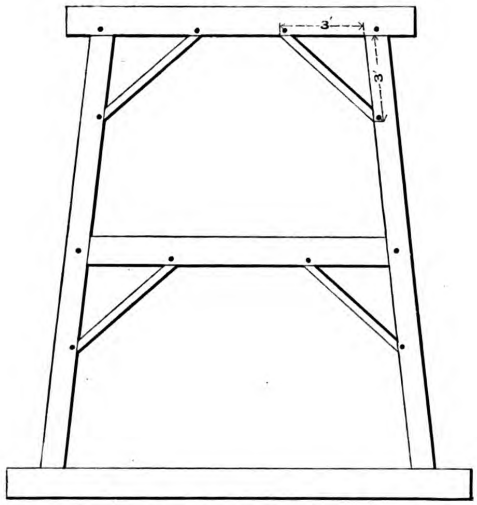

Fig. 2.—Trestle Having Posts Standing on a Batten and a Girt Framed in and Braced.

Problem in Trestle Work.—Sketches Submitted by "M. J."

A Correction.

In the November issue of the paper, in connection with the article from "E. K.," Adrian, Mich., illustrating and describing a combined book case and secretary, a typographical error occurred in connection with the scale of the sectional view of the desk and some of the details of construction. On page 285, instead of reading $\frac{1}{8}$ and $\frac{1}{4}$ inch to the foot, it should read $\frac{1}{8}$ and $\frac{1}{4}$ inch to the inch. As the hight and some other dimensions of the book case were given in the descriptive text, our readers have probably not been misled by the unfortunate error in the matter of scale.

Trouble With Plastering.

From W. H. F., *Knowlton, Pa.*—I would like very much to ask for information in regard to a job of plastering to which my attention has recently been called. I was asked to stop the leaks around the chimney of a house, but after careful examination I discovered that moisture could not have caused the plaster to assume the condition in which I found it. The house is a frame one and was built 14 years ago. Around the chimney in the garret the ceiling is in good condition and also for a distance about a foot down on the flues. A short distance below the ceiling, however, is where the trouble begins and it extends down from the flue 3 or 4 feet. The defects appear in patches on the flues and in places in the second story rooms as well as in the parlors. In some places the defects extend out on the side walls for a foot or more. I would here state that the flues are in the ends of the house. The plaster appears to be full of furrow-like cracks, about $\frac{3}{8}$ inch wide, swollen out about $\frac{1}{4}$ inch beyond the face of the white coating. To me it looks very much as if the white coating had been reduced to a white powder by fermentation or some chemical change which has left the white powder like a streak of frothy foam. This is always falling off, and when brushed over the place will again appear just the same. The ceilings in the garret are becoming covered with these patches and the plaster falls like fine flour, but there are no frothy cracks as yet like those on the breasts of the chimney. If some of the practical readers of *Carpentry and Building* can tell me what causes this trouble, and what I shall do to remedy the evil, I shall be greatly obliged.

Dimensions of an Octagon.

From L. R., *Manalapa, N. J.*—In reply to "R. P. B." of Whitewright, Texas, who asks in the November issue for a rule for finding the length of the side of an octagon when the diameter is known, I would say, multiply the diameter of the octagon by 0.4141, and the result will be the length of a side.

Equilateral Triangle of a Circumscribed Circle.

From J. M., *Cincinnati, Ohio.*—Will some of the mathematical readers of *Carpentry and Building* be kind enough to give me the shortest rule for finding the equilateral triangle of a given circle?

Note.—With no intention of anticipating the replies which our readers may see fit to send in answer to the inquiry of the correspondent above, we would say that as the radius of a circle is contained in its circumference as a chord six times, the equilateral triangle may be obtained by locating the six points in the circumference and drawing connecting lines to alternate points.

Quantity of Material Required.

From F. A. E., *East Portland, Oregon.*—In a recent issue "P. H." of Paterson, N. J., says: "I am a reader of *Carpentry and Building*," and asks the practical readers of the paper what I term silly questions. For instance, how many shingles of various kinds are necessary to cover a building? Now, if "P. H." is in the building trade he must know that the judgment of the architect, the customs of the country or district, the size of the shingles, the distance the shingles are exposed to the weather, the pitch of the roof, the manner in which the roof is cut up by hips, valleys, curves, groins, &c., and certain rules of mathematics all govern the question at issue. If "P. H." is not "in it" he must be governed by the aforesaid conditions and learn by experience, as there is no iron-bound rule by which a builder can determine with any degree of certainty the quantity of shingles, amount of timber or other material used in building in general.

Length of Jack Rafters.

From W. S. S., *Woodlawn, N. Y.*—In the November issue of the paper "G. D. I." of West Philadelphia, Pa., gives a plan for obtaining the length of hip, valley and jack rafters, and in the course of his explanation says: "Carry E D to H." Now, I would like to know where he gets the point H; also where he obtains the point G. Would not the side bevels be the same as the plumb cuts of the rafters of gables to which the jacks belong? How does he get the top bevels? By answering these questions he will greatly assist me and probably help others to solve the problem.

Storage House for Vegetables.

From A. S., *Lancaster, Ill.*—Will some of the readers of the paper kindly give me plans, and tell me how to build a warm house in which to keep potatoes, apples, &c., from freezing. I do not wish to use

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a stove for the purpose of keeping the house warm. If there is a dead air space in the wall, does it make any difference whether the space be 2, 4 or 6 inches? Will a 2-inch air space be sufficient or just as good for the purpose as a 6-inch air space? I desire plans for either a frame or a brick structure.

Problem in Gear Wheels.

From D. W., *Chattanooga, Tenn.*—In the July issue of *Carpentry and Building*, page 166, is a problem in regard to gear wheels from "J. N. H." This problem involves the same principles that were given in the April number, page 99, in that we have the radius and spring of an arc to find the chord. The chord is the full line between the dotted lines, shown in Fig. 1. Where the dotted lines cross the two spheres is the point that will first touch when raised vertically to find the chord. When the radius and spring of an arc are given, multiply the radius by twice the hight of the arc and from this take the square of the hight of the arc, which leaves the square of one half of the chord. The sum of the chords taken from the distance A to B, Fig. 1 will give the distance between C and D, or the hight

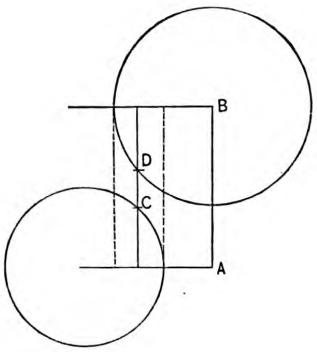

Fig. 1.

b C from the square of the hypothenuse E *b*, and the square root of the remainder will give the distance between E and C. Having found the distance between E and C, the space which the wheel A must be lowered is found by subtracting E C from *a* C, which, by means of the figures above presented, equals 1.29+; therefore, the wheel A must be lowered vertically 1.29+ inches in order to come in contact with wheel B. The above solution is perhaps as simple as any that can be presented, and may be of use to the correspondent referred to as well as to other readers of the paper.

I will, however, endeavor to show how the same problem can be solved by natural trigonometrial sines. In any plane triangle the sides are proportional to the sines of the opposite angles, which may be found as follows: Divide *b* C by *a b*, and the quotient will be the natural sine of angle *a*. For example, 6 ÷ 10 = 0.60, which, by referring to a table of natural sines will be found to be the sine of 36° 52′ 14″ (nearly). Let E *a b* in the sketch, Fig. 2, be a plane triangle; then *E b* : *ab* :: sin. *a* : sin. *E*. Thus

$$\frac{a\,b\,(10) \times \text{sin. } a\,(0.60)}{E\,b\,(9)} = 0.66 = \text{sin. of } 41°\ 48'\ 40'',$$

and 180° − 41° 48′ 40″ =

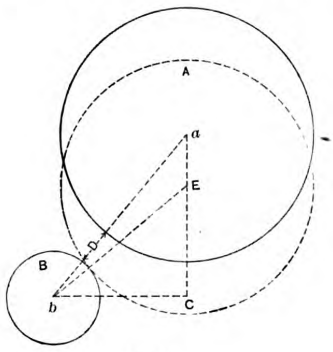

Fig. 2.

N. H." desires to know is the vertical distance one wheel must be raised or the other lowered in order that the teeth of one will mesh with those of the other. It is necessary, therefore, to find the distance *a* E, which may be done as follows:

b E = *a b* − *D* and *E C* = *a C* − *a E*. Since *b E C* is a right-angled triangle, we have: $(b\,E)^2$ or $(a\,b - D)^2 = (E\,C)^2$ or $(a\,C - a\,E)^2 + (b\,C)^2$; hence $\overline{a\,b}^2 - 2\,a\,b\,D + D^2 = \overline{a\,C}^2 - 2\,a\,C\,a\,E + \overline{a\,E}^2 + \overline{b\,C}^2$ $\overline{a\,E}^2 - 2\,a\,C\,a\,E = \overline{a\,b}^2 - 2\,a\,b\,D + D^2 - \overline{a\,C}^2 - \overline{b\,C}^2$. Solving this quadratic equation for *a* E, we have: $\overline{a\,E}^2 - 2\,a\,C\,a\,E + \overline{a\,C}^2 = \overline{a\,b}^2 - 2\,a\,b\,D + D^2 - \overline{b\,C}^2$

$$a\,E - a\,C = \sqrt{(a\,b - D)^2 - \overline{b\,C}^2}$$

$$a\,E = a\,C + \sqrt{(a\,b - D)^2 - \overline{b\,C}^2}$$

From A. C., *Columbus, Ohio.*—In the July number of *Carpentry and Building*

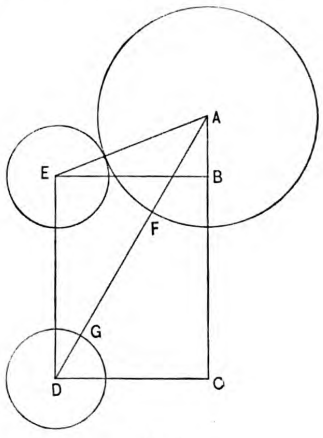

Fig. 3.

Problem in Gear Wheels.—Sketches Submitted by Various Correspondents.

necessary to raise the pinion in order to have the two wheels touch.

From L. G. K., *Kansas City, Kan.*—Referring to the communication of "J. N. H." which appeared in the July issue, I would offer the following: In the sketch shown in Fig. 2, *b* C represents the horizontal and *a* C the vertical distances between the centers of the wheels A and B. The line *a b* represents the diagonal distance between the centers and D the distance between the circumferences of the two wheels when in the position indicated in the sketch. E *b* represents the distance between the centers when the wheel A is lowered vertically until it touches the wheel B, as shown by the dotted circle. Consider, for example, the size of the various parts to be as follows: The radius of the wheel A, 7 inches; the radius of the wheel B, 2 inches; the distance between the two wheels, represented by D, 1 inch; the distance between *b a d* C, 6 inches; between *a* and C, 8 inches, and between *a* and *b*, 10 inches. As shown by the dotted lines in Fig. 2, the distance between E and *b* must be equal to the radius of the wheel A plus the radius of the wheel B, or 2 + 7 = 9. It may be of interest to "J. N. H.," as well as some other readers of the paper, if I state a proposition in geometry, to the effect that "the square of either side about a right angle is equal to the square of the hypothenuse diminished by the square of the other side." E *b* C in the sketch, Fig. 2, represents a triangle whose base is C *b*, the perpendicular E C and the hypothenuse E *b*. The lengths of E *b* and *b c* being known, the length of E C is found as stated. Subtract the square of the base

138° 11′ 20″, its supplement, which is the angle of *E*. As the three angles of any triangle are equal to 180° the angle of *b* is found by subtracting the sum of the angles *a* and E from 180°, which gives 4° 56′ 26″. The length of the side *a* E may now be found by the following formula:

a E : *E b* :: sin. *b* : sin. *a*, or (9 × 0.861) ÷ 0.60 = 1.29+ = *a E*.

