V. 14

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED

The Builders' Exchange.

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Co-operation and the Labor Problem.

Present indications seem to point to May 1 as the date upon which the workmen in various localities will again attempt to secure, by united action, such alterations in the conditions under which they are now working as they consider justly their due. The formation of unions by workmen or the existence of a union in a community is looked upon by many employers as a menace on the part of the employees, who propose to gain by force what the individual employee or the workmen of a single employer cannot secure by petition. In the light of past experience there is some reason in such a view, but the fact that the workmen believe they are deprived of certain prerogatives which should belong to them is worthy of earnest consideration. If the opinions of the workmen exist in such universal harmony as to result in the formation of unions, in order that the expression of those opinions may be understood to represent the views of workmen in a given locality, wholesale opposition on the part of employers is worse than useless, even though a union should be forced out of existence. The chances are a feeling of injury and hostility is engendered, and the convictions of the workmen remain the same while being forced into inactivity pending another opportunity for a trial of strength. The untenable ground taken by some of the unions and the overt acts of others are fully recognized, while the error of these false positions not being at once abandoned by the unions when the falsity is demonstrated lies almost entirely with the employer, for if he has not been fully conversant with the successive steps taken by the union to bring itself into a false position, he should have been (if only from a business point of view), and should have taken measures to prevent a false opinion from becoming prevalent at the outset.

Arbitration.

The average employer being desirous of treating his men fairly when trouble arises, offers to arbitrate with them upon the differences existing in his own business, but is met with refusal, because his individual action in no way affects the condition of the workmen employed by others. He at once considers the matter a personal affair, and proposes to "run his own business" whether or no, and aggravates the case by doing all in his power to oppose the union, utterly and entirely ignoring the fact that he has up to this time tacitly admitted that the position taken by the union was right, by the silence which gives consent. Things being in this condition, he thinks that he has done his duty by once offering arbitration, forgetting again that "this condition" is the result of a long and cumulative course of reasoning by the union; cumulative in more firmly establishing the wrong position of the union because uncorrected by the employer and by his silent consent to its reasoning. The only way to correct the evil in the unions is not by offering arbitration once, nor twice, but by insisting upon it, and by joint consideration establish the just prerogatives of each side, and lay the spirit of encroachment aside once for all. Employers cannot do this individually, and might as well make up their minds to this fact, and to the fact that they owe it as a duty to their brother employers and to their successors to do all in their power to bring about a just and correct condition of affairs, and to exercise that power in union, that it may be of some avail. The fact that the workmen seem to be combining for united action in many localities on May 1 is a desirable condition of affairs, as they define their position and enable the employers in these localities to treat with a definite set of conditions that are maintained by the majority, and obviates the necessity of bringing many workmen of many varied opinions together, in order that when correct practices are secured they may be secured by the majority, and thus established permanently.

Settling Disputes.

The example afforded by the trial of cases of complaint between members of a builders' exchange by a committee appointed for the purpose is eminently valuable, on account of the wisdom of the decisions, and more particularly on account of the influence of such action upon all persons connected with the organization. A very proper restraint is exercised, by the known existence of a tribunal within the exchange which is available in all cases where unfair practices are possible; and many loose and questionable methods are held in check by such wholesome discipline. It is of immense advantage to have an accepted method of hearing both sides of a dispute, from which may result an official decision that will clear the atmosphere of the exchange of rumors and discussions and close a dispute in an effectual and decisive manner. Disputes and suspicions are bound to occur as long as man exists, but it is a decided advantage to have a court of appeal to which the members of a builders' exchange can resort, where the peculiar conditions of the business involved are familiar to those who hear and decide upon the case, where the decision may be had without the cost, friction and delay of courts of law, and where a decision, when reached, will in all probability prove more satisfactory to those concerned than if obtained from the judgment of men totally unfamiliar with the peculiar conditions of the business.

Value of Decisions.

Members of an exchange should bring cases for action before the board of judges, complaint committee, or whatever the body may be termed, rather than permit supposed injuries to rankle in their minds. In this connection it might be well to consider the question as to whether many of the disputes between owners and members of the exchange might not be settled in this manner. Another value of a decision rendered by a competent committee, appointed for the purpose, is that it is practically a precedent, such as would be given if the case was submitted to a court of law, except that it is much more satisfactory, from being tried by men thoroughly familiar with all surrounding conditions, and lacks the publicity attached to court proceedings, while being of equal value with a legal precedent to members of the exchange.

Oldest House in America.

What is said to be the oldest house now standing in America is at Guildford, Conn. It is reported to have been erected in 1639 by the Rev. Henry Whitfield, one of the original settlers of Guildford, for the accommodation of his family and as a fortification for the protection of the inhabitants against the Indians. It occupies rising ground overlooking the south part of the village, and commands a fine view of Long Island Sound. According to tradition the stone of which the house is built was brought by the Indians on hand barrows from the rocks about 80 rods east of the house, and an ancient causeway in the swamp is pointed out as the path employed for the purpose. The house is of two stories and an attic, the walls being 3 feet thick. In the recesses of the windows are broad seats. At the southwest corner of the second story there was originally an embrasure commanding the approach from the south and west. It was about a foot wide, with a stone flooring, and was evidently made for defensive purposes. In the attic there were two recesses, and at the end of the wing by the chimney in the second story was another recess, all evidently intended as places of concealment. The house is said to have been kept in its original form until 1869, when it underwent such alterations as to greatly change its internal arrangement and exterior appearance. The beams are of oak, and the floors, doors and window sash were originally of the same material. The window panes were of diamond shape. When the house was repaired in 1868 it was necessary to remove some of the oaken timbers, and from one of them the present stair rail and balusters were made. The house is owned by Mrs. Sarah B. Cone of Stockbridge, Mass., and is occupied by F. S. Hall.

Boston Fire Department Building.

An imposing structure to cost about $165,000 is soon to be erected on Bristol street, Boston, for the headquarters of the Fire Department of that city. The style of architecture will be Florentine, while the tower is designed after that of the Palazza De Publico in the city of Siena, Italy. The structure will have a frontage of 49 feet on Bristol street and rear width of 59 feet, the additional space projecting out beyond the tower. The building will be 76 feet high while the tower will extend skyward to a hight of 155 feet, being 14 feet square. At an altitude of 142 feet will be a belfry, corbelled out, making the tower at that point 18 feet square and admitting of a passage around the outside. The hight of the belfry within will be 20 feet in the clear. The material to be used in the building will be colored brick, similar to that employed in connection with the Madison Square Garden in this city, while the trimmings will be of Amherst brick. The coping and stone cornices will be of the same material, as will also be the upper portion of the tower and the six balconies. In the lower stories every fifth course of brick will be recessed to give a scheme of stone work to the basement. The underpinning course will be of hammered granite. The building will have a flat roof which will be paved with brick.

Building Details.

Much more attention is paid to details than was the case a few years ago, says a recent issue of the *Building News and Engineering Journal*, when the idea prevailed that it was beneath the province of an architect to care for such trivialities as iron work, wall papers, and the many other accessories which the arts of the decorator and furnisher rendered necessary. A lump sum was allowed for these things; but the architect had very little to do with them except in getting a commission on the sums so appropriated. Probably the neglect of details and accessorial arts was the natural result of an era given up to imitations of classic and Gothic styles, and it was this want of thoroughness and reality which gave the architecture of the early part of the present century the superficial and quasi character it has ever had the reputation for. To the later Gothic revival—the Puginesque period—we must attribute a more healthful state of the art. When it was not thought beneath the dignity of the architect to design metal work and church furniture, a much more comprehensive view of architecture dawned upon the profession. A host of metal workers and wood workers, glass painters and furnishers appeared. The revival of art industries has shown no sign of abatement, and we see the trades connected with architecture carried on with greater fervor and success than at any previous time since the Italian Renaissance. These industries have forced themselves upon the attenion of architects, with the result that a better class of manufacture and more artistic kinds of fittings are produced.

THE SCHOOL OF BRAMANTE.

Quite lately we have heard of the influence of the school of Bramante on the architecture of the revival—how he cultivated the various arts of painting and perspective, the study of Roman details, and by the application of scientific methods produced an architecture in his "last manner" worthy of admiration. The secret of Bramante's success as an architect was his knowledge of details, which he studied with a scientific perception of their value. His compositions, as shown in his grand conception for St. Peter's—a cupola rising above a Greek cross—evinced a bold attempt to invest the Gothic spirit with a Roman dress, and the Renaissance of Italy owed to him its full development as a style capable of genuine application. It would scarcely be fair to say that our modern architects have not shown the same spirit of adaptation; but it will be admitted that we may learn a good deal from these pioneers of modern architecture. Their wider studies of all that belong to the art, due to the fact that they studied painting, sculpture and every science open to them, might well make us hesitate to lay claim to the perfectness of our culture, even in spite of the progress made in science and manufacture. The chief reason why we are so far behind the Bramantes, Albertis and Michael Angelos of the revival is that their mode of learning was so different; they studied art as a whole instead of only a part. The artistic aim or idea was present from the first in their training, and every part of the design, from the plan to the smallest detail, was ruled by it. Now we are apt to allow the builder or the employer to have his way, and are contented to become draftsmen of others' ideas. Why? Because our architectural knowledge is learned mainly in the drawing office, and not in the workshop or on the scaffold. We have no evidence to show that any of the great masters of the Renaissance were expert as architectural draftsmen, though we know they were consummate delineators of the human figure, and could express in a few lines very noble designs and compositions. Their studies were on the spot. When Andrea Mantegna painted a ceiling or altarpiece, he sketched out the design in the building. Michael Angelo designed his frescoes and Cartoons for the Sistine Chapel within the walls. We can hardly imagine one of these old masters making a design to a small scale for an interior on paper out of the building for which it was intended. Vicarious art was unknown to them. Delegated design could never have produced Palladio, Bramante or Da Vinci. They were their own architects, painters and decorative artists, and intrusted nothing to deputies. How different now? Every study for decoration, whether of fresco, stained glass or color, even the ornamental details of our plaster ceilings—all are given to experts. Even such structural details as iron work or the furniture of a church are left to manufacturers, who submit designs. By this loss of contact or touch between the artist and the work, this doing everything by deputy, we can longer claim the old communion of the arts. Disintegration has resulted, and we have now disunion between art and artist.

LOSS IN ARCHITECTURE.

In two or three ways architecture has lost by the separation or splitting up of art. We enter a large building of well-proportioned elevation to find ourselves disappointed immediately we pass the threshold. The architect has forsaken us; the interior is cold and bare in the walls, or, on the contrary, so vulgarly bizarre that we can see the decorative artist has been let wildly loose. No constraining hand is evident. The stained glass on the door panels, the wall-tile decoration, the dadoes and ceiling perhaps paneled with Lincrusta painted and gilded, are wanting in harmony and keeping. Our sense of propriety is shocked by the details—the vulgar consoles supporting the ceiling beams, the elaborate design of the paneling, the curious admixture of Gothic and classic detail in the balustrade of staircases, the cornices heavy and coarse. Why so different a note apparent in the interior? Only one explanation can be given: the interior fittings and decoration have been relegated to specialists by the architect. The rivalries of a set of ill-directed tradesmen are evident. Parquetry, faience, modeled canvas and all sorts of relief decorations are found in lieu of substantial wood work, plaster and modeled decoration or carving from designs by the architect. We see a pattern on the dado panel that is too intricate, more suited to the panel of a china cabinet; the ceiling decoration and the "filling" of the walls, on the contrary, is just as clumsy and heavy. We feel instinctively that the coarse and delicate are not in their right places. The scale of the room and its details have not been consulted, for the simple reason that the owner has selected the pattern in the showrooms of the manufacturer. How unlike the old system of the Cinque-Centisti who designed their decoration to suit the apartment. Even "high-class" ready-made joinery shows the same want of refinement in the details of the moldings. The beauty of the Tynecastle, Anaglypta, Lincrusta and other forms of relief decoration is therefore lost in the application.

MASTERY OF DETAILS.

Again, take the matter of vaulting. Not one architect in fifty knows anything about the practice of vault building. The setting out and construction were originally mastered by the old Mediæval architect, who could study the requirements of the vault on the actual building, and not be content with showing the lines of ribs and groins in the small scale drawings. How to set out the lines, how to form the bevels for the groin bricks, how the springings are managed, are points which descriptive geometry cannot teach practically. To master the details of building a personal acquaintance with the operations of mason, brick cutter and carpenter is absolutely indispensable, and no teaching body nor any theoretical examination conducted in class rooms can teach those operations. Models are valuable in teaching the theory of masonry or brick work; but, being made to explain a preconceived theory, they do not illustrate exceptional modes of working a problem that are found in practice. They are like book diagrams in this respect. Instruction in details can only be found in mixing with workmen and actual buildings; and if every master gave opportunities to his pupils to do so, there would be much to recommend the old system of pupilage. We know, however, that the ordinary pupil is confined to office routine, and his facilities for learning the practical side of his profession are very small.

Attention to details is being forced upon the profession by the very requirements of modern building. As these become more perfect and precise, so must the architect make a more exact study. The lighting of certain buildings has called out many ingenious contrivances for opening windows, like patent gearings for fanlights and skylights. The advantages of screw action or simple levers have to be weighed. Then we have "prismatic lens lights" and systems of glazing. Artificial lighting has developed important industries in the making of burners and lamps for both gas and electricity. The details of "wiring" buildings have introduced a new detail for incasing the wires, in which moldings of wood or plaster can be made useful as well as ornamental. Floorings of various kinds to suit various requirements, sanitary and decorative, have developed a large trade. Sanitary science and the progress of sanitation have immensely added to the details which the architect is called upon to master, if we consider that drainage, water supply, plumbing, warming and ventilation come within the scope of the architect's labor, and in some special buildings make an important branch of the design, Then there are details that specially belong to building materials, such as artifical stones, clay goods and plasters, iron work, in its many branches; while the decorative trades and their numerous specialties have enlisted the services of a separate class of artists. The architect cannot become a master of all these branches; it would be impossible—the details alone would be overwhelming; but he can interest himself in them as crafts relating to his own. There is no reason why he should not make them his own. At least he has the discretionary power in selecting and specifying, if he only did so boldly, and refused to allow the owner or contractor to exercise their own vague and irreconcilable ideas in design. But just now he is very much at the mercy of "low tenders," and is glad if he can sometimes relegate all the details of his design to some one else, to the utter discredit of his work in matters of finish.

COTTAGE AT SOUTH BEND, IND.

A NEAT COTTAGE which was erected not long since for Charles Horst, at South Bend, Ind., from drawings prepared by C. A. Brehmer, architect, of that place, is presented upon this and the following pages. The design calls for five rooms, a reception hall and bathroom upon the first floor and three sleeping rooms upon the second floor. The reception hall and main stairway are so placed that the parlor, sitting room and dining room may be easily reached from both, while in the rear of the sitting room is a chamber out of which opens the bathroom. The kitchen is in the rear of the dining room and communicates directly with it.

Cottage at South Bend, Ind.– Perspective View.—Charles A. Brehmer, Architect.

A rear stairway leads from the kitchen to the basement. The house is finished in soft wood, the first story being grained and the second story painted in cottage colors. In the rear is a cistern having a capacity of 40 barrels. The cost of the house in the location named is said to have been $1750.

The Necessity for Associated Effort.

BY WM. H. SAYWARD.

There are some things which the human animal can do without the assistance of others, but the field of his individual and unaided effort is extremely limited. The natural tendency is to believe that one can easily be independent, and can, to use an oft-repeated expression, "paddle his own canoe," with little dependence upon or regard for others. This idea is, of course, fallacious, and needs no argument to prove it; yet in spite of this fact man is continually desirous of acting in this fashion, no matter how certainly experience may caution him to avoid it. It seems to make little difference how important any particular course of action may be, in which united action is essential to produce a beneficial result. It is only under the sharp pinch of necessity that men will finally seek each other and join hands for the common good.

It is readily conceivable that this inclination to depend with too great certainty upon individual ability, and the disinclination to act in concert with others, is inherited from the earliest eras of human existence, when the individual interest was the only interest, and the sparseness of population presented but little incentive to congregated action—yet at a very early stage, though in the rudest way, and for the most common of purposes, was developed the opposite inclination of flocking together under the stress of alarm, which proneness has also been inherited by all the generations of man.

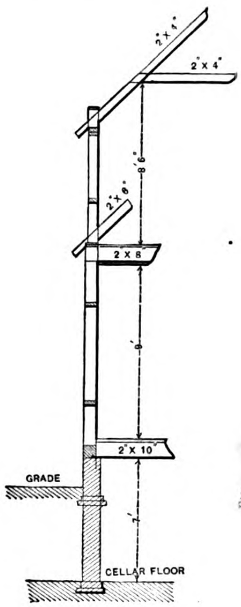
From and out of this tendency has grown government, the fundamental feature of which is the good of the whole as paramount to the special interest of the individual, while directly contributing to the fuller, more complete advantage of the individual through the security given to the group of individuals. Beyond the range of positive government, which comprehends general laws or regulations for the common good, are conditions which, though not within the jurisdiction of general government in themselves, require control and direction for similar reasons to those which cause the establishment of laws for the common weal. These conditions, too, are intimately concerned in the character of general laws, and are to a large extent responsible for effective or ineffective legislation; for the comprehensiveness of regulations that are treated for the control and safety of the people. These conditions are the relations which unduly create the need of government itself; the relations brought about by the varied avocations and the social and business contact of individuals and classes. Yet too close an intrusion of positive government in this domain carries with it the danger of special legislation, which is to be shunned.

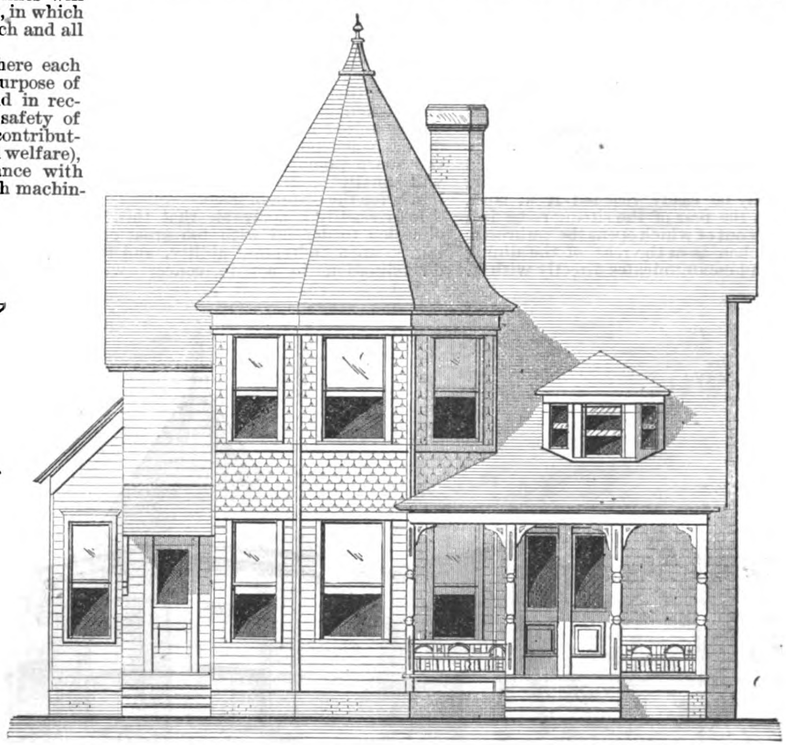
Conditions, then, while needing direction and control on the same general principles which support the existence of laws for the welfare of the whole body public, yet cannot properly be to any considerable extent within the scope of public consideration or interference, must sooner or later recognize a power which, while less coercive than the edicts of general government, will influence and regulate customs and practices within the boundaries where law may not intrude.

The ever-increasing multitudes upon the face of the earth, the ever-growing importance of particular callings or professions, an importance marked by development of methods, good, bad and indifferent, as well as by members involved, might be likened, in the consideration of this question of our responsibility, as groups of individuals, with lines of demarkation fixed by our special callings, to circles drawn upon a broad expanse. At first there is ample room for all without touching one another, but as the circles enlarge the circumferences impinge, and unless skill be used and pains be taken to adjust the swelling circles, the lines will cross and confusion soon follow, in which the symmetry and balance of each and all will be lost.

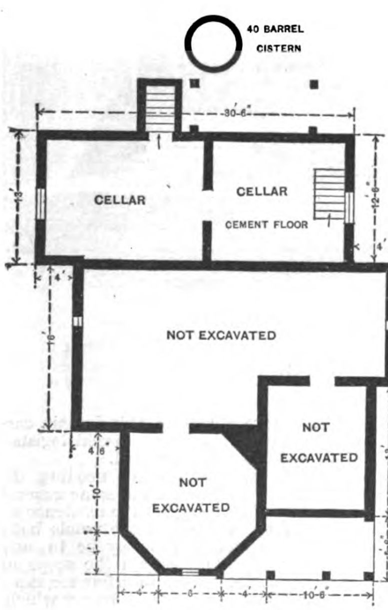
We have reached a point where each calling or profession, for the purpose of internal harmony and safety, and in recognition of the harmony and safety of other branches of business (all contributing to a common fund of general welfare), should prepare itself in advance with methods, and provide itself with machinery to put the methods into operation, which will prevent or avoid the dangers that come through inattention to the evils which insidiously and persistently thrust themselves through every crack and crevice, and against which the individual is powerless. We must put ourselves in position so that we can adjust ourselves to others, for our own good as well as theirs.

The proclivities before referred to as generally inherent in man are particularly noticeable when we come to consider the special interests of business men, rather than the interests of men in any special defined calling. With the greatest confidence men will devise, prepare and work from their own personal standpoint and for their own personal advancement, cut and thrust in every direction, heedless of consequences to others, so long as they are unwounded. Each one seems to conceive that he can stand it as long as the "other fellow," and none think of a better method until the structure, which they have all contributed to erect, falls to the ground; and creeping out from the ruins they compare their wounds and bruises and exclaim: "Let us associate together, and by protecting each other protect ourselves."



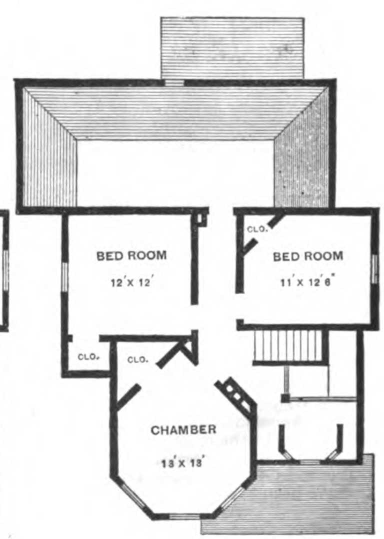


Section and Front Elevation.—Scale, ⅛ Inch to the Foot.



Foundation.

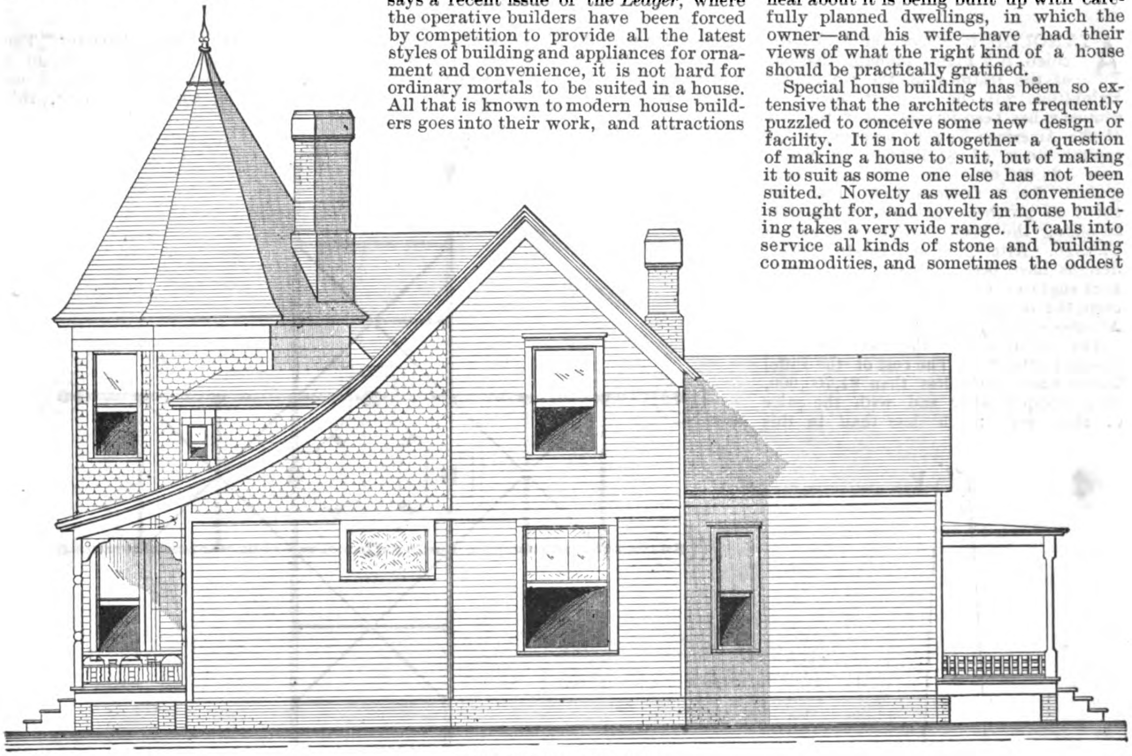
First Floor.



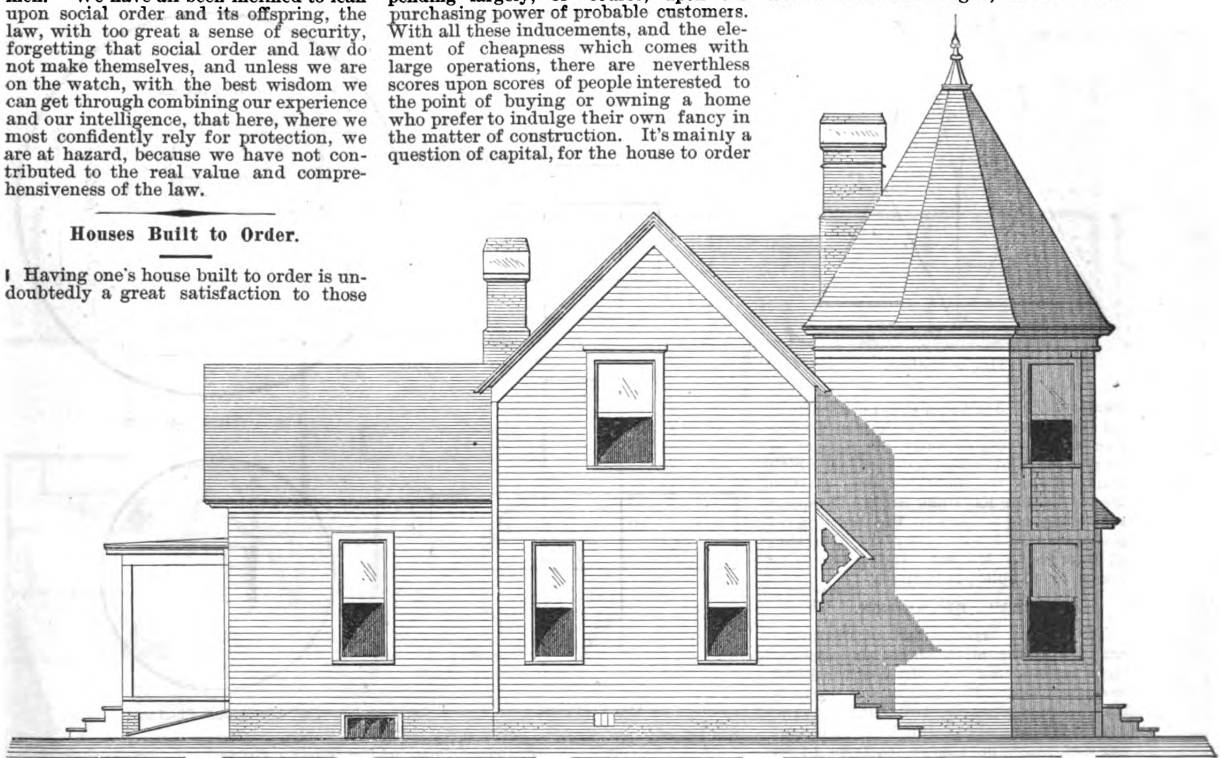
Second Floor.

Cottage at South Bend, Ind.—Scale, 1-16 *Inch to the Foot.*

The idea of voluntary association, with the aim to secure particular benefits and advantages to which a special calling is entitled, is so new as to be little understood and valued, especially by business men. We have all been inclined to lean upon social order and its offspring, the law, with too great a sense of security, forgetting that social order and law do not make themselves, and unless we are on the watch, with the best wisdom we can get through combining our experience and our intelligence, that here, where we most confidently rely for protection, we are at hazard, because we have not contributed to the real value and comprehensiveness of the law.



Side (Right) Elevation.



Side (Left) Elevation.

Cottage at South Bend, Ind.—Elevations.—Scale, ⅛ Inch to the Foot.

Houses Built to Order.

Having one's house built to order is undoubtedly a great satisfaction to those who are ready and able to pay for it. Like shoes or garments for which the customer's measure is taken, the ordered house costs more than the ready-made article, although there are many compensating advantages. In Philadelphia, says a recent issue of the *Ledger*, where the operative builders have been forced by competition to provide all the latest styles of building and appliances for ornament and convenience, it is not hard for ordinary mortals to be suited in a house. All that is known to modern house builders goes into their work, and attractions to suit the most fastidious are presented, the sizes, styles and finish of buildings depending largely, of course, upon the purchasing power of probable customers. With all these inducements, and the element of cheapness which comes with large operations, there are nevertheless scores upon scores of people interested to the point of buying or owning a home who prefer to indulge their own fancy in the matter of construction. It's mainly a question of capital, for the house to order requires the architect, and the architect can put into a building all the windows and closets, all the large rooms and small rooms, all the fads and fancies that the owner sees fit to pay for. Philadelphia is full of such houses, and all the country near about it is being built up with carefully planned dwellings, in which the owner—and his wife—have had their views of what the right kind of a house should be practically gratified.

Special house building has been so extensive that the architects are frequently puzzled to conceive some new design or facility. It is not altogether a question of making a house to suit, but of making it to suit as some one else has not been suited. Novelty as well as convenience is sought for, and novelty in house building takes a very wide range. It calls into service all kinds of stone and building commodities, and sometimes the oddest materials are the most desirable. In the suburbs the novelty of exterior appearance is most encouraged, and it is the variety of constructural ideas that adds spice as well as beauty to the new houses to order.

PROPOSED TOWER AT THE WORLD'S FAIR.

ALTHOUGH it is not yet finally decided, it is highly probable that one of the features of the Columbian Exhibition will be a great tower. A company has been formed under the title of the American Tower Company, with a capital stock of $1,500,000, of which over $1,000,000 has already been spoken for. Options have been secured to purchase grounds immediately adjoining the World's Fair grounds in Chicago. After long and careful study, designs have been prepared by the eminent engineer, George S. Morison, of Chicago, the designer and builder of some of America's most famous bridges.

The actual cost of the tower will be about $1,500,000. The cost of the Eiffel Tower was a little less than $1,700,000, with cheaper labor and with the price of steel very much less than in this country. The American tower can be built for less money, notwithstanding its greater size and earning capacity, on account of its greater simplicity of design, in which standard and merchantable sizes of steel are used. The Keystone Bridge Company are ready to undertake the erection of the proposed tower under the direction of George S. Morison, and give heavy bonds to complete it in time.

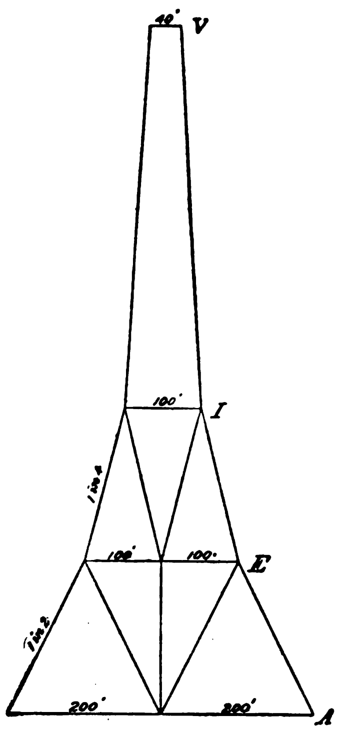


Fig. 1.—Outline.

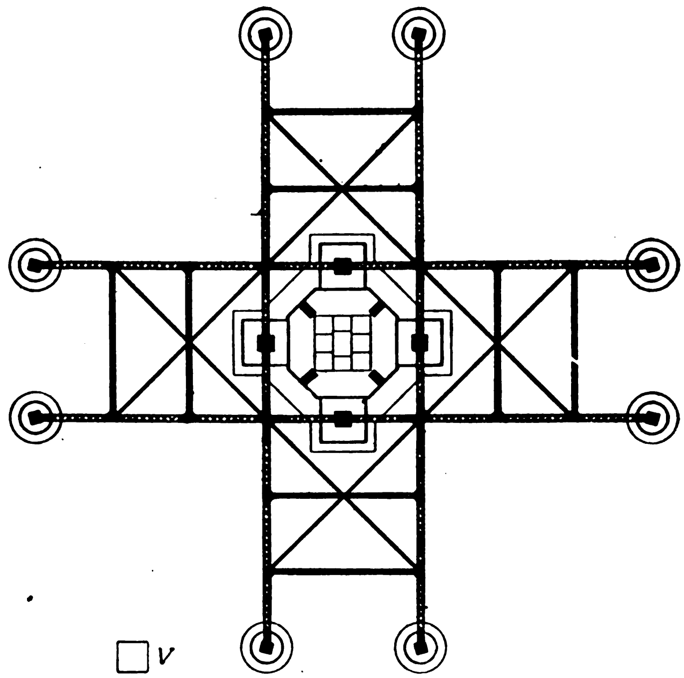


Fig. 6.—Bottom Plane.

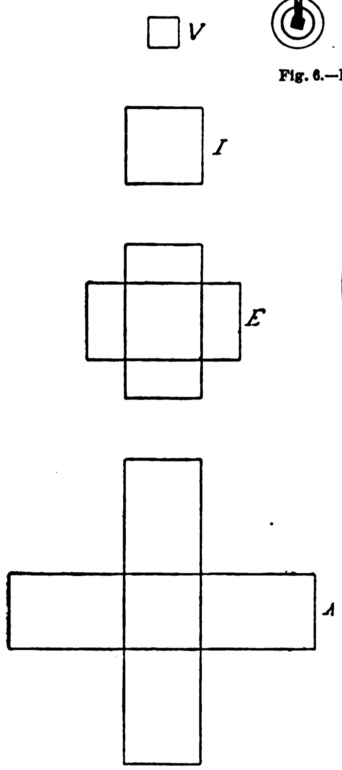


Fig. 2.—Plans.

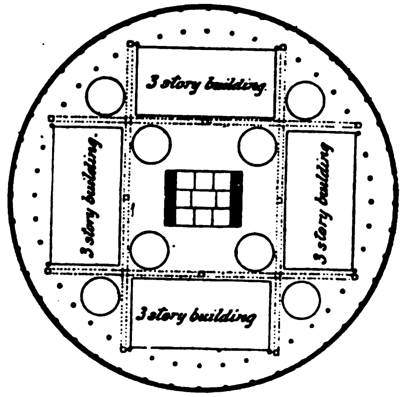


Fig. 3.—First Platform.

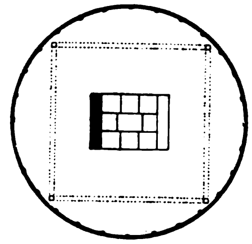


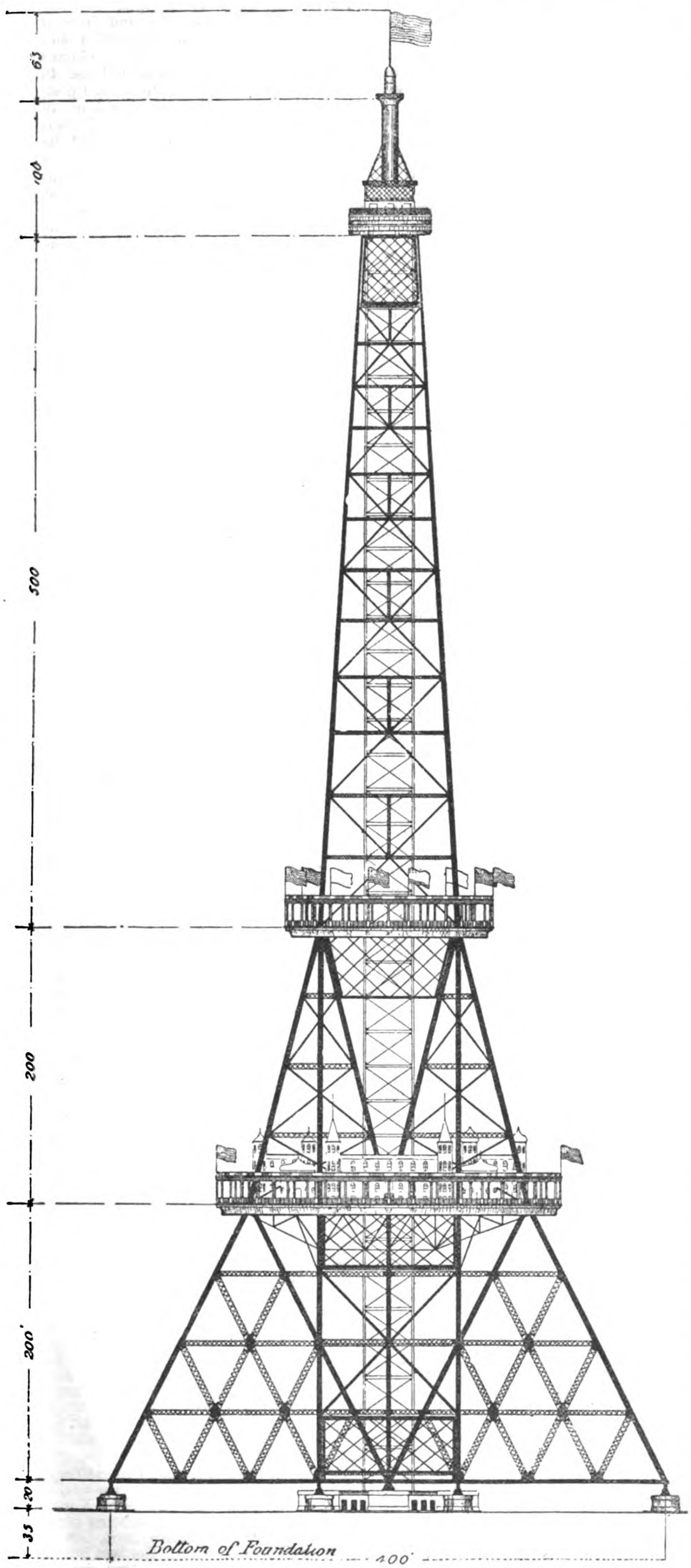
Fig. 4.—Second Platform.

Proposed Tower at the World's Fair.

GENERAL DESCRIPTION.

The general arrangement of the tower and the arrangement of the accommodations are modeled from those of the Eiffel tower at Paris. The base of the tower is made approximately two-fifths of the hight; 200 feet above the base is placed the first platform, a large platform to be occupied by promenades, restaurants and miscellaneous accommodations, this platform being high enough to command the best view of the entire exposition grounds and buildings. The second platform is placed 200 feet higher up than the first platform, though it will not be of so much importance; 500 feet higher up is the lantern, which is the principal point for distant views, and is surmounted by a lighthouse and flagstaff, the whole having a hight of 165 feet.

While, however, the general arrangement is derived from that of the Eiffel Tower, the system of construction is necessarily of a very different character. The problem to be solved was to design a tower to be carried on the soft soil on which the city of Chicago is built, this soil being a fine sand which carries large weights perfectly well when they are properly distributed or supported, but has little power in itself to resist lateral thrusts. This rendered anything like the inclined



Proposed Tower at the World's Fair.—Fig. 5.—Side Elevation.

supports of the Paris Tower inadmissible, and further, made it necessary to provide for the expansion of the metal of the tower in a manner which would not strain the foundations.

Besides these considerations of foundations, it was also necessary to design a tower which can be built in the shortest possible time and erected with a maximum speed. This made it necessary to confine the construction to right lines and square angles. This led to the selection of the plan adopted, Fig. 1. The upper shaft from the lantern V down to the second platform I, is a square shaft battering from 40 feet square at the top to 100 feet square at the base, the entire weight being carried by the four corner posts which are stiffened by bracing in each of the four planes. The details are of much the same character as those of the high towers of an iron viaduct. It is the simplest possible form of construction as well as the strongest and most easily erected.

From the second platform I, Figs. 1 and 2, to the first E, each of the four sides of the upper shaft is continued downward in a vertical plane, the four planes intersecting each other on vertical lines 100 feet apart. Each of the four corner posts is therefore over one of the intersection lines of the planes, and the weight from each of the corner posts is distributed on four posts, two in each plane, these posts battering from each other with an inclination of one in four. The section of the tower, therefore, between the first and second platform consists of 16 posts, of which four are in each of the four planes, the interior posts coming together at the base, and the arrangement of the four posts being like an inverted W 300 feet high and 200 feet wide. The shape, therefore, of the tower at the level of the first platform is cruciform, E, Fig. 2, measuring 200 feet in each direction and 100 feet across each arm. The posts are braced together at intervals of 50 feet in the four planes.

Below the first platform E, the weight from the eight interior posts is carried directly to the foundation by vertical posts, while the weight from the exterior posts is carried down on the same principle that the weight from the four posts of the upper shaft is carried—that is, by two equally inclined posts from each point. To bring these posts together at the center it was necessary to double the batter, making it one in two, Fig. 1, instead of one in four. Each plane, therefore, of the lower 200 feet of the tower becomes an inverted W, 200 feet high and 400 feet wide on the base, with a vertical member in the center. The members of this plane are stiffened by bracing placed every 50 feet. The base of the tower is then of cruciform section A, Fig. 2, each arm being 400 feet long and 100 feet wide.

The weights of the lantern and the several platforms are provided for at their several levels.

With this arrangement more than half the total weight of the tower is carried on four central points and is a fixed quantity. The remainder is carried on eight outlying piers and varies with the wind pressure. The live load is distributed in the same way, but of course is variable everywhere. The four central points of support are made fixed points and rest on piers which are united into one great foundation. The bearings on the outlying points are all made with expansion links which are able to resist both tension and compression, and the lines of motion of these links are made radial to the center of the tower, so that the expansion of the metal both longitudinally and transversely is provided for at the same time. The only expansion not provided for is that due to different temperatures in different parts of the lower horizontal plane, which is so small that it may be neglected.

The entire structure is tied across the base and is complete in itself, the only stress transferred to the foundations being a vertical pressure.

The maximum weight thrown by the tower with a complete estimated live load on each of the four central points is 1760 tons, or in round numbers 7000 tons on the whole foundation, and the maximum weight thrown on each of the eight outlying piers is 880 tons, this, however, being largely due to wind. The dead load alone thrown upon each of these piers is less than 300 tons. If these weights are compared with the weights on the foundations of many of the tall buildings in Chicago, and especially under the grain elevators, which are the heaviest and oldest structures in the city, it will be seen that in spite of the immense size of the tower, the foundations are a comparatively simple thing.

The weight of the structural portions of the tower above the masonry foundations is about 7000 tons. To this is to be added 2000 tons for the weights of floors and buildings, and 2000 tons more for live load, making a total weight of 11,000 tons, of which less than one fifth is variable. A grain elevator of 1,000,000 bushels capacity—and there are much larger elevators than this in Chicago—weighs, when full of grain, at least 50,000 tons, of which more than one-half is variable, besides which it exposes a large flat surface to the wind, and in all respects is subject to much greater disturbing elements than the tower.

ACCOMMODATIONS.

The accommodations, though following the same general arrangement, have been materially increased from those of the Eiffel Tower. The first platform, Fig. 3, which is supported on a cruciform section, is made circular, this shape being easily adapted to the shape of the support. The platform is 250 feet in diameter. Around this platform runs a covered colonnade 15 feet wide, the roof being supported by two lines of columns, and a substantial fence being placed between the columns of the exterior row. This forms a continuous promenade unbroken by angles or any local features to check the movements of a crowd. Inside of the circular promenade the platform is left uncovered, except where occupied by buildings. The spaces between the colonnade and the planes in which the structural members are, give room for four large buildings 45 feet wide and 90 feet long. These buildings will be of light construction and three stories high, and will be occupied as restaurants; the lower stories will be only 7 feet high and used as serving rooms; the second and third stories will each be 15 feet high, and these, together with the flat roof, will furnish accommodations for chairs and tables. From each of these floors there will be an uninterrupted view, people on the first floor looking over those walking on the promenade, people on the second floor looking under the roof of the colonnade, and those on the roof looking over the roof of the colonnade. In the interior, besides the space occupied by the four large buildings, there will be room for a number of small buildings, to be occupied by various small booths and other buildings.

The lantern will be supported on the four corner columns, which are 40 feet apart, the length of the diagonal being, therefore, about 57 feet. The lantern is made 60 feet in diameter and two stories high, each story, however, to be but 7½ feet high. This will give two rooms, each having a circumference of 188 feet, which would be the lookouts of the tower, thus giving nearly 400 feet of observation wall. The circular outside wall of each floor would be made solid for a hight of about 3 feet from the ground, the next 3½ feet will be of plate glass, and above this will be a frieze, which would be graduated to mark the points of the compass, and the names of important places can be painted in the proper directions; this circle will be of such size that each degree will be more than 6 inches long. Above the two observation halls will be an open gallery to which the public will not be admitted, but on which a small circular railroad can be laid on which a powerful electric light can travel so as to make variable effects of colored light, while within this track will be a smaller building containing rooms for special purposes. Above this small building a round shaft, made of boilor plate 12 feet in diameter, will extend 60 feet, this shaft will contain a spiral staircase leading to the highest platform of the tower 1020 feet above the graded surface of the ground. Above this platform will be a lighthouse surmounted by a flagstaff, the total hight from the ground to the top of the flagstaff being 1086 feet, and from the bottom of the foundation to the top of the flagstaff 1130 feet.

Within the main structure is to be built a secondary structure 36 feet square and of uniform size throughout, extending from the foundation to the lantern. This structure is to hold the elevators. It is divided into nine shafts of approximately equal size, eight of which will be occupied by the elevator cars, and the ninth at the center will hold the machinery. Each elevator car will have an area of 100 square feet and be capable of carrying 50 people. The four corner cars will run to the first platform, two of the others will run to the second platform stopping at the first, and the other two will run to the top of the tower. There will be separate entrances at the base to the three different classes of cars, so that no confusion can result. A double staircase will be built around the elevator shafts from the foundation to the first platform, and a single staircase from the first to the second platform. The general design of the tower is shown in Figs. 5 and 6.

CONSTRUCTION.

The foundation work will comprise eight outlying piers supporting the exterior bearings of the tower, and the central pier, which supports the center bearing. The general principle adopted for these foundations is that of concrete piers resting on piles. The weight per pile will be limited to from 10 to 15 tons, according to observations to be made when work is actually begun. These weights are without any allowance for the bearing on the ground surface between the piles. If the piles were entirely omitted the weight on the surface would be from 1¼ to 1¾ tons per square foot. The concrete foundation will begin 2 feet below mean water in Lake Michigan, and the piles would extend up 3 feet into the matrix of concrete. All concrete will be first class Portland cement concrete. The central pier will contain 7500 yards of concrete and be supported on 1600 piles. Each of the outlying piers will contain 700 cubic yards of concrete and be supported by 185 piles.

Above the concrete foundation, which will be about level with the graded surface of the ground, will be built separate piers, one on each of the outlying foundations and four on the central foundation. These piers will be of limestone with heartings of Portland cement concrete, the piers on the central foundation being 30 feet square and 14 feet high, and those on each of the outlying foundations 20 feet in diameter and 11 feet high. The total amount of masonry and concrete in all the foundations is somewhat more than 15,000 cubic yards.

STRUCTURAL METAL.

The tower will be built of mild steel and of wrought iron, wrought iron being used only in the lighter members. The principal columns are of square box section, fitted with manholes and interior ladders for purposes of inspection and convenience of workmen. These columns below the second platform will be 40 inches square, and above the second platform they will taper, decreasing from 40 inches at the base to 16 inches at the lantern. All the interior columns will be built of plates and angles with open-laced sides. All bracing and stiffening members will have riveted connections so that nothing can get loose. The compression members are generally square made of four angles at the corners and with all four sides laced. The tension members are made of four bulb angles placed in pairs back to back with a single line of lacing.

The weights on all the floors are taken at 100 pounds per square foot, of which one-half is treated as live load. The weights of the tower used in the calculations are the actual weights of the metal. A wind pressure of 50 pounds per square foot on the entire structure is provided for, and a wind pressure of 80 pounds per square foot on the lantern is provided for in all members above the second platform. With these conditions the strains are limited to 14,000 pounds per square inch on square box columns within a maximum unsupported length of 16 times the width, and these strains are reduced for longer columns, or when thin metal is used in the plates. Where any member is subject to both tension and compression the sum of the two strains is used in determining the section. The interior elevator shaft will be of the same character of material and will rest directly on the central foundation. The entire structure will be incombustible, the floors of the platforms being covered with asphalt or cement concrete, and no wood being used anywhere for structural purposes.

NEW PUBLICATIONS.

THE DOMESTIC HOUSE PLANNER AND SANITARY ARCHITECT. By Various Practical Writers. 263 pages. Illustrated by 16 folded plates and 60 diagrams. Bound in stiff board covers. Published by Ward, Lock & Co. Price, $2.

This work consists of a series of practical papers on the principles of house planning and arrangement, as well of sanitary construction. In the preparation of the matter relating to house planning the authors have had in view the idea that as domestic houses are constructed for dwelling purposes, and to afford shelter and conveniences for the carrying on of all work which the occupants require to be done for them in the varied necessities of domestic life, the external arrangement or design of the house should in all cases be subordinate to the plan or internal arrangement of the various apartments which go to make up the home. Within the covers of this book the authors have laid down certain propositions bearing closely upon the influence which the internal arrangement of the various apartments have, when duly considered, upon the comfort of the inhabitants. The second portion of the book treats of matters suggested by the title, "The Sanitary Architect," and while written from an English standpoint the volume contains a great deal that is likely to prove interesting to American readers. The volume is profusely illustrated by engravings in the text, as well as by a series of plates containing working drawings, which cannot fail to be both attractive and useful to the student of building construction.

WE ARE APT to think that superstition is dead, or at least confined to the ignorant and illiterate, says the New York *Tribune*. But this is far from being correct. Recently, for instance, in St. Louis a large building in one of the best business streets of the city was torn down simply because it was thought to be "hoodooed."

CORRESPONDENCE.

Making Saw Kerfs.

From M. E. J., *Williamsport, Pa.*—In the November number of *Carpentry and Building* I notice several answers to the inquiry of "A. B. McD." with regard to kerfing. I would like to give my rule, which is—first, lay out with the compasses on a board a plan of the circle around which the board is to be bent. I do this by drawing two circular lines representing the edge or thickness of the board to be bent, as illustrated in Fig. 1 of my sketches. Every portion of a circle has, for a certain distance, a straight surface, and the larger the circle the larger will be this distance, and the smaller the circle the smaller will be this distance. In the next place I draw a line touching the outer circle, as represented by A A in the sketch. This line may be drawn on any portion of the circle desired. The points at which the straight line leaves the curve, as A A of Fig. 1, will be the distance on the outer circle which the saw kerfs are from each other. From the two points A A draw lines to the center of the circle, as indicated by the dotted lines in the sketch. The points where these two lines touch the inner or smaller circle, as at B B, designate the distance the saw kerfs are apart on the straight board. Now, with the compasses or foot rule, space the distance on the straight board, as indicated in Fig. 2, and after running a gauge line on the edge of the board to regulate the depth of the kerf, I saw on to the face of the board square down to the gauge line. When the saw kerfs are all cut the board may be bent. Some judgment must be used, however, as to the thickness of the saw employed. A small circle should be cut with a fine saw, while a large circle would require a coarse saw. If the saw is too thick the thin back of the board will buckle. I consider this method far ahead of anything I have yet seen published.

From M. A. W., *Evanston, Ill.*—In the August number of *Carpentry and Building* "A. B. McD." of Harrison, Tenn., asks about kerfing boards for a circle. I will give my method, which, though not new, may be novel to a great many readers of the paper. I first make a gauge board from a piece of ½-inch or ⅝-inch pine, making it in width equal to the distance the kerfs are to be apart. Tack to one edge of the gauge a piece of tin, band iron, or, if one has it, a piece of saw blade about as long as the width of the board it is desired to curve. I have a piece of buck saw blade which I use for the purpose. Punch three holes in one edge and screw to the edge of the gauge board, leaving one edge of the blade ¾ inch below the bottom of the gauge, as indicated in Fig. 4 of the sketches, which represents a view of the gauge board. The next step is to square across the board and saw a kerf with a saw, to which is attached on the right side a gauge consisting of a piece of ½ inch or ⅝-inch pine secured with two small screws, as indicated in Fig. 3 of the illustrations. I place the gauge on the saw as far from the teeth edge as will represent the depth of the kerfs to be cut. Now put the gauge in the kerf already made and saw close to the opposite edge of the gauge, as indicated in Fig. 5 of the illustrations. In order to make the holes in the saw blade place the saw on the end of a piece of hard wood, and with a hammer and nail set punch the holes where they are required, after which rim out with a drill or rimmer. I know of no rule for finding the width and depth of the kerf, as a saw that is set wide will require a different space of kerfs than one having no set at all. The method I employ is to kerf a narrow piece the same thickness as the piece of board I wish to bend and curve it about as I think it should be, and then try it to the circle. I sometimes have to try two or three of these models before I get the exact space.

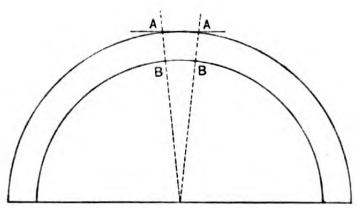


Fig. 1.—Diagram Representing Thickness of Board to be Bent.

Fig. 2.—Board, Showing Position of Saw Kerfs.

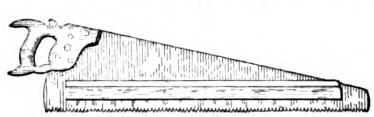


Fig. 3.—Saw with Gauge Attached.

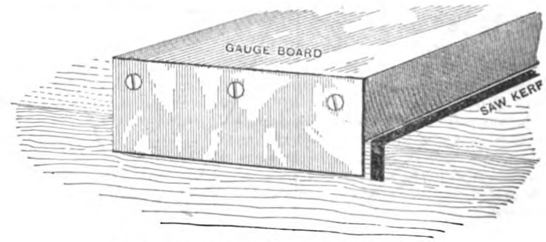


Fig. 4.—General View of Gauge Board.

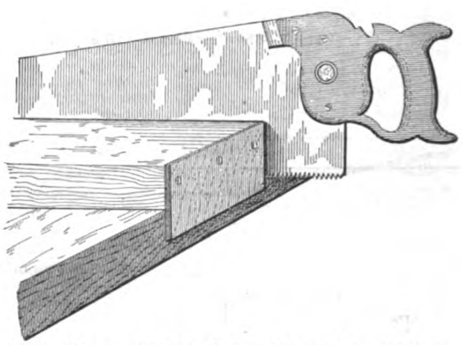


Fig. 5.—Showing Method of Using Saw and Gauge Board.

Making Saw Kerfs.—Sketches Submitted by Various Correspondents.

Laying Out Polygons.

From G. T. W., *St. Louis, Mo.*—I would like to have "S. E. D." explain to me how he spaces off his semicircle for polygons with an uneven number of sides. I have tried the method he described in the January number of the paper, and find that it will apply to polygons having an even number of sides. He says, however, that the same rule will answer for any sided figure. I would say to "S. E. D.," "Let us hear from you again, and give the matter thorough ventilation."

Note.—We are inclined to think if "G. T. W." had carefully followed out the directions given by "S. E. D." he would have discovered that the results desired could have been obtained. As he seems to find difficulty with the rule suggested by "S. E. D.," it is possible that the following general rule, by which any regular polygon may be drawn when the length of a side is known, may prove more satisfactory: "With a radius equal to the given side, describe a semicircle, the circumference of which divide into as many equal parts as the figure is to have sides. From the center by which the semicircle was struck draw a line to the second division in the circumference. This line will be one side of the required figure and one-half of the diameter of the semicircle will be another, and the two will be in proper relationship to each other. Therefore, bisect each, and through their centers erect perpendiculars, which produce until they intersect. The point of intersection will be the center of the circle which will circumscribe the polygon. Draw the center and, setting the dividers to the length of one of the sides already found, step off the circumference, thus obtaining points by which to draw the remaining sides of the figure."

More Correspondence Wanted.

From S. E. D., *Pittsburgh, Pa.*—I have been a reader of *Carpentry and Building* for three years past, and I believe I have learned more from the Correspondence Department than I have from all the books in my possession treating on carpentry, and I have several to which I lay claim. I desire to say to the readers of the paper, and especially to those interested in the Correspondence Department, that I should like to see more questions and answers in that portion of the paper devoted to this department. Let us all see if we cannot ask and answer more questions, give a greater number of plans and suggestions and discuss matters which occur in our every-day business experience. During the long winter evening we shall have plenty of time, and can give the various matters brought up in the Correspondence Department such attention as will enable us to properly express our views. It is true I have not personally asked very many questions, nor have I answered many; but I shall do the best I can. Each one is likely to have some good ideas that will prove valuable to other readers of the paper, and I would urge that no one be backward in writing to the paper. It is our fault if we do not make the columns of the Correspondence Department interesting. Let us all make an extra effort this winter.

Note —The suggestion of our correspondent is a good one, and voices the wishes of the editor with regard to this matter. The Correspondence Department is designed for giving the readers of the paper an opportunity to express their opinions regarding various subjects of interest; to discuss matters which come up in the execution of practical work, and to ask and answer questions in which they are specially interested. We trust our readers will heed the advice of our correspondent, and during the long winter evenings send the editor a great deal of interesting matter.

Floor and Roof Truss.

From C. S., *Brunswick, Ohio.*—In the October number of *Carpentry and Building* I noticed a plan of a floor and roof truss from "R. C. B." of Orangeburg, S. C., in answer to the inquiry of "C. M. J.," Ontario, Ohio. I think the plan of "R. C. B." is not just what it should be in order to carry the load to be placed upon it. A building 36 x 50 would accommodate a great many people, and I think his plan would not carry the load at all. In his plan he shows nothing to which to nail the ceiling lath, either on the first or second floor. It shows that the studding are all cut into, making the upper story separate from the lower one. I cannot see any way of holding this so that it will not lean one way or the other. The roof truss, as he has it, is stayed with 1-inch lumber, and I am inclined to think this would not hold together. The first-floor truss is made of two pieces 2 x 8 with a 1-inch rod running between them, and these are 8 feet apart. In my opinion these are not thick enough, and at each end there should be a pin connection with an eye on the rod instead of a nut, as he has it, and also a sleeve nut for tightening. This sleeve nut should be about 8 inches long, so that it could be taken up 7 inches if necessary.

The accompanying sketches represent the plan of a floor truss which, I think, will stand almost any strain. Fig. 2 represents the side of the first-floor joists, showing the method of trussing according to the plan I have adopted. This truss is made of four pieces 2 x 12, there being one on each side running the whole width of the building, 36 feet, placed 5 inches apart. Between these, in the center, there are two pieces, 2 x 12, which are 18 feet long, with 1 inch between them for the ends of the middle truss rod. The joists in the middle are bolted with four ½-inch bolts on each side of the joists. The ends of the joists are cut on a slant, and oak blocks, 3 x 4 inches, are spiked on, while one half of the pin-hole is cut out to keep the pin from working down. At each end of the truss beams the plank is doubled with a piece about 4 feet long, so as not to leave too long a space between the pin bearings. This piece is bolted on with ½-inch bolts. The pin at each end of the long rod is 2 inches and at the short truss rod 1¼ inches. The long rod is 1¼ inches thick, with two sleeve nuts. The short truss rod is 1 inch, with one sleeve nut. The truss joists are 4 feet apart, with a 2 x 6 studding on each side and a 2 x 6 studding cut in under each side of the outside joists, so that they are kept from tipping or giving way. The pieces over which run the truss rods are two in number, measuring 2 x 8 inches. One is placed in the middle, just under the joint of the outside pieces, and one at each end of the two middle pieces, 18 feet long, which makes them all about 9 feet apart. All of the intermediate joists are spliced in the center, with 1-inch board nailed on the joint they rest on. These pieces run the same way as the joists, and are designed to serve as stringers to which to nail ceiling or lath. They are toe-nailed to the 4 x 8 stringers, so that they are on a level with the truss rods. The second-floor joists are 2 x 8 and all spliced in the center. On each splice is placed a 1-inch board, 10 feet long. Fig. 3 of the sketches represents a plan view of one of the floor-truss rods, while Fig. 4 is an end view of the truss.

The plan of the roof truss, which I send herewith, and which is shown in Fig. 1, indicates my method of trussing, and is so simple that detailed explanation would seem to be unnecessary. I would, however, be glad to have the practical readers of the paper express their opinion concerning this question of floor and roof truss.

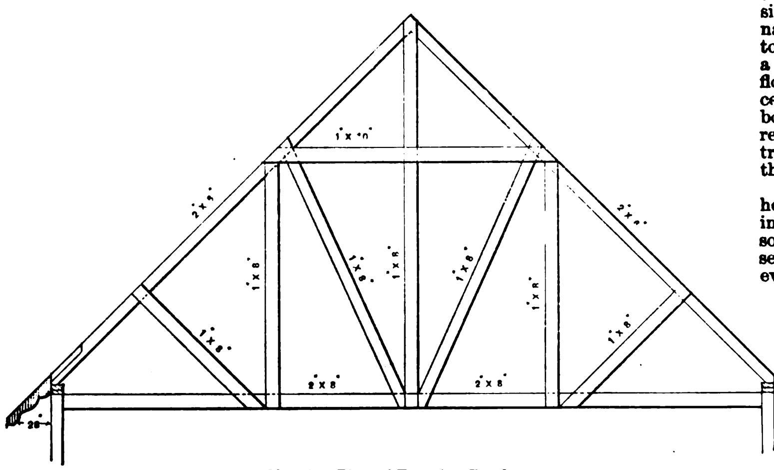


Fig. 1.—Showing Plan of Trussing Roof.

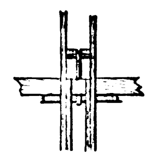


Fig. 4.—End View of Floor Truss.

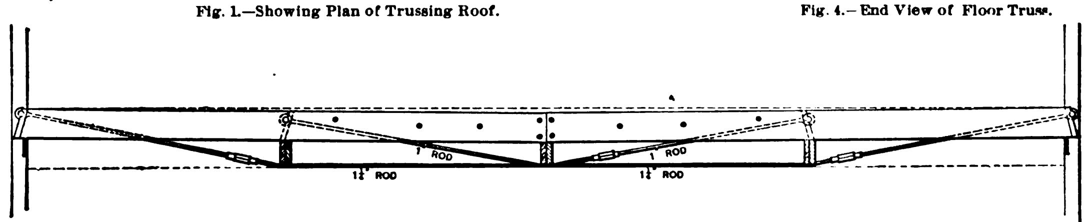


Fig. 2.—Side of First Floor Joints, Showing Method of Trussing.

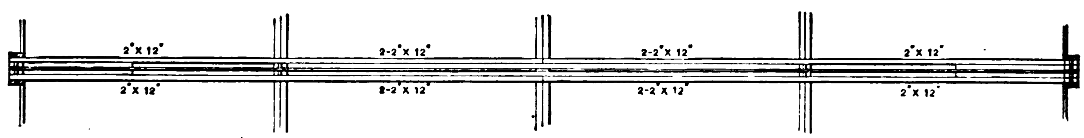


Fig. 3.—Plan View of Floor Truss.

Floor and Roof Truss.—Sketches Accompanying Letter from C. S.

Knot for Sash Cord.

From W. H., *Worcester, Mass.*—I would like to ask through the columns of *Carpentry and Building* what kind of a knot is the most lasting for a sash cord.

Hanging Sash Doors.

From G. L. McM., *Tacoma, Wash.*—A few months ago I saw an inquiry in *Carpentry and Building* with regard to hanging queen or sash doors, the correspondent asking if the putty side should be facing in or out. The queen door should have the glass fastened in with moldings and be back-puttied on both sides, as should also be a sash door where there is one large light surrounded with smaller ones. Where putty is used it should be on the inside of the door, otherwise the occasional slamming of the door will loosen the putty by throwing the glass against it, and in time will necessitate the reputtying of the door, or else the glass will fall out and break.

GOVERNMENT OF BUILDERS' EXCHANGES.

WILLIAM H. SAYWARD.

IN THE December issue of *Carpentry and Building* the value of a builders' exchange to its members was demonstrated by showing how the members can protect themselves by enforcing the rules that have been adopted. The case referred to last month was one in which the defendant had infringed the rules of the exchange, by "trading" upon an estimate submitted by a sub-bidder, showing one form of wrong practice that is more or less prevalent among builders, either from carlessness or from design.

The case given in the following is of a different nature, being an effort on the part of the sub-bidder to enforce the acceptance of his bid, which he considered to be the lowest. The execution of the contract being limited to a specified time, and the complainant being unable to complete his portion of the work within the time limit, it was necessary to award the contract to some one else.

One of the greatest benefits of such trials in an exchange is that the members have brought home to their minds by this means, clearly and distinctly, actual cases, which show by example the practices that are unjust and the manner in which they are unjust. Many builders have grown gradually into the habit of looking at all means by which they can secure a contract as being not only permissible, but fair. All contracts being secured by competition, it has come to be a fact that much of the competition has grown to be of a very questionable nature, simply because there has been no standard of fairness fixed and maintained by the builders themselves. Builders' exchanges have been organized under by-laws which, in a general way state an earnest purpose on the part of the organizers to eradicate the evils that exist in the building business. Customs and practices being so varied, the members themselves seem unable to fix, unanimously, upon what specific portion of a practice or transaction is wrong, and while in a general way they are conscious that wrong does exist, actual cases argued pro and con are necessary to develop the lines upon which action should be taken to bring the transaction of the builders' business nearer to recognized commercial standards.

The value to members of exchanges of the two cases cited lies in the fact that they present two distinct phases of building practices that need correction, and show how important it is for the welfare of the building community that builders themselves should recognize fully and completely the rights to which they are individually entitled. Such action on the question of differences between members of an exchange establishes precedent that is almost equal in value to that obtained in a court of law, and as an opinion of the justice of a case it is much more valuable, because tried by a jury of men all engaged in the building business and familiar with its conditions.

The following case brings out a point regarding a lowest bid and shows that under certain conditions a bid that represents the lowest sum is not the lowest that complies with required conditions.

Decision by the Board of Directors of the Master Builders Association of Boston, in the matter of complaint of James Fagan, member, against Gerry & Northup, members, under Section 3, Article VIII, of the By-Laws.

PLAINTIFF'S STATEMENT.

The plaintiff avers that the defendant asked him for an estimate for the mason work on a certain building which the West End Railway Company proposed to erect; that he acceded to their request, promising them to give them his bid if they would "use him right;" that he did give them the said bid in writing, placing it in their mail box in the exchange room; that within a short time after placing it there he saw Mr. Gerry at one of the writing tables in the exchange room, making up his bid for the work in question; that he then and there asked Mr. Gerry if he had got his bid, saying that he had placed it in Gerry & Northup's box: Mr. Gerry replied that he had not had time to go to the box and as he was in a great hurry to close his estimate asked the plaintiff the amount of his bid, which the plaintiff then stated to him verbally, further asking him if his bid was the lowest, to which query Mr. Gerry replied affirmatively.

The plaintiff submits that the defendants were awarded the contract for the work in question, but in spite of the facts above recited they did not award him the contract for the mason work. This action upon the part of the defendants the plaintiff claims to be dishonorable, and that the directors should discipline them in accordance with the facts and the authority given in Section 3, Article VIII, of the by-laws.

DEFENDANTS' STATEMENT.

The defendants admit that the facts above recited by the plaintiff are substantially correct, but submit further facts and circumstances as follows:

The West End Railway Company, in asking for estimates on the work in question, stipulated that the time of completion should be named, and further stated that the time would be an important consideration in awarding the contract.

The defendants, therefore, in making up bid, knew that they must state the time in which they would agree to complete the work, and to assist them in making this statement they asked the various sub-bidders how soon they could complete their various portions.

When the plaintiff verbally stated to the defendants the amount of his bid, they claim to have asked him how long it would take him to do the work, and that he gave a definite time, which was longer than the time given them by another bidder for the same work, although his price was lower.

The defendants claim that they immediately proceeded to finish and submit their estimate after receiving this bid and statement of time from the plaintiff, and that their bid as submitted comprehended two statements:

1. To do the work at a certain price and in a certain time, in which they used a figure for mason work given them by Gooch & Pray.

2. To do the work at a lower price, but in a longer time, in which they used the bid of the plaintiff.

The first and highest bid, coupled with the shortest time, was the one accepted by the West End Railway, and the defendants therefore awarded the contract for the mason work to Messrs. Gooch & Pray, they being the parties whose proposal as to time enabled them to make the proposition to complete the work in the shorter time.

The defendants claim that they could not honorably have done otherwise than award the contract for the mason work to the parties whose bid enabled them to make the proposition which secured the job.

JUDGMENT.

The Board of Directors having carefully considered all the testimony, having examined the estimate books of the defendants and those of the sub-bidders with whom they made contract for the mason work aforesaid, and having also examined the original bids in possession of the West End Railway Company, render the following

DECISION.

In the opinion of the board the plaintiff has not sustained his claim that he was fraudently deprived of a contract to which he was entitled. The defendants could not have honorably awarded the contract for the mason work to the plaintiff, and are declared free of blame under the charge made.

While there was lack of evidence to sustain the charge made by the plaintiff in this case, the directors are convinced that the charge was honestly made. There was ample evidence of lack of definite statement to sub-bidders, of great haste and carelessness in obtaining sub-estimates, as well as in submission of bids, thus giving great opportunity for suspicion and distrust which might have been avoided.

The directors cannot but advise and urge that greater care and precision be exercised by all members in soliciting and using estimates and in making bids, to the end that better business habits may prevail and that there may be greater freedom from suspicion among those who receive or give estimates.

Issued by order of the directors.

Centralizing Building Interests.

In order to be of practical value to members, a builders' exchange must be able to confer, through its existence, evident and specific benefits that cannot otherwise be obtained; or, at least, best obtained through its influence. One of the most important advantages within the functions of an exchange is that of centralizing the building interests into some particular and recognized locality, and if the exchange is not able to own its home, it should be located in some building in which the members could have their offices. The advantage of having builders grouped together in close proximity to the exchange should not be ignored. Builders have been too long contented to conduct their affairs with comparatively no business system and precision, from their homes or from temporary quarters in some building in the course of construction. The centralizing of building interests would also materially assist at the establishment of value in the exchange itself to members, by more clearly demonstrating the necessity for a 'change hour, at which time builders could always find each other and could always be found by the general public. Another aspect of the question is that no reputable contractor to-day can afford to transact his business in the old-fashioned slipshod way without office or books. He is living in a different time and under different conditions than existed in the past, and to-day the questions of profit, or loss, or opportunity depend much more than formerly upon the business end of the business. The effect upon those with whom the builder has business relations of a thoroughly well conducted office should be considered, and a builder will make more than the cost of an office from increased business that will come to him as soon as he places its transaction upon equal footing with other commercial pursuits.

One of the greatest difficulties in the way of making an exchange practically useful to the individual and to the trade is the carelessness which members display regarding the attendance at regular meetings. The exchange has large opportunities and the builder great needs, but neither can be taken advantage of so long as it is impossible to obtain action upon subjects requiring united effort for their accomplishment. Builders should be willing to spend some time for the intelligent consideration of questions which affect the trade, both for their own welfare and for that of their neighbor.

Design for an Iron Roof.

Our readers will remember that in the November issue for last year we presented some illustrations of the prize design for an iron roof in a competition lately conducted under the auspices of the Royal Institute of British Architects. This design, which was awarded the Grissell gold medal, was contributed by Robert J. Angel, Borough Surveyor's office, Town Hall, Birkenhead, England. In the present number we give a double-page engraving showing a number of details of construction, which, in connection with what has already appeared, cannot fail to prove interesting and instructive.

THE BUILDERS' GUIDE.*

By I. P. HICKS.

Points on Estimating.

TO THE CARPENTER and contractor there is nothing of more importance than accurate estimating, for it is one on which success in business largely depends. What is it worth? is a question very frequently asked the carpenter, and he is expected to know at once everything about a building. What is it worth to build a house like Mr. Blank's? What is it worth to build a porch on my house? What is it worth to build a bay window on my house? How much more will it cost to put sliding doors in my house than folding doors? Similar questions by the hundred are daily asked the carpenter, and the persons inquiring naturally expect a prompt answer and a reliable estimate. The question, What is it worth? is often a difficult one to answer, and when applied to a hundred different things it is no wonder the carpenter finds himself beset with difficulties. That thousands of mechanics have long felt the need of some reliable and practical method of estimating material and labor required in building there can be no doubt.

To make an estimate for a building always requires a careful consideration of the plans and specifications, as well as a considerable amount of figuring. Practical experience and personal familiarity with every item that enters into the construction of a building is what every man needs in order to become a good estimator; yet this is no reason why he cannot learn or profit from the experience of others. In this hustling, bustling age of the world the easiest, quickest and surest way of estimating is needed. Such a method can only be acquired by close attention to business, adopting means and methods which will be a safeguard against mistakes and by learning to estimate actual quantities. Before proceeding further with this subject it will be well to explain some of the principal terms used in measuring distances, surfaces and solids.

LINEAR MEASURE.

This is used in measuring distances where length only is considered — without regard to breadth or depth. It is frequently called lineal measure, meaning measured in a line without regard to breadth or depth. It is sometimes called line measure. Fig. 1 shows a lineal foot, drawn to a scale of 1 inch to the foot, the three figures following being to other scales.

SQUARE MEASURE.

This is used in measuring surfaces or things whose length and breadth are considered without regard to hight or depth, as sheathing, flooring, plastering, &c. Fig. 2 shows a square foot. In the measurement of lumber, square measure is frequently termed board measure, and when used as board measure the thickness is considered as one inch. A square is a figure which has four equal sides, and all its angles right angles, as shown in Fig. 2. Hence a square inch is a square the sides of which are each a lineal inch in length. A square foot is a square the sides of which are each a lineal foot in length, as represented in the diagram. A square yard is a square the sides of which are each a lineal yard in length and contains 9 square feet, as shown in Fig. 3. Square measure is so called because its measuring unit is a square. The standard of square measure is derived from the standard linear measure. Hence a unit of square measure is a square the sides of which are respectively equal in length to the linear unit of the same name.

Fig. 1.—Lineal Foot.

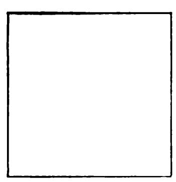


Fig. 2.—A Square Foot.

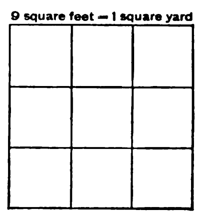


Fig. 3.—A Square Yard.

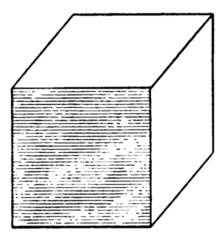


Fig. 4.—A Cubic Foot.

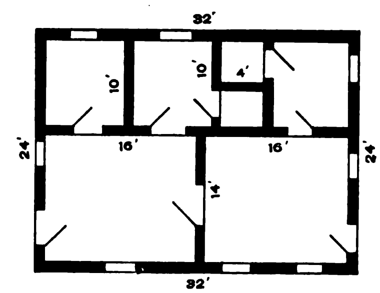


Fig. 5.—Floor Plans of a One Story Cottage, Showing Walls and Partitions.

The Builders' Guide.—Diagrams Illustrating Measures.

CUBIC MEASURE.

This is used in measuring solid bodies or things which have length, breadth and thickness, such as stone masonry, the capacity of bins, boxes, rooms, &c. A cube is a solid body bounded by six equal sides. It is often called a hexahedron. Hence, a cubic inch is a cube each of the sides of which is a square inch. A cubic foot is a cube with each of its sides a square foot, as shown in Fig. 4.

Cubic measure is so called because its measuring unit is a cube. The standard of cubic measure is derived from the standard linear measure. A unit of cubic measure therefore is a cube whose sides are respectively equal in length to the linear unit of the same name.

ITEMS AND QUANTITIES.

Having explained the terms used in the measurement of material the next step will be to consider the method of estimating the same. In estimating the lumber required for a building there are many parts for which the amounts required may be listed in a convenient form of table. For example, if we know the amount of material of one kind required for one window frame, we can multiply this amount by the number of frames, and obtain the total amount at once of this kind of material required for frames, and so on with various other parts. Much time will be saved by having a list of this kind, and it will aid very much to insure correctness in estimating. Following is a list of items giving the amount of lumber required for various parts of buildings arranged for concise and ready reference :

LIST OF ITEMS AND QUANTITIES REQUIRED.

	Feet.
Jamb casings for windows, ⅞-inch finish	10
Jamb casings for windows, 1¼-inch finish	12
Jamb casings for doors, ⅞-inch finish	10
Jamb casings for doors, 1¼-inch finish	12
Jamb casings for doors, 1½-inch finish	15
Jamb casings for doors, 2 -inch finish	20
Outside casings for windows, ⅞-inch finish	8
Outside casings for windows, 1¼-inch finish	10
Outside casings for doors, ⅞-inch finish	10
Outside casings for doors, 1¼-inch finish	12
Inside window casings, lineal measure	20
Inside door casings, one side lineal measure	16 to 18
Inside door casings, two sides lineal measure	32 to 36
Band molding window frames	16
Band molding door frames, one side	16 to 18
Band molding door frames, two sides	32 to 36
Molding outside caps of frames	4
Sills for windows, per frame, lineal measure	3½
Sills for doors, per frame, lineal measure	4
Window stops, per frame	12 to 16
Parting stops, per frame	12 to 16
Door stops, per frame	16 to 18
Porch columns, board measure	24 to 30
Brackets, board measure	4 to 6
Horses and treads for stairs, 1¼-inch finish	90 to 110
For risers and finish about stairs, ⅞-inch finish	30 to 60
Shelving for pantries	50 to 100
Shelving common closets	4 to 8

PRACTICAL RULES FOR ESTIMATING.

To 8 inch flooring add one-third for the matching.
To 4 inch flooring add one-fourth for the matching.
To 6 inch flooring add one-fifth for the matching.
To 4 inch ceiling add one-third for the matching.
To 6 inch ceiling add one-fifth for the matching.
To 8 inch shiplap add one-sixth for the matching.
To 10 inch shiplap add one-eighth for the matching.
To 12 inch shiplap add one-tenth for the matching.

ESTIMATING SIDING.

To 6-inch beveled siding add one-sixth for the lap and make no deductions for openings, for in general the waste in cutting will equal the amount gained by openings.

ESTIMATING SHEATHING.

In estimating sheathing for shingle roofs make no allowance for spreading the boards. Calculate the same as for close sheathing a roof, for what is gained in spreading the boards is generally lost in the cutting. The boards should never be placed more than 2 inches apart for a good roof. Sheathing for gutters on roofs having box cornices is an item often forgotten. These gutters are variously formed, but usually consist of four pieces of sheathing, forming a bottom, two sides and a fillet next to the crown molding. The combined width of these pieces is from 1 to 2 feet. Hence the amount of lumber required for gutters may be found by multiplying the length of the gutters by the combined width of the pieces which form it.

For example, suppose the length of gutters on a building is 42 feet, and to form the bottom sides and fillet requires a board equal to 1½ feet wide, how much lumber will be required ? Operation : $42 \times 1½ = 63$ feet.

The sheathing for gutters often amounts to several hundred feet on large jobs, and is a matter worthy of attention. Sheathing is one of the items of which carpenters usually fall short. The reason is obvious, it being one of the cheapest kinds of material. It is used for many purposes for which the carpenter does not count. Wherever a board is wanted for one purpose or another, a sheathing board is taken, provided it will answer, while several hundred feet are usually employed in building scaffolds. A large portion of this is wasted by being nailed, sawed and split, It is safe to say that in estimating sheathing one-fifth should be added to the net estimate.

ESTIMATING SHINGLES.

In estimating shingles allow nine to the square foot when laid 4½ inches to the weather, and eight to the square foot when laid 5 inches to the weather. Common shingles are estimated to average 4 inches wide, and 250 are put up in a bunch, there being four bunches to the thousand.

Dimension shingles are usually 5 or 6 inches wide, 150 to 180 being put in a bunch, and four bunches counted 1000. In reality there are not 1000 shingles, but being wider than the average of common shingles they are counted the same. There is more waste in laying dimension shingles than the common ones. One-eighth should be allowed for waste in laying dimension shingles.

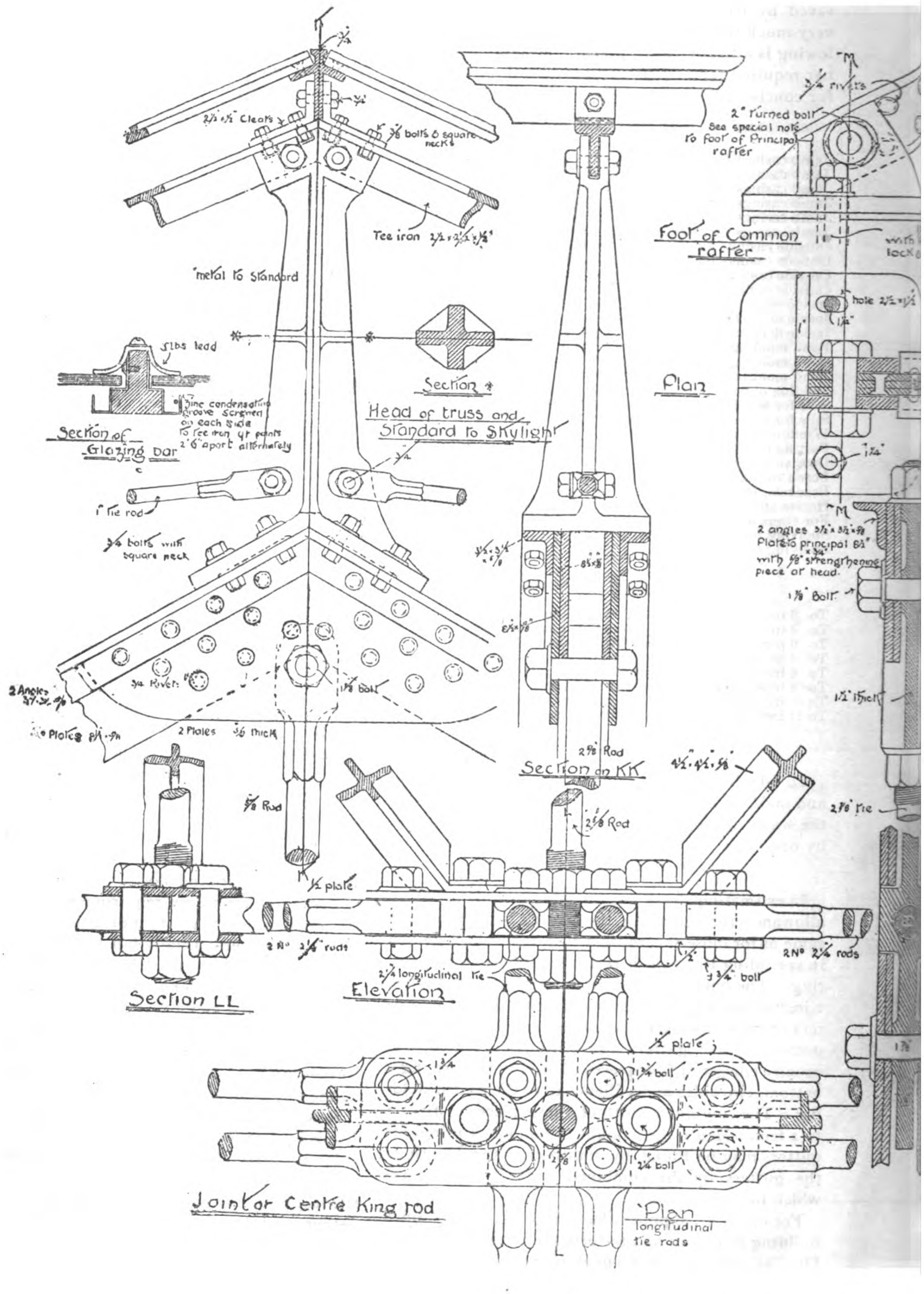
ESTIMATING STUDDING.

To estimate studding for the outside walls and partitions in houses, estimate them 12 inches from centers, then when they are set the usual distance, 16 inches from centers, there will be enough for all necessary doubling around doors, windows and corners. I prefer this rule for the following reasons : 1. Because it is easier to count the studding 12 inches from centers than 16, as the number of feet in length of an outside wall or a partition gives the number of studding, and is seen at once. 2. Mistakes are less liable than in estimating 16 inches from centers, and adding for double studding, as in adding for double studding more than one-half the places requiring double studding will be overlooked. This rule is not intended to make up for things left out, but is only for making up the number of double studding required around doors, windows and corners. Plates and other places requiring studding must be estimated separately. Studding is another item of which carpenters usually fall short, for the simple reason that many are used in places that were overlooked in the carpenter's estimate. To prove beyond a doubt that the method of estimating 12 inches from centers can be relied upon, we will give a plan, Fig. 5, of the outside walls and partitions of a one-story cottage, and a practical example illustrating the method of estimating.

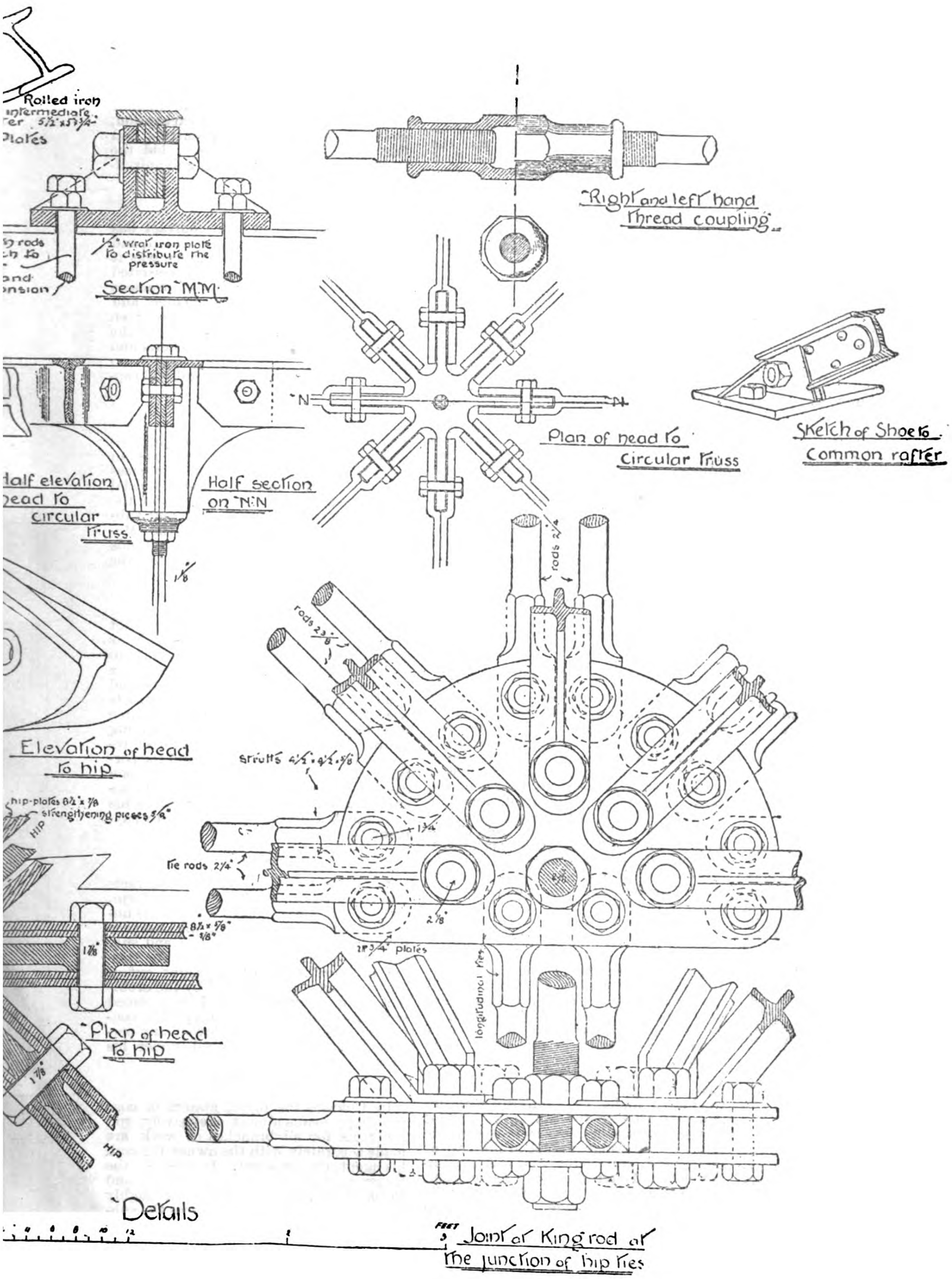
Referring to the plan, it will be observed that the size is 24 x 32 feet, and that the length of each partition is given. We will suppose it to be a 10-foot story. Now, by the plan it is necessary only to add the length of the outside walls and the partitions together, and to obtain the number of studding required. The operation is as follows :

	Feet.
Two outside walls, 32 feet each	64
Two outside walls, 24 feet each	48
One inside partition	32
One inside partition	14
Three inside partitions, 10 feet each	30
One inside partition	4
Total	192

(To be continued.)



Design for an Iron Roof.—Awarded the Grissell Gold Medal by the



'nstitute of British Architects.—Details of Construction. (See Page 11.)

PREVAILING METHODS OF BUILDERS.

DURING the past year there have been presented from time to time in these columns the results of statistics gathered by the secretary of the National Association of Builders in relation to the conditions existing among builders and their workmen in various parts of the country as regards business relationships between themselves and between each other. Various issues of *Carpentry and Building* have contained the result of inquiry as to the manner of working, whether by the day or by the hour, the wages paid, amount paid per hour for overwork, number of apprentices prevailing per employer in different parts of the country in the separate trades, the effect upon labor of the agitation for a general strike among workmen in the building trades on May 1, 1891, and other subjects of similar nature. While the same general forms of conducting the building business have been found to exist throughout the cotntry, certain details are much more prominent in some locations than in others. For instance, in the city of Washington, D. C,, there are general and sub-contractors, business being carried on by means of both, but the general contractor is the only person who deals with the sub-contractor; while in Chicago the sub-contractor deals directly with the owner through his agent, the architect.

EXAMPLES.

Taking ten of the largest contracts executed during the past year in ten of the prominent cities of the country, with the exception of New York and Chicago, as examples from which to draw a conclusion as to the methods which prevail in the large business centers, it appears that 51 per cent. of the contracts were executed under the standard form approved by the National Association of Builders and American Institute of Architects; 90 per cent. of the principal contractors were members of builders' exchanges; 86 per cent. of the contracts were let to members of exchanges; 48 per cent. of the contracts were let under a system of direct contracting, and 52 per cent. under the general contract system; in 17 per cent. of the contracts bids were solicited by the architect for the entire contract under one bid, and at the same time for each branch of the work separately; in 12 per cent. of the cases cited principal contractors were compelled to assume sub-contracts not included in their original estimates, sub-contracts being so placed by the architect. In a very few instances the principal contractor has been allowed a percentage on the amount of sub-contracts placed with him by the architect, and then not more than 5 per cent. The ten cities from which this average is drawn are: Providence, Buffalo, Washington, Cleveland. Pittsburgh, Grand Rapids, Louisville, St. Louis, Kansas City and Boston.

PROVIDENCE, R. I.

In Providence until very recently the uniform contract has not been used except in occasional instances, the members of the exchange having used a form prepared by the exchange itself, but the standard form has been adopted and will hereafter be used exclusively. It has heretofore been the custom of architects in Providence to solicit bids both as general and direct estimates and make up the award according to the combination which will produce the building for the smallest sum, placing what are commonly sub-bids with either the mason or carpenter contractor, if the lowest total figure is procured from a combination of direct bids. The Builders' and Traders' Exchange is at present at work endeavoring to establish a code of practice, based on the "code" adopted at the last convention by the National Association of Builders.