Without attempting to explain the properties of logarithms, I will endeavor to show how they may be used to abbreviate multiplication and division for solving the problem in gear wheels by using the logarithms of numbers and logarithmatic sines. Thus:

E b (9) *a c*.....	9.045757
: *a b* (10).....	1.000000
:: sin *a* (36° 52′ 14″).....	9.778158
: sin. *E*.....	9.823915 = 41° 48′ 40″

∴ *E* = 41° 48′ 40″, or 138° 11′ 20″.

To find the length of the side *a* E, proceed as follows:

Sin. *a* (36° 52′ 14″) *a c*...	0.221842
: *E b* (9).....	0.954243
:: sin. *b* (4° 56′ 26″).....	8.935358
: *a E*.....	0.111443 = 1.29+

When the principles of geometry have been thoroughly understood, as they should be by every carpenter, the above problem will appear very simple.

From L. C. D., *Englewood, N. J.*—Referring to the problem in gear wheels presented by "J. N. H.," in the July number of *Carpentry and Building*, let E of Fig. 2 of the sketches be the center from which a circle having the same radius as the wheel A be struck in order to be tangent to the wheel B. What "J. N. H." desires to know is the vertical distance one wheel must be raised or the other lowered in order that the teeth of one will mesh with those of the other. It is necessary, therefore, to find the distance *a* E, which may be done as follows:

b E = *a b* − *D* and *E C* = *a C* − *a E*. Since *b E C* is a right-angled triangle, we have: $(b\,E)^2$ or $(a\,b - D)^2 = (E\,C)^2$ or $(a\,C - a\,E)^2 + (b\,C)^2$; hence $\overline{a\,b}^2 - 2\,a\,b\,D + D^2 = \overline{a\,C}^2 - 2\,a\,C\,a\,E + \overline{a\,E}^2 + \overline{b\,C}^2$ $\overline{a\,E}^2 - 2\,a\,C\,a\,E = \overline{a\,b}^2 - 2\,a\,b\,D + D^2 - \overline{a\,C}^2 - \overline{b\,C}^2$. Solving this quadratic equation for *a* E, we have: $\overline{a\,E}^2 - 2\,a\,C\,a\,E + \overline{a\,C}^2 = \overline{a\,b}^2 - 2\,a\,b\,D + D^2 - \overline{b\,C}^2$

$$a\,E - a\,C = \sqrt{(a\,b - D)^2 - \overline{b\,C}^2}$$

$$a\,E = a\,C + \sqrt{(a\,b - D)^2 - \overline{b\,C}^2}$$

"J. N. H." of New Orleans, La. wants to know how to move a pinion wheel so as to mesh with a larger cog wheel. Referring to the inclosed sketch, Fig. 3, we have the two diameters of the wheels and of course know their radii, A F and D G. We also have given the distance between the wheel F G, the vertical distance A C and the horizontal distance C D. Now it is required to find D E, the distance the pinion must be raised vertically in order that it will engage with the larger cog wheel. In other words, we want to raise the pinion until the distance F G disappears. In the right angled triangle A C D, $\overline{A\,C}^2 + \overline{C\,D}^2 = \overline{A\,D}$. *A D* must now be shortened until *A D* equals *A E*, the sum of the radii of the two wheels, which is known. Then in the right angled triangle A B E, $A\ E^2 - (E\,B^2 = \overline{D\ C^2}) = A\ B^2$; then by extracting the square root we find *A B*, then *A C* − *A B* = *B C* = *D E*, which is the distance required.

Note.—We also have replies similar to the above solutions from "J. H. D.," Knoxville, Tenn.; "G. E. F.," Louisville, Ky.; "C. W. B.," Denver, Col.; "F. L. C.," New York City, and "J. M.," Cincinnati, Ohio.

Rule for Dividing a Circle.

From E. A. P., *Carthage, Ill.*—In reply to "E. H. G.," who asked in the July number of *Carpentry and Building* for a rule for dividing a circle into any number of equal parts, I send the following sketch: Referring to the sketch, draw the diameter A B, and from A draw the line A C at any angle and of indefinite length. Divide the line A C into as many equal parts of any convenient length as it

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RESIDENCE OF NILES POULSON, ESQ., NEAR FORT HAMILTON, LONG ISLAND, N. Y.

JAMES M. FARNSWORTH, ARCHITECT.

SEE ARTICLE PAGE 298.

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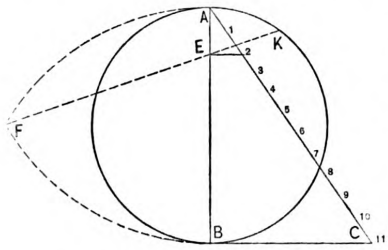
is desired to divide the circle, as, for example, 11 parts. Now, from 11, the outer point of division, draw B 11. From 2, the point making the second division from A on the line A C, draw 2 E parallel with 11 B. From A and B as centers and A B as radius describe arcs intersecting at F. From F draw a line through E to the circumference at K, and the distance A K will be one of the equal parts into which it is desired to divide the circle. Taking A K in the compasses, it is a very easy matter to locate the remaining points in the circle.

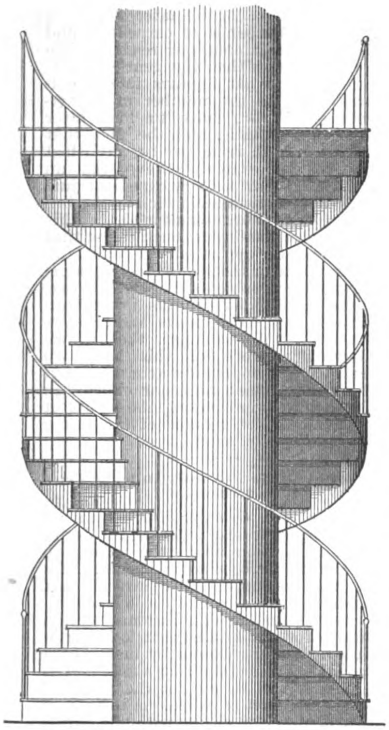


Dividing a Circle, as Suggested by "E. A. P."

Double Spiral Stairway.

From C. D. H., *Hamilton, Ont.*—Can any of the readers of *Carpentry and Building* give me a plan of stairs on which a person may ascend and another descend at the same time without the one seeing the other? I have read of such a stair, but have never seen one.

Note.—The sketch which is presented in connection herewith represents, we think, what our correspondent has in mind. It is

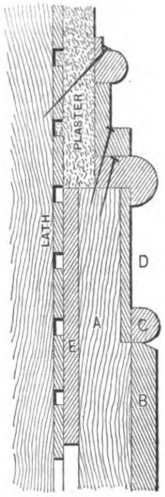


Double Spiral Stairway.

known as a double spiral, and is frequently employed in cyclorama buildings, as well as in connection with other structures. The stairway is constructed upon the principle of a double screw, and permits people passing up one flight to be invisible to those moving on the other. If any of our readers have any suggestions to make in connection with the question raised by our correspondent above, we shall be glad to hear from them.

Molding Circular Wall Strings on Stairs and Easings.

From A. L., *Napa, Cal.*—As being of possible interest to the readers of *Carpentry and Building*, I take the liberty of inclosing a sketch showing a method which I employ in molding circular wall strings on stairs and also on easings. The method consists in splitting the molding into several parts, as indicated in the sketch, and springing and nailing on one piece at a time until the molding is completed. I run heavy gauge lines on the back of the molding, then run a sharp knife on the back and front two or three times, splitting the molding apart. The joints are planed just enough to remove any roughness. I wet the pieces if required, using hot water as the most effective means. The second piece shown in the sketch may be beveled back on the lower edge so it will fit tight to the plaster when nailed. Referring to the sketch, C and D represent the bead and



Sketch Accompanying Letter from "A. L."

veneer bent in on the stringer to cover the keys A exposed by rabbeting. E is a strip bent on the back of the stringer to give it strength. A piece of work well executed in the manner shown in the sketch looks as well, according to my opinion, as straight molding.

Set Squares.

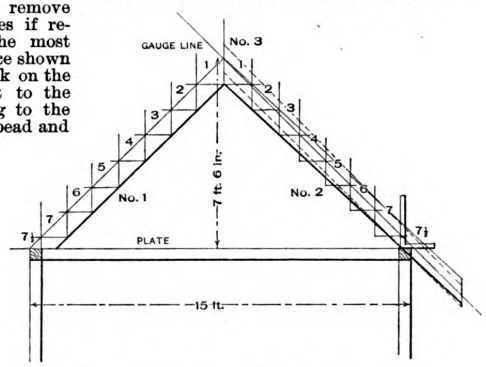
From J. J., *San Francisco, Cal.*—Will some of the readers of *Carpentry and Building* kindly answer the following questions pertaining to set squares: 1. What use is made of set squares having angles of 22½° and 67½°? 2. What is the use of axonometrical drawing, and how is it done? 3. How can one find the length of a set square when the angle is given?

Cleaning Drawing Instruments.

From J. N. H., *New Orleans, La.*—Referring to the inquiry of "F. T. T." in the November issue of *Carpentry and Building* on the subject of cleaning drawing instruments, I have found ordinary ink erasing rubber to be the best thing for cleaning the steel points of instruments, and lead pencil erasing rubber for the silver points. I have a fine set of Swiss instruments which I have kept in excellent order for a great many years by occasionally going over them with ink and pencil erasing rubbers as stated. There is just enough grit in the rubber to do the work nicely and not scratch the instruments. I always use Davidson's Velvet Rubbers, but presume any make of equal fineness would answer as well. I keep my steel straight edges, triangles, &c., clear of rust in the same manner.

Framing a Roof of One Foot Rise.

From N. E. O., *Portsmouth, N. H.*—Seeing so many questions asked and so patiently answered through the columns of *Carpentry and Building* encourages me to come forward for a little information. I am a young mechanic and have never framed a roof. I have tried to study it out alone, but have not succeeded. What I desire to know is this? In framing a roof having a 12-inch rise, and the rafters run over as shown in the sketch which I send herewith, what is the proper way of



Sketch of Rooj Submitted by "N. E. O."

framing? How does one measure the length? In the portion of the sketch marked No. 1 it is evident the bevels are true miters, and the length is to be measured on the back. In No. 2 it is very plain the bevels are not exact miters, and to be a true miter the rafter will have to be as shown in No. 3, which raises the rafter half its width higher than in No. 1. Now, in framing No. 1 with the square, we place it on the rafter at the 12-inch mark and move it along 7½ times the length and bevel. But what would we do in No. 2? The bevels and lengths will differ, but how does one obtain them with the use of the square if the roof must be 7 feet 6 inches higher than the roof plates? Now, in framing No. 3 the rafter should be half the width of the rafter higher than the specified hight, which, of course, it must be if the bevels are true miters and we are to lay it out by the square. Using the 12-inch marks on the blade and tongue, where shall our guiding line for the square be? It cannot be on the outside, as in No. 1. The only conclusion, therefore, I can reach is that a gauge line must be struck, as shown in rafter No. 3. Am I right, and would it be the same for a hip or valley? When one has a valley or hip rafter to frame in the same roof he must be more particular with regard to bevels, length, &c. If some of the practical readers of *Carpentry and Building* will enlighten me on the above I shall be greatly obliged.

Holes in Belting.

From M. B. A., *Waukegan, Ill.*—In reply to "W. J. H.," Rocksboro, Philadelphia, who asked in the October number about laying out belt holes, I will give him my way of doing the work. In one end of the belting I make one more hole than I do in the other end, so that two holes will not be opposite each other, but will be opposite a blank space in the belting. Beginning at one edge of the belt I run the lacing back and forth through every hole to the other edge and then back again to the place of starting, where

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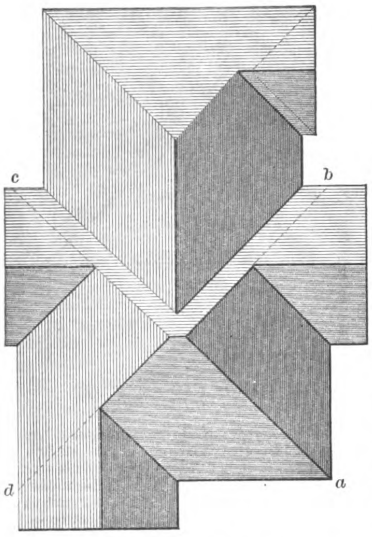
I tie the ends, or else pass them through small holes made with an awl. It will be found that the lacing on both sides of the belt is exactly the same, while the crossings are all within the holes. I have found this mode of lacing to work very well, especially on belts which present both sides to the face of one or more pulleys, which is very often the case with modern machinery.

Problem in Half-Pitch Roofs.

From J. N. H., *Galveston, Texas.*—Referring to the roof plan submitted by "A. W. H.," Los Angeles, Cal., in the October number, I send the following sketch illustrating my idea of the best arrangement of a half-pitch roof. The four principal hip rafters spring from points marked A, B, C, D, as indicated by the full and dotted lines forming the main roof, to which all projections join, as shown. On the



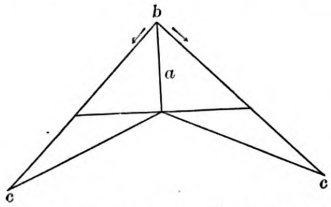
Problem in Half Pitch Roofs, Diagram Submitted by "J. N. H."

diagram of "A. W. H." the small projection at the rear is shown hipped as indicated by the dotted lines, but in such a finish would not show up very artistically according to my way of thinking, and I would advise a gable as being preferable.

Note.—As answers very similar to the above have also been received from "E. H. W," Stamford, Conn., and "O. J. B.," Indianapolis, Ind.

Floor and Roof Truss.

From J. N. H., *Galveston, Texas.*—I sincerely trust that "C. M. J." of Ontario, Ohio, will not follow the plans for



Floor and Roof Truss.—Fig. 1.—Proper Position of Stress Rod.

a floor and roof truss of a 36 feet span hall building suggested by "R. C. B." of Orangeburg, S. C., in the October issue of *Carpentry and Building*. Should he do so I tremble for the safety of the building and for his reputation as a builder. If "R. C. B." has ever constructed a truss of the kind he illustrates and it has stood a practical test, he evidently has the support of a kind and indulgent Providence, not extended to many of the building craft. By a little calculation it is found that allowing 75 pounds per square foot of floor surface for live and dead load, all of which is carried by truss rods, we have a uniformly distributed load of 22,000 pounds, or a center load of 11,000 pounds on each truss. With trusses constructed as shown by "R. C. B." this will bring a tensile

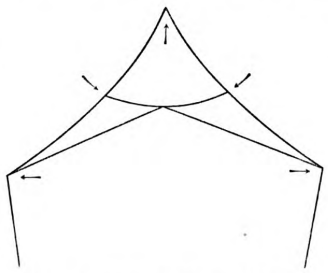


Fig. 2.—Showing Effect on Roof when Stress Rod is Omitted.

strain on the truss rods of approximately 83,000 pounds, to bear which is required a rod of 2⅛ inches in diameter, or two rods of 1⅛ inches in diameter, or 3 rods of 1¼ inches in diameter, of good iron and with upset screw ends, instead of one rod of 1 inch diameter, as advised by the correspondent. "Some of the details" are as bad, if not worse, than the general construction. All parts of a truss should be uniform in strength, but with the truss under discussion the end of the connections would fall and the rods crush into the floor beam or girder long before the rod itself would break. With a depth of truss of 24 inches we would get a strain on the truss rod of about 50,000 pounds, for which one rod 1⅝ inches in diameter or two rods 1⅛ inches in diameter would be necessary. For a single rod 1 inch in diameter a depth of truss of 4 feet would be necessary. The above figures are on the basis of truss rods having a tensile strength of 50,000 pounds and using a factor of two for safety, while in practice a greater factor of safety should be used for the reason that rods of this construction cannot be easily obtained and are rarely used except in bridge work and on first-class building work.

In what he would teach others "R. C. B." also shows unpardonable ignorance

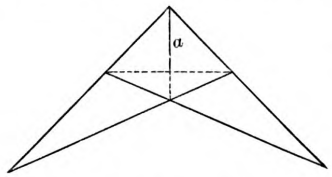


Fig. 3.—An Objectionable Method of Construction.

in the construction of his roof truss. Without discussing details of construction or size of timber used, whether they be of "ordinary size and cut" or otherwise, I would impress upon his mind the fact that in such a roof truss as he shows it is absolutely necessary for a good job that a rod be placed as indicated by *a* of Fig. 1 of the sketches, or, to follow his own details of construction, a board "of ordinary size and cut" should be nailed vertically, as shown. The rod indicated by *a* of Fig. 1 is designed to transmit the stress to the apex *b* of the same figure that it may travel down the rafters in the direction of the arrows to the bearings *c c* on the wall plates. A roof truss constructed without such a tie would sag and spread the walls, as indicated by Fig. 2 of the illustrations. I have seen similar criminal ignorance displayed in the construction of the form of truss shown in Fig. 3, where neither of the members indicated by the dotted lines was originally put in, one of the members being very necessary, preferably the vertical tie *a*.

A Woman's Suggestions.

From M. A. S., *Hilton, N. J.*—Why does not the editor devote a page or more to matters of interest to women? Let us know all about kitchen utensils which are newly patented and are intended to make our work light and easy, the same as the Novelty department is designed for the men. My husband buys *Carpentry and Building*, devours its contents and then locks it up in his tool chest, for he says there is nothing in it which I could read or understand, although I like very much to examine the different designs of houses and mantels. Why not devote a page to the doings of women, how to furnish cottage houses, &c.? Give us a glimpse of the interior of parlors, reception halls, views of handsome staircases, and tell us how to add to our incomes, as wives of mechanics have very little spending money. Many an article for which we have a longing we are forced to do without. Give a recipe once in a while for getting up a good, substantial lunch to send with a laboring man—something that will not look as if it had been sat upon when the basket is opened. If the editor could tell us how to get it up without costing money, so much the better. Once in a while offer a prize, which shall be open to the wives of mechanics, as to the best ideas or suggestions for enlarging the usefulness of *Carpentry and Building*, or for the best story written by them regarding housekeeping or money saving. Give us a chance once in a while to earn a little money, that we may buy what we please with it, and the editor will find women as well as men among the subscribers to the valuable paper.

Note.—We present the letter of the correspondent above for the interest it may have for the husbands of carpenters' and builders' wives among our readers. We are glad to know that the gentler sex is interested in what appears in our columns, but with the number of departments which we have to look after at the present time, and the fact that there are only 12 issues to be published each year, it is scarcely believed that an extension of our field is expedient just now. We, of course, appreciate the importance of the suggestions made by this correspondent, and very much regret that we have not the opportunity of publishing a woman's paper that would be as entertaining and valuable to the wives of carpenters and builders as this journal undoubtly is to the carpenters and builders themselves. We are sure that if we undertook a work of this kind we should have an appreciative constituency, but at the present time our efforts are fully employed in meeting the wants of the large army of readers of *Carpentry and Building*.

Diagonal Section of a Cylinder a True Ellipse.

From C. W., *Orange, N. J.*—I am an old subscriber to the paper and I desire to ask a question about the answer to which there has been some dispute. I inclose a sketch supposed to represent a half cylinder or core box, and the dispute relates to the finding of a diagonal section of the cylinder. I claim that it is a true ellipse and can be struck by means of a trammel. I also claim that a trammel is the proper tool to use for the purpose. My friend says it is ridiculous to talk of either striking an ellipse with a trammel or of finding a section of a cylinder in the manner I have shown it.

Note.—The sketches inclosed by our correspondent above indicate a method of striking an ellipse by means of the trammel which, so far as we can see, is entirely correct. The sketch showing the diagonal section through a cylinder is also correct and gives a true ellipse.

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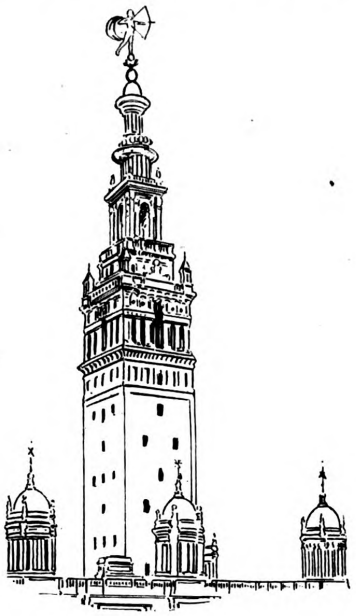
CONTEMPORARY ARCHITECTURE.

Two Notable Towers.

SINCE the completion of the Madison Square Garden tower in this city and the unveiling of the statue of Diana, which serves as a weather vane upon its top, some art critics in the daily newspapers and technical press have been calling attention to the striking resemblance which the design bears to that of the tower of the Giralda at Seville. Without attempting to make comparisons as to details of construction and design between the two, it may be interesting to note some of the general features which characterize the towers. The one on which Diana rests does not rise independently from the ground, but from the roof of the Garden building, the base being crossed by an arcade and flanked by angle turrets. The walls of pale yellow brick are very plain up to the first string course, while those of the Giralda are decorated with sunken panels, filled with elaborate blind arches and traceries in relief. In the first story of both towers, however, is found a tall,



Tower of the Madison Square Garden in New York City.

round-headed arch in the center of each face, with two lower rectangular openings on each side, and above each of these a circular light. The tower of Diana differs, however, very considerably from that of the Giralda in the design of the intermediate piers, which in the one case vary in bulk, while in the other they are more nearly uniform. The treatment of the string courses, arches, circular windows, balustrade and all details of the tower of Diana gives evidence of a desire to handle an old idea in a fresh style, and the same is indicated all through the succeeding stages. The tower of Diana is what may be termed a graceful form of Renaissance, while that of the Giralda is half Moorish and half Renaissance of a rather heavy type. Just how much the tower upon the Madison Square Garden resembles or is an adaptation of that of the Giralda may, perhaps be understood from a careful study of the engravings which are presented herewith. The illustrations, it will be noticed, differ in character somewhat from those which usually adorn our pages and are taken from a recent issue of the New York *Sun*, to the courtesy of whose management we are indebted for their use.

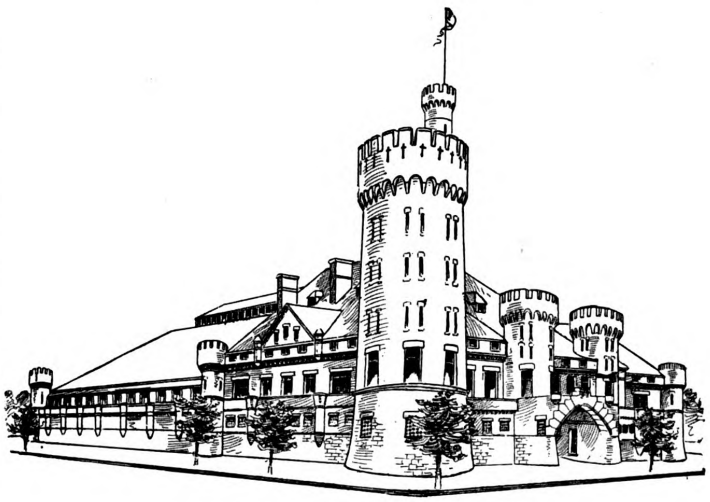
New Armory in Brooklyn.