BUFFALO, N. Y.

In Buffalo, out of the ten contracts given as examples and which amounted to considerably over $2,000,000, four were executed under the uniform contract. Nine of the principal contractors were members of the Buffalo exchange and the tenth was a member of the Cleveland association. The contracts were let in a majority of cases entirely to one man under general contract, and with one or two exceptions the sub-contracts were let to members of the exchange. In three out of the ten contracts the principal contractor was required to assume certain sub-contracts not included in his original estimate and one of these three was allowed 5 per cent. on sub-contracts so assumed.

WASHINGTON, D. C.

The methods by which the building business is conducted seem to be more uniform in Washington than any other city in the country. The general contract system prevails in all work of any magnitude, and it is the general rule that all important contracts are let to members of the builders' exchange. Of the ten contracts cited four were executed under the uniform contract, which is gradually coming into general use; the entire ten contracts were let to members of the exchange, and with the exception of brick work in two cases the sub-contracts were also given to members of the exchange; bids in each case were solicited by the architect for the entire contract, and in no case would contractors comply with a request for a bid on the entire job and portions thereof at the same time.

CLEVELAND, OHIO.

In Cleveland the prevailing method of letting contracts is similar to that which obtains in Providence. Separate contracts are solicited by the architect and then combined and placed by him under some one contractor, generally the mason or carpenter, who receives no return for work thus under his control, and for which he is in a measure responsible.

Of the ten contracts given from Cleveland, and which represent an expenditure of over $4,000,000, eight were let to members of the exchange, in each of which cases the sub-contract work was also done by exchange members.

PITTSBURGH, PA.

The general contract system obtains almost universally in Pittsburgh. In letting contracts for some of the large buildings, heating and elevator contracts are reserved, but in case they are assumed by the general contractor he is allowed a percentage—usually 10 per cent. of the amount.

The ten most important contracts which have been given as examples were all conducted under the uniform contract and were all executed, both as to general and sub-contrators, by members of the builders' exchange except in the case of one general contractor who was a member of the Master Builders' Association, which is largely composed of builders who are also in the exchange. All of the contracts were solicited by the architect under the general contracting form, in one contract, and no contractor was required to assume any contracts not included in his bid without being allowed a percentage on the cost. The general conditions are much the same in both Washington and Pittsburgh, and both cities demonstrate the value of having one thoroughly recognized method, whatever it may be, for conducting the business.

GRAND RAPIDS, MICH.

In Grand Rapids eight out of the ten contracts mentioned were executed under the standard form, and in each case both general and sub-contractors were members of the exchange. Four out of the ten contracts were solicited by the architect under general contracts, and six were solicited from each branch direct. It is the custom in Grand Rapids to include in the mason's estimate the excavation, stone and brick work, stonecutting and plastering; in the carpenter's bid the roofing, painting, plumbing, galvanized-iron work and heating.

LOUISVILLE, KY.

In Louisville the uniform contract has not been taken up to any great extent, and in none of the ten examples given was it used. In seven out of the ten cases cited the work was done by general contractors who were members of the exchange, and in nine cases the sub-contracts were given to members. Bids were solicited by the architect equally between the general and direct system of contracting, but in no case were bids solicited for total and separate bids at the same time.

ST. LOUIS, MO.

In St. Louis general contracting prevails and the uniform contract is used in the majority of cases. Out of the cases cited two were executed under special forms of contract and the rest under the standard form. Both general and sub-contractors were members of the Mechanics' Exchange in each case and bids were solicited by the architect for the entire work under one contract.

KANSAS CITY, MO.

In Kansas City the uniform contract was used in three of the ten jobs given as examples. The general contractors in each case and the sub-contractors in six cases were members of the Builders' and Traders' Exchange; seven of the contracts were let under one estimate, and three were let to separate contractors bidding "direct." In one case the architect required bids for the entire job and for portions thereof at the same time, and in one case the contractor was compelled to assume a sub-contract not included in his estimate, without being allowed any payment therefor.

BOSTON, MASS.

In Boston seven out of ten contracts are executed under the standard form, and the ten most important contracts undertaken in the city during the past year have been let to both general and sub-contractors who are members of the Master Builders' Association. Eight out of ten contracts are solicited by the architect as direct estimates, and then placed with either the mason or carpenter contractor, who is seldom allowed any percentage for work so placed under his charge.

OTHER CITIES.

In Chicago the direct system of contracting prevails almost exclusively, and contracts for all branches of work are made separately with the owner through his agent, the architect. In other of the larger centers, like New York City and Philadelphia, there is no thoroughly recognized practice that governs the submission of bids, but the general characteristics are the same as those shown in the foregoing. The necessity for a uniform code of practice is plainly apparent, and although long habit has seemed to make prevailing customs in different localities seem to be the best to the builders of those localities, there is no doubt but that the business would be greatly benefited as a whole if some universal system were in vogue. The "code of practice" adopted by the National Association of Builders presents a foundation upon which to work, and through the association the means are provided for building up a system that shall in the end place building where banking is to-day.

BUILDINGS OF THE COLUMBIAN EXPOSITION.

THE ILLUSTRATIONS which are presented in connection herewith show the principal buildings of the World's Columbian Exposition, to be held in Chicago in 1893. The first to which the attention of the reader is invited is that of

THE ADMINISTRATION BUILDING,

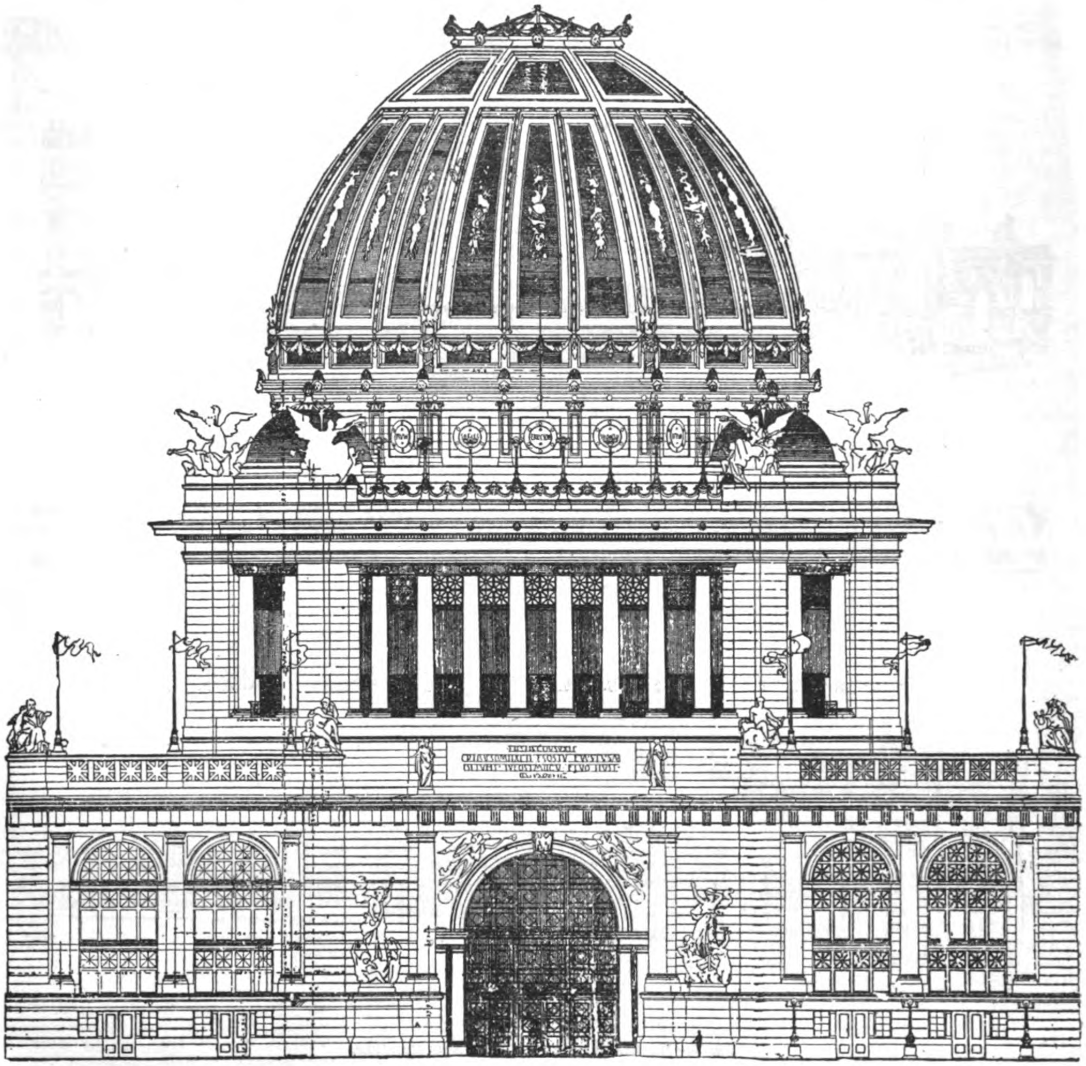
which is shown in front elevation in Fig. 1 of the engravings. This structure is built of material to last but two years, and will cost $650,000. It will occupy the most commanding position on the exposi tion grounds. The building consists of four pavilions, 84 feet square, one at each of the four angles of the square of the plan, and connected by a great central dome, 120 feet in diameter and 260 feet high. In the center of each *façade* is a recess 93 feet wide, within which is a grand entrance to the building. The first story is in the Doric order, of heavy proportions. The second story, with its lofty colonnade, is in the Ionic order. Externally the design is divided into three principal stages. The first stage consists of the four pavilions, corresponding in hight with the buildings grouped about, which are 65 feet high. The second stage is of the same hight and is a continuation of the central rotunda, which is 175 feet square. The third stage is the base of the great dome, 40 feet high and octagonal in form, the dome itself being richly ornamented with heavily molded ribs and sculptured panels and having a large glass skylight. The interior will be decorated with carvings, sculptures and immense paintings.

MACHINERY HALL,

which is represented in Fig. 2, measures 850 x 500 feet. It is spanned by three arched trusses, and the interior will present the appearance of three railroad train houses, side by side, surrounded on all the four sides by a 50-foot gallery. The trusses are to be built separately, and so that they can be taken down and sold for use as railroad train houses, and it is hoped to have iron trusses instead of cheaper ones, which may, however, be necessary. In each of these three long naves there is to be an elevated traveling crane, running from end to end of the building. These will be useful in moving machinery, and when the exposition opens platforms will be placed on them, and visitors will view from these the entire exhibition, at a great saving of tramping.

Shafting for power will be carried on the same posts which support these traveling bridges. Steam power will be used throughout this main building, and this steam will be supplied from a main power house adjoining the south side of the building. The exterior toward the stock exhibit and the railroad is to be of the plainest description. On the two sides adjoining the grand court, the exterior will, however, be rich and palatial. All the buildings on this grand plaza are designed with a view to making an effective background for displays of every kind, and are enriched with colonnades and other architectural features.

The design follows classical models throughout, the detail being borrowed from the Renaissance of Seville and other Spanish towns as being appropriate to a



The World's Columbian Exposition.—Fig. 1.—Administration Building.

Columbian celebration. As in all the other buildings on the court, an arcade on the first story permits passage around the building under cover; and, as in all the other buildings, the fronts will be formed of "staff," colored to an ivory tone. The ceilings of the porticoes will be emphasized with strong color. A colonnade with a *café* at either end forms the connecting link between Machinery and Agricultural halls, and in the center of this colonnade is an archway leading to the exhibits.

The machinery annex will be placed in the rear of the Administration Building. crossing the building at each bay, with a motor at each shaft. The electrical power will be used in the annex and the steam power in the main Machinery Building.

Attached to this great annex will be the power house, convenient to the tracks for coal supply, &c., containing an immense display of boilers, while in the adjoining portion of the annex building will be established the enormous plant of engines and dynamos. This will probably be the largest and most interesting display of electrical power ever made. It is possible that gas will be used instead of coal flights of which are 12 feet wide each. "Columbia avenue," 50 feet wide, extends through the mammoth building longitudinally and an avenue of like width crosses it at right angles at the center. The main roof is of iron and glass and arches an area 385 x 1400 feet, and has its ridge 150 feet from the ground. The building, including its galleries, has about 40 acres of floor space.

The Liberal Arts Building is in the Corinthian style of architecture, and in point of being severely classic excels nearly all the other edifices. The long array of columns and arches which its

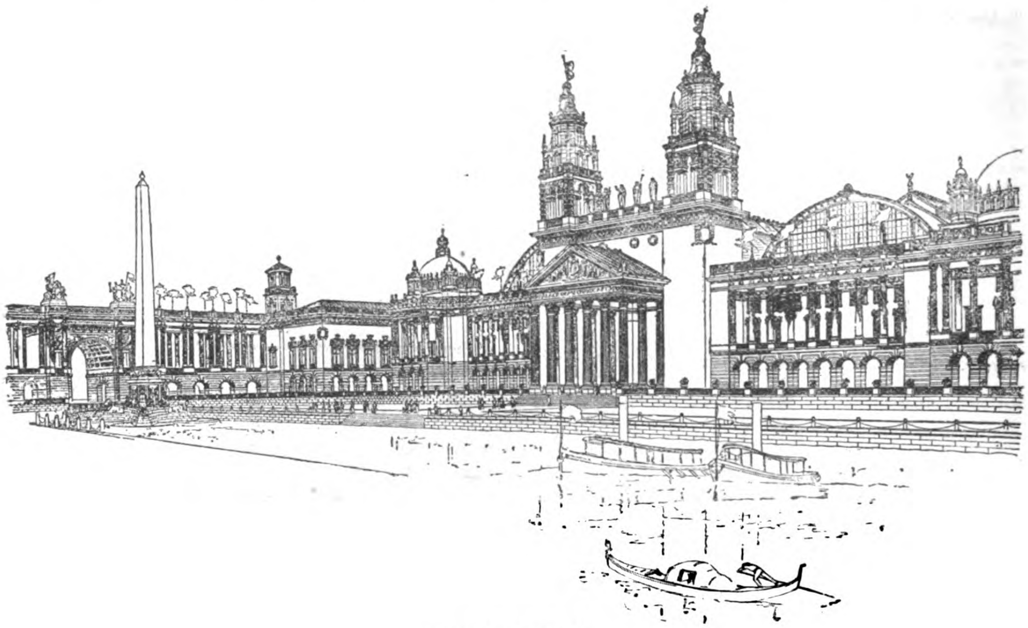


Fig. 2.—Machinery Hall.

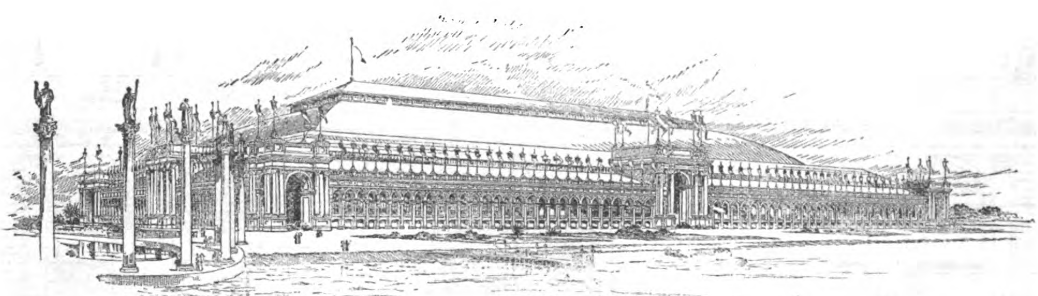


Fig. 3.—Manufactures and Liberal Arts Building.

The World's Columbian Exposition.

It will be entered by tunnels or subways, as well as by bridges, from Machinery Hall and the buildings for Administration, Mines and Transportation. It is to be a very large but very simple building. While in the main Machinery Building a railroad train house is the type, in the annex a mill or foundry will be considered the model for construction. It is all to be built of wood in the most simple and economical manner. The building will have a nave 100 feet wide, with a 50-foot wide leanto in one story on the inside and a 50-foot wide leanto on the outside. Within the inner circle will be a park in which visitors may rest. The power will be transmitted by shafting for fuel beneath the boilers, and in that case a building will be prepared for making this gas.

THE MANUFACTURES AND LIBERAL ARTS BUILDING,

which is illustrated in Fig. 3, measures 1687 x 787 feet and covers nearly 31 acres, being the largest exposition building ever constructed. Within the building a gallery 50 feet wide extends around all four sides, and projecting from this are 86 smaller galleries, 12 feet wide, from which visitors may survey the vast array of exhibits and the busy scene below. The galleries are approached upon the main floor by 30 great staircases, the *façades* present is relieved from monotony by very elaborate ornamentation. In this ornamentation female figures, symbolical of the various arts and sciences, play a conspicuous and very attractive part. The exterior of the building is covered with "staff," which is treated to represent marble. The huge fluted columns and the immense arches are apparently of this beautiful material.

There are four great entrances, one in the center of each *façade*. These are designed in the manner of triumphal arches, the central archway of each being 40 feet wide and 80 feet high. Surmounting these portals is the great attic story, ornamented with sculptured eagles 18 feet high, and on each side above the side arches are great panels with inscriptions, and the spandrils are filled with sculptured figures in bas-relief. At each corner of the main building are pavilions forming great arched entrances, which are designed in harmony with the great portals. The interiors of these pavilions are richly decorated with sculpture and rural paintings. The long *façades* of the great hall surrounding the buildings are composed of a series of arches filled with immense glass windows. The lower portion of these arches up to the level of the gallery floor and 25 feet in depth is open to the outside, thus forming a covered loggia, which forms an open promenade for the public.

FISH AND FISHERIES BUILDING.

In Fig. 4 of the engravings is shown the central portion of the Fisheries Building. Excluded from the view are two smaller polygonal buildings, connected with the main building on either end by arcades. The extreme length of the building over all is 1100 feet, and the width 200 feet. The building is subdivided into three parts to conform to the shape of the site. In the central portion will be the general fisheries exhibit. In one of the polygonal buildings will be the angling exhibit, and in the other the aquaria. The exterior of the building is Spanish-Romanesque and will contrast agreeably in appearance with the classic style of all the other buildings.

THE AGRICULTURAL BUILDING,

Fig. 5, is 800 x 500 feet in size and severely classic in style. It is almost surrounded by lagoons. The features of this building are its fine pavilions, one at each corner and one in the center. The corner pavilions are 64 x 48 feet. The grand entrance is on the north. It is 60 feet wide, leading into a vestibule 30 feet deep and 60 feet wide. At the entrance are Corinthian columns, 5 feet in diameter and 40 feet high. Beyond these massive columns is the rotunda, 100 feet in diameter, surmounted by a glass dome 130 feet high. There are eight minor entrances, 20 feet wide. The roof will be principally of glass.

ILLINOIS STATE BUILDING.

The Illinois Building at the World's Columbian Exposition, represented in Fig. 6, is by far the most pretentious of those erected by the several States of the Union. Being in a sense the host of the exposition, it was deemed not only proper but requisite that Illinois should make such appropriation and provide such a building as would enable her to perform creditably the duties of that office. The State appropriated $800,000.

The building in the main is 160 feet wide by 450 feet long. On the north Memorial Hall forms a wing 50 x 75 feet, and on the south another wing, 75 x 123 feet and three stories high, accommodates the executive offices, and in the third story two public halls. The side walls are 47 feet high, while the south wing is 72 feet and the ends 54 feet. Surmounting the building at the center a fine dome, 72 feet in diameter, rises to a hight of 235 feet. The building is constructed almost wholly of Illinois material—wood, stone, brick and steel—and is covered with "staff" artistically treated. The grand entrance faces the waterway to the south, while at the wast and north ends are others scarcely less imposing. In front of the entrances are beautiful terraces with balustrades, statues, fountains, flowers, and stone steps leading down to the road-ways and lagoon landings.

The building is embellished with fine carving and statuary. It is thoroughly lighted, 1, from the side windows, which are placed about 14 feet above the floor to permit cases to be placed against the walls; 2, with skylights placed in the flat roof of the side aisle, and 3, with continuous skylights on the ridge of a pitched roof or nave. Ventilation is provided for through windows placed a story above the flat aisle roof and the foot of the sloping roof over the nave. The interior of the structure is appropriately and beautifully ornamented.

Memorial Hall, which is fire proof, has a gallery encircling it, and contains a large and interesting collection of relics and trophies of the war and other periods, all owned by the State.

One feature of the Illinois Building which is sure to attract much attention consists of five model common school rooms, of high grade, fully equipped and furnished under the direction of the State Superintendent of Public Instruction. Here may be seen an illustration of the methods and results of educational work.

The Illinois Building was designed by W. W. Boyington & Co. of Chicago, and cost $250,000.

MINES AND MINING BUILDING.

The style of architecture of the Mines Building, Fig. 7, is classic, and its dimensions are 700 x 350 feet. The hight to the main cornice is 65 feet. There is an en-

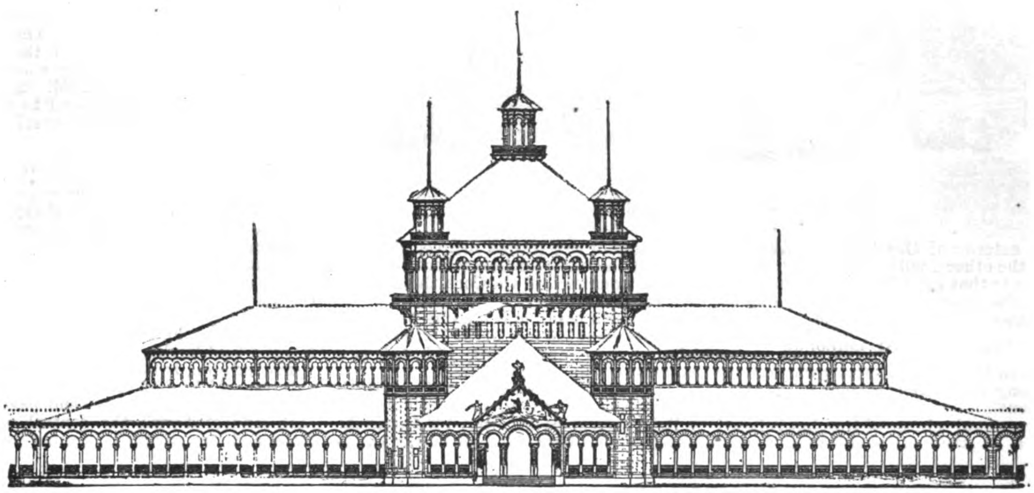


Fig. 4.—Fish and Fisheries Building.

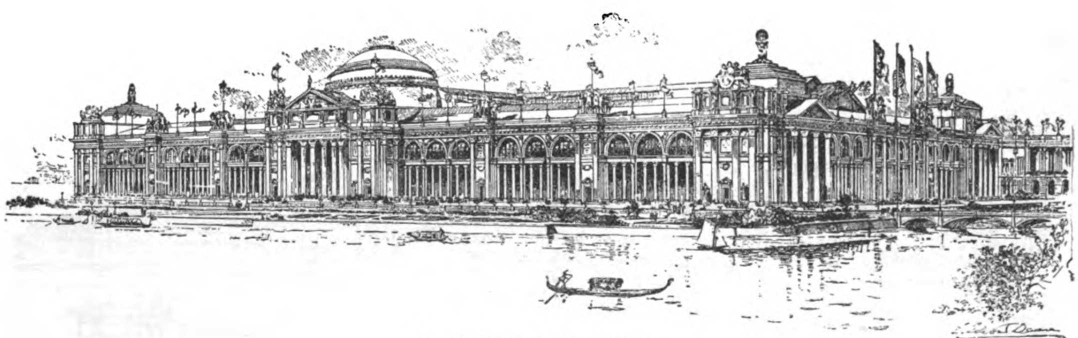


Fig. 5.—Agricultural Building.

The World's Columbian Exposition.

trance on each side of the building, the grand entrances being at the north and South end. These are 110 feet high and 32 feet wide, each opening into a vestibule 88 feet high and elaborately decorated. At each corner of the building there is a pavilion, 68 feet square and 90 feet high, surmounted by a dome. A balcony 60 feet wide and 25 feet high encircles the building and leading to it are eight stairways. The roof is of glass, 100 feet from the floor.

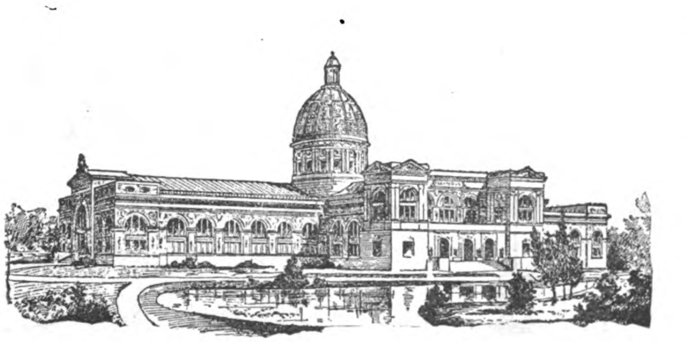


Fig. 6.—Illinois State Building.

The exterior of this building, like that of all the others, will be made of "staff," similar to that used in facing the recent Paris Eposition buildings. The cost of the Mines Building is $260,000.

THE ELECTRICAL BUILDING,

shown in Fig. 8, is 345 feet wide and 700 feet long, the major axis running north and south.

The general scheme of the plan is based upon a longitudinal nave 115 feet wide

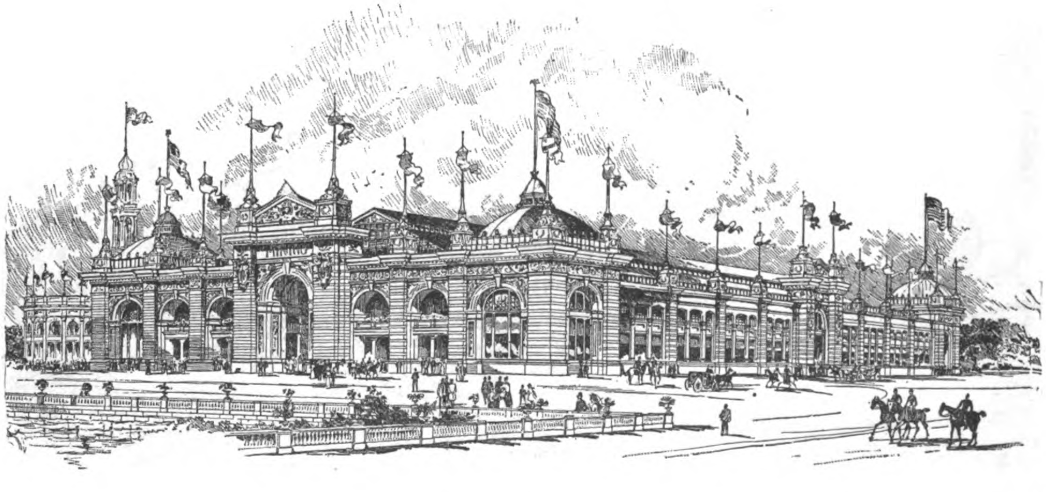


Fig. 7.—Mines and Mining Building.

The World's Columbian Exposition.

and 114 feet high, crossed in the middle by a transept of the same width and hight. The nave and the transept have a pitched roof, with a range of skylights at the bottom of the pitch and clere-story windows. The rest of the building is covered with a flat roof, averaging 62 feet in hight, and provided with skylights.

The second story is composed of a series of galleries connected across the nave by two bridges, with access by four grand staircases. The area of the galleries in the second story is 118,546 square feet, or 2.7 acres,

The exterior walls of this building are composed of a continuous Corinthian order of pilasters, 3 feet 6 inches wide and 42 feet high, supporting a full entablature, and resting upon a stylobate 8 feet 6 inches. The total hight of the walls from the grade outside is 68 feet 6 inches.

The north pavilion is placed between the two great semicircular projections of the building ; it is flanked by two towers 195 feet high.

The east and west central pavilions are composed of two towers 168 feet high. In front of these two pavilions there is a great portico composed of the Corinthian order, with full columns.

The south pavilion is a niche 78 feet in diameter and 103 feet high. In the center of this niche, upon a lofty pedestal, is a colossal statue of Franklin.

At each of the four corners of the building there is a pavilion. above which rises a light open spire or tower, 169 feet high. Intermediate between these corner pavilions and the central pavilions on the east and west sides there is a subordinate pavilion bearing a low square dome upon an open lantern. There are thus ten spires and four domes.

The appearance of the exterior is that of marble, but the walls of the hemicycle and the various porticos and loggia are highly enriched with color, the pilasters in these places being decorated with scagliola, and the capitals with metallic effects in bronze.

In the design of this building, it was proposed by the architects to so devise its details and general outlines that they might be capable of providing an electric illumination by night on a scale hitherto unknown, the flag-staffs, the open porticos, and the towers, especially, being arranged with this in view. The cost is $375,000.

THE DAIRY BUILDING.

The Dairy Building stands near the lake shore in the southeastern part of the park, and close by the general live stock exhibit. It covers approximately half an acre, measuring 65 x 200 feet; is two stories high, and cost $30,000. In design it is of quiet exterior, as may be seen from an inspectlon of Fig. 9. On the first floor, besides office headquarters, there is in front a large open space devoted to exhibits of butter, and further back an operating room, 25 x 100 feet, in which the model dairy will be conducted. On two sides of this room are amphitheatre seats capable of accommodating 400 spectators. Under these seats are refrigerators and cold storage rooms for the care of the dairy products. The operating room, which extends to the roof, has on three sides a gallery where the cheese exhibits will be placed. The rest of the second story is devoted to a *café*, which opens on a balcony overlooking the lake.

THE HORTICULTURAL BUILDING.

Immediately south of the entrance to Jackson Park, from the Midway Plaisance, and facing east on the lagoon, is the Horticultural Building shown in Fig. 10. In front is a flower terrace for outside exhibits, including tanks for Nymphæa and the Victoria Regia. The front of the terrace, with its low parapet between large vases, borders the water, and at its center forms a boat landing.

The building is 1000 feet long, with an extreme width of 250 feet. The plan is a central pavilion, with two end pavilions, each connected with the central one by front and rear curtains, forming two interior courts, each 88 x 270 feet. These courts are beautifully decorated in color and planted with ornamental shrubs and flowers. The center pavilion is roofed by a crystal dome 187 feet in diameter and 113 feet high, under which are exhibited the tallest palms, bamboos and tree ferns that can be procured. There are galleries in each of the pavilions. The galleries of the end pavilions are designed for *cafés*.

In this building are exhibited all the varieties of flowers, plants, vines, seeds, horticultural implements, &c. Those exhibits requiring sunshine and light are shown in the rear curtains, where the roof is entirely of glass and not too far removed from the plants. The front curtains and space under the galleries are designed for exhibits that require only the ordinary amount of light. Provision is made to heat such parts as require it.

The exterior of the building is in "staff," tinted in a soft warm buff, color being reserved for the interior and the courts.

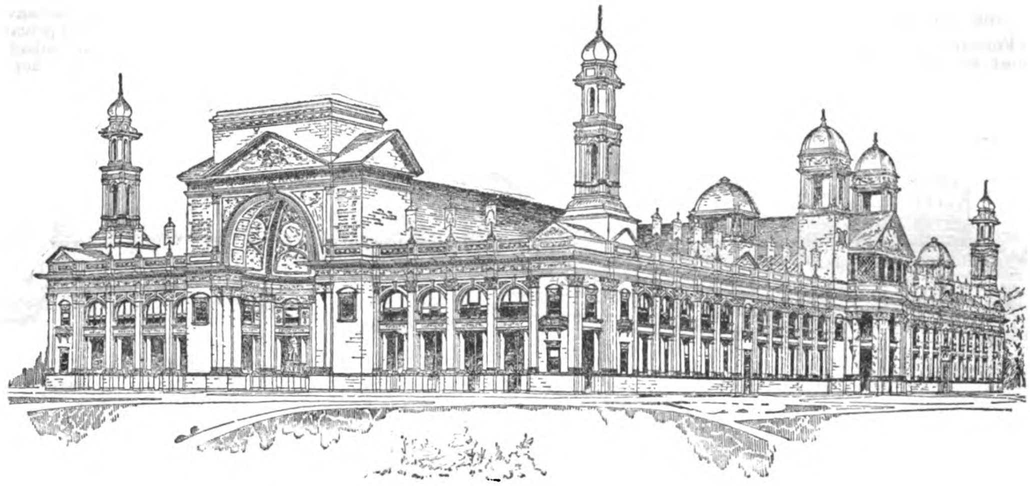


Fig. 8.—Electrical Building

The cost of the building is about $300,000.

THE WOMAN'S BUILDING,

which is represented in Fig. 11, measures 200 x 400 feet, and its estimated cost is $200,000. The style of this architecture is classic, with end and center pavilions. The corner and center pavilions are connected in the first story by an open arcade surmounted by classic vases. The first story is Doric and the second Ionic. The center pavilion contains the main entrance of the building. This is treated with a triple open archway of the story above, with a row of free standing Corinthian columns. The main cornice is an elaborate decorated frieze, running the entire length of the building. The whole is covered with a low Italian roof. From the main entrance of the building the visitor enters the main gallery, 60 x 240 feet. To the extreme left of this, in a room 80 x 200 feet, the retrospective exhibit will be arranged, while a like space at the other end of the building will be devoted to reforms and charities. On either side of the entrance space is reserved for a model kindergarden and a model hospital. A bureau of information, library and a record room are to the right of the main entrance. Wide colonnades extend around the skylight on the second floor, which gives light to the rooms below. The front and back suites of rooms are reserved for committees and parlor gatherings. In the extreme left of the building is a club room for exhibitors, and opposite this is an assembly room 80 x 120 feet. There are also rooms for kitchen demonstrations and for officers' headquarters.

THE TRANSPORTATION BUILDING.

The main building of the transportation exhibit, Fig. 12, measures 960 feet front by 256 feet deep; from this will extend westward to Stoney Island avenue a triangular annex covering about nine acres and consisting of one-story buildings 64 feet wide, set side by side. As there will be a railway track every 16 feet and as all these tracks will run east and west, these annex buildings may be used to exhibit an entire freight or passenger train coupled up with its engine. It is likely that the display of locomotive engines will be very large. The roof is in three divisions; the middle one rising much higher than the others, and its walls are pierced to form an arcaded clere-story. The cupola, placed exactly at the center of the building and rising 165 feet above the ground, is reached by eight elevators. These elevators will of themselves naturally form a part of the transportation exhibit, and as they will also carry passengers to galleries at various stages of hight, a fine view of the interior of the building may easily be obtained. The main galleries of this building, because of the abundant placing of passenger elevators, will prove quite accessible to visitors.

The exhibits to be placed in the building will naturally include everything of whatsoever name or sort devoted to purposes of transportation, and will range from a baby carriage to a mogul engine.

UNITED STATES GOVERNMENT BUILDING.

Delightfully located near the lake shore, south of the main lagoon and of the area reserved for the foreign nations and the several States, and east of the Woman's Building and of Midway Plaisance, is the Government Exhibit Building, shown in Fig. 13. The buildings of England, Germany and Mexico are near by to the northward. The Government Building was designed by Architect

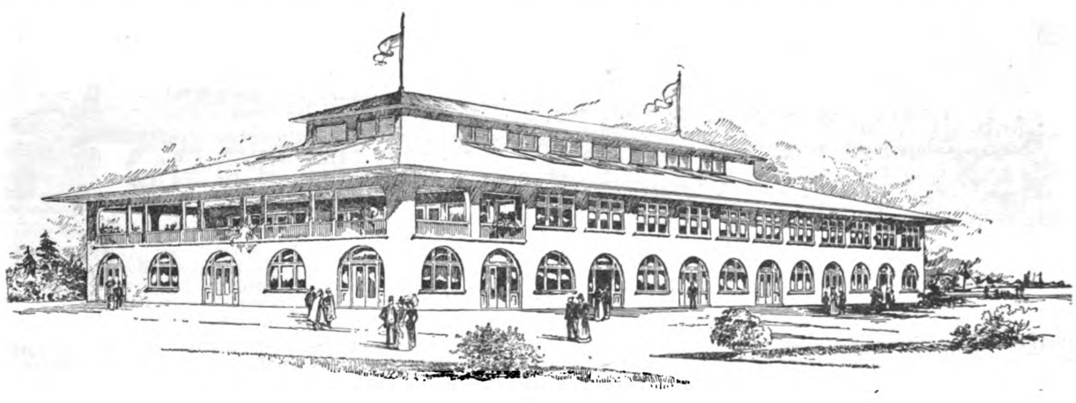


Fig. 9.—Dairy Building.

The World's Columbian Exposition.

Windrim, now succeeded by W. J. Edbrooke. It is classic in style, and bears a strong resemblance to the National Museum and other Government buildings at Washington. It covers an area of 350 x 420 feet, is constructed of iron, brick and glass, and cost $400,000. Its leading architectural feature is a central octagonal dome 120 feet in diameter and 150 feet high, the floor of which will be kept free from exhibits. The building fronts to the west, and connects on the north, by a bridge over the lagoon, with the building of the Fisheries exhibit.

THE FORESTRY BUILDING.

The Forestry building is in appearance the most unique of all the exposition structures. Its dimensions are 200 x 500 feet. To a remarkable degree its architecture is of the rustic order. On all four sides of the building is a veranda, supporting the roof of which is a colonnade consisting of a series of columns composed of three tree trunks, each 25 feet in length, one of them from 16 to 20 inches in diameter, and the others smaller. All of these trunks are left in their natural state, with bark undisturbed. They are contributed by the different States and Territories of the Union and by foreign countries, each furnishing specimens of its most characteristic trees. The sides of the building are constructed of slabs with the bark removed. The window frames are treated in the same rustic manner as is the rest of the building. The main entrances are elaborately finished in different kinds of wood, the material and workmanship being contributed by several prominent lumber associations. The roof is thatched with tan and other barks. Surmounting the cornice of the veranda and extending all around the building are numerous flagstaffs bearing the colors, coats-of-arms, &c., of the nations and States represented in the exhibits inside. A view of the building is presented in Fig. 14.

The Forestry Building was designed by P. B. Atwood, chief designer in the exposition's Construction Department, and cost about $100,000. Chief Buchanan, of the exposition's Department of Agriculture, is entitled to the lion's share of credit for the existence of this exceedingly novel and attractive building and display.

THE FINE ARTS BUILDING.

Grecian Ionic in style, the Fine Arts Building is a pure type of the most refined classic architecture. The building is oblong, being 500 x 320 feet, intersected north, east, south and west by a great nave and transept 100 feet wide and 70 feet high, at the intersection of which is a dome 60 feet in diameter. The building shown in Fig. 15 is 125 feet to the top of the dome, which is surmounted by a colossal statue of the type of the famous figure of Winged Victory. The transept has a clear space through the center of 60 feet, being lighted entirely from above. On either side are galleries 20 feet wide and 24 feet above the floor. The collections of sculpture are displayed on the main floor of the nave and transept, and on the walls both of the ground floor and of the galleries are ample areas for displaying the paintings and sculptured panels in relief. The corners made by the crossing of the nave and transept are filled with small picture galleries.

Around the entire building are galleries 40 feet wide, forming a continuous promenade around the classic structure. Between the promenade and the naves are the smaller rooms devoted to private collections of paintings and the collections of the various art schools. On either side of the main building, and connected with it by handsome corridors, are very large annexes, which are also utilized by various art exhibits.

The main building is entered by four great portals, richly ornamented with architectural sculpture, and approached by broad flights of steps. The walls of the loggia of the colonnades are highly decorated with mural paintings, illustrating the history and progress of the arts. The frieze of the exterior walls and the pediments of the principal entrances are ornamented with sculptures and portraits in bas-relief of the masters of ancient art. The general tone or color is light gray stone. The construction, although of a temporary character, is necessarily

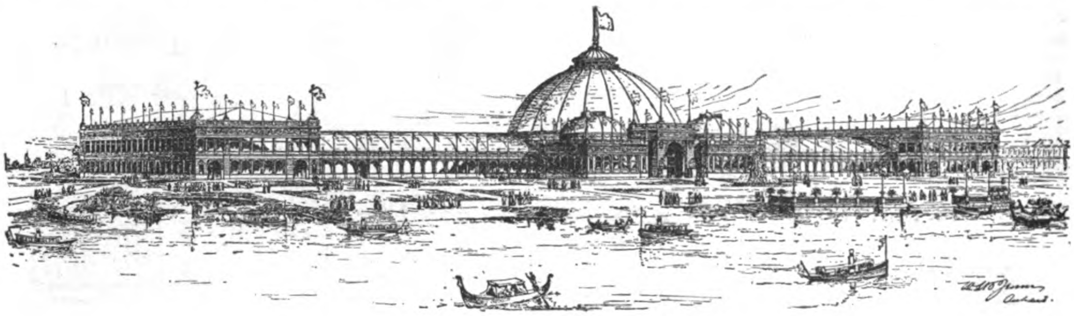


Fig. 10.—Horticultural Building.

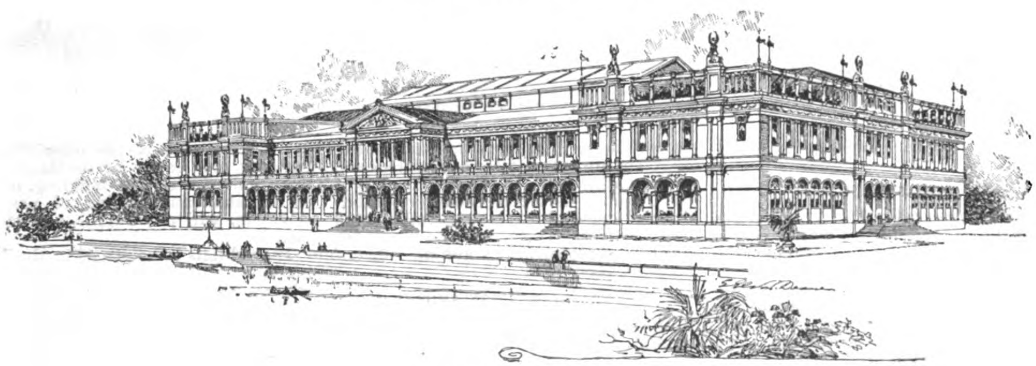


Fig. 11.—Woman's Building.

Fig. 12.—Transportation Building.

The World's Columbian Exposition.

fire proof. The main walls are of solid brick, covered with "staff," architecturally ornamented, while the roof, floors and galleries are of iron. All light is supplied through glass skylights in iron frames. The building is located in the northern portion of the park, with the south front facing the lagoon.

The Kitchen and Its Arrangement.

A well-arranged, well-lighted and conveniently located kitchen is one of the most important rooms in a dwelling house, says D. W. King, for upon its conveniences and equipments will depend the success of the housekeeping. The aspect of the kitchen should, where possible, be upon the north, so that it may be shielded from the heat of the sun in summer. When found necessary to place the kitchen where it will be directly exposed to the heat of the sun the only recourse is to protect it by verandas. The conditions of service most desired are that the kitchen should be as near the dining room as possible, and that the passage between them should never lead past the doors of any of the other living rooms. In order to exclude odors and the sounds of cooking operations, the dinner route should lead through the pantry, the doors of which should be hinged with double hinge self-closing spring butts, which will allow the door to swing either way by simply pushing against it. This arrangement is also very convenient when passing with a large dish which occupies both hands. Since the cooking is the most important work to be done in the house, the utensils to be used for this purpose must be arranged so as to be as near together as possible in order that time and energy shall not be wasted by moving from the sink, range and other fixtures. Consequently the kitchen need not be larger than required for comfortable working space.

The first essential fixture is a good cooking range with water back and a heavy copper boiler of not less than 40 gallons capacity. In most cases a portable range is to be preferred, as it is less expensive and is cleaner. The range is best set upon a tiled or slate hearth, with ample working space about it, and should be fitted with all modern adjuncts. Dish washing is the next in importance, and the facilities for lightening the work should be as complete as possible. The sink should be of porcelain or soapstone, with a "splashboard" or back of some material not less than 12 inches in width, with a hardwood draining board at one end and a small table at the other on which to set the dishes. A rack for holding cups, saucers, plates, &c., after washing is a most desirable convenience, and may be secured to the wall above the sink. The waste pipe and trap from the sink should be of heavy lead pipe with neatly wiped joints, all exposed to view, for sanitary reasons. The kitchen dresser should extend to the ceiling, with compartments at the top and bottom inclosed by panel doors, with glazed sash doors between. The space above the glass doors is used for storing article not generally required in the routine of housework. There should be a separate flue and ample means provided for ventilating a kitchen and carrying off the fumes and smoke of the cooking. The floor of a kitchen should be of hard wood, such as ash, maple or oak, filled, varnished, rubbed smooth and waxed. The custom of wainscoting a kitchen with narrow-beaded ceiling boards is objectionable, as it creates too many cracks and crevices, which accumulate dirt and dust.

Fig. 13.—United States Government Building.

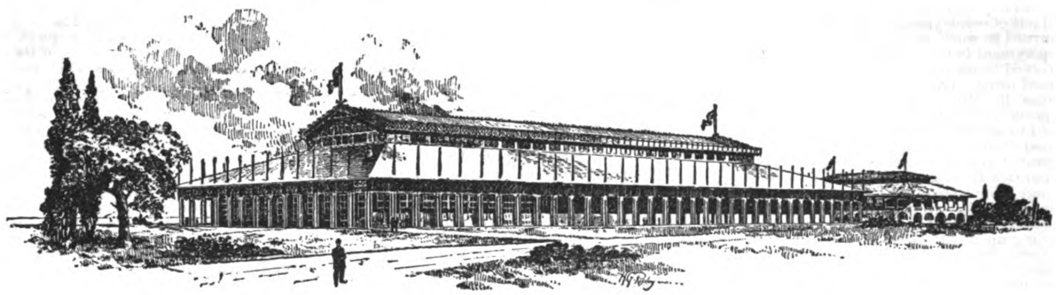


Fig. 14.—The Forestry Building.

Fig. 15.—The Fine Arts Building.

The World's Columbian Exposition.