Among the notable structures now in process of erection in Brooklyn, and



Tower of the Giralda, Seville, Spain.

which possess no little interest for the builder may be mentioned the new Twenty-third Regiment Armory, situated on the corner of Bedford avenue and Pacific street. The corner stone of this structure was laid on the afternoon of Saturday, November 14, and bears the inscription, "23d Regt. N. G. N. Y. S., 1891, presented by the Veteran Association in Brooklyn." A general view of the armory as it will appear when completed is shown in the accompanying cut, for the use of which we are indebted to the New York *Sun*. The new armory will have a frontage of 218 feet on Bedford avenue, 411 feet on Atlantic avenue and 485 feet on Pacific street. The material used in the construction will, for the most part, be hard-burned bricks, while the massive copings, cornices, sills and lintels will be of Carlisle brownstone. The front will be 46 feet in hight and the side and rear walls 35 feet. On either side of the main entrance on Bedford avenue will be a tunnel, as well as one at the corner of Atlantic avenue, There will also be a tunnel at each angle of the drill hall on Pacific street and Atlantic avenue. A tower 120 feet in hight will rise from the corner of Bedford avenue and Pacific street. From the main entrance there will be a hall 144 feet long, running back to the main drill room, the latter being 200 x 300 feet in area, surrounded by galleries. The extreme hight from floor to roof will be 97 feet. Two floors in the tower will be used for hospital purposes. In the basement will be a rifle range 100 yards long, with ten targets, and also waiting and bath rooms. The cost of the ground on which the armory is to rest was $150,000, and the building is estimated to cost $300,000 more. The architecture will be a combination of the Romanesque and Renaissance.



The Twenty-Third Regiment Armory, Brooklyn, N. Y.

AMONG THE NEW BUILDINGS about to be put up in the lower part of New York City is one which will contain the offices of the Delaware, Lackawanna and Western Railroad. The structure will occupy the site of the old building at the southeast corner of William street and Exchange place. It will be ten stories in hight and nearly square on the ground, and it will have a frontage of 56 feet 9 inches on Exchange place and 79 feet 6 inches on William street. It is to be built of Indiana limestone, and the architect, C. L. Holden, describes the design as classic. The interior construction will be on the steel frame-work plan used in connection with some of the tall buildings put up in New York City and in Chicago. It is expected to have the new building ready for occupancy by August 1, 1892.

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GOVERNMENT OF BUILDERS' EXCHANGES.

By WM. H. SAYWARD.

THE FOLLOWING CASE is given in full as indicating the value of a membership in a builders' exchange when the functions of association are properly understood and carried out.

The greatest difficulty in the way of securing beneficial results from organization is the fact that, while fully conscious of the importance of measures for improvement that have been adopted, members fail to apply the rules to themselves individually. All seem to fully recognize the necessity for improvement in the customs which surround the conduct of a particular branch of the business, but each waits for the other to take the first step out of the old rut, and the result is that the business is carried on in the old way, and the rules that have been adopted become dead letters from lack of application.

Nothing can be accomplished in any given direction unless something more is done than to define and suggest improvements for erroneous customs that may exist, and until action follows suggestion no beneficial result will follow legislation in builders' exchanges for the benefit of members.

The value of the case cited is in the fact that it indicates the value of organization properly understood and properly carried out. Members are made to understand that the purpose of organization is to improve the methods that surround the business, and to protect each other against unfair and unbusinesslike practices. A value is fixed upon membership by the demonstration of the fact that infringement of the rules of the association will not be tolerated; and considering that rules which have been adopted represent the opinion of the majority on any given point, the enforcement of these rules is a guarantee of fair and honorable treatment. The existence of this condition of affairs draws to the organization the best elements in the business, from the fact that it is thus plainly shown that a persistent and intelligent effort is being made to eradicate the evils that have so long been permitted to continue uncorrected.

The directors of the exchange in which this case was tried, upon hearing the testimony, were of the opinion that the defendant was more careless than anything else, but the protection of members of an exchange against carelessness is quite as important as against deliberate unfairness.

The rule under which this case was tried is as follows:

COMPLAINT COMMITTEE.

There shall be a Complaint Committee, which shall consist of the whole Board of Directors, whose duty it shall be to summon, hear and act in the following cases:

If any member of the association be accused by five other members, *in writing, over their own signatures*, of acts such as the directors, in secret session, may decide as acts of a character demanding investigation, the said member may be summoned to appear in his own defense, when, upon a fair and impartial hearing, the directors may either acquit him of the charge, or censure, suspend, fine or expel him from the association. The accusers in such case shall also be summoned to the hearing, and in event of their failing to appear, or to show that the charges were honestly made, or to substantiate them in some particular, then they themselves shall be subject to the penalties described for the member accused.

A *résumé* of the case is as follows:

STATEMENT OF CASE.

It appears by the testimony of the plaintiff and the admission of the defendant, in the case submitted, that an estimate for certain work was requested of the plaintiff by the defendant, for the purpose of incorporation in a bid for the carpenters' portion of a certain building; that the defendant was awarded the contract, and being asked by the plaintiff, by letter, if his (plaintiff's) bid was used, replied, in a personal interview, that it was so used.

It appears that the defendant further stated that he had no other bid for that class of work.

It further appears that the defendant, a few days after the interview above referred to, wrote to the plaintiff claiming that upon looking over his figures he had discovered that he had entirely omitted the item covered in plaintiff's estimate, and that he should therefore proceed to get other estimates, hoping thereby to get a lower bid, which would "help him out" of the loss which he would have to suffer on account of the omission aforesaid.

The plaintiff claims that this procedure on the part of the defendant was not fair or honest, and that under the purpose of this association "to secure honorable dealing by and between members," the said defendant should be disciplined, in accordance with the by-laws.

JUDGMENT.

The Board of Directors, after careful consideration of the complaint submitted to them, announce the following as their decision:

The claims of the plaintiff are fully sustained, and the defendant is, beyond question, liable under the by-laws to either censure, suspension, fine or expulsion from the association. The character and extent of the discipline, however, should depend upon the circumstances tributary to the action, and in fixing the same the directors feel that they may properly be influenced by the fact that the defendant does not deny any of the allegations of the plaintiff, and evidently did not consider that his act was essentially wrong or dishonorable.

The claim of the defendant that the discovery of the fact that he had not included in the summary of his estimate an item for the portion of the work in question entitled him to throw aside the bid which he admits he solicited and received, and which he further admits he told the plaintiff he had used; and further entitled him to solicit other bids, in the hope he would get a lower sum named, cannot be admitted as tenable.

Having solicited and received a bid, and having told the bidder that his was the only bid received, that it was used, and that the job was his, commits the party so receiving and stating to the party to whom he was indebted for the estimate, just as completely as if he had. in fact, used the bid identically as he had received it.

If the defendant had put an item in his summary for the work in question under the same circumstances as are above recited, and had made a mistake in the amount, putting in a figure less than the one he received, it could not be claimed that the sub-bidder (plaintiff) should be responsible, or be deprived of the work, or be forced to submit to a refiguring by others.

In the case presented the defendant simply made the larger mistake (according to his personal statement, unsustained by other testimony) of leaving out the item entirely.

It does not appear to the directors that the magnitude of the mistake makes any difference in the principle involved.

The defendant certainly laid himself open to well-founded suspicion by the course pursued, for whether the statement made by him, as to the reasons which caused him to open the job for other bidders, be true or not (and the directors find themselves unable to substantiate this statement, and can only form a conclusion based on inference), it might readily be imagined that the defendant had unworthy and improper motives.

The directors are of the opinion that there was no deliberate intent on the part of the defendant to act dishonorably, but that his action was the result of very loose methods in the conduct of business, and lax ideas in regard to the responsibility which a contractor owes to sub-bidders.

The defendant is therefore severely "censured" for his conduct in this affair, and while no further action is deemed proper at the present time, upon the grounds and circumstances offered by this case, warning is given that more severe measures will be adopted in event of future irregular proceedings, and the plea of ignorance of rightful practice will not be entertained as extenuating the offense.

Business Methods of Builders.

There is no kind of business requiring such care and precision in every detail as that of the contractor in the various branches of the building trade. From the initial proceeding, of examination of plans and specifications prior to making an estimate for the proposed work, all the way through to the final completion of work undertaken, the contractor is surrounded by conditions which make it peculiarly essential that he should be thoroughly grounded in good business principles in order that he may properly protect himself, be just and fair to fellow and subcontractors and not mislead or injure those for whom he is working.

But what are the facts? As a class, contractors in the building trades are woefully lax in business methods, habits and practices, and as a result suspicion and distrust of each other are created and their prosperity is under constant menace. An illustration of the result of lack of business method is given in the decision in a case between two members of one of the filial bodies of the National Association, recited in another column of this paper, and though it is in itself a small matter, it is an indication of the danger existing in the transactions between general contractors and sub-bidders. What contractors need is a more thorough understanding of what is correct and honorable from a business point of view, of what is safe and necessary to successfully conduct a business, and then if they follow these rules, they will find that all the way through the complicated responsibilities of their calling they are not, as now, continually thrusting themselves into unnecessary peril.

How many builders there are who do their business as far as regards the clerical work, the records, the bookkeeping, in the most primitive fashion, making their estimates, for instance, by "rule of thumb" and recording them, if at all, on slips of paper, blank leaves of pay-roll books, or in some other equally shiftless and uncertain fashion. How many there are who through all the detail and complications which are certain to arise do not know or comprehend how essential it is that they should be accurate and precise in every step, making such positive record as will insure their own protection and avoid controversy, delay and annoyance in settlement. The opportunity for reference to evils arising from insufficient and faulty business methods is endless, but the purpose of this article is not a recital of them; it is simply to call attention to the fact that lack of good business methods exists among builders to an extent which warrants the intelligent service of organizations to gradually correct, through action similar to that which has been referred to as appearing in detail in another part of the paper. It is to be hoped that the example given will be of service to all the fraternity and that better business methods may finally prevail.

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STANDARD STOREHOUSE CONSTRUCTION.

C. J. H. WOODBURY, vice-president of the Boston Manufacturers' Mutual Fire Insurance Company, describes standard storehouse construction as follows: The illustrations represent salient points in design for a mill storehouse several stories in hight, and include many features found useful in practice for convenience in operation and also securing the greatest measure of resistance to fire. This plan is not intended to take the place of the services of any mill engineer, but rather to assist in such work. It is important that the floor beams should be designed to sustain the greatest load ever to be placed on them, and the stories should be made low enough to prevent overloading, and also to prevent bales of material from being piled to great hight, the preferable method being to place bales on end. These floors, with beams of 20 feet span, laid 8 feet on centers, will sustain a load of 180 pounds per square foot, which is as much as would be required for raw material or finished goods of a textile or paper mill. The heavy drugs and dyestuffs would be placed on the ground floor. For convenience, as well as to separate the different hazards of raw material and finished goods, the building may be divided into two sections by fire walls extending through the roof. A storehouse one story in hight is recommended in preference to this design whenever there is sufficient quantity of level land at disposal for this purpose, as being cheaper, more convenient, and, when separated into small divisions by fire walls, the safest method of storehouse construction.

On reference to Fig. 1 of the cuts it will be seen that the floors are continuous, without openings, and of the standard slow burning construction—a type which has not yet been burned through by any fire starting under such a floor, unless there have been openings in the floor. To reduce water damage the floors are not level, but have a camber of 2 inches in the middle made by iron plates inserted under the columns in the basement. If it should become desirable to use the building for any purpose requiring level floors, they can be reduced to a level by removing these plates. Inclined iron tubes, with a light swinging cap on the outside, laid in the wall at the level of the floors, act as scuppers for the purpose of removing any water. The floor beams are preferably of Southern pine bolted together in pairs, leaving about 1 inch space between the beams. At the columns the beams are joined by dogs made of ¾-inch round iron, driven in at the top, and they are anchored to the walls by cast-iron wall plates, to which they are secured by means of a rib which fits into a groove crossing the under side of the beam. It is important that there should be a small space at each side and at the end of the beam, in order to allow free ventilation, for the purpose of preventing dry rot. The Goetz box anchor is a special form of wall plate which is especially adapted to such purposes.

The under floor is made of spruce plank, generally 3 inches thick, planed on the under side and grooved at the edges, and fitted with hard wood splines. These plank are two bays in length, breaking joints at least every 3 feet. Over the plank are placed two thicknesses of rosin-sized paper before the top floor of hard wood is laid. The floor is smoother if laid across the line of plank, and the traveling loads moved in or out of the storehouse are better distributed than when the top floor is laid parallel to the plank. The floor should not be secured to the walls, but a narrow strip laid around the edges of the floor and fastened to the wall covers any openings due to shrinkage. The columns should be square Southern pine or oak, with iron cap, pintle and base, preferably cast in one piece, and secured to the under side of the beam by 6-inch lag screws. The caps should be large enough to give the beams ample bearing surface. If brick piers are placed in the basement, it is preferable rather than to insert bond stones in the piers, to use a plate of boiler iron the size of the pier, and containing a number of inch holes punched on both sides over a board, in order to produce as large burrs as possible, to securely hold the masonry.

It is generally preferable that the roof should slope toward the center ⅛ inch to the foot, and the gutter should slope toward the drain pipes $\frac{1}{16}$ inch to the foot, but if the roof slopes towards the walls the arrangement of gutters would be like that shown at A, Fig. 2, in the detail of cornice. Access to the various stories is obtained only by means of a tower outside of the main building and extending above the roof, containing stairways, elevator and water pipes. At each story of the tower open galleries communicate to the rooms on that level, as indicated in Figs. 3 and 4. A doorway from the upper story of the tower affords a ready means of reaching the roof. It is often a matter of great convenience if the doorway at the first story of the tower is made large enough, and at the outside grade, so that a wagon can be backed directly to the elevator. It is unnecessary to provide these elevators with automatic hatches, as guard gates serve every purpose. For the elevators in such towers either hydraulic system or electric motors frequently furnish a more convenient means of applying the power than steam.

The system of tram rails hung from above, in connection with triplex blocks, as constructed by the Yale & Towne Mfg. Company, is a great convenience in handling the contents of storehouses. The walls extend above the roof, and the parapet should be laid in cement, because the moisture readily absorbed by brick would otherwise pass downward, and render walls in the top story damp. In some instances a course of brick dipped in coal tar is laid above the roof level. In Fig. 2 is shown a method of protecting a low parapet wall by plank which is tinned. This form of parapet also tends to reduce the amount of snow lodging on the roof. The window openings are small, and omitted on sides exposed to other fire risks; but if there is any contingency that the building will ever be used for other purposes it is advisable to lay the walls with arches and panels, in which openings can be made suitable for windows of larger size, necessary to furnish light for manufacturing purposes.

In addition to yard hydrants near the buildings there should be a 6-inch stand pipe in the tower, with two 2½-inch hydrants and hose at each story, and at the top story of the tower the stand pipe

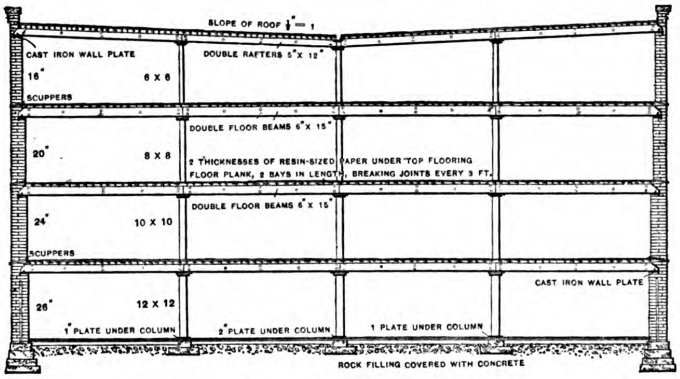

Fig. 1.—Vertical Section.

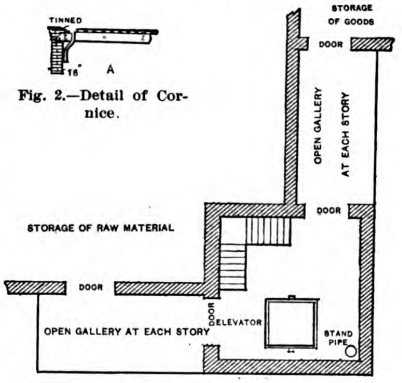

Fig. 2.—Detail of Cornice.

Fig. 3.—Stairway Tower at Corner of Store House.

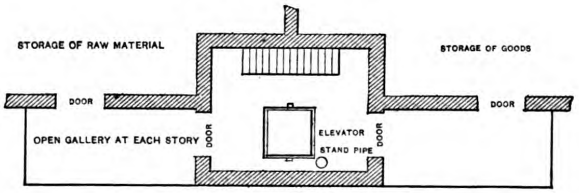

Fig. 4.—Stairway Tower at Side of Store House.

Standard Storehouse Construction.

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branches to a Morse Monitor nozzle on the roof, if there are any adjacent buildings which might be reached by streams from this position. A set of plugs for the roof drain pipes will allow the roof to be covered with water in case the property is endangered by sparks from burning buildings. Automatic fire alarms with thermostats form a valuable auxiliary to the fire apparatus in storehouses. If the contents of the storehouse are of such a nature that automatic sprinklers are advisable it is preferable to shut off the water during freezing weather rather than to rely upon the devices known as dry pipe systems.

Improper Demands by the Architect.

BY WM. H. SAYWARD.

The attention of the National Association of Builders has frequently been called to the methods used by certain architects to fix a responsibility upon the contractor which ought not in reason to be thrust upon him. At several conventions there has been very thorough discussion of this matter, and codes have been carefully prepared and recommended to the various filial bodies which if adopted and a following secured would go far toward correcting the evil, but in a large majority of cases the filial bodies have either failed to act or have not succeeded in getting the co-operation of the architects in setting up the codes referred to.

It is not to be supposed that reforms, however wise, are going to be put into operation merely because it is "resolved" that they should prevail; neither can it be anticipated, even when persistent effort is made to establish them, that the wished for result will be in perfect operation at once. Time is an important consideration, and changes of any substantial character can only be gained by slow degrees.

It is, however, necessary to keep "haming away" at the sensibilities of contractors to keep them alive to the fact that only by active and constant remonstrance will they succeed in abolishing practices that are harmful to them. So long as builders continue to acquiesce in requirements, however offensive and improper, which may be presented in specifications upon which estimates are based, so long as they will without demur agree to conditions that are a positive imposition and a direct attempt to make them shoulder a responsibility which does not belong to them, just so long will architects continue to introduce such clauses in their specifications.

Cases are continually arising which show the need for united action of builders on the lines defined by the National Association of Builders. The protest of the individual is of little avail, but if, for instance, all of the contractors who may have been invited to estimate upon certain work should join in a refusal to estimate unless improper conditions are removed from the specifications, a good result will be certain to follow.

Of course the method which is most to be desired is the coalition of the association of builders in each city with the association of architects, in setting up the code referred to or one based upon similar ideas, but when this has not been accomplished, for the guidance of both builders and architects, then other means should be adopted to correct each specific case as it appears.

One case that has recently been reported shows that the architect still insists that he is to be the sole arbiter in all matters that refer to interpretation of plans and specifications, and the contractor must bind himself in advance to do whatever the architect may choose to announce as his purpose, no matter whether it has been referred to or not in either plans and specifications. So long as the architect shall say that a certain thing was "meant" the contractor must furnish it, even though there be not the slightest intimation of its requirement in the matter submitted to him to estimate from and upon.

In regard to this word "interpretation" there seems to be some considerable misapprehension. In the first place, it has become an almost universal custom to speak of "plans and specifications," placing the plans first and specifications last, as if the latter were an explanation of the former. As a matter of fact, however, the specification is the primal thing and the plans are but illustrations thereof.

It would seem that if the architect cannot, by virtue of thorough specifications and complete plans, furnish the contractor with the information necessary to warrant him in submitting a proper bid, then there is no justice or sense in introducing a clause to save the architect and owner, and make the bidder responsible for what can neither be described nor shown. Such things, if there be necessity for them, should fall, not upon the builder, but upon the owner, the peculiar nature of whose building project creates the difficulty which the architect attempts to make the builder assume responsibility for.

Builders should watch carefully all cases of improper demands in specifications, report the same to their associations, and then make a firm and united remonstrance, if they hope to remedy things that are wrong in this direction.

MASONRY AND STONE CUTTING.*

CORBEL ARCH ON THE PROJECTING ANGLE OF A BUILDING.

TWO WALLS, Fig. 183, meet at an angle, A C B, which in our figure we have taken to be a right angle. Now, as an easement to the footway, the angle A C B is to be removed on the ground floor of the building, but yet left in the floors above. This can be done by a conical corbel arch, the apex of the conical soffit being placed at the meeting of the vertical planes A S and B S taken parallel to the outside walls and at an equal distance from the angle C. The surface on plan A C B S covered by the corbel arch will then be a square, and the directing curve or base of the cone a semicircle of diameter A B, thus giving a cone of revolution for the soffit of the arch.

The base is divided in an odd number of symmetrical parts, diminishing from the springing to the crown, in order to obtain a more equal division in the joints of the face arches. The bed joints will then be planes passing through these division points and the center line S O of the cone. The joint lines on the soffit will be the generators, S′ d', S′ e', S e, which, prolonged to the vertical plane A C of the wall, will give us the points D E . . . D′ E′ . . . of the face arch. The face arch, being the section of a cone by a plane parallel to one of its generators, is, of course, an arc of a parabola. To obtain the point C′ of the face arch, turn down the generator to S A on the plan; turn down also the angle of the wall at right angles with the center line S C; then C² where it cuts the generator has only to be lifted up to its position in C′ on the elevation by describing a circle round S′. The same construction might be used for finding the other points of the face arch; E would come to E_2 and D to D_2 on the turned-down generators.

To draw the mold, Fig. 185, of the face arch, we turn the plane of the wall round a vertical axis in Z, Fig. 183; every point, E, E′, will remain at the same level in E″; the joint line E″ F″ will naturally, when prolonged, pass through the point γ below the angle of the wall on the level of the springing.

Please note that the lines are drawn full on the plan, Fig. 183, as if seen from below, and that the elevation, Fig. 184, is merely explanatory, but useless in practice, the master mason requiring only the mold, Fig. 185, which he can draw direct from the plan, Fig. 184, by cutting each vertical e E″, Fig. 185, by an arc of a circle of radius γ E″ equal to C E_2, Fig. 183.

The eye will begin with the vertical circle, a b, a' l' m' b', and the joint, being formed of a series of normals to the conical soffit, will be a zone of a cone with apex in w. This joint will be limited in α β by another circle, and the rest of the eye will be a cylinder, as shown in Fig. 186.

To cut the eye, produce a cylinder, Fig. 186, of base a_2 z_2 β_2; on the plane of the base draw circle a l m b; on the cylinder draw line a λ μ β; divide both the circles in an equal number of parts and join corresponding points by chisel drafts; this will give the conical joint. To cut out the soffit, draw triangle a S b on the lower plane of the eye, and join all the points of front circle with the point S.

Bed-joint Mold of Arch Stone.—Turn down the plane of the joint E′ S′ O round the center line S O of the cone; the point, E E′ will come to E_2, and the arris on the face wall will take the direction of C E_2 F_2; the length E_2 F_2 is equal to E″ F‴, Fig. 185. The normal m μ, when turned down, comes upon a a, and the mold is then f_2 F_2 E_2 a a P. The other bed molds are drawn in the same way.

Soffit Operation Planes (Fig. 187).—These are the faces of the pyramid inscribed to the cone and having the joint lines as its arrises. To draw it produce an arc of a circle with radius S_2 A_2 equal S A, Fig. 183; carry thereon chords A_2 i', i' d', d' e' . . . equal to chords on the base of the cone, Fig. 184; draw corresponding radii and prolong them until S_2 I_2, S_2 D_2, S_2 E_2, . . . be equal to the corresponding lines on the bed molds. Join the extremities by straight lines, A_2 I_2, I_2 D_2, D_2 E_2 . . . . Then cut off from the arris lines the length S_2 a_2 equal to S a. For the keystone there will be a triangle beyond E_2 E_2, the sides of which are of length E_2 γ_2. To find this length draw, Fig. 183, S R, the trace of the operation plane for the soffit of the keystone; turning R to R″ on Fig. 185, E″ R″ is the trace of the operation plane on the face mold, and E″ γ'' is the length required.

To complete the operation plane, the curve l_2 ϕ_2 m_2 intersection of that plane with the conical eye joint is required. Take point δ' on chord d' e', Fig. 184, and through this point take a plane S′ δ' O cutting the operation plane and the eye joint. The section of operation plane turned down round center line gives S δ; the section of the eye joint turns down on a a, and thus ϕ is on. the intersection of these two lines. Carry length S ϕ on S_2 ϕ_2, Fig. 187, and draw the curve.