THE SAND BLAST was recently used in New York for cleaning the marble exterior of the United States Assay Office in Wall street. The apparatus consists of a "gun" in the shape of a sheet-tin tube 3 feet long and 2½ inches in diameter, which is bent into a goose neck at one end and terminates in a 2-inch nozzle. A second tube, 1 inch in diameter, enters the first at the upper bend of the goose neck and terminates about 3 inches inside, being central with the nozzle. The sand is fed through this tube from a hopper and is projected against the work by an air blast through the outer tube. It is said that with an air pressure of 2 pounds per square inch at the nozzle 1 square foot of marble will be abraded to a depth of $\frac{1}{32}$ inch to $\frac{1}{64}$ inch in one minute, leaving a fresh, clean surface.

THE LARGEST PLATE OF GLASS in this city, says the Philadelphia *Record*, is in the Eleventh street window of Robert J. Thompson, at the southwest corner of Eleventh and Chestnut streets. The size of the plate is 200 x 100 inches, and it was manufactured at Kokomo, Ind. The firm which had the contract for furnishing the glass first placed its order with a Pittsburgh company, which was unfortunate enough to break two plates of that size in preparing them for transportation. There are several others which nearly equal this one in size. There is one 194 x 100 inches, another 140 x 144, and one which was recently replaced, an infuriated bull having gone through it, 198 x 98 inches. The largest plate glass in the country is in stock at Kokomo, and is 200 x 140 inches.

WHAT BUILDERS ARE DOING.

THE YEAR JUST CLOSED has been more universally satisfactory in the building trades, as regards wages paid and hours worked, than for several preceding years, notwithstanding the fact that there have been disturbances more or less serious in several of the large cities. Strikes have not been infrequent but they have been undertaken, in most cases, only as last resorts and in order to gain desired increase in wages or reduction of hours of labor. The growing willingness of employers to confer with the workmen on subjects of difference, which is the outcome of association on their part, has resulted in much less trouble over working rules, the employment of non-union men and matters of a kindred nature and is gradually establishing a feeling that each side has rights that are worthy of consideration by the other.

The most serious strike of the year was that of the bricklayers of Pittsburgh, in which nearly all the other trades became involved, the carpenters particularly. The workmen were very determined and held out for their point long after their cause was hopeless and their places supplied by workmen brought in from other cities. The strike still retains its official existence, having never been declared off, although but few of the bricklayers are still out of employment, most of them having returned to work at the old wages or sought employment in other cities. The other trades involved soon adjusted their affairs and resumed work. Early in the year the building trades in Milwaukee were disturbed by a strike of various trades because employers refused to accept working rules that had been prepared solely by the workmen. After considerable trouble the matter was settled by a committee from the Builders' and Traders' Exchange, who were given power to act for the employers, and who prepared a new set of working rules that were finally accepted as binding upon both sides, and no further disturbance has occurred. The stonecutters of Detroit struck for higher wages in the summer and after considerable trouble and loss were compelled to return to work, as the employers decided that they could not pay the increase asked, and there were plenty of men to be had at the wages then prevailing. The extreme West and Northwest have had some local disturbances, but nothing of a serious nature.

Altogether the indications of the past year show that progress is being actually made in the direction of bringing both employers and workmen into a condition whereby the justice of demands, made by either side, can be demonstrated and the true position of each established and maintained without resort to strikes and lockouts.

Baltimore, Md.

The building trades of Baltimore have for some time past been taking active and combined steps looking toward a united effort on January 1, 1892, to secure the establishment of the eight-hour day in all branches of the trade. Several of the trades have been at work recently preparing a new scale of wages, and the action that the employers will take will be dependent upon the terms of the demand and the wages desired. All trades, with the exception of the freestone cutters, have heretofore worked nine hours per day.

The Builders' Exchange has so far perfected the scheme for erecting a building of its own that work will be commenced as soon as the leases of the tenants now occupying the site selected expire. The building now standing where the future Exchange is to be will be pulled down and removed, and an entirely new structure that will compare favorably with the fine buildings surrounding it will be erected.

The Exchange has appointed a committee to act in conjunction with committees from other influential bodies in the city, such as the Shoe and Leather Board of Trade, to consider certain Baltimore interests in the World's Fair.

Boston, Mass.

The past year in Boston has been a satisfactory one in many respects for both employers and workmen. There have been many large contracts in operation, besides plenty of smaller work in the residence portions of the city. A marked advance has been made in the direction of securing a permanent means for preventing differences between employers and employees from resulting in strikes through the adoption of the form of arbitration advocated by the National Association of Builders between the Mason Builders' Association and the Bricklayers', Stone Masons' and Building Laborers' Unions. A number of meetings have been held by the joint committee with the most satisfactory results; a system of apprenticeship has been adopted and several points of interest amicably settled. No trouble of a serious nature has been experienced in any of the branches of the building trade since the strike and lockout of the freestone cutters in 1890, and there is no present prospect for disturbance in the future.

The union carpenters have determined to petition the Legislature to amend the employers' liability law and the lien law, and to pass a bill for the appointment of an inspector of staging. They also intend to request the enactment of a measure making it obligatory on the part of the State to appoint a member of the Building Trades Union as inspector of public buildings in course of construction. They desire to have the employers' liability bill so amended that when an injured employee dies within a certain number of days, his family shall be able to recover the same amount as if he were killed outright. As the mechanics' lien law now stands first and second mortgages and interest take precedence over labor. It is the opinion of the carpenters that labor's wages should take precedence.

The annual meeting of the Master Builders' Association was held on December 16, at which the secretary made a full report of the condition of the organization, showing that notwithstanding the heavy expense entailed by the extensive alterations in its building, the association is in excellent financial condition. The officers and directors who served last year were re-elected, the officers being as follows: President, James I. Wingate; vice-president, E. Noyes Whitcomb; secretary and treasurer, William H. Sayward.

Buffalo, N. Y.

Rapid progress is being made on the new building for the Buffalo Exchange, at the corner of Court and Pearl streets. It is up five stories, leaving but two stories to do. The boilers have also been put in. So rapid has been the progress that a hope has sprung up to have the building ready for occupancy by May 1. This was the date originally proposed, but afterward the time was extended several months, as it was belived to be impossible to do so much in so short a time. The building will be roofed in very shortly, and then with the boilers in and steam up the inside work can be quickly and comfortably done during the winter. At the last regular meeting Secretary E. L. Cook reported that there were 144 members in the Exchange and that an average of 77 members had made daily use of the rooms. The annual meeting occurs January 2, when important business will be transacted.

The first floor of the new Builders' Exchange, now in process of erection at the corner of Court and Pearl streets, will certainly be occupied by a bank. It will be held for rent to some banking institution for a limited time, after which, if it is not rented, arrangements will be made for the Builders' Exchange to occupy it as a bank. It is believed that the builders and others interested in the Builders' Exchange would supply a large clientage for a Builders' Exchange Bank, and that such an enterprise would be certain to prove a success. The lower portion of the building, the first and second floors at least, will be ready for occupancy by May 1.

Chicago, Ill.

In the opinion of the Builders' and Traders' Exchange of Chicago the Common Council has taken a step in the right direction in ordering that, until the Building Committee reports, no permits shall issue for the construction of building 12 stories in hight. In anticipation of this action of the Council a large number of permits were taken out for 16-story buildings.

The past year has been an unusually prosperous one for builders in all branches of the business, a fact that is largely the result of the city being selected as the site for the World's Fair. Many large operations are being carried on outside the fair ground in the shape of apartment houses and hotels, besides about the average amount of building in the business portion of the city.

Little trouble has been experienced between employers and workmen owing to the existence of joint committees of arbitration in the carpenter and mason branches of the trade. As these two branches are the most powerful their action practically controls the rest, which, together with the fact that the plan of arbitration in force has proved eminently satisfactory, has prevented any serious complications. Some effort was made by the carpenters to prevent any but union men being employed on the World's Fair buildings, but the subject never reached an issue, as the commissioners refused to discriminate between union and non-union men. There was no trouble however, as the scale of wages desired by the union prevailed, and there was no legitimate cause for grievance.

Cincinnati, Ohio.

A meeting was held on Thanksgiving Day between a committee from the Cincinnati Builders' Exchange and a committee from the Building Trades Council at the invitation of the latter, for the purpose of considering the request of the Council that the contractors employ none but union men and use manufactured stock only that is the product of union shops. The subject was considered thoroughly and without friction, although the workmen firmly maintained their request that the contractors refuse to employ non-union workmen. The committee from the Builders' Exchange explained the nature of their organization to the workmen, demonstrating that it was a purely advisory body and that it was beyond the power of the committee to take final action binding members of various branches of the business, and the matter, upon being reported to the Exchange, was referred to the Amalgamated Contractors' Association, the members of which are also members of the Exchange. The form of arbitration advocated by the National Association of Builders was discussed favorably by the Joint Committee and was recommended to the Building Trades' Council by its representatives. The request of the Council is at present in the hands of the Amalgamated Contractors' Association. Several of the unions belonging to the Council have been clamoring, it is claimed, for some time past for permission to strike on work where non-union men are employed, but have been prevented by the central body in the hope that the matter could be arranged by arbitration.

It is the intention of the workmen to make a general demand in the spring for shorter hours, and several of the trades have already given notice of their intention to the employers. The steam fitters have made a demand for nine hours' work with ten hours' pay, to begin January 1.

Cleveland, Ohio.

The members of the Building Trades Association of Cleveland are actively engaged in making preparations for the coming convention, and already have the details well under way. The association, which was reorganized just prior to the last convention, has been gaining steadily in membership and importance during the past year, and has profited by the experience of the old Exchange to establish itself upon a firmer and more satisfactory basis.

The building trades, so far as the workmen are concerned, have been at work for some time perfecting arrangements for taking steps early in the year to prevent the employment of non-union men. The unions claim to control at present 15,000 men and that there are less than 5000 non-union men employed in the building trades in Cleveland. Just what means will be taken to bring about the prevention of employment of non-union men is not yet decided, but it is at present under consideration. Definite action is not proposed before May 1, and the unions hope to have some plan perfected by that time which will enable them to secure their ends without stopping work. No formal declaration of intention has been issued by them as yet to the employers.

Kansas City, Mo.

Building has been very quiet in Kansas City for the past year, the total amount of work done being far below that of 1890. No particular cause is assigned for this depression, except a general lull in the activity that has been so marked for a number of years past. The lack of building operations has been felt by the Builders' and Traders' Exchange, and advantage is being taken of the present state of affairs to reorganize the Exchange upon a better basis in anticipation of its firmer establishment in the future. The members are at present at work upon the reorganization and are seeking to bring the body into greater importance and prominence, as one of the institutions of the city, than ever before. Nothing of a disturbing nature has occurred among the workmen during the past season, and there are apparently no preparations for future action on their part being made at present.

Grand Rapids, Mich.

The year just past has been fully up to the average in Grand Rapids so far as the building business is concerned, there having been several large contracts for building in the business portion of the city executed, besides considerable work in the residence portion.

The Builders' and Traders' Exchange is in a flourishing condition, and is being recognized more and more every day as an influence in the city. John H. Hosken has been appointed secretary, in place of Charles E. Whitcomb, resigned, and James M. Wilcox has been made acting secretary for the unexpired term, in order that the office may receive constant personal attention.

Lowell, Mass.

The members of the Master Builders' Exchange of Lowell held their annual banquet on the evening of December 8, and the affair was a thoroughly enjoyable and satisfactory one in every respect. A large number were present, and several of the prominent members and guests responded to the call of the toastmaster upon topics of interest to Lowell builders. The value and importance of organization was touched upon by J. H. Coggshall, who impressed upon the members the benefit that would accrue to themselves and to the Exchange if they would confine their dealings with builders to brothor members as far as possible. The importance of more thorough establishment of the "'Change" hour and the habit of meeting daily in the Exchange for the purpose of transacting business with each other, instead of wasting time running about the city in search of each other, was urged upon the members.

The approaching season promises well for the builders.

Louisville, Ky.

The past year has been a successful one for the builders of Louisville and the annual report of the secretary of the Builders' and Traders' Exchange indicated that nearly all of the work of any importance was done by the members. At the annual meeting, which was held on the evening of December 10, the following officers were elected for the ensuing year: President, Mr. J. H. Murphy; first vice-president, Mr. Meriwether, and second vice-president, Mr. Grenier. Messrs. J. N. Struck, George L. Smith and William Seaman were elected directors for three years and Thomas Armstrong was elected as director for the National Association of Builders. At this meeting the formation of definite plans for the erection of a building for its own use was undertaken and the project is now well started. A number of desirable sites are at present under consideration, on one of which the Exchange will shortly erect a handsome office building especially adapted to its own use.

Steps are being actively taken by the various unions of workmen to form a Building Trades' Council. The matter is being agitated principally by the carpenters and joiners, who are very strongly united, and they expect that all building trades will participate in the movement.

Lynn, Mass.

The Master Builders' Association of Lynn has been been recently considering subjects of interest to builders of the city, and have among other things taken up the advisability of amending the lien law of Massachusetts. At the last regular meeting of the association, the following members were elected delegates to the sixth convention of the National Association: P. S. Curry, A. J. Dearborn, Benj. T. Davidson; alternates, Frank G. Kelly and Jas. E. Manning.

New York.

The members of the Mechanics' and Traders Exchange have been actively at work on a project for erecting a building to cost in the vicinity of $1,000,000 for the Exchange and its members. The general plan has been under advisement for nearly a year, and is now sufficiently outlined and discussed to warrant the actual undertaking. Secretary Wright, in speaking of the intention of the committee, said: "The object of the committee is, I believe, to expand the Exchange beyond what it now signifies—merely meeting together for merchandising. They propose that it shall be so extended as to include all the trades identified with the construction of a building, many of which are not connected with the Exchange, and by mutual intercourse enable them all to understand each other's needs, so that in times of financial or other trouble, particularly in the face of strikes, they may be able to render each other a united, intelligent and effective assistance. To encourage the union into their own separate organizations of the employers in each trade should be one of the objects of the Exchange. To provide for this it is proposed that the new building shall contain a properly equipped suite of rooms for the meeting of such organizations."

Omaha, Neb.

The second monthly meeting of the Omaha Exchange under the plan adopted at the November meeting was held on December 4, and demonstrated beyond question the wisdom of the move. The principal topic of discussion was the "code of practice" recommended by the National Association of Builders, which was thoroughly discussed and finally adopted.

President Hussey made a brief address, in which he stated the secret of success of all enterprises of this character was promptitude. He said that this Exchange should be considered the home of every legitimate contractor of Omaha Work should be earnestly mapped out and rigidly executed. Flagrant abuses could not be individually corrected, but by organized effort great things can be accomplished. Every reputable contractor should therefore be enrolled, and by this concentration of effort great reforms could easily be rectified.

A light lunch was served by some of the members of the Woman's Exchange, and the character of the meeting showed plainly that the members were being awakened to a knowledge of the importance that the Exchange might attain if proper and united action were taken by the builders.

Pittsburgh, Pa.

The Pittsburgh Builders' Exchange feels, in the light of the experience of the past season, that the contractors should be so organized that they could treat directly and definitely with the trade unions, and in order that, in case of strike, means of protection shall be always at hand. This subject has been very carefully discussed, and while the Exchange advocates and always prefers to settle differences with the workmen by arbitration, means will be provided for the protection of the employers, so that should the carpenters and bricklayers strike on May 1, as they promised, the strike would be exceedingly short lived. The plan will be perfected in time to be presented to the National Association at the convention.

The Exchange held a special meeting on December 10 to consider ways and means for erecting a building of their own A plan has been in existence for some time, but was temporarily laid aside during the trouble with the workmen. Over $150,000 have already been subscribed, and the special aspect of the subject considered at the meeting was a proposition to build a building large enough to accommodate various other business associations, such as the Chamber of Commerce, the Grain and Flour Exchange, &c. The Exchange is also at work upon the trade school subject, advocating the establishment of a more comprehensive school than is at present in existence in Pittsburgh. The school at present only gives instruction in bricklaying, and an attempt is being made to include all other branches of building in a manner similar to Colonel Auchmuty's New York Trade Schools or those of the Philadelphia Builders' Exchange.

The pupils of the school are to be given a trial at actual work by being employed under a competent superintendent to lay the brick of the new Newsboys Home. The architect has been consulted and finds upon inspection that they are capable of doing the work if kept under the oversight of some capable bricklayer. It is not the intent of the Exchange to advocate such experiments becoming a practice, but it is using the present instance as a practical test of the result of the work of the school. The Builders' Exchange has offered the services of the 30 apprentices in the school to the projectors of the home. The whole undertaking is a purely charitable one, and the bricklaying is the share contributed by the Exchange

A great deal more than the usual amount of building has been done in Pittsburgh this fall and winter, owing to the remarkably fair weather that has prevailed. In some measure this has enabled builders to make up for the heavy losses incurred through the strike last summer The coming spring will be a noteworthy one for the erection of big buildings in Pittsburgh, as the projectors of several last spring postponed building in anticipation of the May-day troubles.

The striking bricklayers claim that the non-union men at work are representing themselves as members of the union. The men are still sticking out for their demand of $4.50 for nine hours' work, and eight hours on Saturday, though the strike was inaugurated May 1.

The Brotherhood of Carpenters and the Amalgamated Carpenters are having trouble, which will doubtless result in the extinction of one of the organizations. The more progressive of the brotherhood have apparently incurred the enmity of some of the members by an endeavor to place themselves on an equal footing with the employers by advocating arbitration through joint committees, instead of by old methods, and the result will probably be disruption.

Philadelphia, Pa.

The following delegates have been elected to represent the Master Builders' Exchange of Philadelphia at the meeting of the National Association of Builders at Cleveland: George Watson, Murrell Dobbins, William Harkness, John S. Stevens, Franklin M. Harris and William B. Irvine; delegate-at-large, Stacy Reeves; alternates, Charles Gillingham, William H. Albertson, William B. Carlisle, Charles G. Wetter, Samuel Hart and David A. Woelpper. The election of officers will not occur until January 29.

The Exchange has decided to institute, at the corporation meetings, occurring every few months, a series of discussions on how to best bring the prosperity of the organization up to its proper standard. The subject at the next meeting is "How to get at Good Attendance of Members During 'Change Hour."

St. Paul, Minn.

The members of the Builders' Exchange of St. Paul have made an appeal to the Common Council of the city praying for the appointment of a practical man as inspector of buildings, alleging that the Exchange includes all the prominent builders and contractors in the city, and by the very nature of their business are brought into intimate relations with the inspector. It is, therefore, of the highest importance to them that a thoroughly competent person should be selected for that office. They contend that it is impossible to frame ordinances strict enough to cover all the important minutiæ that enter in the construction of buildings. If the council should choose a man not familiar with practical building, he would be compelled to follow only the letter of the ordinances and in many particulars deviate from their spirit. They argue that such a man would be the prey of unscrupulous contractors, while an inspector thoroughly posted would be able to detect imposition. The Builders' Exchange has no candidate to urge for the position, but desires that whoever is selected should be chosen for knowledge of the duties required to be performed, and that the office should not be made in any sense political. They feel so deeply interested in the matter that the secretary has been ordered to lay their views before the Common Council. The builders offer no objection to the present incumbent, neither do they endorse him, but are apprehensive of a change for the worse, and, therefore, put in their protest.

The Exchange is in excellent condition and is continually gaining in importance, both as to members and as an institution.

Syracuse, N. Y.

The Master Builders' Association of Syracuse had the misfortune to be burned out during the latter part of November, and Secretary Wischoon reports that although the damage to their effects was mostly from water, nearly every thing was so thoroughly drenched as to be practically ruined. The association is at present occupying temporary quarters at 233 East Genesee street during the rebuilding of the burned building.

Building has been unusually quiet in Syracuse during the past season, and as a result there has been no disturbance in the labor market. Builders are looking forward to greater activity in the spring.

Worcester, Mass.

The building business in Worcester is in very good condition for this season, and has been brisk during the larger portion of the past year. Most of the builders have sufficient work unfinished at present to keep them busy during the winter. The prospect for the coming year is bright, and both contractors and workmen are looking forward to a successful season.

At the last regular meeting of the Builders' Exchange C. E. Morse and J. T. Darling were elected delegates to the coming convention of the National Association.

Notes.

The Builders' Exchange of San Antonio has moved into new quarters in the Maverick Building.

The builders of New Haven are seeking for better protection of buildings in course of construction, and have arranged for a conference with the city authorities on the subject.

A builders' exchange has been formed at Los Angeles, Cal., about 50 members of the building interests of the city being participants in the organization.

The Builders' Exchange of San Francisco has moved from 330 Pine street to 314 Montgomery street into more desirable quarters.

One of the latest things proposed for the encouragement of good workmanship is the award of prizes. The master builders of Philadelphia are talking about it; so are the employing painters. The scheme seems entirely feasible where it is possible to have men compete. An exhibition of workmanship where it can be criticized or admired, according to its merit, would doubtless have a stimulating effect. Many men are indifferent because they get no thanks for an extra effort to please.

THE BOSTON FIRE TESTS.

A PRACTICAL exhibition and test of various fire proofing materials was recently made in Boston, Mass., in a building constructed for the purpose in a vacant lot on New Park street formerly used for a baseball ground, the seats providing convenient accommodations for nearly 500 spectators, comprising builders, underwriters, officers of the fire department and architects. The building was built of 2 inch upright plank, covered with a flat tinned roof and divided by partitions into seven cells, each about 5 x 15 feet and lined with fire-proof materials, as shown in the illustrations. The building was erected jointly by the following manufacturers of the materials used: The King's Windsor Cement Dry under the tin. Four links were hung in each cell, which were composed of materials melting at the following temperatures, F.: Lead, 626°; antimony, 842°; aluminum alloy, 1292°; brass, 1850°.

The following persons were requested to act as a committee to supervise the experiments: C. J. H. Woodbury, vice-president Boston Manufacturers' Mutual Fire Insurance Company; C. H. Goddard, secretary New England Insurance Exchange; D. S. Lord, Superintendent of Buildings, and Charles H. Rutan of Shepley, Rutan & Coolidge, architects.

About a quarter of a cord of kiln-dried hickory wood was placed in each cell, and half a cord in the passage between the buildings, with a small quantity of small to a thickness of nearly 1 foot, resembling in its outlines a distended rubber pillow. Various observations were made by the spectators at different stages in the fire, but it was impossible to make any careful examination until the fire had been extinguished by the members of the Boston Fire Department, who used a hose stream very carefully at 2 o'clock, or 1 hour and 40 minutes after the fire had been started.

An examination of the building after the fire was extinguished showed that in cell No. 1 the King's Windsor cement laid on wood lath was off, and that the plastering had fallen by reason of the charring of the wood at the back. The lime and hair mortar laid on the plaster board on the left-hand side was intact, as was also the

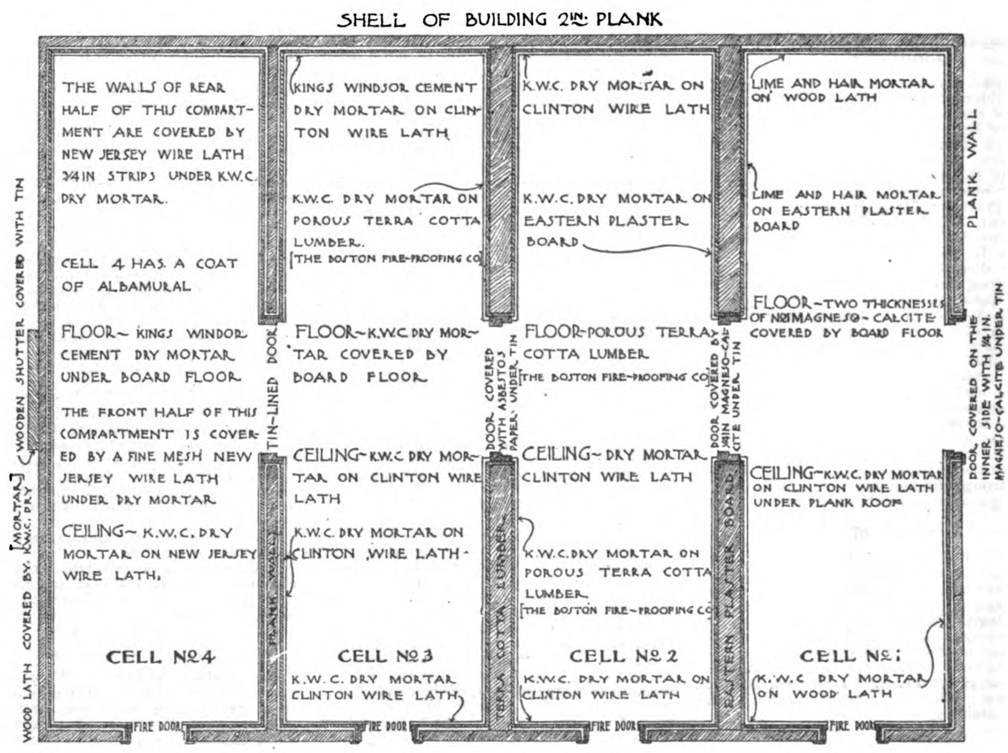


Diagram of Portion of Building Erected for the Boston Fire Tests.

Mortar Company, New York Eastern Plaster Board Company (cellular blocks of plaster of paris with rushes laid in the plaster), the Magneso-Calcite Fire-Proof Company (a fire-proof paper), the Boston Fire-Proofing Company (porous terra cotta lumber), the Clinton Wire Cloth Company, the New Jersey Wire Cloth Company, the albamural made by Stark, Edson & Co. (a fire resisting plaster finish). Common lime plaster and wood laths were also used.

The entrance to each cell at the front was provided with a fire door tinned on one side and the edges, which is not the standard fire door, although frequently used in the practice, where it is considered that the exposure is only on one side. There was a scuttle about 2 feet square in the roof over each cell. The four openings in the partitions of the first four cells were also fitted with tinned fire doors, three of which were lined with fire-proof papers under the tin. On each side of the passage between cells four and five were tinned fire shutters, one of them being lined with magneso-calcite paper wood and kerosene oil to serve for kindling the fires, which were lighted at 12.20 p.m. The flames burned fiercely and the heat was so intense that one would not wish to remain within 50 feet of the building, but the structure resisted the heat so well that it was not on fire for about an hour, although the fire doors at the front had fallen before this time from the charring of the wood at the hinges, caused by the heat following the screws so that they would not hold. Three of the links in the cells had melted by this time, showing the temperature to have exceeded 1292°, and later it was found that all the links had melted except the brass link (1850°) in cell No. 7.

The generation of gas from the wood used in the construction of the tinned fire doors was quite noticeable throughout the test, and at an early stage in the fire one person of an inquisitive mind, noticing the gas issuing from the seams in the tin, lighted it with a match, and thus it burned for some minutes. One of the interior fire doors, covered with tin-lined asbestos paper, was swelled up by the gas pressure King's Windsor cement on the opposite side of this plaster board partition on the right-hand wall of No. 2. The King's Windsor cement laid on the porous terra cotta lumber on the left-hand side of cell No. 2 was intact. In cell No. 3 the King's Windsor cement on the porous terra cotta lumber was in good shape, but the same material laid against the plank wall on the left-hand side had fallen. Cell No. 4 was lined with King's Windsor cement laid upon wire lath. The bond of the cement to the wire lath was so strong that it held in place very well, although the plank wall had been burned so that nearly all the support was removed.

The passageway between the buildings showed the effects of severe heat, as both sides had been destroyed by the flames, reducing the wood to charcoal, and they had afterward fallen down. In No. 5 the walls were covered with King's Windsor cement on wooden laths. These laths had been charred, allowing some of the cement to fall on both sides. Cell No. 6 was quite similar, with the exception that two thicknesses of magneso-calcite were placed against the planking before the lathing was applied, and in some cases the heat had been so great as to entirely remove the wood, leaving the magneso-calcite still on the partition. The last cell, No. 7, was lined with wire cloth covered with lime and hair mortar on the right-hand side and King's Windsor cement on the left-hand side. As far as the melting of the brass links are an indication of the heat, this cell was not exposed to so high a temperature as the others, as it was the only one in which the brass link did not melt, although the heat was such as would be called intense in the course of an ordinary fire. The interior of this cell was in very good order and not severely injured by the fire.

The result of all the experiments was very interesting and instructive, not merely showing the high resistance of the cement and other materials to heat, but also the stability of partitions and walls of 2-inch plank when exposed for a long time to the heat of a very serious fire.

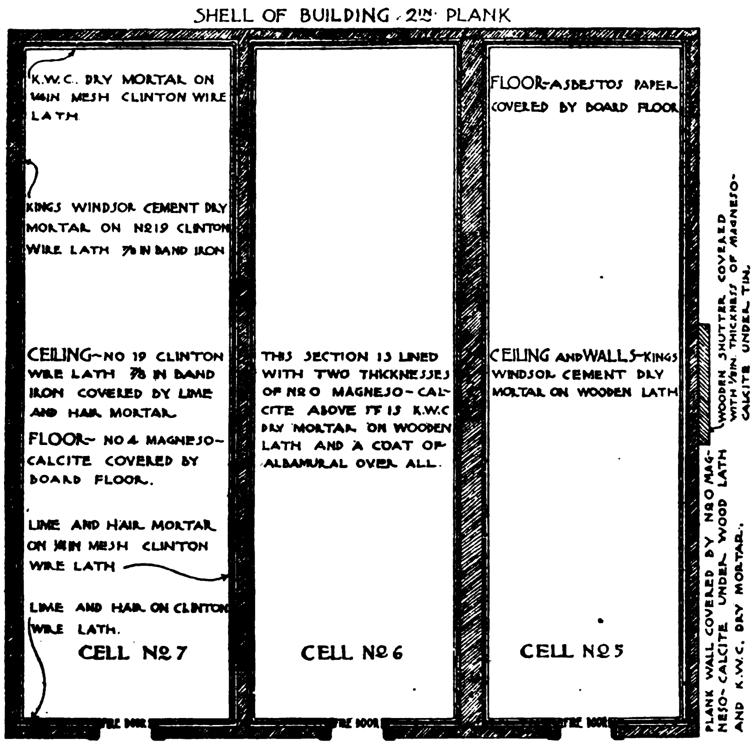


Diagram of Portion of Building Erected for the Boston Fire Tests.

Floors and Their Finish.

The carpenter is not infrequently called upon to finish, or suggest a good method of finishing, a floor that is not intended to be covered with carpets or rugs—such, for instance, as that of a lobby, schoolroom or meeting hall. A large number of preparations have been put on the market for this purpose, says an English exchange, but it may be fairly asserted that none of them will last for any considerable length of time, but will need renovating every year or so. Some of the patent floor paints are for this purpose fairly satisfactory. The best method of finishing a floor will, of course, depend upon the kind of wood of which the floor is composed. If it be hard wood or hard pine, and is a new floor, the wood may be filled with a good paste filler and varnished with the special varnish made for floors, and sometimes known as "floor finish" or elastic finish.

When the floor is an old one, or is made of soft pine, a satisfactory finish may be obtained in the following manner: First give a good priming coat of oil and ocher mixed thin, taking care that the ocher is ground fine. Then take 1 pound fine flour of emery, 1 pound of litharge ground fine in oil, and 3 pounds good yellow ocher ground in oil. Mix together with boiled oil and quick rubbing varnish, in the proportions of 4 of the former to 1 of the latter, until of the consistency of paste. Thin with turpentine and apply two or three coats. It is important that no more be applied than is absolutely necessary. A coat of floor varnish may be added if desired. The above method of floor finishing is especially recommended for the floors of kitchens, schools, &c.

WAXING FLOORS.

Wax finishing of floors is, in the experience of many, the most durable and satisfactory of all floor finishes. The advantage it possesses is that wear and tear only serve to make it, within certain limits, better—that is, if it is properly looked after. When an old floor is to be waxed it should be thoroughly scoured with scouring soap, ammonia being freely used where necessary. When dry, apply a coat of shellac. Rub down thoroughly with fine sandpaper and oil; then apply the wax and polish. This method is particularly well adapted when it is desired to finish a floor quickly. The wax may be purchased ready for use, but may readily be prepared by heating white wax and adding turpentine until of the consistency of a paste. To keep waxed floors in good condition they should be frequently rubbed up, and it is desirable, therefore, to leave a little of the wax with the occupants of the house, with directions to occasionally renovate the work. It may appear at first sight that this would be an unbusinesslike proceeding, as it would destroy the chance of the tradesman being called in to touch up the floor himself. It should be remembered, however, that when the floor is kept in a good condition for a long time in this way a valuable reputation for good work is obtained, which will probably bring in far more than any possible loss by reason of the occupant "doing it himself."

When old floors become spotted they may be made to look "as good as ever" by applying a solution of ammonia and water, half and half, thoroughly washing off and polishing with wax. A method of finishing floors which possesses the advantage at least of durability is as follows: Take boiled linseed oil, heat it to boiling point, and immediately pour it over the floor, distributing it and rubbing it around with an old stubby brush. Take care that the room is dry and free from dust. After, say, five or six hours, rub off with old rags or sacking all the oil that has not dried in. A floor prepared in this way will look well for a long time.

A Woman's House.

If there is any one thing more than another calculated to bring on nervous prostration in a builder, or even to drive him to suicide, it is to have a woman hanging around a house he is building bent on having everything to suit herself.

A man named Jones built a house out in the suburbs of the city, and he mentioned half apologetically to the builder that Mrs. Jones would be around occasionally to suggest little changes she might want made in the plan of the house.

"Occasionally?" said the builder when telling the story afterward to a correspondent of the Detroit *Free Press*, "why, that woman put in an appearance three or four times every day from the time the cellar wall was laid until the last nail was driven and I had turned the house and her over to the paper hangers and decorators, and one of them has been sick in bed ever since he finished his job because of his efforts to please that woman.

"She'd come around every day with her mind changed regarding all of the orders she had given on the day before, and she'd want to know the why and the wherefore of every nail that was driven into that house. I'd be hard at work when she'd come buzzing around with:

"'What are you doing that for?'

"'Well, because it has to be done, madam,' I would say.

"'But what for? I don't believe I like it done that way. And I believe I'll have that closet changed, and some drawers put in it, and the door made smaller. And I've changed my mind about that window in the dining room.'

"'But the order has been given for the window sash and—'

"'Oh, well, you can have the order countermanded. I've been thinking the matter over, and I'm sure I wouldn't like that kind of a window. And I don't want but two shelves in this closet.'

"'You said Monday that you wanted three, and we've made three for it.'

"'Well, use the other one for something else. I've changed my mind. What's that man doing over there?'

"'He's sandpapering that door frame.'

"'I'm not sure I want it sandpapered.'

"'It will have to be sandpapered before it can be finished up.'

"'Why?'

"'Well, because it must.'

"'I don't see why.'

"She couldn't see 'why' about anything, but she felt herself to be a 'born architect.'

"'I know just exactly what I want,' she would say. 'And I'm going to have the house built to suit myself.'

"Well, it was built that way, and such a looking thing as it is. She has something changed about it every day of her life, and she told a friend of mine that if she ever built again she'd have the whole plan changed. She changed it 15 times while we were building the house. Give me anything on this earth but a woman to boss me at my work."

"SKY SCRAPERS" in Chicago are virtually prohibited hereafter by exorbitant rates of insurance demanded by the fire underwriters.

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

Notice of Convention.

THE NATIONAL ASSOCIATION OF BUILDERS.
Office of Secretary, 166 Devonshire street.
BOSTON, Mass., December 1, 1891.

The sixth annual convention will take place at Cleveland, Ohio, beginning Monday, January 18, 1892.

1. Exchanges already affiliated are entitled to representation in accordance with the constitution as follows:

ARTICLE VII. REPRESENTATION AT CONVENTIONS.

Each exchange affiliated with this association shall, at annual or other conventions, be entitled to representation as follows:

One delegate at large, who shall be the director chosen at the preceding convention, and one delegate in addition for each 50 members or fractional part thereof.

Each delegate shall have one vote, and may be represented by alternate or proxy.

No delegate shall hold more than one proxy.

2. New exchanges or associations desiring representation at this convention may send one delegate for each 50 members in their respective organizations, application for membership being made to the Board of Directors in accordance with the constitution, as follows:

ARTICLE III. MEMBERSHIP.

Membership in this association shall be established on the basis of associations or exchanges, as follows:

Properly incorporated or duly organized builders' exchanges, representing, collectively, employers in the various trades concerned in the erection, construction and completion of buildings, shall be entitled to membership in this association upon application and acceptance by the Board of Directors.

Not more than one exchange in any city or town shall be admitted to membership. Individual members of exchanges thus affiliated shall be considered members *de facto* of the National Association.

3. Delegates should wear distinguishing badges, and the suggestion is made that they be as simple as possible; for instance, a button with name of city thereon.

4. Each delegation must present a credential (upon blanks provided by the national secretary) signed by the secretary or president of the association they represent, giving names of all delegates.

Per order of the
EXECUTIVE COMMITTEE.
W. H. SAYWARD, Secretary.

PROGRAMME AND REGULATIONS FOR THE SIXTH ANNUAL CONVEVTION, CLEVELAND, OHIO, BEGINNING MONDAY, JANUARY 18, 1892:

Place of Meeting.—Association Hall, Prospect and Erie streets.

Sessions.—Following suggestion offered at the last convention, there will be but one session each day, beginning at 10 o'clock, a.m., and continuing as long as the business may require, in order that committees may have the remainder of the day for conference.

Resolutions.—Resolutions must be presented in writing and in duplicate, both copies signed by the party presenting the same.

Voting.—All votes (unless otherwise ordered) must be announced by the chairman of delegations.

The general headquarters of the delegates during the convention will be at the Hotel Hollenden.

Detail of Proceedings.

MONDAY, 10 O'CLOCK, A.M., JANUARY 18, 1892.

1. Opening address, by the president.
2. Appointment of Committee on Credentials.
3. Presentation of credentials.
4. Recess for inspection of credentials.
5. Report of Committee on Credentials.
6. Roll call.
7. Appointment of Committee to Report Time and Place of Next Convention and to Nominate Officers for the Coming Year.
8. Report of secretary.
9. Report of treasurer.
10. Report of Standing Committee on Uniform Contract.
11. Report of Standing Committee on Legislation.
12. Report of Standing Committee on Statistics.
13. Report of Special Committee on Lien Law.
14. Report of Special Committee on Building Law.
15. Offering of resolutions.

TUESDAY, 10 O'CLOCK, A.M., JANUARY 19, 1892.

1. Roll call.
2. Consideration of report of Committee on Uniform Contract.
3. Consideration of report of Committee on Legislation.
4. Consideration of report of Committee on Statistics.
5. Consideration of report of Committee on Building Law.
6. Consideration of report of Committee on Lien Law.
7. Reports from filial bodies.

WEDNESDAY, 10 O'CLOCK, A.M., JANUARY 20, 1892.

This time will be occupied in the consideration of a very important subject, notice of which will appear in the circular bearing the official programme.

Report of the Committee on Resolutions.

Report of the Committee on Time and Place of Next Convention, and on Nomination of Officers.

Election of officers.

Naming and election of directors.

Unfinished business.

Miscellaneous.

Notices.

NOTICE TO SECRETARIES OF FILIAL BODIES.

Secretaries of filial bodies are requested to note carefully all items of the various notices issued in regard to the coming convention, particularly in relation to representation, transportation, credentials, badges and resolutions, and see that the delegates from their bodies are fully informed. Circulars covering these points have been sent to each secretary in sufficient number to furnish each delegate.

Blank forms for credentials have also been sent and secretaries are requested to *use these blanks only*, in order that the credentials may be uniform.

Secretaries are also reminded that the national secretary would like *immediately* the special reports previously invited by letter, as to general condition of affairs in their bodies and matters upon which the counsel and advice of the National Association is desired.

Per order of the
EXECUTIVE COMMITTEE.

COMMITTEE ON LIEN LAW.

The members of the special Committee on Lien Law are requested to meet at Hotel Hollenden, Cleveland, Ohio, on the morning of January 16, for conference.

COMMITTEE ON BUILDING LAW.

The members of the special Committee on Building Law are requested to meet in the Hotel Hollenden, Cleveland, Ohio, on the morning of January 16, for conference.

COMMITTEE ON UNIFORM CONTRACT.

The members of the Standing Committee on Uniform Contract are requested to meet in the Hotel Hollenden, Cleveland, Ohio, on the morning of January 17, for conference.

COMMITTEE ON RESOLUTIONS.

The members of the Standing Committee on Resolutions are requested to meet in the Hotel Hollenden, Cleveland, Ohio, on the morning of January 17, for conference.

LEGISLATIVE COMMITTEE.

The members of the Legislative Committee are requested to meet in the Hotel Hollenden, Cleveland, Ohio, on the morning of January 17, for conference.

COMMITTEE ON STATISTICS.

The members of the Standing Committee on Statistics are requested to meet in the Hotel Hollenden, Cleveland, Ohio, on the morning of January 17, for conference.

Sessions of the Convention.

Following the suggestion made at the last convention it has been deemed advisable to have but one session of the convention daily, beginning at 10 a.m. sharp, and continuing as long as the business of the programme may require. By this plan, the various committees will have ample time for conference, and the delegates will have more time for observation of the buildings and institutions of Cleveland.

Regarding Transportation.

It has been the custom in the past for the secretary to make arrangements for securing reduced rates of railroad fare for delegates attending the convention, but owing to the fact of the difficulty of ascertaining the exact number that will attend, and the refusal, for that reason, of the Western Association to grant a rate last year, it has been considered advisable for each exchange to make its own arrangements in this regard.

Application should be made to local ticket agents as soon as possible, for a reduction of fares. The total attendance at past conventions has averaged about 400.

Steps are being taken in Chambersburg, Pa., Scranton, Pa., and Arkansas City, Kan., for the formation of builders' exchanges under the advice of the National Association. Inquiries are being constantly received by the National Secretary from builders in cities where there is either no filial body or no exchange at all, as to methods which should govern in peculiar instances.

In the death of Henry R. Coulomb of Philadelphia the Master Builders' Exchange loses another valuable member. The Philadelphia Exchange has been particularly unfortunate during the past year in losing a number of its most active members. Mr. Coulomb was always a prominent member of the Exchange, and will be sadly missed.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED

The Builders' Exchange.

DAVID WILLIAMS, - - PUBLISHER AND PROPRIETOR.
A. O. KITTREDGE, - - - - EDITOR.
JOHN S. KING, - - - - BUSINESS MANAGER.
96-102 READE STREET, NEW YORK.
W. H. SAYWARD, - - - - - SPECIAL.
SECRETARY NATIONAL ASSOCIATION OF BUILDERS,
166 DEVONSHIRE ST., BOSTON, MASS.

FEBRUARY, 1892.

The late appearance of the present issue of *Carpentry and Building*, we desire to state, is due to a fire which occurred a few days since in our printing department.

Builders' Convention.

This issue of *Carpentry and Building* is very largely devoted to a report of the convention of the National Association of Builders, held in Cleveland during the third week in January. In addition to a carefully prepared abstract of the proceedings, we present an article over Mr. Sayward's signature, being in effect a review of the meeting and pointing out what occured that is of special importance to the building interests. A single incident of the occasion is perhaps to be regretted. We refer to the unfortunate misunderstanding or difference of opinion concerning the matter of representation raised by the Pittsburgh Exchange. We say "unfortunate" because at this time, when it is so much to the interest of builders to stand together in an effort to bring their branch of business up to the high plane on which it belongs on account of its importance, it is inexpedient to have any internal dissensions. In the interval since the adjournment of the convention we have secured interviews with a number of men prominent in the councils of the National Association, in Chicago, St. Louis, Cincinnati, Cleveland, Pittsburgh, Philadelphia, Boston and other places with a view to learning the general sentiment. All regret the occurrence as being most unfortunate, but the general drift of opinion is that the National Association could not do otherwise than to pursue the course it did under the circumstances. Pittsburgh has gone through a peculiar experience in the year just closed, and its membership may have had in mind incidents of the struggle just closed to the exclusion of some of the objects to achieve which the national organization was formed.

Just as we go to press we are in receipt of the following telegram from E. A. Knox, secretary of the Pittsburgh Builders' Exchange, bearing date of February 2:

"Report of delegates regarding action taken at Cleveland convention unanimously and enthusiastically sustained at meeting of Builders' Exchange yesterday."

The Drexel Institute.

The Drexel Institute of Art, Science and Industry, which was dedicated with appropriate ceremonies in Philadelphia on December 17, is an imposing structure in which the building trades of the country cannot fail to be more or less interested. It was built and endowed by Anthony J. Drexel and its scope and objects as outlined by him are "the extension and improvement of industrial education as a means of opening better and wider avenues of employment to young men and women." The building has a frontage of 125 feet on Chestnut street and a depth of 130 feet on Thirty-second street. The principal entrance is on Chestnut street, which admits to a portico enriched with colored marbles and paneled oak ceiling, and from here the visitor enters the central hall of the building. This hall is a court 65 feet square, surrounded on all sides by galleries opening from the four floors, and extends to the roof. At the end of the hall is a double marble stairway leading to the upper floors. The building is heated throughout by steam and lighted by electricity. It has accommodations for about 2000 students. The structure is built of buff-colored brick, with a granite base, and is in the classic Renaissance style of architecture. The institute was erected at a cost of $600,000, and in order that it may not lack the means of support in its first days, Mr. Drexel has endowed it with $1,000,000.

Bad Air.

The term "bad air" is applied to a great many different kinds of noxious atmospheres. We speak of the bad air from sewers, the bad air of a closed, unoccupied room, the bad air of chemical factories and cow sheds. But probably the worst of all airs, without exceptions, is in the unventilated room where many people are. During the summer time this extremely offensive atmosphere is seldom encountered, as a desire for coolness makes people confined within doors open all windows possible. When cold weather comes on, however, the first desire of the ordinary person seems to be for warmth, and this is obtained not by artificial means, but by excluding the cooler atmosphere of out-of-doors. When the temperature falls still lower, as winter takes full possession, it becomes necessary to have artificial heat in the form of stoves, boilers, furnaces, or gas or oil apparatus, some of which add still further to the foulness of the air. Perhaps as people get more civilized they will come to recognize the fact that it is far more important to have air containing a proper amount of oxygen and unadulterated with carbonic acid than it is to have air of uncertain composition, but containing the requisite number of heat units for bodily comfort. We can live in a cold atmosphere, but we cannot even exist in an atmosphere of carbonic acid, though many steer a middle course and carry on a sort of semi-existence in an atmosphere almost as well charged with carbonic acid as a newly filled soda-water fountain.

The 'Change Hour.

It is no doubt true that the advantages of a builders' exchange are often overlooked. The purpose is not alone an effort to secure the attendance of members of a builders' exchange at a meeting of that body, but to confer upon them the unquestioned benefit that arises from being found every business day in a specified place at a specified time, in company with others of a kindred calling. As an instance, the Boston Exchange is said to present the highest example of practical usefulness in the country. Every builder in the city is sure to find every other builder of importance, or his representative, in the exchange during the 'change hour. Every dealer in building materials is sure to find every contractor to whom he desires to sell his wares, and all are thoroughly conscious of the fact that they are "in the swim." The architects of Boston are aware of the fact that all the contractors can be found at once in the exchange during the 'change hour, and they also know that any peculiarities in their methods of conducting competitions or carrying on work are sure to be thoroughly ventilated among the builders.

Advantage to Builders.

The advantage to the builder of creating more intimate social relations with his co-workers and competitors should not be underestimated, for no matter how entirely self-dependent he may consider himself, he will unquestionably find his business improved by helping to create these improved social relationships. The entire business is better for being controlled by certain honorable and just rules and regulations, and it is a fact that such rules and regulations are very seldom placed in active operation by the members of an organization who meet not oftener than once a month. Out of the daily gathering for the purpose of transacting business customs evolve themselves, and without doubt the best will prevail. Members of an exchange should not go to the exchange during the 'change hour because some one has asked them to, but because they are looking for business, and desire to stand on an equal footing with others who want business.

Supplement Plate.

The double-page plate forming our supplement this month consists of a group of portraits of the officers, directors and past presidents of the National Association of Builders for 1891. In identifying the various faces the reader should bear in mind that the top row of names in the caption corresponds to the top row of pictures across the plate, the others following in regular order.

REVIEW OF THE CONVENTION.

WILLIAM H. SAYWARD.

THE SIXTH ANNUAL Convention of the National Association of Builders, just closed, was in some respects more satisfactory than any of its predecessors, inasmuch as the discussions were much more fully participated in, resulting in a diffusion of views very material to wise conclusions, and to the building up of confidence in the individual, which enables him to be of greater service each year both in the national and in his local body. The opening address of President McAllister was most admirable. The concise and telling manner in which his points were presented was highly appreciated by the delegates, and their approval was manifested in an order to print the address separately from the report of the convention, for special distribution. During the first session occurred the only impairment to the general harmony of the whole convention, in the refusal of the delegates from the Pittsburgh Exchange to accept the judgment of the convention in regard to the number of delegates to which that exchange was entitled. The friction came on the report of the Committee on Credentials, which report was divided on the matter of the Pittsburgh representation, the majority report being that the Pittsburgh Exchange was entitled to but four delegates and the minority report claiming that 18 should be seated.

THE PITTSBURGH INCIDENT.

The cause of this wide disagreement rested in the fact that the exchange in question had returned its membership as 185 at the time it remitted its *per capita* assessment to the national treasurer, but had soon after received a large accession of members through the agitation caused by great labor disturbances in that locality, so that at the time of the convention its membership was between 800 and 900, and although it had not readjusted its payment of *per capita* assessment to cover this increase of membership, it claimed that it was entitled to seat delegates for the increase. The basis of this claim was on the clause in the constitution in relation to representation at conventions, which reads that "each affiliated body shall be entitled to one delegate-at-large and one delegate in addition for every 50 of its members or fractional part thereof." The majority of the Committee on Credentials based their judgment on the declared membership at the time the *per capita* tax was paid, and claimed that no exchange had a right to representation in excess of that for which it had paid. The committee argued that as the constitution was not sufficiently explicit in fixing the time of year when the filial bodies should declare their membership upon which their representation in the next convention would depend, it must be taken to mean that such membership and representation must depend upon the number which the filial bodies themselves determine, declare and pay for under the *per capita* assessment, and that unless an exchange was willing to make payment into the national treasury on any increase in membership which might have occurred in the interim between the time of such declaration and the time of the following annual convention, it certainly could not be entitled to representation on such increase. The Pittsburgh Exchange was given the greatest latitude in endeavoring to substantiate its claims, no restriction being placed upon the number of Pittsburgh representatives during the discussion on the acceptance of the report of the Committee on Credentials. Upon vote being taken, which vote demonstrated that almost three-fourths of the delegates present supported the views of the majority of the committee, the Pittsburgh delegates withdrew for consultation, and on the following day sent in a communication to the effect that as the committee had decided that the Pittsburgh Exchange was only entitled to four delegates, no seats at all would be taken, and the Pittsburgh Exchange would withdraw from the National Association.

AUTHORITY FOR ACTION.

The communication was received and "placed on file," no other action being possible inasmuch as it appeared to be evident that the delegation had no authority from the parent body to act as it had either in the matter of refusing to seat the number of delegates allowed as proper by the convention, or in the matter of withdrawal of the exchange from affiliation.

The action of the delegates from Pittsburgh was generally deplored, for whether the judgment of the majority of the convention was just or not, it was certainly the proper thing for the Pittsburgh Exchange to accept the verdict, inasmuch as it was but one unit of the 35 units forming the national body, and had agreed, in common with the others, to be governed by the majority.

In the matter of interpretation of a portion of the constitution, not sufficiently explicit in itself, they should have accepted the three-fourths vote against their views as conclusive, and if strenuous to have 18 delegates seated in the sixth convention they should have readjusted their payment of *per capita* assessment for 1891 in accordance with the views of the majority. If they did not do this they still had the opportunity to seat the four delegates allowed and could well afford to await the seventh convention for a larger representation, when they would have had time to demonstrate that their increase in numbers was permanent and reliable.

The immediate result of this attempt to seat delegates upon a basis of representation different from that which has always been the custom led to the passing of an order directing the Executive Committee to prepare a revision of the constitution in the matter of representation for the consideration of the association at its next convention.

So much time was consumed by the discussion of the report of the Committee on Credentials that the Monday session was extended to a late hour in the afternoon, and only a part of the secretary's annual report was presented. The plan of holding but one session each day proved undesirable, and two sessions were held on Tuesday and Wednesday respectively.

REPORT ON LIEN LAW.

The largest interest centered in the discussion of the report of the Committee on Lien Law, and this discussion consumed the better part of the two sessions of Tuesday. The greatest benefit may be anticipated from the freedom and fullness of this discussion, and it is a source of great gratification to the National Association to find that the habit and capacity of analyzing are growing among the membership. This is one of the great things to be desired, and if the annual conventions gradually develop this power of analysis and discussion a great benefit will result in all the filial bodies, and the power of the National Association of Builders will proportionately increase. The result of this discussion was the appointment of a standing Committee on Lien Law, to have the matter under discussion between conventions, and bring it up anew for discussion each year, with such added fund of information as they may be able to gather. Great good may be expected from this systematic investigation and yearly discussion. The feature of having reports from filial bodies was greatly appreciated. These reports were asked for and were expected to comprehend conditions existing in each exchange, reforms undertaken, either on its own motion or on the lines formulated by the National Association; methods in vogue, matters that need reform, law cases in which builders would be interested, progress made in introducing any of the reforms previously recommended by national conventions, and efforts made in the way of owning buildings. Almost every exchange presented a report. Some few who did not comprehend exactly what was expected of them made up hurried reports at the convention, or reported verbally, but the plan proved very effective, and it was voted to make such reports a feature of every convention. Much encouragement was given to the project of ownership of buildings by local bodies by the reports made by exchanges that have got their buildings under way since the last convention, and a strong impetus given to this idea in the associations who have not already moved in this direction.

HIGHER EDUCATION FOR THE BUILDER.

It was to be regretted that Professor James of the University of Pennsylvania was prevented from delivering the address he was to have prepared on "Higher Education for the Builder." Severe sickness made it impossible for him to be present, and Dr. Woodford, who came as his substitute, was handicapped by lack of time in preparation. His address, however, was listened to with careful attention, and undoubtedly awakened many thoughts which will prove of great benefit in the future. The closing of the convention was marked by greater expressions of interest than the one before, and a larger confidence in the benefits to be derived from the contact with others and the information and encouragement received. Many exchanges that confessed themselves weak at the opening expressed through their delegates a sense of renewed vitality, and that from this time on matters will be pushed in their local bodies along the lines of improvement already defined and to be defined in the future in the conferences of the national body.

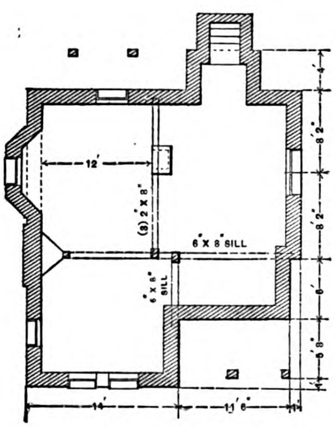
The newly elected directors held a very full and satisfactory meeting on the morning following the close of the convention and much work was mapped out for the coming year. It may be truly said that the National Association starts out on its sixth year with renewed vigor and with greater promise of being of substantial benefit to the filial bodies and the building fraternity generally than ever before.

A VERY LARGE TREE, one of the largest in California, the country of big trees, was discovered near Arlington, Snohemish County, a few days ago, says an exchange. It is a cedar and measures 68 feet in circumference. Around the knotty roots the tree measures 99 feet. About 75 feet from the ground it forks into four immense branches, and just below the forks is a big knot hole. Five men climbed into this and explored the interior of the tree. It was found to be a mere shell, and about 45 feet down it would afford standing room for 40 men. The tree is still green, and a remarkable feature is said to be that it is barked on the inside and outside alike.

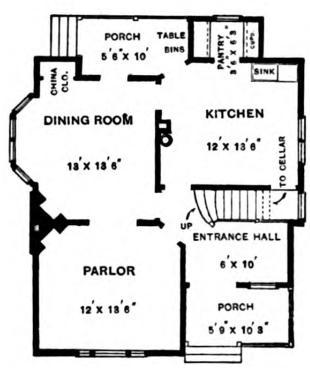
DESIGN FOR A COTTAGE.

THE DWELLING which we illustrate upon this and the following pages was designed by E. M. Lockard of Indiana, Pa. The elevations give an idea of the general exterior of the house, while the floor plans show the arrangement of the rooms. The house is intended to occupy a space 26 x 29 feet on the ground, exclusive of the bay window and porches. The first story is 9 feet in the clear, and the second story 8 feet. The cellar extends under the entire building. An inspection of the first floor plan shows that the main hall is reached directly from the porch. From the hall, doors open into the parlor, dining room and kitchen. This arrangement of rooms permits the front door to be reached from the kitchen without the necessity of passing through the living rooms. Below the main stairs, which rise from the entrance hall, are the stairs leading to the cellar. The parlor is fitted with an open grate and mantel, and with a triple window, which affords a good view to the front. The dining room communicates with the parlor by folding doors or *portières*, as may be preferred. Opening from the dining room is a china closet and a rear porch 5½ x 10 feet in size. The kitchen communicates directly with the dining room and also with the rear porch. On the second floor of the house are four sleeping rooms, a bathroom and a number of closets. The stairway is so arranged as to render easily accessible the four rooms, and reduce to a minimum the space devoted to hall purposes. From the author's specification we learn that the sills are 6 x 8; the joists 2 x 8, placed 16 inches on centers; the plate to be doubled, also all openings for doors and windows, and the rafters 2 x 5 inches. The exterior is to be covered with poplar siding and clapboarded. The front gables are shingled. The exterior is to have three coats of best white lead and linseed oil, in such colors as the taste of the owner may direct. The cost of the building is estimated at $1600.

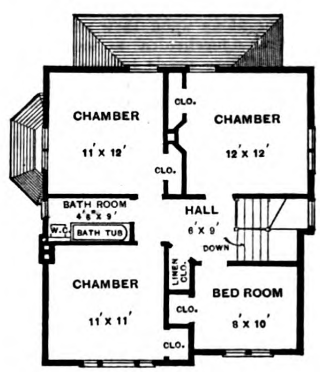
Front Elevation.—Scale, ⅛ Inch to the Foot.



Foundation.



First Floor.



Second Floor.

Scale, 1-16 Inch to the Foot.

Design for a Cottage.—By E. M. Lockard, Indiana, Pa.

The following remarks, by the author of the design, may prove of interest in this connection: "The drawings were not made with the intention of teaching any one how to make house plans, and I trust my brother readers of *Carpentry and Building* will feel kindly toward me in regard to errors and omissions, especially when they know that it is less than three weeks since the first line was drawn, and that the entire set was made at night after doing a day's work. My business is that of carpenter rather than that of architect, although I have designed and built a number of first-class houses. I am at present working on the plans for a ten-room brick dwelling, an eight-room frame house and a seven-room cottage. I give this bit of autobiography that it may induce the younger readers of the paper to make use of their spare moments, for they must in time take the place of the older members of the trade. Four years ago I was engaged in the country, working from sun up to sun down, and that for $1.40 a day. At the present time I am foreman for a large contractor and am earning three to four times as much as then. The ability to understand plans, &c., is, in my estimation, the thing that counts."

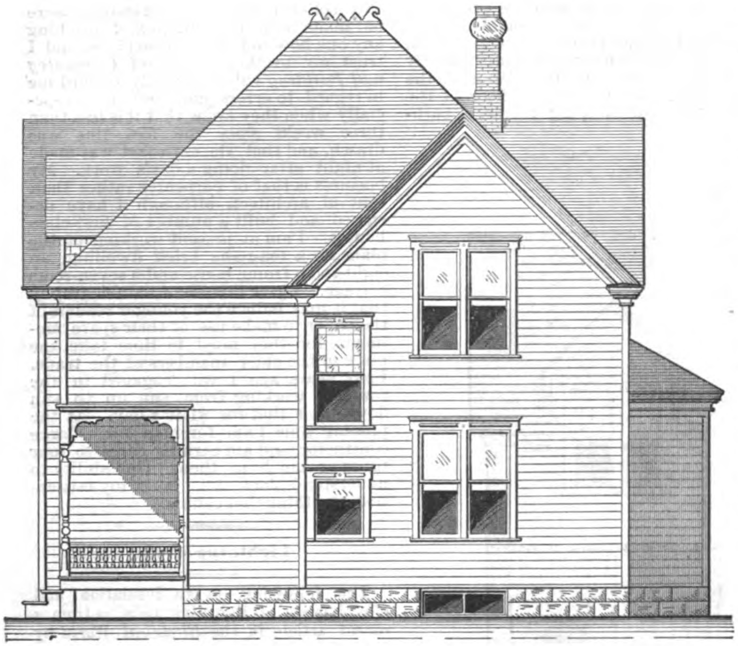
Lightning Rods.

The following, as to insulation and effectiveness of lightning rods, is from a recent article in the *Electrical World* by Elihu Thompson:

Lightning rods need not be insulated from the building. It matters very little whether they are or are not insulated, as the ordinary provisions for insulation so far as a lightning discharge is concerned are practically *nil*. The insulation given to a lightning rod is frequently that which is not good enough for a telegraph line where the pressure of the current on the line may not exceed in all 200 volts, while in the lightning discharge the pressure may be many millions of volts. Where there are large masses of metal in a building it would do no harm as a rule to connect these masses to the ground as well as to the lightning rod; and it may be said also that where a building is filled with masses of metal or machinery, damage from lightning could be largely obviated by connecting the various masses of the metal one to the other and to the ground. It is not, however, essential that they be actually connected to the ground; for if a mass of metal in the building is but slightly separated from the ground wire by what is known as a discharge space, it will be quite sufficient to allow lightning to pass. A slight opening between two parts of a conductor constitutes a discharge space. Such discharge spaces and protective arrangements are used commonly on telegraph and telephone lines, in which the lines, although they are not connected to earth at each instrument, may be so near the earth by the provision of a discharge space between the line and earth that they are practically connected.

The effectiveness of lightning rods depends, I think, not alone upon their cross section nor alone upon their surface. It is as much a mechanical as an electrical question. There needs to be a sufficient cross section of metal not to be melted by any discharge, and it is best that the metal be made in the form of a pipe or flat strip, since the tendency of the lightning discharge is to follow the surface portion of the conductor. This is due to the fact that it is an extremely quick discharge and may take upon itself an oscillating character. This means that each spark which connects earth and cloud is not a stream of something running in one direction, but merely a core or axis for a set of disturbances or reliefs of pressure which may act alternately in opposite directions during the short intervals through which the flash lasts. The oscillating action may be illustrated by fastening the end of a thin steel rod and bending it by carrying the free end to one side. This if let go will be followed by a series of oscillations made very quickly, but which are akin to oscillations of a pendulum. The relief of electrical pressure is in lightning so sudden as to result in the action of relief going too far, after which a relief in the opposite direction ensues, back and forth, until all of the energy of the discharge has been used up in the form of light and heat.

This must not be confounded with the action which often occurs during thunder storms, when two, three or more separate discharges are visible separately to the eye, and follow down the same path or the track which has been opened by the first discharge. This is a phenomenon common enough and easily observed, but it has no relation to the oscillations of a single lightning discharge. These oscillations, if they exist at all, are in periods inconceivably small, and therefore are not to be discovered by the unassisted eye. Neither do I wish to be understood as subscribing to the opinion that all lightning discharges are oscillating in character. I am convinced from my own observation that very many lightning discharges, particularly those which pass over great lengths of clouds, are more apt to be discharges of some duration. Observation over a long period of years has led me to think that it may be possible that the discharges in some instances have a measurable rate of progress from cloud to cloud and perhaps to earth. The photographic plate, which is being more and more applied to the study of lightning discharges, will some day resolve this doubt.



Side (Right) Elevation.

Side (Left) Elevation.

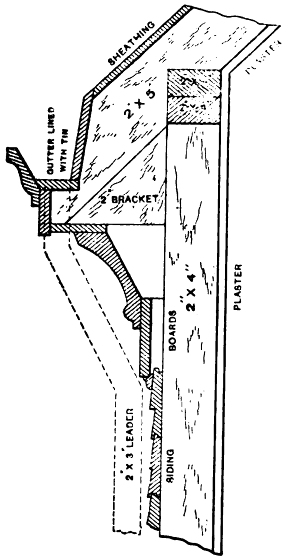
Design for a Cottage.—Elevations.—Scale, 1/8 Inch to the Foot.

NEW PUBLICATIONS.

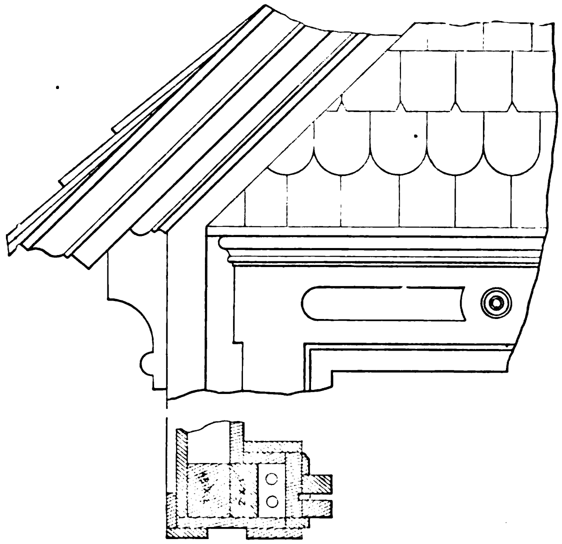
PRACTICAL CENTERING. By Owen B. Maginnis. Illustrated with 65 engravings; 80 pages; bound in stiff board covers. Published by William T. Comstock. Price, $1.50.

This book, as indicated by its title, treats of the practice of centering arches in building construction as carried on at the present time in this country, and presents each subject in such detail as to render it especially serviceable to the mechanic. It is comprised in 16 chapters, the first four of which treat of centers for arches ranging from a small span up to those having a span of 16 feet and constructed to sustain heavy stone *voussoirs* in ashlar work. The following chapters are devoted to Centering Circular Windows, Suspended Centers, Oblique or Skew Centers, Flaring or Splayed Centers, Sewer Centers, Method of Making a Diminishing Plumb Rule, Trimming Windows for Shutters, Setting Jambs, Working Hard Wood and Clamping and Extemporized Scaffolding. A number of hints and suggestions are also given which are likely to prove useful in this connection. A portion of what is contained in this volume originally appeared in *Carpentry and Building.*

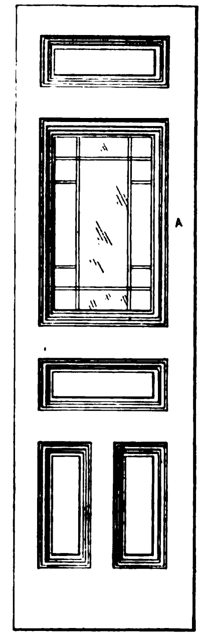
SOME FINE SPECIMENS of jet-black marble are on exhibition in Lewiston, Idaho, says a recent issue of an exchange. They were taken out of a quarry above the mouth of Grand Ronde. The stone is of the best quality, and has the advantage of varying in color from pure white to jet black in different parts of the ledge exposed. Such a rich deposit of marble has not been found elsewhere in the West. Jet-black marble is rarely found anywhere. There are only two well-known quarries in the world except that discovered in Idaho—one is in Egypt and the other in Ireland.



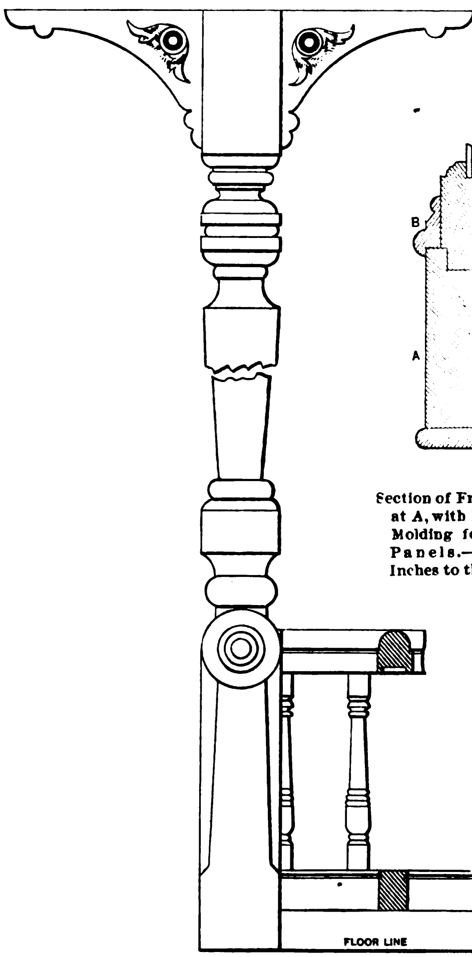
Detail of Main Cornice.—Scale, 1 Inch to the Foot.

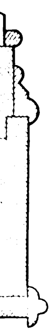


Detail and Section of Dormer Window.—Scale, 1 Inch to Foot.

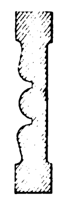


Detail of Front Doors.—Scale, ½ Inch to Foot.

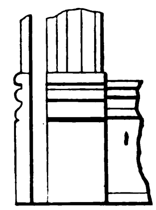




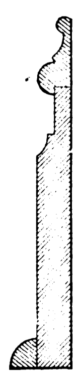
Section of Front Doors at A, with B showing Molding for all the Panels.—Scale, 3 Inches to the Foot.



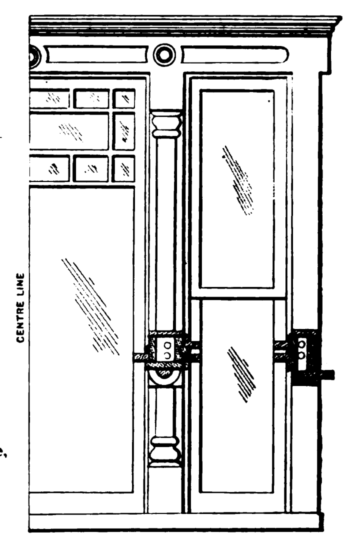
Section of Inside Casing of Doors and Windows.—Scale, 3 Inches to the Foot.



Plinth Block.—Scale,● Inch to the Foot.



Section Through Base.—Scale, 3 Inches to the Foot.



Detail of Front Porch.—Scale, 1 Inch to the Foot.

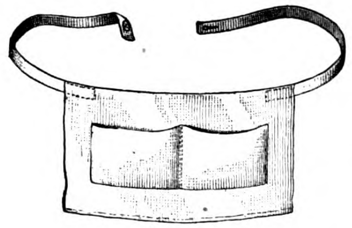
Detail of Triple Window.—Scale, ½ Inch to the Foot.

Miscellaneous Details of Cottage.—Designed by E. M. Lockard.

CORRESPONDENCE.

Carpenters' Aprons.

From O. B. M., *New York City.*—At the noon hour recently a discussion arose concerning the best form of carpenters' apron, and as the subject is one of no little interest to the trade, I am of the opinion that great benefit would result if some of the best shapes of aprons were submitted by practical readers of the paper. I contend that the best and most convenient apron is that which is suspended around



Carpenters' Aprons.—Fig. 1.—Form of Apron Recommended by "O. B. M."

the waist like a belt, with the nail pockets sewed on in front, as in Fig. 1 of the accompanying illustrations. Others are of the opinion that the apron indicated in Fig. 2 is the best adapted for carpenters' use, as it is quickly put on and does away with the tightness around the waist, thus giving more freedom of movement. There were those, however, taking part in the discussion who preferred the shape shown in Fig. 3, which is a combination of the forms indicated in the previous figures. In addition this has a strap so attached as to keep the band around the neck from working up. All of us, however, are of the opinion that coarse bed ticking is the

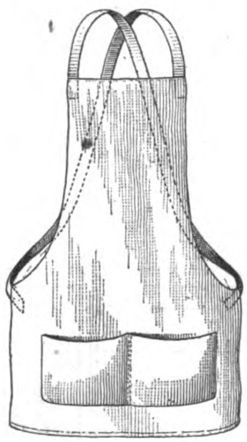


Fig. 2.—Apron with Shoulder Straps.

best material from which to make them, and that their manufacture can best be conducted at home.

Scales on a Carpenter's Rule.

From F. J. R., *Manalapan, N. J.*—Will some of the readers of *Carpentry and Building* kindly tell me through its columns what the scales on a carpenter's 2-foot rule marked ¼, ½, ¾ are, and what are they used for?

Note.—The inquiry of our correspondent is scarcely specific enough to enable us to reply in a satisfactory manner. In order to intelligently discuss the question it is first necessary to know the number of the rule, or at least the name of the maker. There are a number of carpenter's rules on the market and we doubt very much if our correspondent will secure just the information he desires without giving further particulars. In all probability what he refers to are scales of fractions of an inch to the foot, for draftsman's use. Thus, "¼ inch to the foot," "½ inch to the foot," &c.

Fence Designs.

From J. C. P., *Bicknell, Ind.*—I would like to ask through the columns of the paper for some designs of fencing. As a general rule we have in a small place only two or three styles, and what I now desire is a design which can be made by hand from wood and have a neat and artistic appearance.

Note.—This is a branch of carpentry to which comparatively little attention has been given in the Correspond-

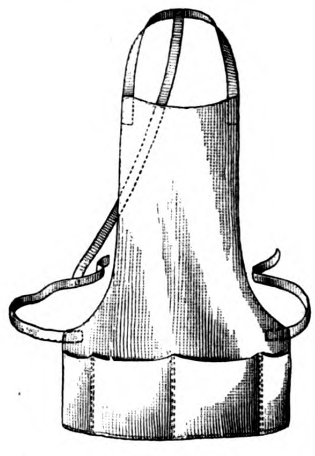


Fig. 3.—A Combination of the Two Previous Forms.

ence Department in the past, and the question raised by "J. C. P." is calculated to stir up an interesting discussion as well as bring out a great many designs of fencing which will prove both interesting and instructive. The subject of fence designs in general is a good one for discussion, offering a broad field, and we trust the readers of the paper who have given attention to this particular line of work will be free to send forward drawings and descriptive matter for the benefit not only of the correspondent above, but also of the craft at large.

Portable Picture Gallery

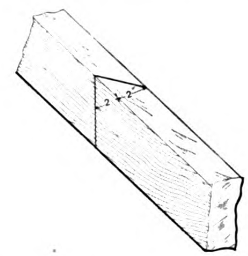
From P. D. C., *Tunkhannock, Pa.*—I will esteem it a favor if some of my brother carpenters will give me the best plan for building a portable picture gallery. It is to be made in sections and the size of the building is 10 x 24 feet, and the hight is 7 feet to the eaves.

Storehouse for Vegetables.

From E. E. P., *Imlay City, Mich.*—In the December number, "A. S.," Lancaster, Ill., asks for information with regard to building a warm house for vegetables. I suggest that it is not as difficult to build a house as it is to provide for the moisture given out by the vegetables stored. I built a vegetable house, and when it was filled found that the moisture given off by the vegetables congealed in drops on the ceiling. I could only ventilate by letting in air from the outside, and in cold weather this could not be done without endangering the contents. This compelled me to use a kerosene stove, and I soon found that "eternal vigilance" was the price of vegetables stored in that way. From my experience I believe the covering should either be of earth, which will allow the moisture to escape, or else store large quantities of ice overhead and in that way dry the air.

Bevels for Hip and Jack Rafters.

From J. J., *San Francisco, Cal.*—Notwithstanding the fact that this subject has been exhaustively treated in past numbers of the paper, I desire to make a few remarks with regard to some of the



Bevels for Hip and Jack Rafters.—Fig. 1. — Simple Method of Obtaining Bevel.

methods for obtaining bevels for jack and hip rafters which have appeared in the columns of *Carpentry and Building*. Several correspondents have given the simple method illustrated in Fig. 1 of my sketches as applicable to all cases of ground plan —namely, to set the thickness of the rafter square from the plumb cut, as shown. This, according to my way of thinking, is erroneous and misleading and applicable only where the seat of the rafter is at an angle of 45° to the wall plate. The method illustrated in Fig. 2 of the sketches may be applied to all cases of ground plan and is self explanatory.

Design for a Curb Roof.

From J. T. J., *Jersey City, N. J.*—Will some of the readers of *Carpentry and Building* give me details of a neat design of a mansard or curb roof for a three-

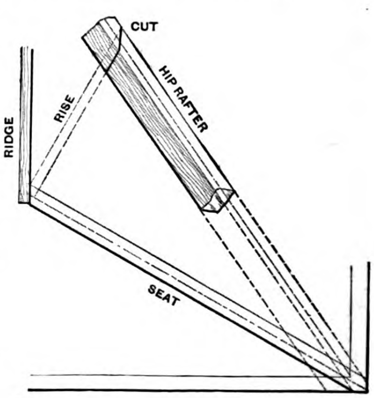


Fig. 2.—Method Suggested by "J. J.," as Applicable to all Cases of Ground Plan.

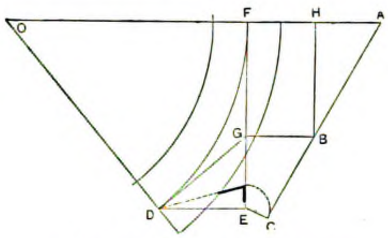
story brick building standing between similar or smaller structures? The building is to be 37 x 80 feet, and the roof to be entirely self-supporting. A little variation on the front slope would no doubt be in place.

Finding the Number of Joists in a Building.

From L. J. N., *Lincoln, Neb.*—I would like to ask the readers of the paper if they know of any shorter or easier way to find the number of joists in a building 16 inches from center to center than multiplying the length of the building by 3 and dividing by 4?

Stair Rail For Less Than a Quarter Circle.

From A. L., *Napa, Cal.*—I send a plan of a stair rail for less than a quarter of a circle which is equal in pitch over both



Stair Rail for Less Than a Quarter Circle.—Fig. 1.—Development of the Rail.

tangents. Referring to Fig. 1, take O as a center and strike the center line of the rail F D. The tangent lines are represented by F G D. Extend F G to E and square over to D. The hight over both

Fig. 2.—The Bevel.

tangents is represented by F A. Bisect F A at H; draw G B at right angles to F G and equal to F H. Connect B with H and draw the pitch line A B C and square over to E. To obtain the bevel of both ends of the wreath, take C E on the tongue and E D on the blade of the square and apply to the square edge of the board, marking at the top of the square as indicated at A, Fig. 2, or as shown by the dotted lines in Fig. 1. To draw the face mold, lay the square on the stock from which it is to be cut and draw A C and C D of Fig. 3 indefinitely. Make A B C equal A B C of Fig. 1. With A B mark the arc at D and connect B D. Make the ends A and D square with the tangents and half the width of the rail on the

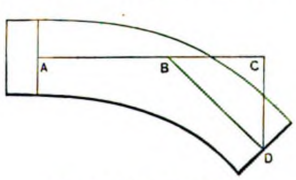


Fig. .3—The Face Mold.

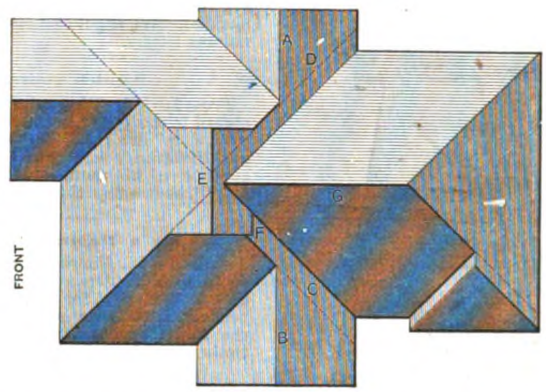
bevels each way from the center, as shown by the dotted line at A, Fig. 2. Bend a flexible strip and mark the curves. Straight wood may be added on one or both ends.

The Acanthus Leaf in Decoration.

From W. F., *Philadelphia, Pa.*—I would like very much to have some of the readers of the paper send the editor drawings showing the acanthus leaf in the different forms in which it may be used in decoration. I would like to see published front views and profiles, as well as description of the method of drawing them.

Problem in Roof Framing.

From G. L. McM., *Tacoma, Wash.*—I submit the following solution to "A. W. H.'s" roof problem, published in the October number of the paper. Fig. 1 of the sketches represents a plan of the roof, giving the seats, hips, valleys and ridges, &c., while Fig. 2 represents the right side as the plan is given in the October number of *Carpentry and Building*. In Fig 1 the dotted lines indicate where the hip



Problem in Roof Framing.—Fig. 1.—Solution of the Problem by "G. L. McM."

rafters, if continued, would lie in the plane of the roof and also indicate their starting point. The only difficulty in framing this roof is found in the fact that the ridges A and B are not on a line, A being 5 inches nearer the rear of the building. This brings the hip at D 5 inches higher than the hip at C, to overcome which the small gables, one being shown at H, Fig. 2, are thrown out as indicated. A gable similar to H is also placed at the opposite end of the ridge, E, Fig. 1. The gable at H, Fig. 2, finishes with the narrow cornice (a 5-inch molding) returning against the roof, as shown at F in Fig. 2. The ridge at E, Fig. 1, may be longer or shorter as desired, provided it is long enough to allow the cornice at F to fall below the ridge G. I think the diagrams illustrate what I mean, so that further explanation is unnecessary. I shall look

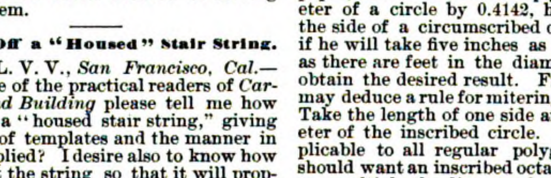


Fig. 2.—Elevation of Right Side.

forward with a great deal of interest to seeing a much better method of solving the problem.

Laying Off a "Housed" Stair String.

From L. V. V., *San Francisco, Cal.*—Will some of the practical readers of *Carpentry and Building* please tell me how to lay off a "housed stair string," giving the size of templates and the manner in which applied? I desire also to know how to get out the string so that it will properly intersect with the base board at the top of the stairs.

Dimensions of an Octagon.

From R. D. C., *Delevan, Ill*—In reply to the inquiry of "R. P. B.," Whitewright, Texas, which appeared in the November number of *Carpentry and Building*, for a rule to find the sides of an octagon when the diameter is given, I submit the following: Subtract from the diagonal of a square whose sides are equal to the diameter of the octagon the diameter of the octagon, and the remainder will be equal to one of the sides of the octagon. For example, suppose the diameter is 12 feet, or one of the sides of a square; then the diagonal, minus one of the sides, will equal one of the sides of the octagon desired. Thus, $\sqrt{(12 \times 12 \times 2)} - 12$ will give the side. As being of possible interest, I would also say that to find the area of an octagon when the diameter of the sides are known, subtract the square of one of the sides from the square of the diameter, and the remainder will be the area of the octagon. For example, let 12 equal the diameter and 5 one of the sides, then will $12 \times 12 - 5 \times 5 =$ the area.

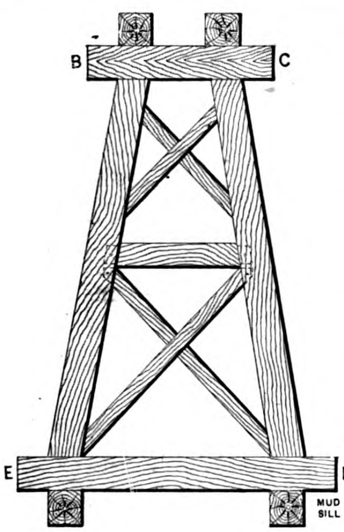
From G. H., *Narrowsburg, N. Y.*—In reply to the correspondent from Texas who recently asked for a rule to find the length of a side of an octagon when the diameter is given, I would say multiply one-half of the diameter by 0.7653, which will give the length of the side. The same result may be obtained by striking the circle and dividing the circumference into 8 equal parts and connecting the points.

From O. L. W., *Dallas, Texas.*—Permit me to say for the benefit of "R. P. B.," Whitewright, Texas, whose inquiry appeared in the November issue of the paper, that if he will multiply the diameter of a circle by 0.4142, he will have the side of a circumscribed octagon; or, if he will take five inches as many times as there are feet in the diameter he will obtain the desired result. From this we may deduce a rule for mitering the angles. Take the length of one side and the diameter of the inscribed circle. This is applicable to all regular polygons. If he should want an inscribed octagon I would say multiply the diameter by the decimal 0.38268.

From S. E. D., *Pittsburgh, Pa.*—In a recent issue of the paper "R. P. B," of Whitewright, Texas, asks for a rule for finding the length of the sides of an octagon when the diameter is known. In reply I will say multiply the diameter by 5 and divide by 12, when the product will be the length of one of the sides. For example, suppose it is desired to find the length of the sides of an octagon which is 6 feet in diameter, $5 \times 6 = 30 \div 12 = 2\frac{1}{2}$, or 2 feet 6 inches, which is the length of one of the sides. Now, this rule may not be exact, but is near enough and will be easy to remember.

Problem in Bevels.

From TRAMP, *Denver, Col.*—Will some of the readers of *Carpentry and Building* solve for me a problem, the conditions of which are as follows: A tapering structure is to be erected similar to a tank support, and two bents or sides framed together like B C D E in Fig. 1. The mortise and tenons are pinned. The corner posts, caps and sills are 12 x 12 inches, the girts are 9 x 9 inches and the diagonal braces 4 x 6 inches. The joints across the top and bottom sides of the girts and braces are made square. Now, when these two bents are raised opposite each other, as at F G and H I of Fig. 2, the girts and braces being put in as indicated by the dotted lines, what will be the bevel across the top and bottom sides of the girts and braces? These are to be put in so that their outside surfaces are at the same batter, or angle, as the posts, as indicated by *a* of Fig. 2. The dotted lines show the position of the end of the girt which is on the outer side of the post. The reason I ask for a method for finding the bevels across the top sides of the girts and braces is because I had a dispute with some carpenters regarding the matter. They claim that the cut across the top sides would weaken the structure, while I was of the opinion that such would not be the case.



Problem in Bevels.—Fig. 1.—View of One of the Bents.

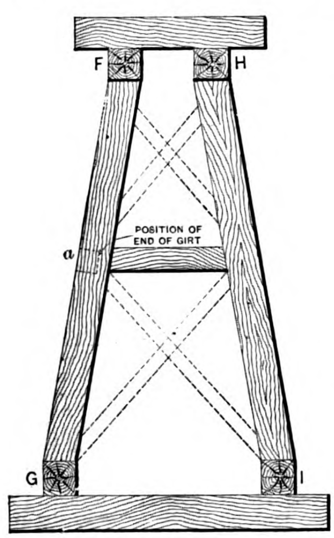


Fig. 2.—Bents in Position.

Note.—Similar problems to this have been discussed in these pages in the past, but the subject has by no means been exhausted. We should be glad to have numerous letters.

"Quick Stairs."

From L. C. A., *Waynesboro, Va.*—With regard to the quick stairs, described by "W. J. S." in a recent issue of *Carpentry and Building*, I would say that I heartily approve of his method of stairbuilding and think it a fine thing.

Framing a Hammer-Beam Roof.

From H. L., *Moorestown, N. F.*—Will some of the readers of the paper kindly give me a method for framing a hammer-beam roof, the span of which is 28 feet, the rise 15 inches to the foot, and the timbers to be employed 6 x 10?

Patterns for Wood Carving.

From S. E. D., *Pittsburgh, Pa.*—Will some of the readers of the paper tell me where I can obtain patterns or designs for wood carving, such as door panels, corner blocks, &c.?

Smoke in Burnt Brick.

From J. C. D., *New York City.*—Can any one inform me what will take out smoke from burnt brick? I have used sal soda and Soapine, but it has not been a success.

Trisecting an Angle of Any Size.

From E. A. P., *Carthage, Ill.*—Will some of the readers of *Carpentry and Building* tell me how to trisect an angle of any size? I have seen the operation performed, but do not know the rule.

Design for Bookcase.

From E. T. B., *Mount Sterling, Ill.*—In the November issue of *Carpentry and Building* there was presented a design furnished by "E. K." Adrian, Mich., for a combination secretary and bookcase. I am much interested in this design, but do not fully understand all portions of it. I would like to ask "E. K." if the ends are cut from the plank, with panels planted on molding, &c., and returned across, or is it built in sections, with sunken panel? Is the end of the bookcase portion the same as on the secretary, or is it a straight line from base to top?

Design for Cheap Cottage.

From W. P. R., *Cleveland, Ohio.*—I would like very much to have some of the readers of *Carpentry and Building* send a sketch showing a cheap cottage suitable for a small family. I would be glad to have it so arranged that the building could be enlarged by a parlor and a bedroom in the course of a few years if desired.

Red vs. White Oak.

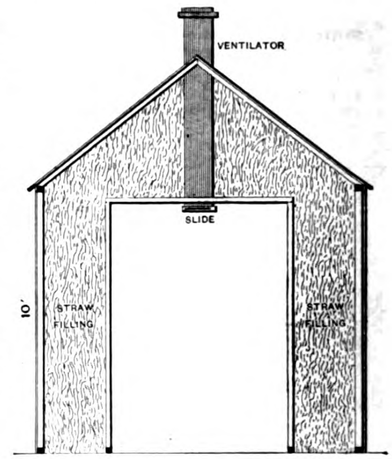
From W. F., *St. Louis, Mo.*—Will some of the practical readers of *Carpentry and Building* inform me how to tell the difference between red oak and white oak?

Designs for a Cheap Country House.

From H. B., *Justus, Ohio.*—I would like very much if some of the readers of *Carpentry and Building* would present drawings of cheap country houses, arranged with six or seven rooms. In this section of the country we want something that is convenient and handy, and which does not cost too much money.

Storehouse for Vegetables.

From A. T. C., *Jacksonville, Fla.*—In the December issue of *Carpentry and Building*, "A. T." of Lancaster, Ill., expresses a desire for a plan and method of building a warehouse in which to keep vegetables from freezing. Many years ago I put up in a cold State a house for such a purpose and the vegetables were kept in a perfectly satisfactory condition. I erected two buildings, one within the other, the outer structure being $2\frac{1}{2}$ feet larger all around than the inner one. The space between the two I filled with straw well packed. For ventilation I put in three 12 x 12 inch boxes running from the ceiling of the inside building to a distance 3 feet above the comb of the outside structure. In the bottom of the box was a slide, by means of which I could open the box a little or as much as circumstances required, the amount varying according to the temperature. I bored about 20 2-inch holes in the box that extended outside of the roof and it gave me all the ventilation required. I think a tight board building is much preferable to one of brick or stone. In Fig. 1 of the sketches is presented a sectional elevation of this house, showing the straw filling between the inner and



Storehouse for Vegetables.—Fig. 1.—Vertical Section Through the Building.

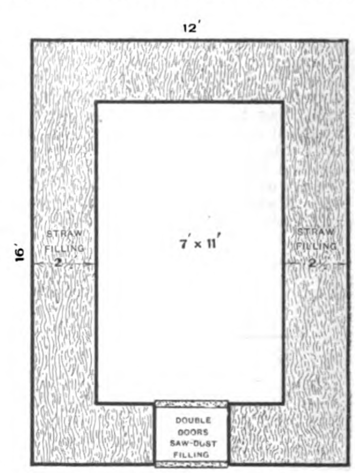


Fig. 2.—Plan View.

outer buildings, while Fig. 2 represents a plan view. The doors I made of double thickness filled with sawdust. I also had some ten or 15 bundles of rye straw piled in between the outer and inner doors, and it occupied but a few moments to remove them when I wished to enter the building.

Floor and Roof Truss.

From C. W. W., *Allentown, Pa.*—In the October issue of *Carpentry and Building*, "R. C. B." submitted an answer to the question of "C. M. J." about the construction of a floor and roof for a hall 36 x 50 feet, both to be self-supporting. I hope "C. M. J." has not yet built the floor according to the description of "R. C. B.," as the floor would not be stronger than to support its own weight, and by no means sufficiently strong to support such a weight as is likely to come upon the floor of a hall which may be used for dancing or be crowded with people at any time.

This may not sound very promising for the constructing ability of "R. C. B." or for the solution of the problem offered by him in such an easy and off-hand manner, but I will ask only the question, if he has already put 2 x 8 inch floor joists in a common dwelling house with a free length of 18 feet? If he has done it—well, I will not try to picture here the consequences of such a work, but will only say that a little thought would have told him the fact that joists 2 x 8 inches and 18 feet long, laid more than 18 inches from centers, are not sufficient for a dwelling house, and consequently much less for the floor of a hall. Having found this out by common sense, a second thought would have told him that in consequence a girder of two pieces of 2 x 8 inches, with a free length of 36 feet, strengthened by an iron rod of 1 inch between them would not do, even if the girder was placed 18 inches from centers instead of 8 feet, as shown in his sketch and description.