To work the stone from the soffit operation plane a bevel must be used equal to the solid angle comprised between the operation plane and the wall face. The shortest way of finding this angle is as follows: The intersection of the two planes is projected on R A C, Fig. 183, and shown in E″ D″ V″, Fig. 185. If a plane be taken through line A S, and perpendicular to the above intersection, this plane will cut the wall face along the line A″ T″, Fig. 185, which is turned down on the plan in A T, Fig. 183, when the plane revolves round A S. But T S is then the position of the section made by that plane in the soffit operation plane, and the angle of the bevel required is R T S, Fig. 183.

The working of the arch stone is done as in the former corbel arch studied, Fig. 188.

* Continued from page 287, November issue.

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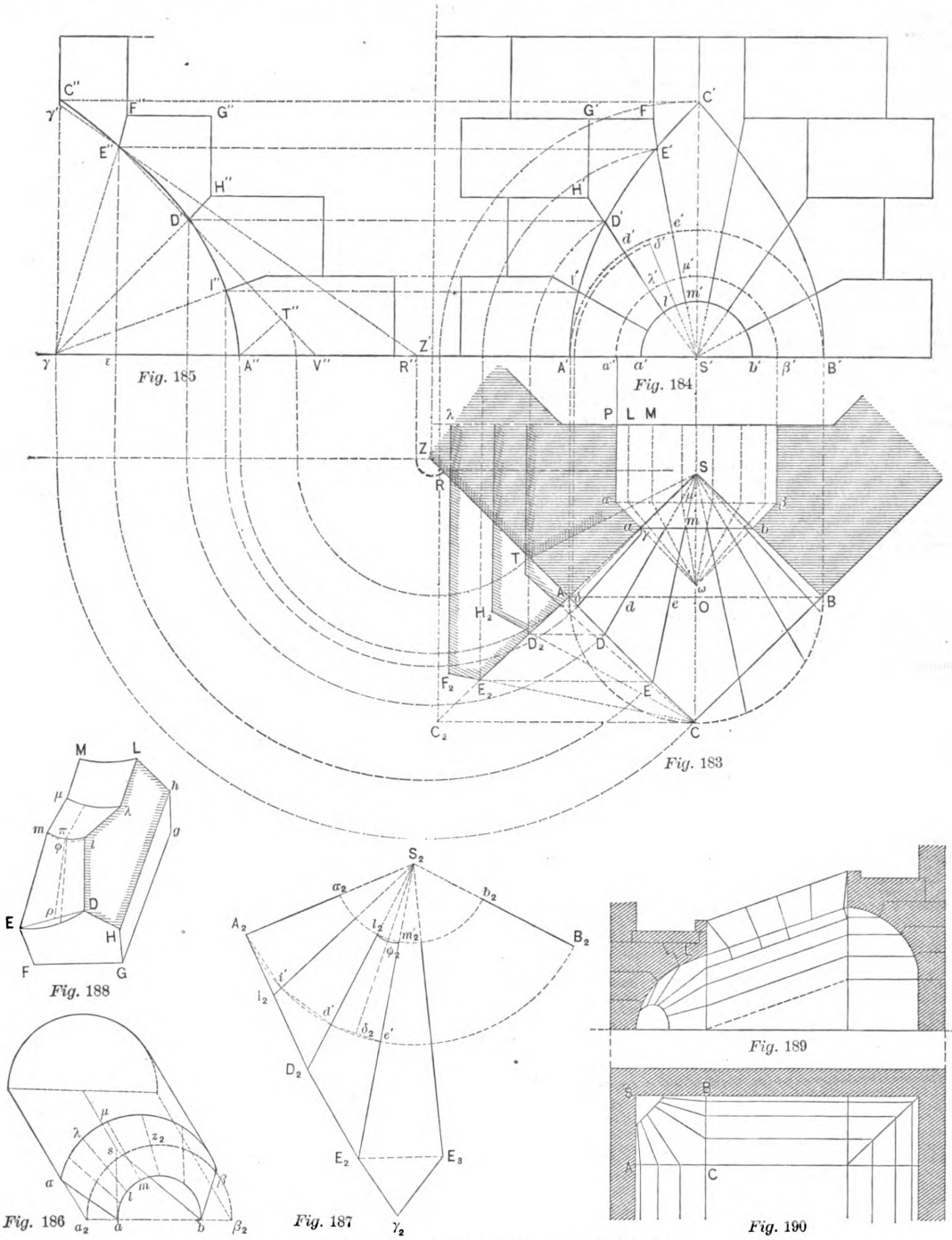
The construction given is that used during the Renaissance, with some variations as to form of soffit. Sometimes the soffit is spherical; sometimes it is a cylinder, with springing line coinciding with the bevel of the angle. In all these cases the principle of the construction is essentially the same; it consists in an arch, the bed joints of which radiate from the line which bisects the angle on plan. Now, it is evident that the thrust of such an arch must tend to throw over the walls at the angle. If it do not so in practice, it is because these arches are only used on a small scale. There is another result also to be feared when such corbel arches are used on a large scale. The weight of the wall overhanging the corner will act as a lever, with the line A B as its fulcrum, and tend to fall out into the street, and is only prevented from doing so by being tied by mortar, cement, or iron clamps to the remainder of the wall on both sides. On the other hand, by the use of twisted bed joints, I believe corbel arches of any size might be constructed to support the angle of a building, provided that the keystone be firmly tied to the body of the wall by iron, or, better, by bronze, chains. But as I have never seen any such construction, nor produced one myself, I shall for the present abstain from giving a more detailed description of my idea.

These corbel arches have often been used for carrying the landings at the angles of rectangular staircases in connection with raking vaults which carry the steps, as in Fig. 189. Such staircases are most noble in appearance, and have the practical advantage that the steps may be replaced when worn out without interfering with the structure of the walls. In constructing such vaults, begin by the corbel arch; then take the parabola of its section by planes A C and B C, and use these parabolas as the guiding lines to the cylindrical vaults supporting the steps. To prevent the uppermost course of stones from slipping down, it should be jointed as a flat arch, or a rebate, as in L, may be made. The corners of such stairs are sometimes treated as groins, Fig. 190; but they do not look so well when finished with a corbel arch



Masonry and Stone Cutting—Figs. 183 *to* 190 *Inclusive.*

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WHAT BUILDERS ARE DOING.

AFFAIRS IN BOSTON, as relating to the business interests of builders, continue in a satisfactory condition and nothing of an unpleasant nature has transpired during the past month. The members of the Master Builders' Association embraced the opportunity afforded by the presence of the architectural convention in the city to extend to visiting architects the courtesies of the Exchange, and to offer further hospitalities in the shape of a reception, an account of which appears in another part of this issue. This reception was not considered as a formal opening of the new Exchange, which event will occur at a later date.

On another page will also be found the description of a case of a complaint made by one member against another for alleged infraction of the rules of the Association. Such cases as this demonstrate the benefit and protection that is accorded to members by a properly conducted builders' exchange.

The Joint Committee of Arbitration between the Mason Builders' Association and the Bricklayers' Union has had several meetings during the past month looking toward more thorough understanding of the conditions of government in which both are mutually interested.

Every meeting more clearly shows the value of the form of arbitration under which the joint committee exists, and under which all differences are adjusted.

The builders of Boston are endeavoring to perfect some arrangement whereby the relationship of the architect to the builder may be more clearly defined and established and just what the prerogatives of his position are, more plainly marked. The architects of this vicinity have been gradually assuming a more dictatorial position than their relationship to the execution of a contract warrants, and a good description of the situation in Boston may be found in another column of this issue.

Buffalo, N. Y.

The building business in its various branches is unusually brisk for this season of the year, and a large number of fine buildings are now in course of construction. The outlook for next year is very good at present, there being a number of large contracts in prospect. The code of practice adopted by the Builder's Association Exchange for the government of the relations between general and sub-contractors and between contractors and architects, which was adopted and published in these columns early in the year, has proved eminently satisfactory to all concerned. The code is based upon the one advocated by the National Association of Builders

The work on the new building being erected by the Exchange is progressing rapidly, and it is expected that it will be ready for occupancy by May 1 next at the latest. An excellent design, presenting a very handsome appearance, of the building was sent to the Exhibition of Architectural Designs held in conjunction with the recent convention of the American Institute of Architects in Boston.

Chicago, Ill.

The following resolution, for which A. W. Murray deserves the lion's share of credit, the majority of the preparatory work having been done by him, was passed by the Builders' and Traders' Exchange without a dissenting voice, at a special meeting held on November 14.

Whereas, The tendency to erect high buildings in this city has reached a point where, in the judgment of those interested in the building trades, a halt should be called; and

Whereas, It is believed by the Builders' and Traders' Exchange that the health and safety of the citizens of this city would be best protected by the passage of an ordinance limiting the hight and providing for a rigid inspection of buildings; and

Whereas, We believe that if the present tendency to high buildings in the business district is permitted to continue the streets will within a limited period become inadequate to accommodate the people; therefore, be it

Resolved, That we recommend to the committee of the City Council now having charge of this question the introduction and passage of such an ordinance as will serve to remedy what we believe to be a growing evil.

A very interesting paper on the evils attending the construction of high buildings was read in support of the resolution, the data for which was supplied by Charles V. Weston, civil engineer.

The local brick manufacturers are working to effect an organization that shall be able to control the price of brick in the Chicago market.

Grand Rapids, Mich.

An unimportant strike of bricklayers, which was quickly adjusted, is the only thing that is reported from Grand Rapids as being of interest to builders. The workmen struck because the contractor refused to sign an order drawn on him by one of his bricklayers who owed the union the sum of $100, and which they were trying to collect in this manner. Last spring, when the trouble in this branch of the business was settled, it was agreed between the employers and the union that future differences should be settled by arbitration, but the workmen preferred to strike first and arbitrate afterward.

The builders generally are fairly busy, and a considerable amount of work is in progress.

Detroit, Mich.

The Detroit builders are all busy, and the present prospect is very favorable for plenty of work next year. There are several large jobs in progress now and others contemplated for the coming season.

The Builders' and Traders' Exchange is gradually but surely establishing itself as a benefit to the trade and an institution with which it is desirable to be identified.

Philadelphia, Pa.,

The Master Builders' Exchange of Philadelphia has demonstrated the benefit of its existence to the building trades to such an extent that the present building occupied by the association is rapidly becoming too small, and the necessity for a more commodious home is daily becoming more apparent. A plan is contemplated whereby the trade schools will be removed into a separate building, which will secure larger quarters for the school and permit an increase in the size of the exhibit of building materials. Applications for space are being continually received, and as none of the exhibitors are withdrawing more room must be provided.

A description of the exhibit, illustrated with half-tone process views taken from various points in the rooms, has been issued by the Exchange in pamphlet form. A brief history of the Exchange since its organization is included in the pamphlet and aads to its value as a souvenir that will attract considerable attention among builders.

Carroll D. Wright, United States Commissioner of Labor, has been investigating the Philadelphia trade schools with a view to ascertaining the practical value of such institutions to young men who contemplate entering the mechanical trades. The report of the superintendent, Captain Allen, makes a very satisfactory showing, and indicates beyond any question the value of such instruction.

It is expected that before this issue is off the press a definite arrangement will have been made between the Master Bricklayers' Association and the Bricklayers' Union with reference to the admission of trade-school boys to recognition by the union. The attitude of the union has been very friendly from the first, and the details of the arrangement only remain to be fixed.

The code of practice for the government of contractors and sub-contractors and the submission of estimates, as adopted by the fifth convention of the National Association of Builders, is being thoroughly discussed by the Exchange in order to familiarize every member with its various rules.

The Exchange has officially answered the request of Superintendent of Census Robert P. Porter, advocating the establishment of a permanent census bureau.

Pittsburgh, Pa.