I like to see a young man step forward and try his hand at a job, but I expect at the same time he will use some discretion and judgment in executing the work. I am sorry that it is not done in this case, as it may mislead others who perhaps do not read the criticism of "R. C. B.'s" solution. I remember some years ago a similar question was asked by a brother craftsman, and answered by me in this paper, and if "R. C. B." had read that he never would have come out with such a proposition.

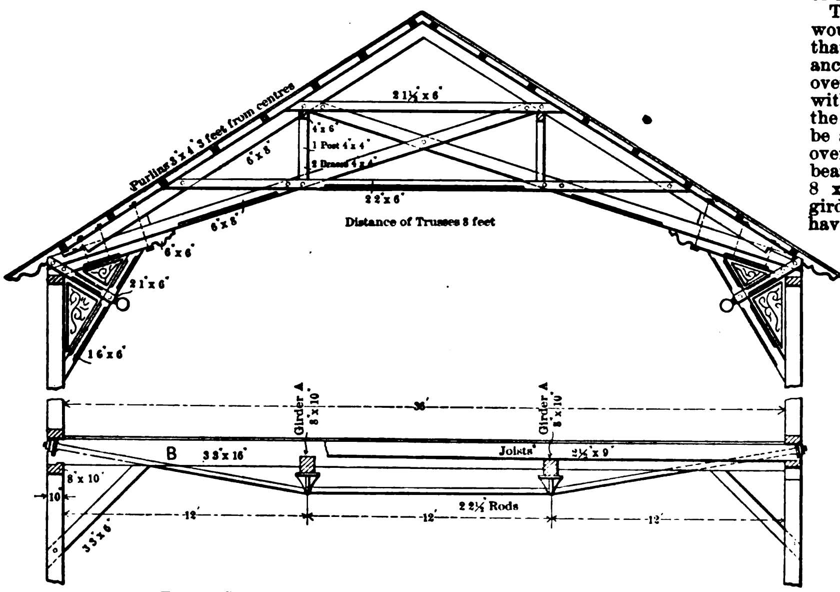


Fig. 1.—Section Through the Building.—Scale, ⅛ Inch to the Foot.

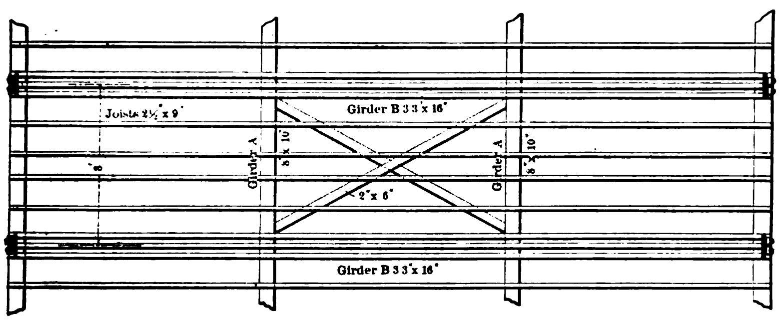


Fig. 2.—Showing System of Flooring Employed.—Scale, ⅛ Inch to the Foot.

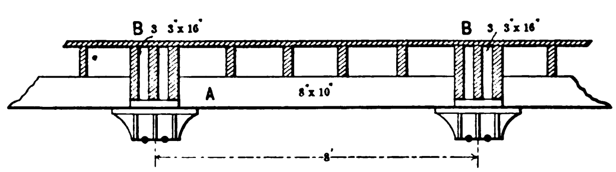


Fig. 4.—Cross Section Through Floor.—Scale, ¼ Inch to the Foot.

Floor and Roof Truss, Suggested by "C. W. W."

The own weight of a hall floor, including the superimposed load, should not be taken less than 150 pounds per square foot of floor space. I will take the width of every floor panel (distance of girders from centers) to be 8 feet, as "R. C. B." has done, in order to better show the faulty construction of his design, but instead of one center girder I will place two girders, A A, Fig. 2, dividing the width of the hall into three equal parts of 12 feet each.

The load on one of these girders, A, would be approximately 12 x 8 x 150—that is, 14,400 pounds. No extra allowance is made that the floor joists may run over the girders continuously—that is, without a joint—as this would increase the load. This load of 14,400 pounds may be assumed to be distributed uniformly over the length of the girder by the floor beams, and requires a piece of timber of 8 x 10 inches. In placing only one girder as "R. C. B." has done, it would have been loaded with 18 x 8 x 150—

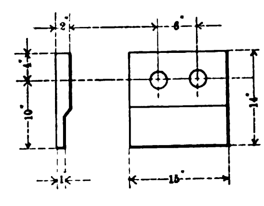


Fig. 3.—Plate for Truss Rod.—Scale, ¼ Inch to the Foot.

that is, 21,600 pounds—and would have required a piece of timber 9 x 12 inches (108 square inches), instead of two pieces 3 x 8 inches (48 square inches), as given by "R. C. B."

The main girder B, in Fig. 2, is supported twice in the center, as shown in Fig. 1, and is loaded at each of these points with 14,400 pounds. The pressure in the top chord will be about 86,400 pounds, and in the bottom chord, the supporting iron rod, about 87,600 pounds. We must use for the top chord a timber of at least 130 square inches section—that is, 9 x 16 inches (144 square inches)—and for the bottom chord an iron rod of 7 square inches section; that is, one rod of 3 inches diameter or better, two rods of 2¼ inches diameter each, the rods to have upset ends.

In the foregoing calculation I have not taken account of the bending of the main girder B by the flooring, as this would not change the result to such an extent as to render the 9 x 16 inch timber (three pieces of 3 x 16 inch) insufficient. Each of the floor joists has to support a load of 133 x 12 x 130—that is, 2100 pounds—and must be at least 2½ x 9 inches, although they have only a free span of 12 feet, instead of 18 feet, as in the construction of "R. C. B." In using the same span as "R. C. B."—that is, 18 feet—the weight on the floor joists would have been 1.66 x 18 x 130—that is, 3900 pounds—and would have required a joist of at least 3 x 12 inches, instead of 2 x 8 inches.

As the room under the hall has no partition walls we have to brace the length walls which support the floor of the hall, as otherwise any little wind would throw the whole structure in a heap. It is absolutely necessary to set head braces from the wall posts to the trusses, as shown in Fig. 1. I would not make the posts to support the girders less than 8 x 10 inches; of course the intermediate posts may be smaller, say 3 x 6 inches. Another thing I would recommend is to place laterals in at least two of the floor panels, that the end walls may not be bulged out, and have the floor joists bridged in every panel.

"R. C. B." will see that it requires at least ten times the amount of timber, and ten times the amount of iron he proposes to make a solid hall floor, and this floor would not be any too strong.

The roof as given by "R. C. B." may be sufficient if the rafters are placed not more than 2 feet apart from centers, although there is every indication that the walls will be pushed outward by the rafters. I would recommend making the 1 x 8 inches inclined boards so long that they meet with the top end of the rafters and nail to them. This would not require much more lumber, but would strengthen the roof to a considerable extent. "R. C. B." says, "the rafters are of the ordinary size and cut." This might indicate 3 x 4 inches, 2 x 6 inches, or 3 x 8 inches, according to our section, but I would not use less than 2 x 6 inches, or better still, 3 x 8 inches, according to the roofing material employed. "R. C. B." does not use any head braces between posts and rafters. I consider these to be absolutely necessary, and the braces should start from a point as near as possible from the floor, not to act against the push of the rafters, which may spread, but to overcome the action of wind. I would never go near a building constructed in the upper part without braces for the walls, even if the weather officer predicted only "light wind, no storm."

In the above I have spoken only of the strength of the construction proposed by "R. C. B.," but now comes the question of appearance. For my own part I would prefer another roof construction, as I do not think that for a hall the ceiling should be left free, showing the 8-inch and 12-inch boards in all their beauty, and if they are to be concealed by plastering, the ceiling would not look nice with the center ridge along the whole hall. It would be better to construct the roof of several trusses, the trusses perhaps with 8 feet distance as the floor girders below, and to show part of their construction, with neat brackets between supporting posts and trusses. This would divide the ceiling, give a better appearance, and the trusses may support the purlins for the boarding and roofing. Fig. 1 shows a roof truss constructed according to the same principles as the roof designed by "R. C. B.," which would give a nice strong appearance to the hall if the lower struts and ties are left free, projecting below the ceiling. Fig. 3 represents the elevations of the plate for the rod, while Fig. 4 shows a cross section through the floor.

American Shingle Practice.

From W. J. McQuillen, *Engineer, Port Blair, Andeman Islands, East Indies.*—Many thanks for the sample copy of *Carpentry and Building*, which reached me safely. I like it very much and herewith inclose you money order for two years' subscription. I desire to ask of the readers of the paper regarding American practice in shingles. I would like to know the length, breadth and the thickness of the thick end, also the slope given to the roof. What timber is best? Are the shingles split or cut up at the mill? How much weathering is given, what preservative is used and how long do they last? The readers may be interested in the practice in this part of the world. The general rule in Burmah is shingles 15 x 5 inches and ½ inch thick at the thick end, tapering off to nothing at the other end. Five inches are exposed to the weather, and the slope of the roof is 35°. Teak wood is generally used. The shingles are cut by circular saw. Each shingle is dipped in crude petroleum before being laid. Some are on roofs here that have been exposed for 30 years. It is a rule to give shingles a coat of hot crude petroleum every two years. The shingles are laid on 2 x 4 inch battens, placed 5 inches between centers, and are fastened by 1¼ inch French wire nails. Any information on American practice which the readers of *Carpentry and Building* may be pleased to put on record will be appreciated.

Note.—We should like to have from a large number of our readers a brief statement of the shingle practice in their sections of the country to print in reply to this inquiry. We would like to have a complete exposition of the shingle business so far as relates to the points raised by this correspondent, covering everything from the old rived-out clapboard to the modern machine-made shingle. There is more variation in practice between different parts of our country than any one builder would imagine. Let us hear from every State in the Union.

Various Topics Discussed.

From J. C. McF., *Richland Center, Wis.*—Having been laid up for some time with an old malady superinduced by an experience of out-door life in Southern latitudes during "the late unpleasantness" of "61" and "65," in combination with an attack of *la grippe*, I amused myself by looking over some of the volumes of *Carpentry and Building*. I found much that was instructive as well as interesting, especially where some correspondent advances a point and another one proceeds to smash it "clean out of sight," as it were, especially in his own imagination. For instance, one says the correct way to file a saw is to point the file to the point of the saw, &c. Another comes back at him with the opposite theory, leaving the matter very much unsettled by their correspondence. I think, however, the correct method of filing a saw is to file it the way the workman can make it cut the best. I file my saws with the point of the file toward the handle of the saw, commencing at the point of the saw. I file a great many for my fellow workmen, and they appear to like my filing. I notice also that my own workmen prefer to use my saws, so that "the proof of the pudding," &c.

Then, again, I find a great many methods of obtaining the length and cut of rafters—hip and valley. My idea is that the best method is that with which the workmen is most familiar. It is perfectly reasonable to suppose that the mechanic can obtain the length and cut his own way much quicker and easier than he can according to the method of someone else. Of course there is a rule for such work ; in fact, several of them ; yet that does not prove that my idea is incorrect. Then, again, there is the hopper that is cut up in all manner of ways, yet the practical workman "gets there just the same" by the "simple twist of the wrist," and does it so neatly and quickly that it is executed before the scientific man has half of his lines drawn and bisected.

Then, again, a carpenter's sister gets into the shop and how the men do spruce up and what a nice young man she speaks of. You bet your sweet life if I was a young man again and could see that article, does any one think I would rest night or day until I had learned the carpenter's trade? And then, if I could make such a "mash" as her young man evidently did, why would I not be in the seventh heaven of joy, and would feel as if I could never tire of fixing up around the house those little shelves, bric-a-brac, &c., for I can see she would appreciate such little attentions. Who would not do such things when one knows they will be appreciated? I cannot help but think, however, that she draws on her imagination a little for her picture. Yet I would be pleased to have her come into the shop every day, as I know her presence would prove enlivening and her suggestions instructive. She might be able to induce some of the old heads to lay aside that nasty old pipe in the shop, and if they must smoke, make use of a good cigar, or wait until the noon hour when they could take a quiet stroll and enjoy a smoke at the same time.

The editor also comes in for his share, for the "policy of the paper" man is after him hot and heavy. Our Toronto friend thinks he could run it better than the present editor, forgetting probably the points he criticises are just what someone else was looking for and that there are a great many readers of the paper besides himself. The editor invites criticism and therefore it is all right.

Such things as I speak of occurred to me while, as stated above, I was looking over my volumes of the paper. I merely write them as they occur to me, not for the purpose of publication but just to show how we country "plugs" look at these things. My rule is to preserve all the issues of the paper and get them bound as fast as a volume is completed. In this way I can get the information I want at the time I need it, while at the same time saving a great deal of research and study.

Note.—We are very glad to have the letter of our correspondent above, and trust that other readers will favor us with a record of such thoughts as may occur to them while perusing the matter contained from month to month in the Correspondence Department of the paper.

Bevels of a Diamond Spout.

From W. A. L., *Kansas City, Mo.*—Will some of the readers of the paper who have had experience in mill work be so kind as to give me through the columns of *Carpentry and Building* an easy way of finding the bevels of a diamond spout? While this subject is of special interest to me, I have no doubt it would be regarded with favor by many other readers.

Articles on Stairbuilding.

From H. F., *Lapelle, Ind.*—I am very much pleased with *Carpentry and Building* and find much in the various issues which is of interest and value to me. I would like very much to have some of my brother Chips present an article or two on the subject of stairbuilding.

Shingling a Hip Roof.

From A. W. P., *Buffalo, N. Y.*—I desire to ask some of the practical readers of *Carpentry and Building* if they can tell me of a practical method of shingling a hip roof without the use of weather boards and do the work so the roof will not leak.

The Leaning Tower of Saragossa.

The old tower in Saragossa is doomed, says the *British Architect*. It was erected four centuries ago, but it is still, as on its first day, the Torre Nueva. As an example of Spanish brick work the tower is interesting enough, but to its inhabitants its importance consists in its rivalry to the Pisan structure. The Torre Nueva cannot, however, be treated as a builder's freak. If there is a departure of 9 feet from a perpendicular line it is owing to the sinking of the foundations. Cases of settlement are generally chronic, and there can be no doubt of the symptoms which are to be observed in the tower. It menaces the people who are so proud of its renown. Although it was restored 30 years since, the ground could not be made firm, and owing to the subsidences the tower was never in a worse state than it is now. The commissioners who have charge of the ancient buildings in Aragon have met and considered the reports of the architects, which state that it is no longer feasible to make the tower secure, and that the safety of the public makes demolition inevitable. But the commissioners have affection for the tower, and instead of approving of the operation they have implored the advice of the Academy of St. Ferdinand in Madrid. But a Spanish savant needs a long period of time for deliberation, and unless an accident should occur, the tower may be visible for many months or years. The faith of the custodians in its stability continues unchanged, for they allow people to ascend to the upper platform.

The Builders' Exchange

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Convention of the National Association of Builders.

The sixth convention of the National Association of Builders was held in Cleveland, Ohio, on January 18, 19 and 20, and presented many strong indications of the fact that the leaven of its existence is continually affecting the builders of the country in various beneficial ways. The work of the convention was carried forward without unnecessary delay or complication, and the attendance of delegates was full and representative. The first session was opened at 10 o'clock on the morning of the 18th, with President Arthur McAllister of Cleveland in the chair. Prayer was offered by Rev. R. A. Rose, and an opening address was delivered by his Honor, Mayor Wm. G. Rose, who took occasion to compliment the builders upon the work in hand and also upon the character of work, in their profession, that is being done for the United States at present. He closed by appointing Col. McAllister commander of the brigade of Cleveland's entertainers and delivered a warm eulogy on the builders of the city.

THE PRESIDENT'S ADDRESS.

The president's address was first on the regular programme of proceedings and was very warmly received. Among other things he said:

Gentlemen of the Sixth Annual Convention: It is with great pleasure that I welcome you on behalf of the Building Trades Association to our city. For the sixth time we are assembled in convention to consider questions which are of supreme importance to us as builders, and it is of the utmost consequence that we should bring to the discussion of these questions our best and most earnest thought. That there are questions of sufficient importance to demand the careful attention of the builders throughout the country is shown by your presence here to-day. The report of the secretary will inform you as to the work which has been accomplished, in whole or in part, during the year just closing. And while I do not desire to anticipate anything he may have to say, I can but express regret that more vigorous action has not been taken in the matter of organizing and fostering trade schools. As I am informed, Philadelphia stands almost or quite alone in this matter. If American boys are to learn mechanical trades they must have the opportunity of doing so provided by such schools. Our workmen are supplied almost exclusively by immigration, very much of it of an undesirable character, in fact, largely of such character as to cause serious damage to the well being of the country, and to threaten the permanency of our institutions. I am fully in accord with the published views, as expressed by their resolutions, of the Workmen's Association in New York, only I would not confine the restriction to the Chinese. As good citizens we should encourage the establishment of trade schools, and as organizations the exchanges affiliated with the National Association, working in harmony, could do much toward the accomplishment of this object. I entertain the hope that your presence here will have the effect of assisting our local builders to a better appreciation of the advantages of proper organization and of affiliation with the National Association. No organization having for its object the getting of something for nothing, but organization whose aim shall be to place the building business upon a plane as high as that of any business practiced in this broad land. The value of the interests involved in our business is so large as to demand an ability and an intelligence second to that required of no other business man, and we should avail ourselves of every possible source of information in the acquisition of a thorough knowledge of the best business methods. We should cultivate a high sense of business honor and have full regard for the rights of our fellows. Let those of us who are less fortunate, less fully equipped, those who are not yet upon the high plane which they should occupy, receive assistance and encouragement from those more highly gifted.

THE CONTRACT QUESTION.

One of the most level-headed attorneys of this city said to me two years ago, in speaking of a contract which I had myself signed, "It always makes me mad to read a contract such as builders sign."

This question—of the character of the articles of agreement—has been considered by this association and may be said to be in a fair way to settlement upon a basis that is equitable and just, but the uniform contract has come into but partial use, due, in a large measure, to the fact that every builder feels that if he refuses to sign any agreement submitted for signature there is a builder standing behind him who will sign, and so, in the absence of effective organization, the abuse continues and grows. It may be accepted as an aphorism that the man who submits to abuse invites abuse, and is certain in the end to be abused. In every business except ours a man who makes an agreement to do a certain thing has this thing specifically set forth, just that and nothing more. The thing to be done and the amount to be paid are both limited. Now, in the agreements which we make the amount to be paid is fixed—the work to be done only partially so. Both drawings and specifications are very frequently incomplete, but the owner is protected from loss on this account by some such phrase as this in the specification: "All work necessary to complete this building and which may not be specifically set forth herein shall be done under the direction of the architect without additional cost." Now, the builder who signs a contract with such a phrase as that above quoted in the specification agrees to do for a stipulated sum an amount of work limited only by the conscience of the architect. It is no answer whatever to this to say that the architect is usually fair and that he rarely takes advantage of his opportunity to damage a contractor. There is no reason in justice why he should have the opportunity and every reason why he should not.

POSITION OF THE ARCHITECT.

In all this there is no intention of having any quarrel with architects or of casting any imputation of bad faith or unfair dealing upon them. The architect, like the lawyer and other professional men, is zealous in the interests of his client, as he ought to be: he is, of course, always desirous that his work should be satisfactory to his employers, that he may again be employed, but above all is his zeal for his client's interest. This zeal, however honest it may be, is the exact thing which disqualifies him for the position of arbiter between his principal and the other party to the contract. Even if it could be shown that in no single instance since the world began had an architect been known to render a decision that was not grounded in absolute justice, still it would be unbusinesslike in one party to a contract involving the expenditure of money to place his interests at the disposal of an arbiter who was the paid agent of the other party to the contract. Who ever heard, except in the building business, of an arbitration in which the attorney, or agent, of one of the parties to the dispute acts as sole arbiter? The contracts as now written are inequitable for want of mutuality. I have noticed in a current architectural publication an address delivered by Mr. Walter Dickson before a class in the Department of Architecture of the Brooklyn Institute. I presume Mr. Dickson is an architect. He was urging the members of the class to inform themselves upon the construction part of their profession, and said: "If an architect is deficient in the practical part of his profession, I defy him to be able to draw a correct specification properly explaining the whole of the work intended, and when a specification is deficient the architect has been known, in order to maintain his dignity and save himself, to exact from the builder, by some peculiar interpretation of his own, the work so omitted. Many a builder has been ruined in consequence, and by the architect refusing to give proper compensation for extra work, thus withholding the certificate until the works were completed to the architect's satisfaction and the builder's ruination." Observe the arrangement of this passage and it will be noticed the "ruination of the contractor" follows the "satisfaction of the architect" as closely as effect follows cause. It will be observed also that it is the architect and not the builder who makes the statement. Now, I want to say in all seriousness that I have never yet met the grade of architect to which the gentlemen referred to by Mr. Dickson belongs, but I am liable to meet him at any time.

There is no reason why any interpretation that is necessary should not be made before the price is fixed and the agreement signed. I know that the claim is made that it is impossible to foresee all the points which may come up. If that is true, then leave those points to be taken care of by subsequent agreement, as is now done in some of the best offices. Why require the builder to draw upon his imagination and anticipate that which it is admitted cannot be foreseen? It is our legal and just right to have the agreement limit the work to be done as rigidly and completely as the sum to be paid is limited.

BONDS OF INDEMNITY.

There is another matter in this connection to which I feel justified in calling your attention, and that is the subject of bonds of indemnity and reservation of payment. To illustrate, a builder agrees for $100,000 to erect a building complete. He is required to give a bond of indemnity for not less than $100,000, conditioned that he shall complete the work in accordance with certain drawings and specifications, which are to be interpreted by a gentleman who is the paid agent of the owner, and in addition to this bond there is reserved the payment of not less than 15 per cent. of each of the partial payments provided for under the agreement, which reserved payment remains in the hands of the owner until the building is completed, usually 30 days after completion and acceptance. When the building has been carried to within $20,000 of completion, and the builder has been paid according to agreement up to that time, the owner has in his possession $72,000 worth of work which has been completed by the builder and his bond for $100,000 to secure the completion of $20,000 worth of work, and at the completion of the work and prior to acceptance the owner has $92,000 of the builder's money and a bond for $100,000. In practice it seems to amount to just this: At the close of such a contract, supposing that the work has been completed in one year, the builder has given the owner a bond, as above stated, for the privilege of having the owner keep $72,000 of the builder's money for about seven months, and of $20,000 for 30 days, without interest. As a business proposition I think nothing could be more unjust.

In ordinary business life it is the man who owes the money who gives the security, but builders have not yet reached ordinary methods. The absurdity of this arrangement is further shown by the fact that, as the responsibility of the builder under the contract is diminished his guarantee is increased, and in the case cited the owner holds the same bond as at the beginning, plus $92,000, while the builder's obligation has practically ended.

Is there any reason in justice or fairness why some such arrangement as the following could not be made: When 25 per cent. of the money value of the building has been put in place and accepted by the owner, through his agent, the architect, have a settlement and pay the reservation up to that date. The owner's guarantee is not impaired, because he has the same bond for the completion of 75 per cent. of the work as he originally had for the entire building. Now, let this be done at the completion of 50 per cent., and again at 75 per cent. of the work.

BUILDER'S GUARANTEE.

Even under this arrangement the guarantee which the builder gives the owner increases as the builder's responsibility decreases. These abuses to which I have referred are not of recent growth. They began at the time when the profession of architecture was not much regarded in this country, when its practitioners were, in the main, men of little education, most of them having graduated from the workbench. They were men with good practical knowledge, but they had no literary training, and but little ability in setting forth in specifications the requirements of their buildings, and in this way, I apprehend, arose the necessity for covering the defects in their drawings and specifications by some general requirement under which the builder who had contracted to build a church could be held to build a steeple also, though none had been shown or specified, because the church was to be complete, and no church is complete without a steeple. This system of making blanket clauses to cover all sorts of contingencies gave them great advantages, and the architects, like other men, will hold any advantage which custom gives them as long as possible, but they do not need this advantage now. The profession is now full of men thoroughly educated, trained designers and constructors, who know what their buildings require and how to impart that knowledge to the intelligent builder, and I can see no reason for the perpetuation of this old makeshift, the necessity for which passed away with the men who devised it. Therefore, I think an open and manly demand for the use of the uniform contract and the elimination of all ambiguity in specifications, all necessity for "interpretation," "peculiar" or otherwise, will be readily acknowledged by architects.

And now, gentlemen, in closing, let me congratulate you upon the fact that our association is and has been exercising a wide influence, not only in our own country but also beyond the seas. I am told by our secretary that he has applications from almost every part of the English-speaking world for reports of our proceedings and other of our literature. This shows us that wise action on our part may produce effects beneficial to our craft in places far removed from us. For this and many other reasons let us try to do our work well.

COMMITTEE ON CREDENTIALS

After the reading by Secretary Sayward of various communications which included many invitations to the delegates to visit numerous places and points of interest in the city, the president announced the following Committee on Credentials: W. D. Collingwood of Buffalo, Thos. J. Hamilton of Pittsburgh, Geo. W. Libby of Minneapolis, James I. Wingate of Boston and C. C. Dewstoe of Cleveland. A recess was taken to await the report of the committee, which was presented in the form of a majority and minority report.

MAJORITY AND MINORITY REPORTS.

The former was as follows:

Your Committee on Credentials beg leave to present the following report: There are credentials from 26 cities, represented by 98 delegates, as follows: Boston, 6; Buffalo, 4; Baltimore, 4; Cleveland, 2; Chicago, 13; Cincinnati, 4; Denver, 4; Detroit, 2; Grand Rapids, 3 Indianapolis, 3; Louisville, 3; Lowell, 3; Lynn, 2; Milwaukee, 3; Minneapolis, 2; New York, 7; Portland, 3; Providence, 3; Rochester, 3; Saginaw, 2; St. Louis, 5; St. Paul, 4; Wilmington, 2; Worcester, 3. The Pittsburgh Exchange have presented credentials containing the names of 18 delegates. The secretary's list shows that they are only entitled to four. Your committee are unable to decide which four are entitled to seats and refer the matter to the judgment of the convention. Respectfully submitted,

WM. D. COLLINGWOOD,
GEORGE W. LIBBY,
JAMES I. WINGATE,
C. C. DEWSTOE.

The minority report was as follows:

I offer the following as a minority report on credentials. I do not concur in the majority report on credentials, in so far as it applies to the Pittsburgh Exchange, and report the following as the legal and properly-authorized delegates (the names of the delegates being subjoined). (Signed)

T. J. HAMILTON of Pittsburgh.

The Pittsburgh Exchange, by reason of the recent strikes which have been in force in that city, has increased in numbers from 135, at the time of the payment of the per capita tax for 1891, to 873 at the time of the convention, and by their misinterpretation of Articles VII and IX of the constitution considered themselves entitled to the above number of delegates. The articles of the constitution bearing on this point are as follows:

ARTICLE VII.—REPRESENTATION AT CONVENTIONS.

Each exchange affiliated with this association shall, at annual or other conventions, be entitled to representation as follows:

One delegate-at large, who shall be the director chosen at the preceding convention, and one delegate in addition for each 50 members or fractional part thereof.

Each delegate shall have one vote, and may be represented by alternate or proxy.

No delegate shall hold more than one proxy.

ARTICLE IX.—ANNUAL DUES.

The annual dues for the ensuing year shall be assessed by each convention, upon recommendation of the Board of Directors. It shall be assessed *per capita* of membership in exchanges or organizations that have gained membership in this association, and be payable through the officers of the exchanges. This assessment will be due and payable at the annual convention, and must be paid within 30 days next ensuing. Default in payment of assessment shall forfeit membership and representation

The position of the Pittsburgh Exchange seemed to be based upon the belief that the convention is the beginning of a fiscal year instead of the end. The constitution having been previously interpreted by the directors to mean that the fiscal year shall begin with the ending of one convention and close with the end of the next convention, it was apparent to the majority of the delegates present that Pittsburgh having paid a *per capita* tax on 135 members for the fiscal year of 1891, which ended with the close of the present convention, they were entitled to only such representation as the 135 members upon whom they had paid their tax for the year 1891 permitted, which would be four, in accordance with the constitution above quoted.

PITTSBURGH WITHDRAWS.

The complication resulted in much argument pro and con, and the minority report was rejected by a vote of 28 to 71. Upon the announcement of the vote the Pittsburgh delegation asked permission to withdraw from the convention, and arose in a body for the purpose of leaving the hall. Before they had reached the door, however, they were prevailed upon to listen to the remarks of Edward E. Scribner of St. Paul, who beseeched them in the name of the National Association and in the name of every delegate present to remain in the convention, to seat the four delegates to which the majority of delegates had voted them entitled, and participate in the proceedings of the meeting. Mr. Scribner requested permission to invite them to seat the remainder of the delegation as alternates, which was spontaneously granted by the whole convention. In closing his appeal Mr. Scribner said: "Allow me, gentlemen, then, in the name of my colleagues and our fellow members, to plead with you that you remain upon this floor, that you accept the decision of this body, even though you may think it wrong; even though you may think it unfair; stay here with us, vote with us and make this concession to the opinion of the majority." Mr. Scribner's remarks were received with the utmost warmth and appreciation by all present and after brief consultation the Pittsburgh delegation announced that they would withdraw for consultation, and departed in a body.

The majority report of the Committee on Credentials was then adopted unanimously.

RESOLUTIONS OF PITTSBURGH DELEGATION.

On the second day of the convention at the beginning of the afternoon session the following preamble and resolution was received from the Pittsburgh delegation:

To the President and Members of the National Association of Builders in Convention assembled at Cleveland:

GENTLEMEN.—At a meeting of Pittsburgh delegates the following action was taken:

Whereas, the Pittsburgh Exchange elected 18 delegates, as allowed by the constitution of the National Association of Builders, being one delegate for each 50 members in good standing; and

Whereas, On the presentation of their credentials to the proper committee of the N. A. B., a majority of said committee decided that the Pittsburgh Exchange is entitled to only four delegates, including the delegate-at-large, and said action of the committee was confirmed by the convention now in session; and

Whereas, Although we regret being compelled to take action severing the connection of the Pittsburgh Exchange from the national association, as our heartfelt sympathies are with the association in its mission and work, yet as we cannot submit to gross injustice, therefore be it

Resolved, That we withdraw, both as delegates and as an exchange, from the National Association of Builders. (Signed)

A. J. HARNACK, Chairman.

On motion, the resolution was unanimously received by the convention and ordered placed on file.

The next business in order after the adoption of the report of the Committee on Credentials at the first session was the appointment of the following Committee on Time and Place of Next Convention and to nominate officers for the ensuing year: George C. Prussing of Chicago, W. J. Hill of Denver, Thomas J. Kelly of St. Louis, H. H. Edgarton of Rochester and N. H. Creager of Baltimore.

REPORT OF SECRETARY.

The secretary's annual report, which next followed, covered the ground gone over during the past year very thoroughly, showing the work accomplished and projected, and the present condition of the association. The last annual report of the secretary showed an affiliation of 35 exchanges, and during the year three exchanges have dropped out and two new ones become members, leaving an affiliation at present of 34. The Kansas City Exchange has been obliged to temporarily drop out owing to various causes. A thorough reorganization is now taking place for the purpose of placing the exchange on a firmer footing and improving some of the conditions under which the organization formerly existed. It is the purpose of the Kansas City Exchange to rejoin the National Association as soon as their reorganization is effected. The secretary, in a recent letter to Mr. Sayward, wrote that he had never heard either in or out of meeting such favorable expressions as to the great good which the National Association has done and is doing, and the benefit it has been to that exchange, as were voiced at their last previous meeting. The exceedingly dull season in St. Joseph, Mo., has resulted in so great a lack of interest in the affairs of the exchange that it has been unable to comply with the requirements of the constitution. "The worst feature of this condition of things in exchanges," said Mr. Sayward, "is not the loss to the National Association, but is rather the great misfortune which the exchanges suffer through demoralization, which follows from a cessation of interest in their associated work, a demoralization which will sometimes require much more determined effort than ever before exerted to concentrate and combine their work and influence again. There is no doubt there are opportunities in an exchange for mutual protection and benefit, particularly through seasons of general business depression, and even in cases of special disaster, by means of organization and combined endeavor, little dreamed of by the greatest enthusiast in the future of builders' associations It is, of course, to be regretted that we are not already in possession of all the benefits that the future may develop, but it must be remembered that the oldest of our local organizations is but young in its investigations, and cannot expect to have all the advantages of fuller growth."

WASHINGTON EXCHANGE.

The filial body in Washington, which up to the latter part of the year was in full sympathy with the national body, withdrew its membership without a word of explanation, and the secretary's department is not at present in possession of any definite reason for its withdrawal. An intimation was given shortly after the last convention that the Washington Exchange was in favor of a $2 *per capita* assessment and opposed to $3, but their assessment was paid on a basis of 135 members, and, as the difference would only be $135, it is hardly to be supposed that the exchange could have withdrawn on that account. The defection of the Washington Exchange is to be deplored. In many respects it is an exceptional body. Its attainments during its short existence have outstripped many of the older bodies. The progressive action of the Washington Exchange has always been a source of gratification to the National Association, and their action in regard to a building an example to every other organization of builders in the country, and it is to be hoped that no internal disaster is the cause of this withdrawal.

The two exchanges which have been added are Chattanooga, Tenn., and San Antonio, Texas.

The 34 associations represent a total membership of about 3500 builders, and indirectly many more, for every community in which there is a filial body is benefitted by any action which is for the good of all. It may be fairly claimed that the whole building fraternity in each city affiliated with the national body is represented through the local association.

BEST METHODS FOR ORGANIZING EXCHANGES.

The secretary's department is continually besieged for information as to the best methods for forming organizations. The idea of association is unquestionably spreading, and it is of the utmost importance that the new bodies which are being organized should start in such a manner that the work will not have to be done over again in a few years. Herein is manifest one of the beneficent functions of the National Association—viz , to aid in securing the establishment of associations of builders on the right basis, and prevent them in the beginning from making the almost inevitable mistakes which new bodies make, unguided by the experience of others.

It is now pleasing to report that the efforts made by builders of Australia have successfully formed a national association, and it is particularly gratifying to note that it has been formed upon lines that are identical with our own, with changes suitable to the locality. Their second annual conference, held in October, at Melbourne, the report of which follows the style adopted by this association, shows that much the same conditions exist with them as with us. The president, R. C. Brown of Melbourne, in his address, gave due credit to this association, saying: "You are no doubt aware that in holding these conventions we are following the lead of the American builders, for, finding the conditions of our business life to be similar in almost every respect to theirs, and that great benefits had resulted to them from their association, we determined to follow their example. We cannot expect to do things with the order and completeness which obtains in the United States. If, however, we get no further than an annual interchange of ideas and experience between the leading builders of the Australasian colonies on matters generally affecting the interests of the trade, we shall have accomplished enough to repay us for the time and expense."

BENEFITS FROM PUBLICATIONS.

The secretary touched upon the benefits that have been derived from the various publications of the National Association, showing that much importance is attached to the pamphlets issued and that they have been widely distributed both in this country and abroad. Through the medium of *Carpentry and Building*, public attention has been drawn to subjects considered by the National Association in localities where there are no filial bodies and hundreds of requests for information are received from all over the world in regard to subjects treated by the secretary through its columns. There is no doubt that the uniform contract is now firmly established and that its use is gradually extending, still it needs the constant urging by the officers of the central body and the equal interest of filial bodies. Unless the importance of its use is continually placed before those who are called upon to make contracts, by those who have been instrumental in its creation, we cannot expect that it will be pushed by others. The secretary strongly recommended the presentation of the literature of the National Association, either reports of conventions, special reports of committees, discussions and articles prepared in editorial form, or other material of similar nature, more thoroughly before the members of the local bodies. Members of filial exchanges should read the official paper, in which articles are presented from month to month that are prepared with the greatest care for the purpose of exciting thought, and bringing about action on subjects upon which all agree that study and action are much needed. "In consideration of the fact that we are engaged in a great and noble calling, we are too readily content with the superficial information, and the builder will never realize how great his vocation really is until he comprehends its scope and understands its logic and its technique, as well as its practice; until he grasps its full meaning from a business point of view and follows it upon broad lines to higher development."

MEETINGS OF EXCHANGES.

For the better dissemination of the recommendations of the national body the secretary urges that each exchange hold meetings for the purpose of having such recommendations read and discussed, and unhesitatingly advises that such discussions be preceded by a dinner or light repast. Such meetings should be held at the usual time that club dinners are held—say from 5 to 6 o'clock—thus giving ample time for a "smoke-talk" afterward, and an adjournment at a seasonable hour. The meetings should be held as often as once in two months, and perhaps as often as once in each month, though it would be better to be obliged to hold the meetings oftener than to have them lapse from too great infrequency. This plan will furnish a capital means of creating interest in the work of the National Association and the reading of its productions systematically, with the discussion which will surely follow, will build up methods of examination, analysis and comprehension which are so essential to the clearer understanding and deeper knowledge which the National Association seeks to encourage. Considerable stress is laid upon this point, for the reason that the secretary's observation shows that the great need of all associations is the devotion of more time to the consideration of questions and methods in and through which the individual is affected, but which need the united study and action of the group of individuals in that particular interest in order that modifications and betterments may be secured, and in which all may participate.

THE GREAT DRAWBACK.

The great drawback to the efficiency of associations to-day is the apparent existence of an idea that reforms can be obtained simply by the establishment of organizations or the adoption of resolutions. These two factors are essential as primary movements, but they are of little value unless supplemented by continuous, persistent regular work on the lines of organization and resolve, and without this work no result can be hoped for. It is not easy for builders to lend themselves to this necessary work; their whole habit has been to suffer evils and "get along" in almost any fashion, no matter how much worse off each inattention and each sufferance may leave them ; secretaries, as well as other local officers, are continually appealing for advice and counsel—as to how to overcome this apathy—to the National Secretary, who seeks on each occasion to suggest some new way and to infuse new hope, even while confessing that the task is far from easy. To induce men to think more, and then to apply the fruits of this thought so that proportions to good may follow, is the one great impulse which sustains all progress, and yet the history of the world shows that in no direction has progress been made without constant endeavor in the face of such distrust and apathy, even among those to whom the greatest benefit is to accrue.

BUILDERS' EXPERIENCE NOT PECULIAR.

This condition, then, is not peculiar to builders only, and the secretary says to all officers of filial bodies who feel discouraged because their members are apparently heedless of their duty, and thus fail to put into operation the recommendation of the national body, or carry out effectively measures calculated to improve existing conditions: Don't imagine for a moment that your experience is singular—'tis the way of the world—and while it is disappointing that all are not imbued with the same feeling at the same time, and do not unite in a grand movement toward accomplishment of ends that all agree are desirable, it is still nothing peculiar to us as a class. All classes of men are alike in this—they suffer much as individuals before they will combine and act for any common good. Progress cannot be hoped for in one steady march onward, there are bound to be many haltings and retrograde movements, doubts as to the direction of our course, defects on account of inattention, and slothfulness, and hesitations, and discouragements innumerable; but if we only keep our faces in the right direction, we are bound to succeed eventually.

Keep a motive back of all our endeavors and we need not question the final result, even though there may be many stages which surround us for the time with confusion and apparent defeat. Here lies one of the great functions of the national body —to keep the motives pure and high, to insist upon the integrity of the principles which guide us and so encourage all the filial bodies through seasons of doubt and discouragement. In any event, the National Association has no right to waver. No matter how any filial body may falter and fail, the central body must keep up its tone and raise the standard high, so that every filial body may feel, as one of them recently and aptly expressed it, "loyalty to the national body and its principles is the greatest strength and the surest safeguard of the local bodies. The National Association should be above discouragement, should discount all the obstacles which its high standpoint permits it to overlook, and steadily proceed in its great work of leading the builder up to higher levels, to greater security and to larger opportunity."

STATISTICS OBTAINED.

The statistics that have been collected during the past year have been much more comprehensive than in years past, and include information regarding conditions under which contracts are submitted in various parts of the country, the percentage of contracts carried on under the uniform contract, the wages paid and hours worked in the different cities and the list of associations, as in former years. The statistics regarding the latter show an increase of 85 associations throughout the United States, nearly half of which are organizations of builders, the majority of which have applied at some time or other to the national secretary for information and advice.

The secretary presented the result of the various efforts in search of statistics, and gave a summary of the action taken at the mid year meeting, with the work which it entailed, all of which have been presented from time to time in these columns. In touching upon the conditions that have existed in the labor market during the past year the secretary stated that the strike in Pittsburgh was the most serious disturbance that had occurred, as every trade was involved with the exception of the stonecutters, who had previously adopted the form of arbitration recommended by the National Association.

THE PITTSBURGH STRIKE.

The strike was long and bitter and the Builders' Exchange of that city proved to be the rallying ground and inspiration of the building interests, and the membership of the exchange increased largely under the stress of trouble. This increase of membership is an illustration of what has so often been stated in arguments in favor of organization for builders, that while builders, like other business men, when all is fair are apathetic in, and perhaps directly antagonistic to, the idea of associated effort, when there comes a time of trouble they huddle together and find comfort and help by so doing. If by good fortune some have been wise enough to have the frame work of organization ready, it is then considered providential, and all are willing to take advantage of it. The strike started on May 1, and although never officially declared off by the workmen, the result is practically the same as though it had. The Builders' Exchange succeeded in maintaining its ground and virtually won the victory, although it is not so acknowledged by the labor organizations. The exchange is to be congratulated upon the great skill with which the difficulty was handled and the cohesion of so large a body under such a strain is very remarkable. The advice of last year in regard to the importance of having a paid secretary for each exchange was reiterated and its importance urged. The ownership of buildings by exchanges is increasing. Buffalo and Milwaukee have their buildings well along at the present time; Baltimore has a purchased lot of land and plans approved for its building. Other cities report consideration of this subject, and before many years there will undoubtedly be many new exchange buildings throughout the country, connecting the members of the local bodies more firmly together and giving strength to the chain that binds us all together. The builders of the filial bodies can be congratulated upon a generally prosperous condition during the past year with other prosperous years in sight. They may feel thankful that so little has occurred to jeopardize their interests since we last met, and they can attribute a large share of their peace and security to the National Association.

REPORT OF TREASURER.

The treasurer's report showed a balance on hand of $1,848.99, from which the expenses of the convention are to be deducted, which will leave the balance carried over to 1892 somewhere in the vicinity of $1000.

COMMITTEE ON UNIFORM CONTRACT.

The report of the Committee on Uniform Contract was next in order and was submitted by the chairman, Mr. George C. Prussing of Chicago. The report recited the strength of the position held by the form and the fact that while certain criticisms had been made as to the length of the document, all the changes that have been suggested have been of the nature of interpolations tending to increase its length. The change suggested at the mid-year meeting, of changing the word "being" to "if" in the end clause of the contract, was recommended and the change is anticipated at the next meeting of the joint committee. The committee paid a tribute to the late O. P. Hatfield, who was a member of the original committee. It has been impossible to hold a meeting of the joint committee owing to the fact that the members from the American Institute of Architects of the joint committee were appointed too late to make a conference to be had previous to the present convention.

The long discussion regarding the Pittsburgh complication and other consideration so prolonged the session that it was inexpedient to continue to the end of the programme, and a motion was made and carried to hold two sessions daily, allowing an intermission for lunch, the plan of holding but one session having proved impractical, and the convention adjourned.

TUESDAY.

Taking up the balance of the programme, the first thing in order was the report of the Legislative Committee, which was as follows:

To the President and Delegates to the Sixth Annual Convention of the National Association of Builders of the United States:

Your committee having been instructed by vote of the directors at the recent mid-year meeting to consider "whether it would be feasible for the National Association to recommend any plan whereby the sale of building materials could be so regulated that contractors in the building trades would be entitled to purchase at lower rates than the outside public," would respectfully submit the following as the result of some little thought, inquiry and careful consideration of this very important subject.

It goes without saying that in general commercial life and practice in the handling and sale of any of the leading lines of either agricultural or manufactured products, outside of the building trades, it is recognized as right and eminently proper that he who purchases in carload lots, or, if otherwise, is constantly in the market buying the material demanded by the exigencies of his business, should purchase such product or material at lower rate than he who buys in smaller quantity or need to make, perhaps, but one such purchase in a year, or, possibly, in a lifetime. Yet in the building trades or among the manufacturers and dealers in building material we are credibly informed that quite a different custom has and does prevail. Nay, so anxious many times are the purveyors of building material to make a sale, that the laws of trade governing all other branches of commercial life are actually reversed, and we find the gentleman proposing to erect a single residence or store building able to buy cheaper in the open market the brick or lumber required than can his builder, who, it may be, is carrying on a building business amounting to $100,000 or more per annum, and, therefore, presumably purchasing annually for a series of years many times more material than does the would-be owner of this one edifice. These being the admitted facts and admitted wrongs, what is the remedy? Here your committee must admit that they find themselves confronted by a problem not easily solved.

It has seemed to the members of your committee that it would be unwise for them to attempt more at the present time than to suggest thoughts and ideas on this subject, calculated to induce a thorough discussion of this very important subject, and of ways and means calculated to secure to the members of the various affiliating exchanges the maintenance of better business methods in this regard than now obtain.

We would suggest for your consideration, whether this subject could not be better handled, more conclusively and effectively settled, by the members of each of the master trades associations constituting the several local exchanges. The carpenters first taking action, then, through a committee, conferring with lumber dealers. The master masons pursuing the same course with the stone, brick and cement dealers, &c., and each association reporting their action and subsequent success to the local exchange for endorsement and ratification. One important association, whose members are found also in our local exchanges and are represented on this floor, has decided and demanded that the manufacturers of the material which they, as skilled mechanics, are using and applying in the course of their business, shall not sell such material at any price, as we are informed, to any *but such master mechanics.*

Your committee feel that there may be serious objections to endeavoring to enforce so stringent a rule in all lines of building manufacture and among all the building trades, and would suggest that the remedy for the evil so justly complained of, as we believe, by the master builders of the country, may be found, rather, in a system of discounts similar to that so familiar in merchantile life. Such system to be made, of course, favorable to the master builder, who is necessarily the steady buyer, whose trade the manufacturer or dealer naturally seeks and highly values.

With these thoughts and suggestions we hope, as above intimated, to promote reflection and discussion of this very important subject, not on this floor alone, but among these delegates and their associates in the various local exchanges, where, after all, the real work of this body should be done and its results achieved.

EDWARD E. SCRIBNER, Chairman.