The building trades of Pittsburgh are gradually settling back into a normal condition, although the bricklayers' strike still holds an official existence. The probabilities of a renewal of the general strike next season are growing less every day, and it is more than likely that some satisfactory arrangement can be made between the employers and workmen before the next season's work begins.

The trade school, in which as yet only bricklaying is taught, is in excellent condition and the pupils show marked progress. The members of the Exchange are highly gratified with the result and are fully convinced of the wisdom of the undertaking.

The committee appointed to select a site for the new building to be erected by the Exchange reported progress at the last regular meeting, but deferred the final report until the December meeting, when the advantages of several localities will be presented for consideration.

An undefined project is being discussed among the members of the Exchange, that looks to the establishment of a bourse such as at present is being agitated in Philadelphia, and which shall include all branches of industrial representation in one building. The scheme is not yet fully elaborated, but in any case the Exchange will push its plan, for erecting a building of its own, to fulfillment.

An unfounded rumor that the Pittsburgh Exchange contemplated withdrawing from the National Association of Builders gained credence to a limited extent, through articles published by a local newspaper and by a technical publication of that city. The Pittsburgh builders are too keenly alive to the advantages of association and to the benefits that the National Association has placed within reach of Exchanges in the predicament in which they found themselves this summer to think of withdrawing their membership; on the contrary, they have prepared an important measure for consideration at the next convention.

The present building season has, owing to the strike, been exceedingly unsatisfactory, but the prospect for next year is very good indeed, and builders are looking to the early future to retrieve the losses of the present year.

The code of practice adopted at the fifth convention of the National Association of Builders has been fully discussed in the Exchange, and the importance of its adoption conceded. The case of McNeil *vs.* the Boston Chamber of Commerce, demonstrating the rights of the lowest bidder, has been of direct benefit to the builders of Pittsburgh, and a call has been made for a copy of the description of the case, in the form published by the National Association, for each member of the Exchange.

San Francisco, Cal.

The builders of San Francisco have had nothing of particular importance to disturb them lately, and although the building business is not excessively active, things are in a fairly satisfactory condition.

The question of the lowest bid, as dilated by the case of McNeil *vs.* the Boston Chamber of Commerce, is proving of value to the San Francisco builders, as similar grounds for action exist in one or two instances in that city.

Affairs in the Builders' Exchange are apparently moving along about as usual.

St. Louis, Mo.

The Bricklayers' Union of St. Louis have sent the following communication to the Mechanics' Exchange and to all contractors in the city:

Resolved, That on and after April 1, 1892, there shall be no change by this union in the present rate of wages, and that all contractors be notified of the same.

The following law of the union concerning fire proofing is also to be enforced:

That fire proofing be considered by this union as brick work, and that any bricklayer or bricklayers working on a job where fire proofing is being done by unskilled labor, or by bricklayers who are not in good standing in the union, and knowing such to be the case, shall be deemed guilty of a violation of the rules of the union.

Worcester, Mass.

The Builders' Exchange of Worcester is actively engaged in considering the code of practice advocated by the National Association with a view to its adoption. The lien law question as suggested by the mid-year meeting is receiving active discussion, and the decision in both cases will be arrived at while this paper is in the hands of the printer and will be given in the next issue.

The handbook of the Builders' Exchange for 1891 has just been issued by Secretary George Bouchard and copies sent to each association in the country, as well as to those interested in building in this city. The book contains the new charter, by-laws and business classification of members, building and sanitary ordinances and lien laws. Copies may be had by applying to the secretary.

Nothing of an important nature of interest to builders has transpired in Worcester during the past month.

Omaha, Neb.

W. S. Wedge, secretary of the Omaha Exchange, writes that the decision in the case brought to test the constitutionality of the law making eight hours a legal day's work was a complete surprise, as it was decided in the affirmative, the judges maintaining that the law is direct and unambiguous, and in the absence of any special contract or agreement

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a person not exempt (domestics, farm laborers, &c.) from the operation of the act who works eight hours has performed a legal day's labor. This applies to employment either by the day, week or month. The act, however, in no wise interferes with the right of persons to work for a greater number of hours than eight daily, at any compensation that may be agreed upon. The judges were united in the opinion that the right of the workingman to work as many hours as he choose cannot be denied. The question of compensation for overtime and the effect of the law upon the persons who have been working more than eight hours per day was left to the decision of the Supreme Court. There are several cases awaiting the decision of the Supreme Court in the matter, and all are anxious for a final settlement of the question.

The practice which has heretofore prevailed in Omaha of giving bricklayers eight hours' pay for seven hours' work on Saturday ceased on November 1, and it is gratifying to note that many of the workmen have expressed themselves as appreciating the injustice of the custom.

The Exchange has inaugurated a series of meetings for the purpose of coasidering some specific topic of interest to the builders, and the question of the lowest bid as made public by the National Association of Builders will be one of the first subjects considered. A movement is on foot to establish an exhibit of building materials in connection with the Exchange similar to that of Philadelphia.

The building business generally is quite dull at present, but builders are looking for increased activity in the spring. Everything is harmonious between employers and workmen and no definite prospect of any unpleasant complication in the future.

The first of the series of meetings which are the result of Secretary Wedge's efforts was held on November 12, and was a surprising success.

The meeting was called for 10 o'clock a.m., and notices had been sent out to all of the members, and many invitations extended to builders who were not connected with the Exchange. Several subjects were up for discussion, and a novel feature of the occasion was the serving of a lunch at 12 o'clock by the ladies of the Woman's Exchange.

The question of the lowest bid, as demonstrated by the "McNeil" case, occupied most of the discussion, but there were remarks made by a number of members on topics of local interest.

The meeting was so thoroughly successful that it was unanimously voted to meet once each month under the same conditions for the discussion of subjects of interest. The lien law will be considered next time.

Washington, D. C.

The records of the Building Inspector's office show that during last month permits were issued for the erection of 212 new buildings, costing $541,220, while the repairs made during the same period footed up $109,711, making a total expenditure for building purposes during the month of $650,931.

Plans for the enlargement of the exhibition hall in the Exchange Building have been made and the work of reconstruction will commence at an early date. This hall will occupy the first floor of the original building, and by placing the north wall on the building line a space 4 x 60 will be gained. This addition will be constructed of galvanized iron, will have a hammered-glass roof and will be entirely devoted to the display of plumbing goods.

Milwaukee, Wis.

The interest of the members of the Builders' and Traders' Exchange is steadily increasing in the affairs of the association, and the work of the new building is being pushed ahead as fast as possible.

It has been decided to occupy the second floor as Exchange rooms, instead of the top, as was originally intended. This move will be a very beneficial improvement.

Building business is in a fair condition, with good outlook for next season.

Kansas City, Mo.

The building business has been very dull for some time, and the effect of the depression has been felt to a certain extent by the Builders' and Traders' Exchange.

Little interest in the affairs of the Exchange has been taken by many of the members for some months past, and an effort is being made to reorganize the body on a new basis, with certain changes and improvements in the form of government and the by-laws. With the return of activity in the building trades of Kansas City the Exchange will resume its position as one of the most influential and important institutions of the city.

Baltimore, Md.

E. D. Miller, secretary of the Builders' Exhange of Baltimore, writes that the condition of affairs in his city as affecting the interests of builders is generally satisfactory, and the season's operations have been fairly profitable.

The new ordinance affecting the inspection and construction of buildings in Baltimore, and which the Exchange was largely instrumental in having passed, is not at this writing yet all off the prees. A few advance copies have, however, been issued, and from partial examination the code seems to be an excellent one, thoroughly covering the ground, and in a manner that reflects great credit upon its framers.

It is expected that the plans for the new building to be erected by the Exchange will soon be completed, when the structure will be immediately begun and carried through to an early completion, thus adding another to the list of filial bodies of the National Association that have taken its advice and built permanent homes for themselves.

Portland, Maine.

A prominent member of the Builders' Exchange of Portland has recently been defrauded out of a sub-contract by a carpenter contractor, whose bid was to include the lathing and plastering and other minor contracts.

The carpenter, who is not a member of the Exchange, requested a bid from the plasterer for the lathing and plastering of a proposed building, and after using the said bid was awarded the contract, informing the plasterer that his bid, being the lowest, was accepted. Several days after the notification of acceptance the carpenter called upon the plasterer and asked him if his bid included heat for drying out the walls, and was informed that it did not, and no such requirement could be found in the specifications. The carpenter then stated that heat would have to be supplied, and if the plasterer could not furnish it within the amount of his bid the job would be let to some one else. The plasterer having made a low estimate was unable to supply heat at the price named for the work, and declined to do so without increasing the amount of his bid.

The carpenter, in this case the general contractor, thereupon let the contract to another plasterer (sub-contractor) who was not a member of the Exchange, trading upon the bid already submitted by the plasterer in question. The plasterer thus wrongfully deprived of his contract being reluctant to seek redress in a court of law, laid the case before the secretary of the National Association of Builders, who strongly advised him to place the case officially before his Exchange, with the recommendation that the Exchange take the matter up and carry it through to a legal decision, in order that the principle may be vindicated and a precedent established for the benefit of other builders in like situation.

The amount of money involved is not large, but the opportunity afforded for establishing a legal precedent that will materially aid in putting an end to such fraudulent proceedings in future should not be neglected. The value of such tests is clearly shown by the "McNiel case."

Syracuse, N. Y.

Building interests in Syracuse have been very dull for some time past and there is but little movement in any branch of the business. Builders are looking forward to next season in the hope that there will be an increase in building operations.

C. F. Wisehoon, Jr., says that the Master Builders' Association, of which he is the secretary, reflects the condition of the business in the lack of interest displayed by the members.

Providence, R. I.

Reports from Providence indicate that the building business is in good condition.

The Builders' and Traders' Exchange is still at work upon the adoption of a code of practice to obtain as regards the submission of estimates and the transaction of business between general and sub-contractors.

On November 4 the secretary of the National Association of Builders complied with a request to address an evening meeting of the Exchange on pertinent topics. The meeting was a large and interesting one, and included an excellent dinner in the programme. The secretary touched upon the duties of members in order to bring into operation the full benefits of an exchange, and briefly went over the ground covered by the work of the National Association.

Notes.

Col. Richard T. Auchmuty, proprietor of the New York Trade Schools, was among the honorary members elected by the American Institute of Architects at its recent convention.

A request has been received by the secretary of the National Association of Builders for samples of its literature for use in Belgium and Germany. The practical working of the form of arbitration is exerting attention abroad as being a very desirable means for bringing about better conditions between employers and workmen, as it provides for equal representation on both sides and is entirely voluntary in its operation.

The union painters of Central Ohio have made it a finable offense to be found using adulterated paint. The master painters have been notified that union men will not work with "dope," as adulterated paints are termed.

The builders of Toronto, Ontario, are following the example of their Nova Scotia brethren, and like the Halifax builders are considering the work of our National Association, with a view to adopting many of its salient points. A request has been made for such printed matter as has been issued, particularly the uniform contract.

The Builders' and Contractors' Association of Toronto is contemplating many reforms in the methods of conducting the building business, of which the formation of a new contract form is only one.

The recently-formed Builders' Exchange of Galveston, Texas, is having a peculiar experience that is somewhat novel in its character. Certain men, purporting to be contractors, were admitted to membership at the time the association was formed, who have, during a recent quiet season, sought and obtained employment as journeymen, still desiring to be considered members of the Exchange. The initiation fee being $25 and the quarterly dues $1.50, it was much less expensive to pay the $1.50 once in three months than to forfeit their membership and then pay $25 more should they again assume the position of contractors.

The exhibition of architectural designs held in conjunction with the recent convention of architects in Boston comprised a very excellent collection of drawings. With but few exceptions the work of the Hanging Committee was well done and the display was very satisfactory. It is an exceedingly difficult thing to discrimate between original designs of artistic merit, more or less tinted with architecture, and those that are distinctly architectural in their treatment, and it is not to be wondered at that several meritorious pictures were hung, to the exclusion of drawings of buildings of more or less architectural merit. Such exhibitions are particularly desirable and should be held oftener and should be of a more permanent character. No school for a national style of architecture could be more instructive than such collections of designs, principally American in both conception and execution, with a sufficient number of examples of types of various styles, ancient and modern, to bind the whole together in the most agreeable form of instruction, comparison.