COMMITTEE ON LIEN LAW.

The report of the Committee on Statistics having been incorporated in the secretary's report, the Special Committee on Lien Law reported as follows:

To the National Association of Builders of the United States:

GENTLEMEN.—Your Special Committee on Lien Law would respectfully report that they met in Cleveland at the mid-year meeting and were in session on several occasions, four of the five members being present. The subject was thoroughly discussed, and we found that our views were at great divergence; in fact, we were equally divided as to the advisability of having a lien law in any form. It was decided to ascertain the views of all the exchanges connected with the National Association on this important subject. With that end in view we caused to be issued the following circular letter to many of the individual members, and to all the filial bodies.

"For the purpose of assisting the committee in the formulation of a comprehensive report and recommendation for action to the coming convention the following questions are asked of each filial body, and you are urged to consider the subject carefully, to the end that thorough and intelligent action may be taken on the subject by your exchange:

"1. Is the exchange in favor of a lien law?

"2. If it is, is the present law of your State satisfactory?

"3. If present law is not satisfactory, what change would you suggest?

"A letter has been sent to the secretary of your exchange requesting that a meeting be held as soon as possible for the consideration of the subject, as it will be one of the most important under discussion at the convention.

"By order of the

"COMMITTEE ON LIEN LAW.

"W. H. SAYWARD, Secretary."

Replies were received from 22 of the 34 exchanges comprising the association, as follows:

Seventeen answered in the affirmative to question No. 1, "Is the exchange in favor of the lien law?"

One in the negative.

One equally divided by a tie vote to question No. 2, "If it is, is the present law of your State satisfactory?"

Six answered "yes," while the balance either answered "no" or suggested certain changes.

While the replies to the circulars indicate that the exchanges, as bodies, are largely in favor of a lien law, yet your committee, at their meeting on Saturday night last, were again evenly divided in their views on the subject. One of the committee who was present at the mid-year meeting was absent on this occasion on account of sickness, while the former absentee at the mid-year meeting was present at this latter meeting. Your committee fully appreciate the magnitude of the subject referred to them with the great interests involved, affecting not only the general contractor, the sub-contractor and the material men, but equally affecting the interests of the owner. They therefore believe it would be to the best interests of all concerned to have this subject thoroughly and exhaustively discussed, with a view of securing the greatest amount of information on the subject by comparing the views of the delegates present.

In conclusion we would respectfully recommend that the whole subject be referred to a Standing Committee on Lien Law, and that each exchange be requested to thoroughly discuss the subject, and to communicate any and all suggestions from time to time to the general secretary.

Your committee would offer the following resolution:

Resolved, That a Standing Committee on Lien Law, consisting of seven members, be appointed by the president to consider the subject and report from time to time to the convention.

Signed by

JOHN S. STEVENS, S. D. TIPPETT, RICHARD SNELL, J. T. DARLING, } Special Committee on Lien Law.

W. G. VINTON, absent on account of sickness.

UNIFORM BUILDING LAW.

The report of the Special Committee on Building Law was next presented:

1. The committee shall be known as the Combined Committee on Uniform Building Law and Reduction of Fire Waste.
2. The purpose of this joint committee is to investigate and consider the question of construction of buildings, with the end in view of arriving at conclusions which can be recommended to all cities of the country as the consensus of opinion of the various professions and callings represented in this committee, and as the best general methods to adopt for the interests of the people in the matter of construction of buildings and protection against loss of life and loss of property by fire.
3. The combined committee shall consist of three members from each of the following bodies—viz.: the National Association of Builders, the National Board of Underwriters, the National Association of Building Inspectors, the National Association of Fire Engineers and the American Institute of Architects—who shall be chosen in such manner as may be deemed best by the bodies which they represent.
4. The officers of the combined committee shall be a chairman and a secretary who shall also be treasurer.
5. Regular meetings of the committee shall be held annually, if practicable at the time of the annual meeting of the National Association of Builders, and special meetings at the call of the chairman, but a sub-committee shall be appointed to act during the recess of the combined committee, under such instructions as may be given it.
6. Each association shall pay the expenses of its own delegates and one-fifth of the general expenses.

RESOLUTIONS PRESENTED.

The following resolutions were presented and referred to the Committee on Resolutions:

Resolved, That President McAllister be requested to furnish the secretary with a copy of his address to the delegates of this convention, and that the secretary cause to be printed and distributed such number of copies as may appear to the Executive Committee right and proper.

(Signed) EDWARD E. SCRIBNER of St. Paul.

Whereas, There appears to be a difference of opinion on the interpretation of the constitution, and certain defects in other parts, therefore

Resolved, That the incoming Board of Directors be requested to consider the subject, suggest the necessary changes, if any, and present the same for adoption at the next convention.

(Signed) MURRELL DOBBINS, Philadelphia.

Whereas, Delegates from the wild and woolly West, learning with surprise and regret that individuality is in Cleveland carried to so great an extreme that several different standards of time exist and are expected to govern the movements of the populace or the strangers within their gates, and being greatly embarrassed thereby, and uncertain as to which of these several standards of time are to control the movements of this convention; therefore be it

Resolved, That the sessions of this convention be opened and conducted by railroad or standard time, rather than by any one or more of the systems adopted and in use by the conservative inhabitants of this conservative city.

(Signed). GEO. W. LIBBY.

GENTLEMEN.—We, the undersigned delegates of the Builders' Exchange of Indianapolis, have been requested to offer through your committee the following resolution for consideration at the meeting of the National Association of Builders:

Resolved, That the mid-year meeting, instead of being held in the same place where the annual convention is to meet, be held at some other city where the work of the committee would be equally as well done, and at the same time render some valuable service to exchanges who need encouragement and assistance in the methods of work and in the management of their affairs. It is earnestly requested that our delegates invite the next mid-year meeting to be held at Indianapolis.

Respectfully submitted,

WM. P. JUNYLANE,
C. BENDER,
J. E. TWINAME.

At a stated meeting of the Master Builders' Exchange of Philadelphia, held on January 5, 1892, the following resolution was adopted:

Resolved, That the committee of the National Association having the matter in charge be requested to fix the date for the holding of the annual conventions early in February of each year, instead of January.

(Signed) GEORGE WATSON, president,
WM. HARKNESS, secretary.

A resolution on free coinage was presented by C. J. Smith of Denver, which was considered by the Committee on Resolutions to treat of a subject upon which the National Association of Builders is not competent to act and recommended that no action be taken thereon, which recommendation was adopted.

CONSIDERATION OF REPORTS.

Following the programme, the next thing in order was the consideration of the report of the Committee on Uniform Contract, which was adopted without discussion.

The report of the Committee on Legislation elicited considerable discussion, some of the delegates being of the opinion that the same thing could be accomplished through the National Association of Builders as had been accomplished through the National Association of Plumbers, in regard to securing a less cost of material to the contractor than that at which building material was sold to the owner or occasional buyer. In view of the difference in the case of the builder and the plumber, and the fact that the manufacturer of building material, in a very large majority of cases, only supplies a very small locality, it was voted to recommend to the filial bodies that an effort be made whereby each exchange should arrange a system of discounts from the regular price of building material which should apply only in the case of the builder and urge the same upon all material dealers in their various localities.

THE LIEN LAW.

The report of the Special Committee on Lien Law brought out the best and most intelligent discussion of the convention, and was very thoroughly argued on the proposition asked of each filial body: Is your exchange in favor of a lien law? The discussions were very full on both sides of the question, and it transpired that while the sentiment of the majority of the exchanges were in favor of some form of lien law, the personal opinion of the delegates present was about equally divided. The position taken by delegates who were not in favor of any form of lien law was that it depreciated all classes of contracting by enabling the dealer in building material to sell to any contractor, no matter how irresponsible or incapable, thus permitting and fostering an undesirable class of competition. The irresponsible contractor being assured that the material dealer, under the protection of the lien law, will sell him all the material he wants, is thus enabled to come into competition with contractors of reputation and ability and can underbid them, because he has nothing to lose, and trusts to luck to be able to "skin" something out of the job. The existence of such an element, it was maintained, results in the depreciation of the entire building interests by compelling a ruinous competition and in bringing the reputable builder down to the level of the man who could not procure a dollar's worth of material if the lien law were not in existence. The arguments in favor of a lien law were such as have been familiar to all for years. It was apparent to all that a uniform lien law for the entire country is an impossibility and the result of the argument was the adoption of a resolution that a standing committee of seven be appointed to consider the question and report to the association.

The report of the Committee on Building Law was next adopted.

Reports from filial bodies were next in order, but owing to the lateness of the hour the report from Boston only was presented.

REPORT FROM BOSTON EXCHANGE.

The report from Boston showed that a very satisfactory year had just passed without serious labor disturbance of any kind. The Master Builders' Association has fully carried out the recommendation of the fifth convention regarding arbitration in the mason's branch of the trade, and the result is very gratifying. The next important step taken by the exchange in the past year is the entire remodeling of their building, which is now fully occupied by builders and is yielding a handsome return. The membership has considerably increased during the year and at the same time the standard of membership has been retained. The exchange extended a reception to the members of the American Institute of Architects during their recent convention held in that city, which was a very enjoyable and satisfactory affair.

After the reading of the Boston report an adjournment was taken until Wednesday morning.

WEDNESDAY.

The hearing of the reports from filial bodies was resumed. The Buffalo Exchange reported, as one of the most important events of the year, the adoption and bringing into actual practice of a code of rules for the government of the submitting of bids. The code was published at the time it was adopted, and it has withstood the test of almost a year and is in beneficial operation at present.

The new home of the exchange is now being put under roof, and when completed will be one of the finest fire-proof office buildings in the city. The method of securing funds for erecting the building was the formation of a stock company and the issuing of $75,000 worth of stock; the balance, $90,000, was raised on bonds and mortgage at 4½ per cent. The increase in membership has been steady and satisfactory, and the exchange is in most excellent condition.

THE CHICAGO EXCHANGE

reported that but few changes had occurred during the year as far as the membership was concerned, and that there is a strong feeling of the need of an exchange building of their own. After the expenditure of much time and money the exchange finally secured the repeal of the most offensive portions of the Illinois lien law, and a new section embodied giving the contractor a lien for work performed up to the time of refusal or failure of the owner to make payment at the specified time. For the protection of labor the owner is now required to retain 50 per cent. for twenty days after the completion of the contract in order that in default of the payment of labor by the contractor the labor may be protected. A committee has been recently appointed in the exchange to consider the benefits received from the National Association, as against the cost, and after exhaustive study of the subject it was conclusively shown that the benefits far exceeded the cost. The exchange has enjoyed an exceptionally successful career, and is at present in good condition.

THE CINCINNATI EXCHANGE.

reported a fairly satisfactory year and progress in the organization. The exchange recently placed itself on record as favoring an equitable lien law, and is at present considering the recommendations of the National Association. An effort is being made to secure full statistics regarding the building interests in Cincinnati, from which beneficial information is expected. Committees from the Builders' Exchange have been invited to consider subjects of interest to the city in connection with the Chamber of Commerce and Board of Trade, and it is continually growing in influence and importance. The exchange has formally adopted the uniform contract and is advocating its use in all cases.

GRAND RAPIDS, MICH.

reported a prosperous year, with an increase in membership of nearly one third and a bright outlook for the coming year.

INDIANAPOLIS, IND.

The report from Indianapolis showed the exchange in good condition with an active effort on foot to establish a 'change hour. A very gratifying recognition was made of the value and importance of affiliation with the National Association, and the importance of applying the suggestions which it makes. The exchange has been doing good work in settling differences between members by arbitration, without resorting to process of law, and the result is entirely satisfactory. It is the sentiment of the exchange that the labor problem should receive the earnest consideration of the National Association, and it requested that the mid-year meeting for 1892 be held in a different city from that in which the convention is to be held, in order that a greater number of exchanges may receive the benefit of the presence of the national officers and directors, and requested that the next meeting be held in Indianapolis.

LOWELL, MASS.

The Master Builders' Exchange of Lowell reported that the past year has been one of almost unexampled activity in the building trade, with a larger number of public buildings and business blocks under construction than ever before in the same time. There has been no trouble with the workmen, and fair prices have prevailed. The exchange has considered the Code of Practice, the desirability of securing a building of its own, and the importance of using only the uniform contract. An effort is now being made to secure the establishment of the code and the uniform contract with the architects, with prospect of success. That the exchange is of some importance in the city is shown by the fact that during the past year a supervisor of Government buildings under construction and an inspector of of buildings have been appointed from among the members.

NEW YORK CITY.

The Mechanics' and Traders' Exchange of New York City reported a total membership of 300, with a cash surplus of $20,000 in the treasury. The uniform contract is steadily growing into more general use and the form of arbitration advocated by the National Association is already established in several employers' associations. The Code of Practice is at present receiving consideration, and it is expected that it will be adopted either in part or in full. The project for erecting an exchange building to cost in the vicinity of $1,000,000 is still under discussion, with a good prospect of success. The report closed with the following: "To the National Association we again renew our fealty and well wishes, and are proud of the distinction of being considered one of its loyal filial."

PROVIDENCE, R. I.

The report from the Providence Exchange shows that several important topics have been considered during the past year. The Uniform Contract has been officially adopted by the exchange and the Code of Practice has been presented to the architects, with a fair indication of its final adoption. A plan is being agitated looking to the establishment of a permanent industrial exhibit and it is believed that it will be an accomplished fact in a short time.

ROCHESTER, N. Y.

The Rochester Exchange reported itself in good condition. The Uniform Contract is gradually coming into general use, but the Code of Practice failed in securing a foothold. A plan for securing a building is in existence, but has not been definitely accepted. The labor market has been undisturbed during the past year and the buiding business has been about as usual throughout the season.

ST. PAUL, MINN.

The report of the St. Paul Exchange showed that building had been somewhat inactive during the past season and that the exchange had undergone internal disturbances which were only overcome by the careful and conservative action of the best element of membership. Everything is harmonious at present and the exchange has recently taken active part in measures for the welfare of the city and received the consideration due to an organization of its character.

WILMINGTON, DEL.

Wilmington reported that the exchange is increasing in membership and importance, many of the architects being in the habit of sending plans directly to the exchange to be estimated. The Uniform Contract is but little used as yet and the majority of the exchange are in favor of a lien law in some form, although the no lien law men are making converts every day.

WORCESTER, MASS.

The Builders' Exchange of Worcester reported a prosperous year, during the course of which it has been incorporated under the laws of Massachusetts, and has moved into new and more comodious and desirable quarters. The membership has increased one-third and the organization is in excellent financial condition. Nothing of importance has transpired to disturb the builders during the past year, which has been a satisfactory one.

After the presentation of the reports from filial bodies the next thing in order was the address on Education of Business Men with special reference to the needs of higher education among builders in the direction of training for direction and management. This address was to have been delivered by Prof. Edmund J. James of the Wharton School of Finance of Philadelphia, but owing to illness he was obliged to send a substitute in the person of Dr. Arthur Burnham Woodford, who made a very interesting talk on the subject and which will be presented in full in the official report of the proceedings. The Committee on Resolutions reported that the resolutions presented to them were respectfully referred to the Executive Committee and the report was adopted.

PLACE AND TIME OF NEXT CONVENTION.

The Committee on Time and Place for the Next Convention then reported. They recommended that Tuesday, February 7, 1893, be the time and St. Louis the place for the convention. It was moved by a Philadelphia delegate that the date be fixed at February 14, and no objection being raised, the report, as amended in that respect, was adopted.

OFFICERS FOR 1892.

Then the committee presented the following nominations for officers of the association: For president, Anthony Ittner of St. Louis; first vice-president, Ira G. Hersey of Boston, Mass.; second vice-president, Hugh Sisson of Baltimore; secretary, William H. Sayward of Boston, and for treasurer, George Tapper of Chicago.

Some few of the delegates thought that the ninth convention should go to the West, inasmuch as the eighth will probably be held in Boston, and the name of a Denver man was presented, but the report of the committee was adopted by a very large majority, and the assistant-secretary of the convention was directed to cast one ballot for all the officers, who were then declared duly elected.

BOARD OF DIRECTORS.

The following directors were then named and elected for the ensuing year: Baltimore, Noble H. Creager; Boston, James I. Wingate; Buffalo, A. A. Berrick; Cleveland, E. H. Towson; Chicago, C. W. Gindele; Cincinnati, Samuel D. Tippet; Denver, A. J. Baker; Detroit, Alex. Chapaton, Jr.; Grand Rapids, P. C. Campbell; Indianapolis, Jas. McGauley; Lowell, Chas. P. Conant; Lynn, Frank A. Kelly; Milwaukee, Paul Reisen; Minneapolis, Geo. W. Libby; New York, Marc Eidlitz; Omaha, N. B. Hussey; Portland, Me., N. E. Redlon; Philadelphia, Stacy Reeves; Providence, Wm. W. Batchelder; Rochester, H. H. Edgarton; Saginaw, Michael Winkler; St. Louis, Jeremiah Sheehan; St. Paul, J. W. L. Corning; Syracuse, J. E. Baker; Wilmington, A. S. Reed; Worcester, C. D. Morse; San Francisco, Wm. N. Miller.

The *per capita* tax was fixed at $3, the same as last year, without discussion.

The naming of the directors finished the business of the convention, which then adjourned *sine die*.

ENTERTAINMENT.

The entertainment offered by the Building Trades Association reached its culmination in a most delightful banquet tendered to the delegates, which was served in the main dining room of the Hotel Hollenden on January 20, about 300 covers being laid. The service was excellent, and everything passed off in a most thoroughly enjoyable manner. The souvenir *menu* was of a very artistic design, in the shape of a booklet bound in parchment and beautifully executed. The toasts were all ably responded to, and every delegate in attendance carried away the most delightful memories of the hospitality of the builders of Cleveland.

Convention Notes.

There were about 300 delegates and visitors in attendance on the convention and the generous hospitality of the Cleveland builders was warmly extended to all. The ground being well covered with snow, there were a number of sleighing parties arranged and the delegates were shown the beauties of Cleveland to their hearts content.

One of the amusing incidents of the convention resulted from the publication in the *Daily Plain Dealer* of cuts of the officers and some of the more prominent delegates. The cuts were amusingly bad, and at the close of the morning session of the day on which the cuts appeared, President McAllister in all soberness announced that the convention would go into executive session, previous to adjournment, for the purpose of devising suitable means for slaughtering the *Plain Dealer* reporter, who was the cause of the publication of the funny little pictures, and that the delegates must not be surprised if on their return to the convention hall after lunch they should find the broken fragments of the unfortunate reporter scattered about the room. At this point some one attracted the president's attention to the fact that a blushing young lady seated at the reporters' table was the *Plain Dealer* "man." The Colonel's retreat was concealed by a hearty burst of laughter.

The delegation from New York at the convention arrranged a very pleasant surprise for Stephen M. Wright, the secretary of the New York Exchange, who, in consequence of the enforced absence of Mr. Tucker, the chairman, so ably and satisfactorily filled the duties of that position also. It was decided that the entire delegation should dine together *en famile* on the evening of its departure from Cleveland, with Messrs. Jenks and Chandler of that city, who had devoted themselves to the care of the New Yorkers, as their guests. This was successfully carried out, as their fitting termination to the visit to the Forest City. At the close of the dinner Warren A. Conover, on behalf of the delegation, presented to Mr. Wright an elegant pair of cut-glass inkstands resting on a masive silver tray. It is scarcely necessary to say that this exceedingly appropriate present was indeed a genuine surprise to the recipient, as he had been kept in profound ignorance of his associates' intent till the moment it was produced for presentation. He was scarcely able to express his gratification at being made the recipient of so beautiful and unexpected a gift, which he would ever retain in loving remembrance of the delightful intercourse with his associates during the time passed at the convention.

Mechanics' and Traders' Exchange.

At the annual meeting of the Mechanics' and Traders' Exchange of the City of New York, held on January 26, the following officers and managers were elected without opposition:

President, George Moore Smith.
Vice-President, Isaac A. Hopper.
Treasurer, Edmund A. Vaughn.
Secretary, Stephen M. Wright.

TRUSTEES.

John J. Tucker. John J. Roberts.
Thomas Dimond. Otto M. Eidlitz.
Benjamin A. Williams. James B. Mulry.
John C. Doremus.

EXAMINERS (BUREAU OF BUILDINGS).

Warren A. Conover. Edwin Dobbs.

INSPECTORS OF ELECTION.

Ronald Taylor. Fred. M. Hausling.
J. Henry Deeves.

Philadelphia Master Builders' Exchange.

The sixth annual meeting of the Master Builders' Exchange of Philadelphia was held on Tuesday, January 26, at which the following directors were elected for the ensuing year: Franklin M. Harris, John Kisterbock, Charles P. Bancroft, A. B. Barber, John E. Evanson, Murrell Dobbins, William B. Irvine and Peter Gray. The Board of Directors reported that the assets of the exchange were valued at $168,095.50 and the liabilities amounted to $155,631.08, showing an excess of assets of $12,464.42. The treasurer reported the receipts of the year to have been $59,410.39 and the payments $57,-710.32, showing an excess of receipts over expenditures of $1700.07.

Edward H. Williams was elected an honorary member of the exchange in consideration of his gift to the exhibition of the magnificent model of a Japanese temple. The Historical Committee was directed to secure a bust of Col. R. T. Auchmuty of New York, who donated $6000 to the trade school connected with the exchange. The bust of Colonel Auchmuty is to be placed in a prominent position in the headquarters of the exchange building on Seventh street.

Chicago Builders' and Traders' Exchange.

The regular annual meeting and election of the Chicago Builders' and Traders' Exchange were held on the 11th of January. According to the report of Secretary James John the membership roll numbers 592 this year, against 595 last year.

The election resulted as follows: W. H. Alsip, president; R. Vierling, first vice-president; A. Gordon, second vice-president; W. H. Mortimer, treasurer; James John, secretary; directors for two years, D. Freeman, J. L. Rutherford, F. V. Gindele, Ed. Kirk, Jr., and George Lill.

Business was resumed in the evening, when the newly-elected officers were installed. A resolution for the appointment of nine members, representing the different trades in the exchange, to communicate with the Illinois Chapter of the American Architects for the purpose of bringing about more equitable methods in contracting and subcontracting work, was adopted.

Building Construction in the United States as Viewed by an Englishman.

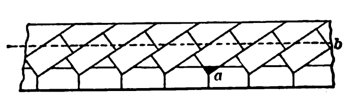
AN ENGLISH GENTLEMAN in this country writing to the *Builder*, gives the following views regarding the use of brick work in building construction in America:

There is, perhaps, no country in the world where a better appreciation of the phrase "Time is money" may be had than in the United States of America. Labor is dear, and the fact makes itself plain on every hand. In every branch of the mechanic arts everything possible is done to reduce labor and get the work done quickly. In the construction of buildings the high cost of labor makes itself very much felt, and produces systems of construction which would appear to English eyes to be far from workmanlike. Perhaps no branch of building construction stands in greater need of improvement than brick work. Let some of the practical readers of the *Builder* who are inclined to view with something akin to horror an 18-inch pier built without closers, consider a country where brick work is constructed almost entirely without bond, where damp courses and hoop-iron bond are practically unknown, and where the whole of the brick work of a four-story building is not infrequently erected within the space of a single week. It should be added as an offset to this, however, that the appearance of outside brick walls is, in general, almost all that can be desired, while the large variety in form and color of the bricks now produced places at the command of the architect and builder means for producing effects which are truly admirable.

In comparing the system of constructing brick work in America with that followed in "the old country," it may prove useful to refer briefly to some of the more commonly-used bricks, and to give their cost, for convenience, in its equivalent in English money.

VARIETY AND COST OF BRICKS.

What would be termed a "place" brick in London is called a "pale" in New York and a "salmon" in Philadelphia, for names as well as methods of construction vary largely in different parts of the States. Pale and salmon bricks cost £1 per thousand, and, being underburnt, they are, of course, only used for inferior buildings. The next variety which may



Plan of One Course of Brickwork.

be compared to the English "stock" is known as "hard brick," and is worth £1. 16/. This brick is of a bright red color in Philadelphia, New York and the East, and is a light straw color in the North-western section of the country. Hard brick is used for interior walls and for the backing of all front walls. And we should here explain that excepting in the commonest description of buildings, in barns, stables, &c., all exterior walls are invariably built of two distinct varieties of bricks, the outer casing being termed "face bricks," while the backing is made up of either hard or pale brick.

There is a very large variety of face bricks on the market, varying in cost from £4 to £25 per 1000. The Philadelphia facing brick is of a firm, close texture, and pleasing, brilliant red color, of very nearly uniform size, and with straight edges. These bricks cost on pier £4. 12/. Buff facing bricks cost £7. There has lately been a great demand in city building for what are known as "Pompeiian" bricks, or, as builders usually prefer to call them, "Pompeys." These are of a peculiar reddish brown color, spotted with black, and when laid they look well. They are made in two sizes—viz., 8 x 4 x 2¼ inches (which is the uniform size of facing bricks), and 12 x 4 x 1½ inches. Pompeiian bricks cost from £8 to £11 per 1000, the last-named size being the most expensive. The above figures are given because, for one reason, there is—strange as it may appear—no such thing as a builders' price book published in the United States, and hence the only way of ascertaining prices is to correspond with the manufacturers or dealers. Some enterprising publisher will probably make his appearance one of these days and give the building community of the States the benefit of a "Laxton."

CONSTRUCTION OF BRICK WORK.

Coming now to the construction of brick work proper, bricks are comparatively little used for foundations, chiefly for the reason that suitable building stone is available. For instance, New York City is almost wholly built up in the foundations of its buildings of gneiss rock, of which Manhattan Island is largely composed. In erecting foundations of stone no attempt is made to produce more than a rough rubble wall, or, as it is called, "broken range." The thickness of foundation walls built in this way is rarely less than 18 inches. Damp courses, as before stated, are to all intents and purposes unknown. It is very rarely indeed that bricklayers think of putting in anything to prevent damp rising. The bricks, generally speaking, are not very absorbent, but the walls are, of course, more or less damp. It is probably for this reason that in all first-class structures—and, indeed, one might say second-class also—the plaster is not rendered directly on the walls, but they are "firred out"—that is, lathed. All laths are at least 1¾ inches broad and ⅛ inch thick.

The foundation walls having been brought up to the level of the street, the brick work is built upon it in a manner which, to say the least, must appear peculiar to an English bricklayer. If the wall is an interior one the operation is very simple, and is carried out with the strictest regard for the saving of time. The bricks are all laid stretchers excepting in every fifth, seventh or ninth course (depending upon the quality of the work), which are laid headers. English and Flemish bonds are practically unknown in the country, excepting, perhaps, as curiosities in old buildings, some of which were erected in Flemish bond. Running bond, with its one course of headers in five, seven or nine, is almost universally employed. But to state that a wall is nearly all stretchers tells little as to the manner in which it is actually erected.

BRICK WALLS.

The English plan of taking each brick separately and carefully placing it in position would take far too much time, so the following method is followed: The bricklayer builds up a half-brick wall to a hight of five, seven or nine courses, as the case may be. Then on the other side of the wall, he builds up another little half-brick wall, leaving a space between the two casings, according to the thickness of the wall. The bricks of these casings are laid with something like care, although, as a rule, the mortar is not spread on the bed of the bricks below, but is "wiped off," so to speak, from the trowel to the upper edges of each brick held in the left hand of the bricklayer, who then turns it over and places it in position. Suppose the wall in course of erection to be equal in thickness to two bricks and a half. When the two little walls have been built up, there will be a space between them a brick and a half wide to fill up. The bricklayer takes his trowel—a very large one—and with a dexterity and speed almost bewildering to a foreigner, throws in five or six trowelfuls of mortar, pours in a pail of water on top, gives the mortar a stir with the trowel (making it about as thin as grouting), and then with both hands takes up bricks, half bricks and pieces of bricks, places them in the wall, arranging them as best he can in his hurry, and squeezing up the liquid mortar between them. An occasional half dozen trowelfuls of mortar and another half bucketful of water, and the interior of the wall is brought up to the hight of the exterior casings. Now is laid a course of headers, then six or eight courses more of stretchers, and so the wall grows.

Now it must not be supposed that the operation of bricklaying, as described, is that carried on only in inferior buildings; on the contrary, it is used in the most important structures. In some parts of the country the grouting process, if it may be so called, as described, is not used, but the bricks of the interior of the wall are laid, each course dry, and mortar of a thin consistency is spread on top and allowed to run into the joints.

OBTAINING BOND.

But if the construction of interior walls appears to be open to improvement, it is certain that outside walls fall short of good construction in a greater degree. Every face brick must be laid a stretcher—that is a *sine quâ non* of American brick work—no headers are allowed to be seen. Then how, it may be asked, is bond obtained? Well, such as it is, it is obtained by cutting off the back corners of the face bricks in every seventh course only, and inserting the bricks at the back diagonally, as shown in accompanying diagram, which represents a plan of one course, the dotted line *b*, showing 8-inch wall. Thus, it will be seen that the very small trangular piece marked *a* in the diagram is the only bond between the inner and outer casings. When the facing bricks are only 1½ inches deep, bond is obtained by inserting small pieces of hoop iron across the wall. These iron bonds are sometimes inserted also in walls of ordinary-sized bricks, but not often. Hoop-iron bond, as used in England, is not used at all, at least as far as the writer can ascertain by careful inquiries.

BUILDING APPLIANCES.

Many of the building appliances used in the States are of very ingenious construction. In large building operations lifts or "elevators" are used for raising bricks, mortar and materials. They are usually formed of a small platform, having in the center an upright post, around which the hods are stacked. Gangs of hod carriers—whose wages, by the by, are high, 10s. to 11s. a day being the standard in New York and Philadelphia—seem possessed of the fever of speed which dominates all the operatives more or less. To a stranger, it must appear that these hod-carriers are a very industrious set of men, for they do not stop work a minute, but run up and down the ladder at a great rate. But there is a little secret attached to their speed, and it is this. Every gang of hod carriers has a "leader." This leader is picked out for his quickness, and he gets higher wages than the rest. It is his business to get his hod filled, and run up and down the ladder as quickly as possible. Now all the gang are bound to follow him, and must not drop out of line on penalty of discharge. The quicker the leader works, therefore, the quicker must all the others. Thus by a practical game of follow-my-leader, is a good deal more work got out of a man in a day than there would otherwise be.

BRICK ARCHES.

The absence of arches in American brick work frequently strikes one. Certainly there are some, but very few are used over door and window openings; no relieving arches are used, and the brick-work rests directly on the window frames. For this reason the window and door frames are invariably built in the brick-work, and are never put in afterwards, as in England. Of course, when an opening is very wide, arches are sometimes used, but more frequently a wood or stone lintel is used.

FINISHING BRICK WORK.

A word or two on finishing brick work may be added. It is the custom in many parts of the country to paint newly erected brick work in two or three coats, finishing with what is known as "flat brick red." This dries without gloss, and gives an appearance very similar to Philadelphia brick. The paint is put on all over the face of the wall, including joints, and the surface, when finished, is almost a perfectly level one. The mortar joints are then painted on with white paint put on by means of "seamers" and "liners," which are small striping brushes having hard bristles the width of a mortar joint. The horizontal joints are run in with the seamer held against a straight edge as a guide, the vertical lines being painted in without a guide. The appearance of a wall finished in this way is very pleasing, the thin painted seams or joints being all exactly uniform in width and distances.

BUILDING WITH CONCRETE.

CONCRETE is becoming so universally used in all important buildings where strength, stability, proof against fire and durability, as well as economy, are required, says Frank Jay, in a recent issue of the *Carpenter and Builder*, that it would be useless to enlarge upon the various ways and means of utilizing it for the hundred and one purposes in which it can be profitably adopted. I shall, therefore, refrain from speaking upon them, and confine my remarks to one or two simple methods of fixing and using an apparatus for building walls, &c., and also filling in fire-proof floors with concrete. I do not say that these methods, with which to do their respective work, are the best. I have no doubt that there are better methods even than these, but I give these for the benefit of those who wish to know of a simple and cheap method of doing work of this kind. If these methods are adopted in the erection of small cottages, most of the timber used in the apparatus can be used up in the building as joists, scantlings, timber of roofs, &c.; so that, practically, there is no waste beyond the few ⅝-inch bolts used, and these can be reused in the apparatus for filling in concrete floors.

The main point with the apparatus for building walls in concrete is to get the 7 x 3 inch standards perfectly plumb and upright, and keep rigidly in their places by the 4 x 3 inch stays, and if the bolts are used, say, every 2 feet in hight, they will keep the standards from bulging out and making a round belly or protrusion on the walls. In filling in it is best to fill in about the hight of four boards or 3 feet in hight at a time. There is a better bulk of material to manage, and it also enables the work to be done more expeditiously, as you have not to wait so long a time before you strike or draw the sheeting boards out as when you fill in 5 or 6 feet in hight. The greatest care should be taken not to knock or jar the work more than is necessary, particularly while it is in its green state. To avoid this it is best to have everything fitted into proper place, and to use as few nails as possible—screws being preferable where there is any jointing or bonding to be done.

In raising each tier of sheeting boards the bolts want to be so arranged that the bottom of the lowest board rests upon the bolt, and they should be slightly notched, so that the lowest board covers the top of the concrete already filled in so as to avoid a joint or ridge in the face of the wall. It is also advisable to sweep the dust off the top of the last layer and damp it a little before filling in the next layer. Great care should also be taken in fixing the jamb and head timbers to form the reveals for the doors and windows. They should be mitered so that they leave each other easily and do not pinch or bind. The props or struts used in the openings should also be so arranged that they can be easily removed.

MATERIALS EMPLOYED.

Now a few words as to the materials to be used and the strength of any gauge of them. The aggregate is generally composed of any hard material that can be procured near at hand, and which the locality affords in the most economical manner. Almost any hard substance may be used when broken up, such as broken rock, stone, slag, bits of brick, of earthenware, burnt clay, gravel or shingle. Preference should be given to fragments of a porous nature, such as pieces of brick or limestone, rather than to those with smooth surfaces, such as flints or shingle, as the former offer rough surfaces, to which the cementing material will readily adhere. Any aggregate of a very absorbent nature should be thoroughly wetted, especially if it is used in connection with a slow-setting lime or cement; otherwise the aggregate will suck all the moisture out of the matrix and greatly reduce its strength. Many prefer aggregate composed of angular fragments, rather than those consisting of rounded pieces—*e. g.*, broken stone to 2-inch gauge there is $10\frac{2}{3}$ cubic feet of voids, and to the same measure of Thames ballast, which contains the necessary sand, there is $4\frac{1}{2}$ cubic feet of voids.

A mixture of stones of different sizes reduces the amount of voids, and is often desirable. The contents of the voids in any aggregate may be ascertained by filling in a water-tight box of known dimensions with the material, and measuring the quantity of water poured in, so as to fill up all the interstices, or by weighing 1 cubic foot of the aggregate, and comparing its weight with that of a cubic foot of the solid stone or rock from which it is broken.

A GOOD MIXTURE.

Apart from the method of gauging above, the following makes a good, strong concrete: Three and a half parts of broken by placing a piece of wood or tile about $\frac{1}{2}$ inch in thickness between the boards and bottom of a girder, as at C. This will leave a clear space under the girder, which will enable some specially-prepared material, such as small gravel and cement, to be pushed under and so cover the face of girder. In taking the apparatus to pieces, first unscrew the bolts C, which should be of sufficient length to allow the boards B to be taken away, and so take the weight off the bearers A.

Homelike Homes.

The following paper by Ernest Newton relating to the subject indicated by the above title was read at a meeting of the Architectural Association held in London, England, a short time since:

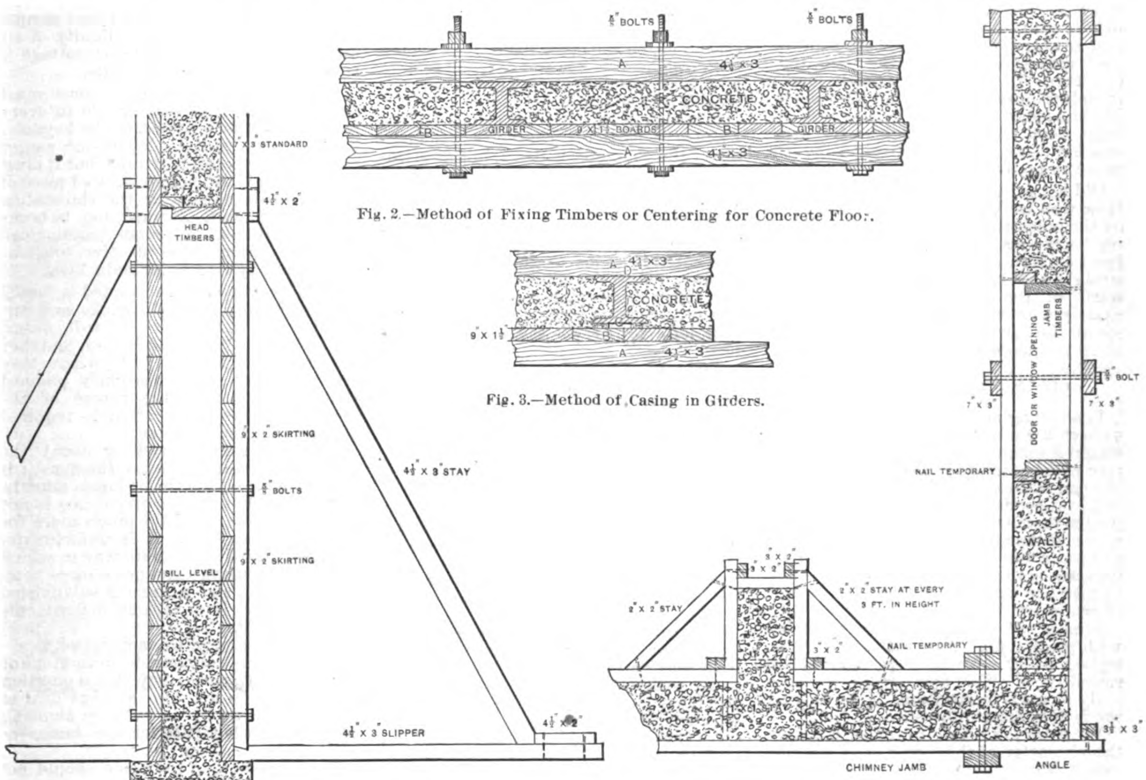


Fig. 2.—Method of Fixing Timbers or Centering for Concrete Floor.

Fig. 3.—Method of Casing in Girders.

Fig. 1.—Sectional View.

Fig. 4.—Plan View of Fig. 1.

Building with Concrete.—Illustrations of Apparatus Employed.

broken stone than shingle. The reason for this is that the angular fragments fit into one another, and slightly aid the coherence of the mortar or cement by forming a sort of "bond," while the round stones of the shingle are simply held together by the tenacity of the matrix. Moreover, the angular stones are cemented together by their sides; the rounded stones only at the spots where they touch one another.

The aggregate should be broken small enough to pass through a $1\frac{1}{2}$ or 2 inch mesh. Very large blocks cause straight joints in the mass of the material, which should be avoided if the cement is to bear a transverse stress or to carry any considerable weight.

The size of the pieces of which the aggregate is formed influences the contents of the void spaces between them, and therefore the quantity of cement or lime that must be used. Unless the mortar is of such a description that it will attain a greater hardness than the aggregate the object should be for the concrete to contain as much broken material and as little mortar as possible. In a cubic yard of bricks, stone or rock, one and a half parts of furnace cinders or gravel, one part of sand, one sack of cement (eleven sacks to the ton). In gauging, place the aggregate upon the gauging board, spread out and add the cement, then thoroughly mix together, turning it over first to right then to left; add the water through a rose, and again turn over twice and fill in quickly, well ramming the matrix so as to knead it well together. It is also advisable to lay a layer about 1 foot thick in at a time, and after filling in to the length of the sheeting, to turn back and lay another layer in. By this means the work is made more solid than if filled in to the hight of the sheetings at once.

Fig. 1 of the engravings shows a sectional view of the apparatus, while Fig. 4 illustrates a plan view.

In Fig. 2 is shown a simple method of fixing centering for concrete floors. To insure a good job the bolts should not be less than 2 feet 6 inches apart, and screwed tight up. In Fig. 3 is shown a simple method of casing in a girder, or, rather, covering the bottom of a girder where it is not required to be exposed. This is done

The love of home is an instinct possessed by man and the greater part of the animal world alike. It is perhaps the only sentiment which the reticent Englishman is not ashamed to confess to; indeed, it is his boast that the English language alone possesses the word "home" in its fullest sense.

Is it not strange, therefore, that, while all possess this instinct, the large majority of people are content to live in houses which are quite unworthy shrines of the household gods? The love of home exists still, but the love of the house has almost died out, or is lavished on a building which is quite undeserving. We have only to look round us and contrast the old houses with the new in order to see the truth of this.

Let us picture to ourselves the old Elizabethan house, quiet, dignified, and stately, as befits the age.

THE ELIZABETHAN HOUSE.

It is early morning on a bright summer day; the master of the house paces the long alley guarded by yew and box, or turns into the flower garden, where the flowers, drenched with dew, give out a sweet, fresh scent; or it is late afternoon, and we see the head of the house sitting with his wife in the shaded arcade, while the children play on the terrace. The air is full of the scent of roses and musical with the hum of bees; the shadows lengthen, the rooks sail slowly through the air; part of the house is in deep, cool shadow, and chimneys and gable tops begin to glow like burnished gold. There is a sense of perfect rest and contentment; cares are forgotten for a time. Would it be wonderful if, in homes like this, men should grow noble and true, and the love of their home should become a passion? Can we wonder that they cling to such homes, and feel that here indeed there is peace?

It is not only the mansion that fills its owner with delight. Take the farm house on a summer evening, when the farmer is coming in weary with a day's toil in the fields. The cows are just being driven out into the fields after milking, and he hears the musical clatter of the milk pails as he walks up the path, lined on either side with simple homely flowers in rich profusion. How cool the shaded kitchen looks, and how delicious is the faint smell of wood smoke. He drops into his chair and is refreshed by the peace and quiet of home.

Old houses are all alike in this respect. How well we know the little prim house on the outskirts of a country town, standing back from the road, with a wall in front and a high narrow iron gate with a straight path to the door. We grasp the spirit of the place at once and know exactly what the owner is like; we can see all the furniture and china, and even smell the lavender and rose leaves.

OLD ENGLISH COUNTRY HOUSE.

I can imagine nothing which can give so keen a sense of pleasure as looking at an old English country house on a summer evening as the sun is setting. Then one can realize best the beauty of color and proportion. The house and the garden seem the very incarnation of the spirit of home; all sounds are hushed, and peace and quiet reign supreme. How different is the modern "mansion." Let us take one hap-hazard—there is no lack of examples.

First of all the entrance gate, red hot with paint and gilding, with stone piers, topped either with lamp posts or a borrowed crest. This opens into a drive, aptly termed "serpentine," and presently the house comes into view.

We seem to be able to tell at a glance the character of the owner of this house. Wealthy he undoubtedly is, and the house is apparently designed to advertise the fact to the world in general. The enormous conservatory is an outward and visible sign that priceless orchids are grown within, and many tropical plants, whose names and natures are unknown to any one but the gardener.

The windows blink and stare at the sun, and the great sheets of plate glass look like molten brass.

The drawing room is furnished *en suite* in blue or crimson, and he is a bold man who would dare to sit uninvited on any of the gorgeous chairs or sofas. See the garden from the windows; curved paths streaming like ribbons in all directions, manufactured undulations, "specimen" trees and carpet beds, everything baking in the sunlight, and as neat and trim as three gardeners and a boy can make it.

No one can feel that this is home-like. The melancholy thing is that this result is not brought about accidentally; it is all deliberately planned and thought out, and may be taken as expressing exactly the spirit of the age. The owner is proud of it, and so, in a measure, is the neighborhood.

Even more depressing than this is a walk in the suburbs of London. North, south, east or west they are all the same. There are only two styles of suburban houses, the gabled and the ungabled. The gabled is the most popular.

Take any one and examine it a little in detail. The hight is generally considerably greater than the width. The windows of which the front mainly consists are of impossible proportions. There are, of course, a stone bay, with wooden sashes; a porch rich with brown graining, going half way up the house; and bricks the color of a London fog, with wiry streaks of red running through at intervals. A purple slate roof, with a formidable spiky iron ridge, tops the whole, and the house is complete.

THE IDEAL HOME.

In every age and in every country the spirit of the time is shown in the homes of the people, and I am afraid that when future generations read our history from our houses, they will not see in them anything to increase their admiration for the spirit of the nineteenth century.

The house is so often built with too much regard to economy—thin walls and floors, and a too close apportionment of space; or, on the other hand, it is loaded with ornament inside and out, and is more a vehicle for the display of the owner's wealth than a home.

It is difficult to say what it is that gives a house its particular character of homeliness; the character is there, but it is impossible to dissect the building and say, it is here or it is there; the home feeling is everywhere alike.

Breadth is, perhaps, the most marked feature in a homelike house,—the long, low building seems to fit better into the landscape than the house of many stories. The tower speaks of war and strife; and the nearer we approach to that form of building, the less is the air of homeliness.

To build a homelike house we must have the home feeling strong within us. It is no good to study old houses merely as pieces of architecture, sketching a corner here, or measuring a molding there, and reproducing them more or less correctly. We must study the soul of the building as well as the body; indeed, it is the more important study of the two. Let us once grasp the spirit of the old homes, and we may express it in any outward form we please.

And now, having settled in our minds the ideal home, let us see how we should proceed to realize it.

We will begin with the obstacles. First, the person for whom the house is to be built may be presumed to have no sympathy with our ideal; his wish is solely to provide a covering for himself and family which shall be convenient and economical. He will no doubt say, as so many do, that he is going to live inside his house and not outside; he will also have various ideas as to the disposition of certain rooms, and other matters of detail. As to these last, it is important to note any strongly-marked individuality and, if it is at all possible, to emphasize it and let it appear in the house. We will, then, suppose that you have been able to show him that a home must be more than four walls and a roof, and brought him into full sympathy with yourself.

It is important to do all this, but every one must do it in his own way; no one can lay down rules for the guidance of another.

Then we must see the place where it is proposed to build the house, and if we don't grasp it at once we must go again and again till we do.

It is generally while we are looking at the site for the house, its prospect and aspect, the slope of the land, the positions of the trees, roads and neighboring meadows, that a half-formed idea of the kind of a house that would fit this spot floats into our minds. It is, of course, very vague and shadowy, but it is sufficient to turn our minds in a certain direction.