The Philadelphia Master Builders' Mechanical Trade Schools.

In a letter received from W. A. H. Allen, superintendent of the Master Builders' Mechanical Trade Schools of Philadelphia, we quote the following account of progress of this excellent institution, where the manual trades are taught:

The course of instruction is substantially the same as for last term, though some additions have been made, and experience will probably furnish still more. The results of the instruction of last term have been very satisfactory. Of the 130 pupils about one-half obtained certificates on a graduating average of 65. Many considerably exceeded this and more would have reached it had they fully understood the importance of attention to the instruction on drawing evenings and its value in the written examination. Recognizing the cause of their failure, several are attending the schools during the present term with the intention of making up their former deficiency. Employers, whether members of the exchange or otherwise, speak highly of the attainments of the pupils taken from the schools, and find them of a value which only the second year of apprenticeship could give.

FOR three years Canada has been trying without success to establish a 20-knot mail steamship line between England and the St. Lawrence, offering a subsidy of $500,000 per annum. The Government will now reduce its demands to a 17-knot service, feeling that a direct line is indispensable.

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The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

Officers for 1891.

President, ARTHUR MCALLISTER, 20 Newton street, Cleveland, Ohio.

1*st Vice-President*, ANTHONY ITTNER, 9 North Seventh street, St. Louis, Mo.

2*d Vice-President*, IRA G. HERSEY, 166 Devonshire street, Boston, Mass.

Secretary, WILLIAM H. SAYWARD, 166 Devonshire street, Boston, Mass.

Treasurer, GEORGE TAPPER, 159 La Salle street, Chicago, Ill.

DIRECTORS.

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Boston, Mass. ..... JAMES I. WINGATE.
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Chicago, Ill. ..... GEORGE C. PRUSSING.
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St. Joseph, Mo. ..... JOHN DE CLUE.
St. Louis, Mo. ..... WM. M. ANDERSON.
St. Paul, Minn. ..... EDWARD E. SCRIBNER.
Sioux City, Iowa. ..... FRANK CLARK.
Syracuse, N. Y. ..... HENRY F. CRAWFORD.
Washington, D. C. ..... B. H. WARNER.
Wilmington, Del. ..... A. L. JOHNSON.
Worcester, Mass. ..... H. W. EDDY.

STANDING COMMITTEES.

Committee on Uniform Contracts.

GEORGE C. PRUSSING, 13 National Life Building, Chicago.
JOHN J. TUCKER, 37 West Twelfth street, New York.
IRA G. HERSEY, 166 Devonshire street, Boston.

Legislative Committee.

EDWARD E. SCRIBNER, Chamber of Commerce Building, Chicago.
WM. N. MILLER, 330 Pine street, San Francisco.
B. F. SWAIN, Builders' and Traders' Exchange, Kansas City.

Committee on Resolutions.

J. MILTON BLAIR, Builders' Exchange, Cincinnati.
J. B. WARE, 157 Ottawa street, Grand Rapids.
CHAS. F. KINDT, 1 Grand avenue, Milwaukee.

Committee on Statistics.

JOHN DE CLUE, Ninth street, St. Joseph.
W. D. COLLINGWOOD, Builders' Association Exchange, Buffalo.
VALENTINE JOBST, Builders' Exchange, Peoria.

SPECIAL COMMITTEES.

Committee on Lien Law.

JOHN S. STEVENS, Chairman, Philadelphia.
WARREN G. VINTON, Detroit.
RICHARD SMITH, Omaha.
SAMUEL D. TIPPETT, Cincinnati.
JASPER T. DARLING, Worcester.

Committee on Building Laws.

Appointed for conference with committees from the National Association of Fire Engineers, the American Institute of Architects, National Association of Building Inspectors and the National Board of Underwriters.

ARTHUR MCALLISTER, Chairman, 20 Newton street, Cleveland.
W. H. SAYWARD, 166 Devonshire street, Boston.
STACY REEVES, Philadelphia.
JOSEPH DOWNEY, Chicago.
J. B. LEGG, St. Louis.
W. H. GORSLINE, 247 Powers Building, Rochester.
WARREN A. CONOVER, Building Trades Club, New York.

Directors and members of committees whose personal address does not appear in the foregoing may be addressed in care of the Builders' Exchange of their city. Addresses of all filial bodies will be found in the directory of Exchanges as published in the appendix of the report of the fifth annual convention.

For discussions of Builders' Exchange questions and articles from Mr. Sayward's pen see preceding pages.

Special Notice.

The attention of all individual members of the National Association is called to the following resolution passed at the mid-year meeting.

Resolved: That the Board of Directors of the National Association of Builders hereby express their appreciation of the efforts of the publishers of *Carpentry and Building* to disseminate the special work, news and information of the National Association, and it is hoped by the directors that members of filial bodies will subscribe for this periodical, and they are urged to carefully read the "Builders' Exchange" matter therein contained and prepared for their particular information and instruction.

It is hoped that members will not fail to subscribe for *Carpentry and Building*, and read attentively all the matter prepared by the National Association in its columns, for the influence of the body depends largely upon the circulation of its doctrines.

To Filial Bodies and their Members.

The attention of all filial bodies is called to the action taken at the mid-year meeting of directors and committees of the National Association, particularly the instructions given to the Legislative Committee and to the Committee on Uniform Contract.

These committees would be very glad to receive suggestions from any of the members, or from any one interested in the work in their hands. Communications for the Legislative Committee should be addressed to Edward E. Scribner, chairman, Chamber of Commerce Building, Chicago, Ill., and for the Committee on Uniform Contract, to George C. Prussing, chairman, 13 National Life Building, Chicago, Ill.

To Filial Bodies.—Meetings for Discussion.

By vote of the Board of Directors at the mid-year meeting, the secretary is instructed to request and urge all filial bodies to hold frequent meetings for discussion of the recommendations of the National Association, made at the various conventions held, and take such action as may be deemed advisable and possible to put the recommendations into operation for the benefit of those they were intended to assist.

To Committee on Uniform Contract.

By vote of the Board of Directors at the mid-year meeting, the Committee on Uniform Contract is instructed to secure consideration by the Joint Committee of the American Institute of Architects and the National Association of Builders, upon the desirability of changing the twelfth word in the sixth line of Article 2 from "being" to "if" or to some other word more clearly expressing the intent.

To the Legislative Committee.

By vote of the directors at the mid-year meeting, the Legislative Committee is instructed to consider whether it would be feasible for the National Association to recommend any plan whereby the sale of building materials could be regulated so that contractors in the building trades would be entitled to purchase at lower prices than the outside public. If the committee consider such measures within the proper line of action of the national body, it is to prepare form of action for presentation to the National Association at its next convention.

Lien Law.

The Committee on Lien Law made report of progress at the mid-year meeting, but had no conclusions to present to the directors. The field of work of this committee is very large and they would be very glad to receive suggestions from each and every member of the national body.

Communications for this committee should be sent to John S. Stevens, chairman, 130 West Sixth street, Philadelphia, Pa.

Ornamental Woods.

Many kinds of ornamental wood are now to be had suitable for joinery and cabinet making. The principal thing is selection. For veneering or panels, says the *Architect*, the root end is the most ornamental. Even mahogany varies; there is the plain Honduras kind used for ordinary purposes; the "watered," "mottled," "bird's-eye," and "festooned" varieties, depending upon the vein structure. The Mexican mahogany is less ornamental than the Cuba variety, which is wavy on its figure and takes a high polish, or the St. Domingo variety, also of deep color and well figured. These highly ornamental mahoganies are generally imported in very small logs 3 feet to 10 feet long, and seldom more than 8 inches to 10 inches square. Doors and other framing made of Honduras in the stiles and rails, and of Spanish in the panels, are effective. Jarrah, or Australian mahogany, is very similar in color, hard and durable, with a wavy grain, and promises to become a useful substitute, though its importation is not very large. For roof timbers and framing jarrah offers some advantages, but it is said to be liable to shrinkage.

One of the many decorative woods for which New South Wales is noted is the tulip wood, known as the Horpullia pendula. It has the advantage of being close grained, hard, and well figured, the colors varying from black to yellow. For decorative joinery the tulip wood is in much esteem, especially for panels, cabinet work and turnery.

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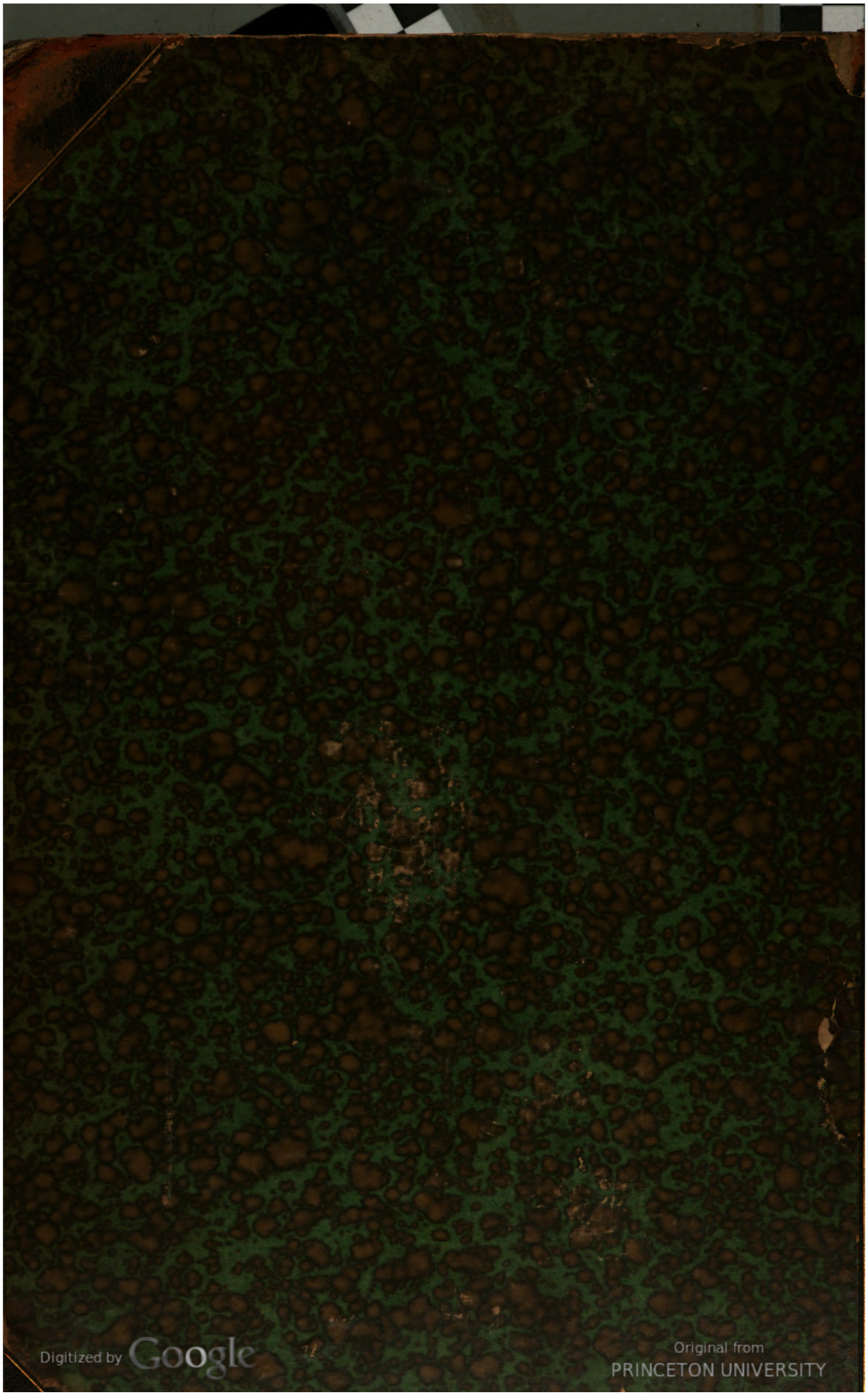
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