Having got a motive, our next step is to work it out, quite roughly at first.

Above all things, we should avoid looking on a house as consisting of two parts —plans and elevations. The outside and inside must be considered absolutely as one, and it should be impossible for us to say that the outside suggested the inside, or the inside the outside. We should now let our rough studies simmer a little, and then go more seriously to work. The actual drawings should be looked upon merely as diagrams, and we must avoid being led into the mistake of supposing that things which look well when well drawn will also look well in solid materials. Everything should be thought of as built before we draw it, and if we have thoroughly made up our minds that this is what we are going to do let us then draw it as well as possible. Drawing carefully will make us think carefully.

GENERAL CHARACTER OF THE HOUSE.

And now as to the general character of the house.

Home means, as I have said before, rest, quiet and simplicity. Our house must, therefore, be restful, quiet and simple. It does not matter how small it is; it can always be treated in a broad and simple manner and have a quiet dignity of its own. A glance at any country cottage is sufficient to convince us of this.

I don't mean to say that a house must necessarily be bare and simple in every part, but simplicity must be the keynote. Certain parts, both inside and out, can, of course, be elaborately treated, but it must seem natural, and not an isolated piece of work, and the reason for the elaboration must be apparent. It must, too, be borne in mind (although it sounds paradoxical) that elaboration, to be effective, must be simple, at any rate in its main lines.

Another danger to be avoided is the deliberate planning of odd nooks and corners; let them come, if they will, naturally, like they did in old houses, and they will be very charming; but where they are purposely and consciously planned they always destroy the repose of the house and make one feel that it required an effort to produce them.

I am not saying anything about the convenient arrangement of the house; it goes without saying that a house must be convenient, but mere convenience is not sufficient. We must do much more for our house than that. It is unfortunate, perhaps, that the elaborate way in which we live nowadays demands a more complicated plan, and a greater subdivision of the house into various departments than formerly.

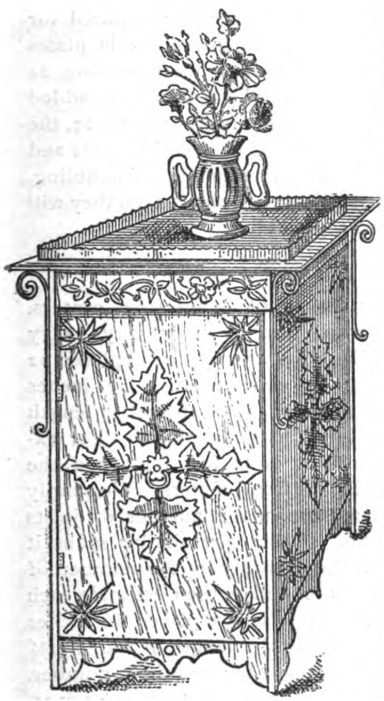
Absolute privacy, when required, is undoubtedly necessary, and is, in fact, one of the charms of home; but it is a question whether we do not lose a great deal of picturesqueness by so entirely shutting off the working part of the house as we do.

The furnishing of the home should not be left to chance. We must contrive to arrange this as well as the house; the homelike character of rooms can very soon be destroyed. The garden, too, must be planned and schemed; it is as much a part of the home as the house itself.

In conclusion, I should like to emphasize a few of the remarks I have made previously, especially those bearing upon the home feeling. Unless we have this very strongly, it seems to me that it is impossible to give a house any life at all. Let us study old houses, not as inanimate buildings of more or less architectural beauty, but as expressing the most valuable and beautiful of human sentiments—the love of home. Nowadays, when all religions are assailed, and we believe in nothing very strongly, it is almost impossible to make our churches express anything more than a sort of galvanized enthusiasm; we reproduce old forms as symbolical of certain legends, although we are not quite sure whether we believe them or not (I am only speaking generally, of course, as there are still many who believe strongly, and whose buildings express this belief very clearly). Belief in the sacredness of home life, however, is still left to us, and is itself a religion, pure and easy to believe. It requires no elaborate creeds, its worship is the simplest, its discipline the gentlest, and its rewards are peace and contentment.

COMBINATION TABLE AND COAL BOX.

IN A RECENT ISSUE of one of our foreign exchanges, a correspondent presents a description of a combination table, cupboard and coal box, which is likely to prove of interest to many of our readers. The complete article, which is shown in Fig. 1, represents a pedestal cupboard about 13 inches square at the base and 2 feet 8 inches in hight, these dimensions admitting of any amount of alteration necessary to suit local requirements. If intended to stand against the wall the fourth side need not be decorated, but it is preferable to ornament all the sides and then the article can occupy any posi-



Combination Table and Coal Box.—Fig. 1.—General View.

tion. The materials required, says the writer quoted, are a sufficiency of ½-inch pine, four lengths of 1-inch square deal laths (or preferably, in the latter case, wood of more grain and beauty when finished, this being a matter of taste entirely) and some ¾-inch deal for the coal box. The pine should be obtained in boards not less than 11 inches wide, yet if 12 inches can be obtained, so much the better. Cut up four 2 feet 6½ inch lengths of the inch stuff, and plane them up straight and true for the uprights, and having decided upon the exact width of the panels, cut up and plane four 2 feet lengths of the pine. Take particular care that these are cut true and square with each other, as upon this part of the work will depend the general truth of the whole.

Lay these aside and prepare two pieces, one for the inside at bottom of panel, the other for inside at top of panel. Mark off accurately upon the uprights 3¼ inches at both ends, and proceed to glue two of the panels into position. This should be done upon a flat surface, so as to let the panels lie flush with the back of each upright, showing when finished a square corner. While this work is drying, prepare four pieces 3¼ inches wide, scrolled somewhat, as shown at the bottom of Fig. 1, and four pieces of the same width, but long enough to overlap the two uprights, and to allow of cutting a miter for making a square joint for the top fronts. If the panels are dry, the third one may be put into its place and the work of gluing up the top fronts and bottom scrolls proceeded with. Care should be taken that the work stands upon a flat and true surface. Frequent use should be made of the square, so as to insure the uprights being perpendicular, and that the panels are flush with uprights at the back, while the overlapping pieces are flush with the fronts. It will be necessary to fit four lengths of the same material as the top pieces, about 1 inch wide, on the top edges of the panels just under the cross pieces and projecting about ½ inch. This will not only fill up the space, but give the work a much stronger appearance. Of course one panel must be left free for the door of the cupboard, which must be subsequently hung by hinges to one of the uprights.

The bottom, of 1-inch deal, previously cut, can now be fitted into its place at a point near the top of the scrolled cross piece at the base by gluing some struts across each side, and then fixing the bottom by the same process. The top shelf should be fitted into a relatively similar position at the bottom of the cross pieces, and need not be stronger than the ½-inch pine. Whether it is made with three or four sides will be determined by the manner of fitting the table top. If hinged, the shelf will be accessible from the top; if fixed rigid, it can only be reached from the door, and must then have only three sides.

For the top of the table will be required a square of ½-inch pine, 17 inches each way, being sufficient to overlap each corner by ½ inch. The joint is easily made by planing the edges true and bringing them together upon a flat surface, with scalding hot glue, gently moving the surface either way, so as to insure contact with the least quantity of glue. When dry the joint should be a good one, and the four sides carefully planed up. Upon the top of this the tray should be formed by gluing on four lengths of planed pine 1 inch deep and the top edges fluted. This is a very easy matter, and an effective method of ornamentation. Use a round file about ⅜-inch thick, and at equal distances make a clean-cut hollow. The same finish may, if preferred, be given to the edges of the table top.

The coal box, shown in Fig. 2, is a simple affair, and needs no description as to its construction, except to say that the worker must remember to fasten the sides on to the bottom, not the bottom on to the sides, or the rough usage of filling it with coals will soon loosen it; also, it should be fitted on its front base with a round iron rod, which, in its turn, fits into a slotted wooden bar on each side loose enough to be easily dropped into position or removed. The front of the box must also be fitted with a hinged stop piece (B) about 6 inches wide (Fig. 2), so that when in use, as the coal box works on the bar it falls and forms a rest at a convenient angle and renders the upsetting of the box impossible. By these two arrangements no jar or strain is thrown upon the table, the motion being at the same time very convenient.

The work should now be well sandpapered to a thoroughly smooth surface, as it is intended to be varnished. The overlaying patterns should be cut out of darker wood. Empty cigar boxes will serve admirably, and, after being sandpapered, glued into position. The center leaves should be fixed round a center about 2 inches in diameter, and a very pretty effect is produced by fastening at each of the stems a brass rosette. These can be had at any ironmonger's shop, and are known as "roses"—such as are used in gas-fittings.

The four scrolls for the corners should be cut out of the pine and glued diagonally, necessitating, of course, planing down the corner of the upright. The reader will have noticed that thus far we have used neither screws nor nails, and yet the work is remarkably strong and rigid. This is explained by the fact that in proportion to the width of the work there is a very large surface of glued jointing, with very little leverage, so that

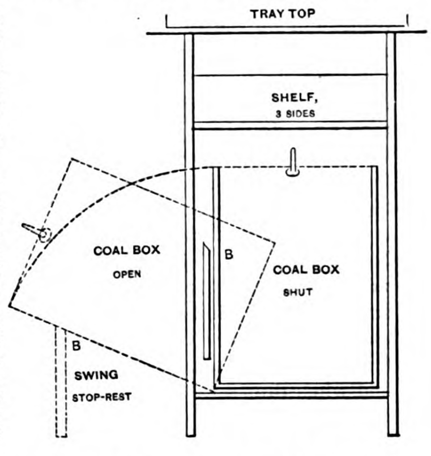


Fig. 2.—Vertical Section Through Table and Coal Box, Showing Internal Construction.

the structure, although made of such light materials, is a really substantial and serviceable job.

There remains now only to put the finishing touches in the way of varnishing; and to obtain the best effect from this, the work should be given a coat of size and allowed to thoroughly dry, when a coat of copal or oak varnish will complete the work.

Estimating Brick Work.

A recent issue of the Boston *Journal of Commerce* presents the following with regard to estimating brick work:

Ordinary bricks are about 8 inches in length, and, with the mortar joint, about half that in width, so that each brick, on the flat, will give horizontal surface of about 32 square inches, or 4½ bricks will cover 1 square foot. As ordinarily laid, there are nine courses to every 24 inches, or 4½ to the foot; 4½ courses, with 4½ bricks to the course, will give 20¼ bricks to the cubic foot. Waste, cutting, and closer joints will easily require an allowance of 21 bricks per cubic foot, which will be found a very convenient figure for estimating the number of brick required for a wall of given hight and thickness, as it thus becomes unnecessary to find the cubic contents of the wall, but merely to multiply its face area, or the product of its length and hight in feet, by seven-fourths of its thickness, which, as the thicknes is always some multiple of 4 inches, is a very simple process.

THE GEORGE A. FULLER CO., prominent Chicago builders, have beaten the record in putting up high buildings, having built three stories in one week. Formerly one story in two weeks was considered good speed. The building in question was of steel frame work construction.

THE BUILDERS' GUIDE.*

By I. P. HICKS.

Points on Estimating.—(*Continued.*)

THUS WE SEE that the total number required is 192 studding. Now, by the old way of estimating, we would have to find the feet as above. Multiply by 12, because 12 inches make a foot, and divide the product by 16 inches, the distance the studding are to be placed from centers. By the old method the work of estimating has but just commenced, but we will help it out a little by an occasional short cut. If we multiply 192 feet by 3 and divide by 4 the result will be the same as though we multiplied by 12 and divided by 16, thus $192 \times 3 \div 4 = 144$ studding, the number required without any doubling. Now comes the work of counting up the places requiring double studding, which is more bothersome than all the rest put together. In cutting out for the windows the pieces that come out will make the leaders; consequently, if the sides are doubled it will take about three studding to two windows. Now, there are eight windows, which require 12 studding. This amount can nearly always be saved, as most window frames are made for weights, and the studding have to be set far enough away from the jambs to allow the weights to work freely, and when thus set they seldom require doubling. In cutting out for the doors the pieces that come out will double one side, and it will require one 10-foot studding to double the other side and make the header. There are eight doors on the plan, consequently eight 10-foot studding will be required for them. There are four outside corners, to double which will require four studding. There are 12 inside partition angles, which we will suppose in this case to require two studding to the corner, which they will not, as one studding has been included in the partition, but we will call it two to the corner, which will make 24 studding. Now, let us sum up and notice the results.

Number of studding estimated 16 inches from centers....	144
Number of studding for doubling around windows.....	12
Number of studding required for doubling around doors.	8
Number of studding for doubling four outside corners..	4
Number of studding for doubling 12 partition angles.....	24
Total...	192

Thus, after allowing an abundance for doubling, we still come out even. After all our figuring, the old method has only proven the correctness of the new, and, as it is so much easier than the old, it may meet with favor. As for myself, I can say that I have used the method of estimating studding 12 inches from centers with perfect satisfaction, and have always had a few left. I not only consider it the easiest, but the most accurate way of estimating studding for outside walls and partitions.

At the present day the frame work of most houses is composed principally of studding, such as are used in the outside walls and partitions. This is especially true regarding the plates, rafters and sometimes the ceiling joists. The plates on the outside walls are usually doubled and the partition walls usually have a single plate, top and bottom. The outside walls of small buildings do not require plates across the ends, but on tall buildings it becomes necessary to extend the plates across the ends. To estimate the number of studding required for plates, add together in feet the lengths of the outside walls and partitions which require plates and divide by the length of studding used for plates. For example suppose it is required to put plates all around on the plan shown in Fig. 5, which is 192 feet, including outside walls and partitions, and that the lengths of studding used is 16 feet; then $192 \div 16 = 12$, which represents the number of studding required for a single plate. This amount doubled will give the number required for double plates on the outside walls and single plates top and bottom, on the partition walls, making 24 studding, the net amount, to which should be added one-eighth for waste in cutting, making in all 27, the number required for plates. If the outside walls and partitions do not have the same amount of doubling, or the same number of pieces for plates, then they will have to be estimated separately.

ESTIMATING FLOOR JOISTS.

These are usually placed 16 inches from centers, except for floors which are to carry very heavy weights. In these the joists are frequently placed 12 inches from centers. To estimate them 12 inches from centers add 1 to the number of feet in length of one wall on which the joists are placed. For example, suppose a building is 32 feet long, and the joists are placed 12 inches from centers. We simply add 1 to 32, which makes 33, the number of joists required for one span. If there are similar spans it will only be necessary to multiply by the number of spans. If the spans are unlike, then estimate each span separately. If the joists are placed 16 inches from centers, then multiply the length of wall by $\frac{3}{4}$ and add 1. This will give the required number. Thus if the wall is 32 feet long, then $32 \times \frac{3}{4} + 1 = 25$, the number required for one span. The reason for adding 1 is because the first operation, that of multiplying by $\frac{3}{4}$, gives the number of spaces between joists, and one joist more than there are spaces is always required, except in cases where the sills serve the place of a joist. In such a case the exact number will be one less than the number of spaces. A few extra joists are usually required for doubling and framing headers around stairways, chimneys, &c. A little attention given to a plan will show the number required for this purpose. Ceiling joists, cellar beams and rafters may be estimated in the same manner.

ESTIMATING CORNICE.

A cornice usually consists of several members, the most common kind being known as the five-member cornice, which consists of a planceer, fascia, frieze, crown and bed molding. To estimate the quantity of lumber required for a cornice, multiply the length in feet by the combined width of the planceer, fascia and frieze in feet. Thus if the planceer is 12 inches wide, the fascia 4 inches and the frieze 12 inches, the combined width is 28 inches, which reduced to feet equals $2\frac{1}{3}$. Now, if we have a cornice 120 feet long and $2\frac{1}{3}$ feet wide, the operation will be as follows: 120 × 2⅓ = 280 feet, net amount. In cutting up lumber for cornice there is always more or less waste, and it is safe to say that one-eighth should be added to the net figures. One-eighth of 280 is 35; thus the total amount required is 315 feet board measure. The bed and crown molding will each be the same as the length of the cornice, with one-eight added for waste in cutting. One-eighth of 120 feet is 15; thus the total amount of molding required is 135 feet lineal measure. It usually takes a few feet more of the crown molding than of the bed molding on account of the crown molding being on the outside line of the cornice. This difference is hardly worth noticing except on large jobs. The difference usually amounts to from 2 to 3 feet per square turn in the cornice, and is usually estimated by counting the number of turns.

ESTIMATING CORNER CASINGS.

The width of the average corner casing is about 5 inches, and the easiest and quickest way to estimate material for this purpose is to allow 1 foot board measure to each lineal foot in hight per corner. Thus the hight of a corner in feet gives the number of feet board measure required, and is very easy to calculate. For example, if a building has 18 feet studding for outside walls it will require 18 feet of lumber, board measure, per corner for corner casings. Many houses have what are commonly termed belt courses. These are usually casings of the same width as the corner casings and extend around the building at the top or bottom of the window and door frames. To estimate these, find the number of feet, lineal measure, required and divide by 2, which gives the amount in board measure. Board measure is understood to mean 1 inch thick. One quarter must be added for 1¼-inch lumber, and one-half for 1½ inch lumber. In estimating corner casings and belt casings in the manner just described, nothing need be added for waste, because we have estimated the casings 6 inches wide when only 5 inches are required. This allowance is sufficient to cover the waste and makes the computation much easier.

MISTAKES FROM OMISSIONS.

Having given the reader the essential points and short cuts in estimating material, we will now point out what is considerd a source of frequent mistakes, and give a safeguard for it. In estimating material many mistakes are made from omissions. A bill of material for the construction of a building always requires a long list of items, and it frequently happens that some items have been forgotten and left entirely out of consideration. Probably more serious mistakes in estimating material arise from this cause than any other. They are very discouraging to the contractor. They are things he did not count on, but nevertheless he has them to buy, and as extras he always has to pay more for them than he would had he included them in his original bill. Now, if a person had an itemized list of the material entering into the construction of a building, there is no doubt by comparing his bill with the list mistakes from omitting items would be avoided. In a bill there are many items of material that are use for different purposes and different parts of a building, hence to make a list complete in every detail it should mention the part of a building for which each kind of material is used. In the list following, the items which are likely to be used for more than one purpose or part of a building are in full-face type, and the different parts for which the same are likely to be used are in type of the usual face.

LIST OF ITEMS FOR ESTIMATING LUMBER.

Sills.
- Side Sills.
- End Sills.
- Middle Sills.
- Trimmers.

Posts.
- Main Posts.
- Center Posts.
- Door Posts.
- Basement Posts.

Girts.
- Main Girts.
- Side Girts.
- Tie Girts.

Joists.
- First Floor.
- Second Floor.
- Third Floor.
- Ceiling Joists.
- Porch Joists.

Studding.
- Side Studding.
- Gable Studding.
- Partition Studding.
- Braces.
- Plates.
- Porches.
- Bay Windows.

Roof Timbers.
- Common Rafters.
- Hip Rafters.
- Valley Rafters.
- Jack Rafters.
- Trusses.
- Purlins.
- Collar Beams.

Sheathing.
- Outside Walls.
- Roof Sheathing.
- Gutters.
- Floor Lining.
- Shiplap Sheathing.

Shingles.
- Dimension Shingles.

Siding.
- Beveled Siding.
- Cove Siding.
- Barn Siding.

Battens.
- ⅞ Ogee Battens.
- ½-inch Battens.
- Lattice.

Furring.
- 1 x 2 Inch.
- 2 x 2 inch.

Fencing.
- 4 Inch.
- 6 Inch.

Paper.
- Straw Board.
- Tarred Board.

Finish, ⅞ Inch.
- Outside Base.
- Bay Window Finish.
- Porch Finish.
- Cornice.
- Brackets.
- Stair Risers.
- Jamb Casings.
- Pantry Shelves.
- Closet Shelves.

Finish, 1¼ Inch.
- Outside Casings.
- Corner Boards.
- Jamb Casings.
- Porch Finish.
- Bay Window Finish.
- Scroll Work.
- Stairs and Steps.
- Outside Steps.

Finish, 2 Inch.
- Door Sills.
- Window Sills.
- Jamb Casing.
- Brackets.
- Cellar Stairs.

Finish, 1⅜ Inch.
- Outside Casings.
- Outside Steps.

Finish, ½ Inch.
- Panels.
- Drawer Bottoms.

Flooring.
- Main Floors.
- Kitchen Floor.
- Dining Room Floor.
- Porch Floors.

Ceiling.
- Porch Ceilings.
- Panels.
- Wainscoting.
- Lining Partitions.

Inside Finish.
- Casings.
- Corner Blocks.
- Plinth Blocks.
- Base.
- Stair Rail.
- Newel Posts.
- Balusters.

Molding.
- Bed Molding.
- Crown Molding.
- Panel Molding.
- Cove Molding.
- Base Molding.
- Band Molding.
- Quarter Round.
- Door Stops.
- Window Stops.
- Parting Stops.
- Wainscoting Cap.
- Window Stools.
- Water Table.
- Thresholds.

Doors.
- Front Doors.
- Sliding Doors.
- Closet Doors.
- Cupboard Doors.
- Cellar Doors.

Windows.
- Bay Windows.
- Pantry Windows.
- Cellar Windows.
- Transoms.
- Art Glass.
- Plate Glass.

Blinds.
- Outside Blinds.
- Inside Blinds.

Corner Beads.

(To be continued.)

HINTS FOR THE SLATE ROOFER.*

THE SLATER should be very particular to put boards in the gutters, so that the metal cannot be injured by tramping, or by pieces of slate. In nailing slate on great care should be used that the nails should not be driven down too tight, as they will pull through, and on the other always be separate. The shingle flashing should be laid in with the courses of slate, one piece under the lower end of the first slate or half slate intersecting any wall or chimney, and should be 2 inches longer than the gauge of the slate (the slate are laid to weather) and 6 or 7 inches flashing is usually done by the tinner. If lead is used for flashing no heavier than 2½ pounds to the square foot should be used for the part interlapping with slate. If thicker is used it makes the slate lie badly. Flashing should never be put in in long strips, but always cut and laid

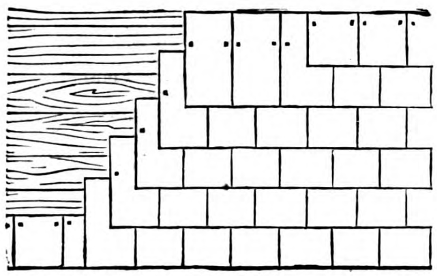


Fig. 9.—Showing Manner of Starting and Finishing a Roof.

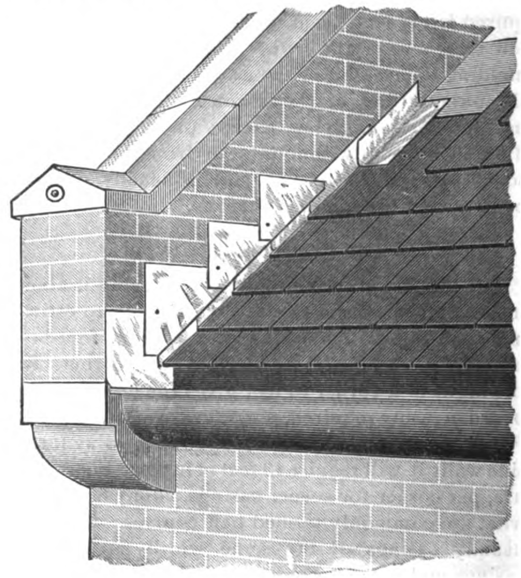


Fig. 11.—Method of Flashing.

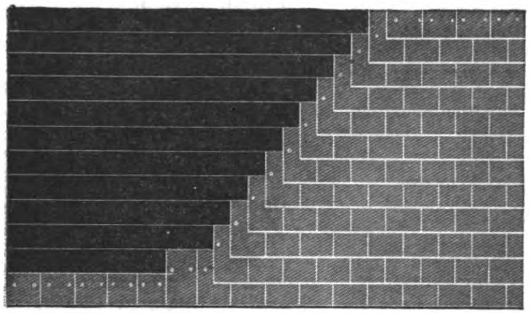


Fig. 10.—Head Lines on Felt.

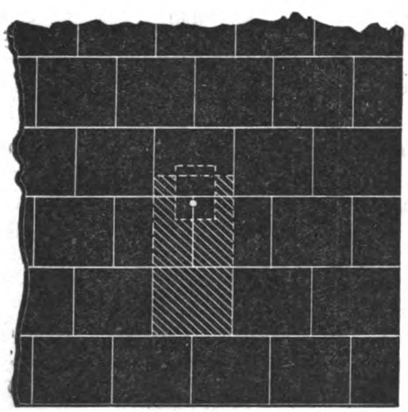


Fig. 14.—Shape of Piece of Tin for Covering the Nail Head.

Fig. 13.—Method of Repairing a Slate Roof.

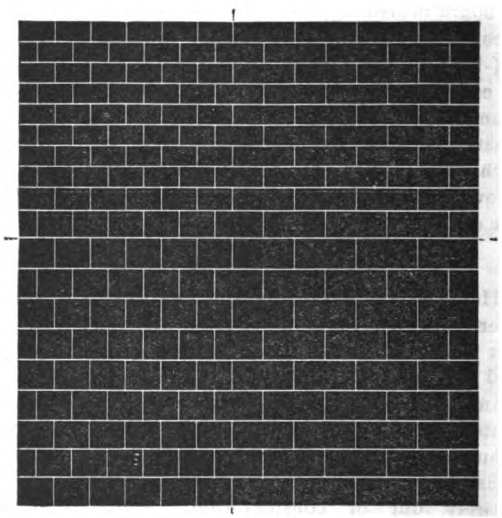


Fig. 12.—Showing How Several Sizes of Slate May be Used on One Roof.

Hints for the Slate Roofer.

hand, they should be driven down even with the slate, so that the nail will not punch the slate above when pressure is put on from above by stepping on the slate, or by the scaffolding.

Fig. 9 of the cuts shows how to start and finish a roof.

The lap is the amount the tail of the third course laps over the head of the first course.

FLASHING AND COUNTER FLASHING.

Flashing and counter flashing should wide. Turn up square 2½ to 3 inches. The part turned up against a chimney or wall should never be nailed to same, for the reason that the wood work of the roof will settle more than brick or stone work in chimneys or walls and cause the flashings, if nailed, to tear up the slate. The counter flashings should be let into the brick or stone joints 1 inch, well wedged in and pointed with mortar. The pointing is a part of the masons' work. If grooves have to be cut in the stone or brick work to receive counter flashing it is the masons' work to cut them. Counter in with the courses, Fig. 11. A great source of trouble and leaks is the manner in which chimney backs are usually put in.

USING DIFFERENT SIZES ON ONE ROOF.

On account of the long distance that slate has to be shipped and the length of time it takes to get a carload through, it often happens that the slater may have slate enough for a job, but not enough of one size for even one side of the roof. We have prepared Fig. 12 to show the manner of using different sizes of slate on the same section of roof. The cut shows

* From "The Slate Roofer," published by Auld & Conger, Cleveland, Ohio.

four sizes, but more can be worked the same way; for example, take a roof 20 feet long and 20 feet rafter—there are four squares—now suppose you have one square 10 x 16, one square 8 x 16, one square 10 x 14, one square 8 x 14. Start with 10 x 16; when half way across the eave run 8 x 16 the other half, then run up 10 feet on the roof with these two sizes, the two sizes joining in the center; then start on the 10 x 16 with 10 x 14, and over the 8 x 16 lay 8 x 14. If more than four sizes are to be used divide the roof into sections according to the slate to be used.

REPAIRING A ROOF.

Many slaters think they have a perfect right to charge a ruinous price for repairing because they do it by the day. This class of so-called slaters never succeeds in building up a permanent business and are almost certain to finally bring up in the hands of the sheriff, no matter how prosperous they may appear at first. They do more damage to the slate business than any other one thing known. They do a poor job of roofing and depend on making money by repairing. In putting on a new roof every slate should be left whole and perfect, both nails should have their full hold, and the slater should feel that each slate is right before covering it up with the next. The same care should be used in repairing. Take out every slate that can possibly cause a leak, and carefully replace it. If the roof is steep and the slate 20 inches or larger, put in two nails—the upper one as close up in center joint as possible, the other 2 inches lower down. Over the head of the nails slip a piece of painted tin, about 3 x 6 inches; bend the tin so it will bind and not slip out. Putty or cement is sometimes used for the nail heads, but neither is good. Leaks are often caused by cracks in the slate above the gauge line, so that it is only by close scrutiny the leak is found. Leaks are also caused by a rough surface on the slate near the head, causing the water to run across the slate. This is very often the case with hand-punched slate, as large pieces are frequently scaled off, which catch the water, running it in around the nail.

The dotted lines in Fig. 13 show the piece of tin over the nail, the light shaded space showing where the broken slate is taken out and replaced.

Fig. 14 shows the shape of the piece of tin before being slipped in over nail head. Putty or cement should never be used in repairing to cover nail head, as they will not last.

SLATERS' SCAFFOLD BRACKET.

Fig. 15 shows the method now generally adopted by slaters for scaffolding a roof. The scaffold can be made in two ways, the old way being to nail up a bracket at the building from pieces of board. This is a slow, expensive plan and often very dangerous. The safer and better plan is to have adjustable brackets, shown in Figs. 16 and 17, that can be changed to any pitch of roof instantly and folded up when not in use. The plan of using the bracket on the roof is shown in Fig. 15. A light and convenient extension ladder is the most convenient way to get slate upon small buildings; for buildings more than two stories it is better to use a rope pulley and pull the slate up to the gutter, using a ladder to carry the slate from the gutter up to the scaffold where slaters are at work.

Spire slating is done in two different ways. The first and usual way being to use the carpenters' scaffold for putting on the slate, leaving out slate where the scaffold timbers come through until done. Then take the scaffold down from the top, finishing the ridge and repairing as you come down. The other and more difficult plan is to put the slate on from a chair or swinging scaffold, as shown in Figs. 18 and 19 of the engravings. This is the plan used when there is no carpenter's scaffold. When this plan is used it is customary to build a small scaffold around the spire at the highest point that can be reached from the inside through an opening. It is very handy to have a scaffold around the base of spire from which to start.

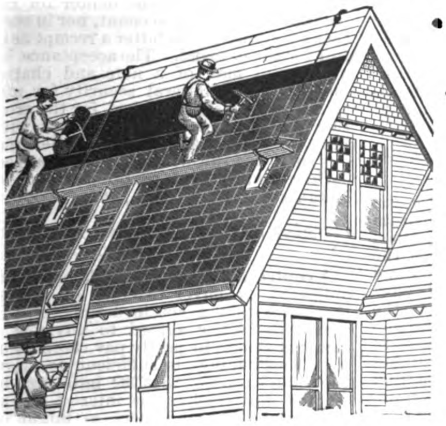


Fig. 15.—Showing Application of Slaters' Scaffold Bracket.

Fig. 16.—Scaffold Bracket Ready for Plank.

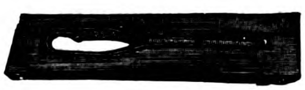


Fig. 17.—Bracket Closed when Not in Use.

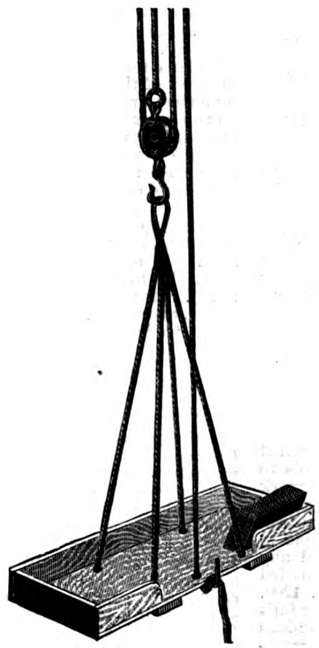


Fig. 18.—Swinging Scaffold.

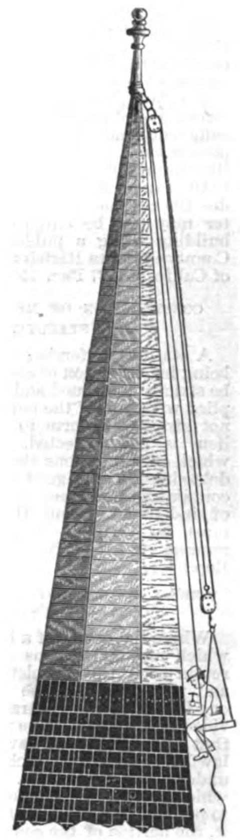


Fig 19.—Showing Method of Slating a Spire.

Hints for the Slate Roofer.

Few of our native trees have odoriferous wood like the sandal wood of the islands in the Pacific Ocean; but a few of the coniferæ on the Pacific Slope have sweet-scented woods. The fine church at Metlakatla, built by the civilized Indians of Alaska, says *Meehan's Monthly*, is as fragrant as if incense was continually floating through the air, from the wood of the great arbor vitæ—Thuja gigantea—of which it is built. Libocedrus decurrens, found further south, is known as "incense cedar" from its fragrance. The yellow cypress, Cupresses nutkænsis, and the Monterey cypress, Zupressus macrocarpa, have also scented wood.

LAW IN THE BUILDING TRADES.*

RECOVERY FOR VALUE OF REFUSED PLANS.

AN ARCHITECT contracted to draw plans and specifications for a building, let the contract, and superintend the construction, and was to receive for his services $\frac{1}{2}$ per cent. of the cost of the building. After the plans and specifications were completed the employer refused to accept them. In an action to recover the reasonable worth and value of the work performed, the measure of recovery was such a proportion of the $\frac{1}{2}$ per cent. as the work done bore to the whole work contracted for.—Noyes *vs.* Pugin, Supreme Court of Washington, 27 Pac. Rep., 548.

CLAIM AGAINST PUBLIC BUILDING.

Where the statute provides that a mechanic or material man may give the owner of the building for which he has furnished material or labor written notice of his claim, and that it thereupon becomes the duty of the owner to retain sufficient funds to pay it, a mechanic employed by a sub-contractor, who serves the required notice, acquires a prior right to the funds in the hands of the owner due the contractor, and though the latter may not be entitled to a lien, the building being a public one.—Bates *vs.* County of Santa Barbara, Supreme Court of California, 27 Pac. Rep., 438.

CONSTRUCTION OF MECHANICS' LIEN STATUTE.

A statute conferring mechanics' liens, being in derogation of common law, must be strictly construed and absolutely complied with, and if the notice of claim does not strictly conform to the statute, the lien is not perfected. A verification which only mentions the abstract of indebtedness is not good when the notice contains matter other than the statement of indebtedness, and the whole notice must be verified.—Minor *vs.* Marshall, Supreme Court of New Mexico, 27 Pac. Rep., 481.

CREDIT ON RESERVED PAYMENTS FOR CONTRACTOR'S FAILURE.

Where the owner of a building, against which mechanics' liens are filed, fails to retain after the completion of the work and pay over to those entitled thereto one-fourth of the contract price, as provided in his contract, he is responsible to that extent, but may have deducted any lawful credits to which he is entitled under Code Civil Proc. Cal., Sec. 1200, which provides that if the contractor fails to perform his work in full or abandons it, the portion of the contract price applicable to mechanics' liens shall be deemed the difference between the value of the work and materials already done and furnished and the payments then due and actually made.—Reed *vs.* Norton, Supreme Court of California, 27 Pac. Rep., 426.

BASIS OF RIGHT TO LIEN.

The right of a material man to a lien upon a building does not result from the contractor being an agent of the owner, but from having furnished such contractor materials which were used in the erction of the building.—Pomeroy *vs.* White Lake Lumber Company, Supreme Court of Nebraska, 49 N. W. Rep., 1131.

CONSTITUTIONALITY OF MECHANICS' LIEN LAW.

The Wisconsin statutes provide that sub-contractors who furnished material used in the erection of buildings might have liens therefor, but restricted the amount of their recovery to the amount of the original contract price. In 1889 that law was amended so as to do away with the restriction as to the amount of recovery by the sub-contractors, but made it the duty of the original contractor to defend all actions by sub-contractors, and when their claims exceeded the amount of his contract price it gave the owner of the property a right of action against the contractor for amount of liens over and above the contract price. This amendment is invalid and unconstitutional.—Mallory *vs.* LaCrosse Abbatoir Company, Supreme Court of Wisconsin, 49 N. W. Rep., 1071.

ATTORNEY'S FEES OF OWNER IN LIEN CASES.

Where the owner of a building has been compelled to enforce liens, to which both he and the contractor were parties, he is entitled to set off against the contract price not only the amount of the judgments recovered, but all that he had been compelled to pay to relieve his property from the liens, including his attorney's fees and costs.—Cavell *vs.* Washburn, Supreme Court of California, 27 Pac. Rep., 859.

LIABILITY OF WIFE FOR CONTRACT OF HUSBAND.

Where a husband contracted for the erection of a house on his wife's separate property, the fact that the wife examined the plans for the building, watched the progress of the work and personally and by letters urged the material men to push on the work are sufficient to sustain the verdict that the wife is liable to the mechanic's lien of the material men. In such case it was proper to charge "that a husband cannot, by making a contract like this, charge his wife's property, unless it appears that the materials were furnished with her knowledge and consent. If she assents to the contract made by her husband in this respect. . . . If she knowingly received the goods, assented to the application of the goods to her property, she is bound by the contract.—Bodey *vs.*" Thackara, Supreme Court of Pennsylvania, 22 At. Rep., 754.

PENALTY CLAUSE IN BUILDING CONTRACT.

A person named Kemper and one named Candon entered into a written contract whereby Candon agreed to build a wall, &c., or else, at his election, to remove a certain house 3 feet, and put it in as good condition as it was before, and in such contract the parties further stipulated as follows: "It is mutually agreed between said parties that a failure on the part of said Candon to perform these obligations shall entitle said Kemper to recover from him the sum of $500, as liquidated and ascertained damages for breach of this contract." Candon elected not to build the wall, &c., and afterward failed to remove the house. The cost of removing the house and putting it in as good condition as it was before would not have exceeded $100. When the parties made the contract and stipulated for damages in case of breach, fixing the amount at $500, they could not have had in contemplation actual compensatory damages, and therefore the sum of $500, mentioned in such contract as liquidated and ascertained damages, must be treated as a penalty, and not as liquidated damages, and therefore it cannot be enforced, and only actual damages can be recovered.—Candon *vs.* Kemper, Supreme Court of Kansas, 27 Pac. Rep., 829.

CONTRACT AGAINST LIENS.

A building contract in Pennsylvania provided that the owners should not "in any manner" be answerable for any of the materials used in finishing and completing the building, and that there should not be any lawful claims against the contractor in any manner, from any source whatever, for work or materials furnished on said building. The contract provided against the filing of mechanics' liens, and was binding on sub-contractors.—Dersheimer *vs.* Maloney, Supreme Court of Pennsylvania, 22 At. Rep., 813.

MECHANIC'S LIEN ON PARTNERSHIP PROPERTY.

A partnership composed of three persons erected a building upon a lot owned by two of the partners. The partners holding the legal title of the lot contracted in the name of the firm for material used in the construction of the building. In an action by the material man to foreclose his lien it was held that the lien attached to the lot and building thereon. A mechanic's lien under the Nebraska law is not lost or waived by the taking of the note of the debtor for the balance due on their account, nor in such case by giving to the latter a receipt as in full for the demand. The acceptance by a material man of a note and chattel mortgage as collateral security for materials previously furnished for the erection of a building under a contract with the owner is not a waver of the lien unless such was the intention of the parties.—Hooglund *vs.* Lusk, Supreme Court of Nebraska, 50 N. W. Rep., 162.

INTEREST IN LAND NECESSARY TO SUSTAIN MECHANIC'S LIEN.

A contract for the sale of land, which obligated the buyer to erect six houses thereon within a specified time, and in which the seller agreed to advance a designated sum to partly pay the cost of their construction, is sufficient to show the seller's consent that the buildings be erected and renders his interest in the land subject to such liens as might be filed for labor and material furnished for the construction of the houses. A stipulation in the contract of sale that any mechanic's lien should be subject to the seller's consent to the erection of the houses was not sufficient to subordinate to the seller's rights the lien of a person furnishing materials for the work, who was not connected with either of the parties to the contract and who had no notice of the stipulation.—Miller *vs.* Mead, Court of Appeals of New York, 28 N. E. Rep., 887.

APPLICATION OF PAYMENT.

Where a contractor who was building a house for defendants delivered a check to plaintiffs' agent, taking a receipt therefor, and requested the agent to apply the proceeds to materials furnished by plaintiffs on a building then being erected for a third person; that the agent refused to so apply the proceeds of the check, but stated that part would be so applied, and that the residue would be applied to certain other contracts, not including that with defendants; that afterward the contractor went to the plaintiffs' office, showed plaintiffs' bookkeeper the receipt for the check given by the agent, and the bookkeeper, in ignorance of the facts, and relying on the contractor's statements, gave him a receipt for the amount of the check on the materials furnished for defendants' house; that plaintiffs, on discovery of the facts, promptly repudiated the application of the check so made by the contractor, and the contractor afterward approved plaintiffs' bill for the whole amount of materials furnished on defendants' house, without claiming any credit on account of the check; that the contractor, by producing the receipt, afterward induced defendants to advance "further money" on his contract; and that plaintiffs did not know of the use to which the contractor put the receipt. The defendants were not entitled to have the amount of the check deducted from plaintiffs' claim for material furnished.—Schallert-Ganahl Lumber Company *vs.* Neal, Supreme Court of California, 27 Pac. Rep., 743.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
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MARCH, 1892.

Scope of an Exchange.

One of the surest methods of securing for builders' exchanges the influence and recognition which is obtained by other organizations of business men in every community is an open and direct willingness to identify itself, as an organization, with every movement that is calculated to improve or enhance the welfare of the city in which it exists. There is no reason why the builders should not be an integral part of every effort to improve the condition under which its citizens live and conduct their business as well as the Chamber of Commerce or the Board of Trade. Builders, by education and experience, are peculiarly qualified to deal intelligently with all subjects that touch the welfare of the people, as regards construction, sanitation and other matters of like importance and are thoroughly capable of considering financial questions as well. It is often the case that the community at large are virtually without knowledge of the existence of an exchange in their city, for the reason that its members have made no effort to secure either representation or recognition in the consideration of the affairs of their city, but have confined themselves entirely to the consideration of such matters as are purely connected with their business, and then perhaps in meetings poorly attended, held not oftener than once a month. Nothing would tend more to impress the builders with the dignity of their own calling than to be recognized by the citizens of the community in which their organization exists, and asked to participate in the consideration of plans for the general welfare. The builder apparently needs to be waked up to a keener realization of his own importance.

A Novel Building.

Chicago is a city of surprises in architectural matters as well as in other directions. As a city Chicago is always reaching out for big things, irrespective of the opinion in which she may be held by the balance of the world. For a long time past Chicago has been the greatest railway center. She has been the greatest inland city, and aspires at an early date to be the largest city on the continent, if not in the world. She has the tallest buildings, the largest number of miles of streets and has developed more novelties in building construction than perhaps any other city. She has had the largest fire of modern times, and has put on record unparalleled feats of building enterprise in the work of recovery from that terrible calamity. Just at present she has the World's Fair on hand, an enterprise in which she proposes to outdo the rest of the world and cast in the shade all former exhibitions. While preparing for the World's Fair, her citizens in their private enterprises are not neglectful. Nor are they failing to improve each opportunity as it presents itself to give the city a varied appearance and to keep it to the fore in an advertising sense. Not only are mammoth structures in progress on the fair grounds, but also all over the city buildings are in process of erection which are wonders in themselves. A single instance is sufficient to illustrate Chicago's propensity to the large and to the grotesque, to the striking and to the impressively realistic, irrespective of artistic or æsthetic considerations. A movement of architecture is in progress which, in the language of one of the daily papers, "Chicago feels to be worthy of her temperament and her genius. It is original, and yet it is deemed to be select. It is unlike anything else that cumbers the earth or abrades the sky. It is what the superlative scatterers who are employed as harbingers and heralds of circuses would joyfully describe as the most majestic megatherium and cyclopean colossus of constructive and artistic skill. It is, in the exact language of Chicago, 'a corker, and don't you forget it.' It will cost $300,000, be 12 stories high, built of brick and terra cotta on a steel frame over the sticky abyss which is the foundation of Chicago. The building is to be occupied by a publishing company, and the 'cunning architect' has planned a building in which the design of the book published by the company is copied. The front is one curved bay representing the back of the volume, the title appears across the tenth and eleventh stories in letters which shall serve as windows. The trade-mark of the company will be reproduced in immense terra cotta medallions on the two fronts of the building."

Possibilities of this Type of Architecture.

We cannot better impress the reader with the possibilities which this new departure presents than to give below the pleasantries which one of the metropolitan dailies has published in commenting on this design. There is food for thought, reading between the lines, in what follows: "As the eye climbs delightedly over this tall copy, one cannot help thinking of the triumphant question of the hot Scotch who were present at the first performance of Mr. Home's celebrated tragedy: 'Where's Wully Shakespeare noo?' Where's Micky Angelo now? Where's Messer Filippi Brunelleschi now? Why did Henry Hobson Richardson have to die before this new style of architecture was revealed? For consider the possibilities. Consider how it simplifies things for the architect. Do you want a brewery built? The architect builds you a 12 or 15 story building in the shape of a beer bottle, with the cork or cupola in yellow brick. The name of your brewing company and your beer will appear across the tenth and eleventh stories in letters which shall seem as windows. Immense terra cotta medallions of goats will be placed on the two fronts. The basement will be arched like the dimple in the base of the bottle. If you want a design for a hog-rendering establishment, a canned meatery, a sausage factory, your architect will give you in stone or brick or terra cotta miracles of pig pens, cans and linked sweetness. The Sausage Building could be built to an altitude that would have the firm of architects that designed the celebrated Tower of Babel, Limited, sick and sore. A tailor's shop will be built after the manner of the goose, a manner which will require much delicate calculation of strains and thrusts, and will, we are afraid, result in rather a squatty appearance after all. A dry goods store will be in the present approved form of an oblong or square box. The cigar factory will give beautiful cloud-pushing effects. Private houses will be built according to the professions of their occupants. For instance, a physician's house will be a pill box, a minister's a pulpit, and an editor's a pencil in bluestone. The infinite variety of these seemingly conventional designs will make the coming architecture of Chicago a wonder and a joy. Chicago has at last evolved an order and a type of architecture peculiarly her own, stamped with her impress, the very frost of her breath. We trust there will be plenty of specimens of the style by the time the show begins."

Arbitration.

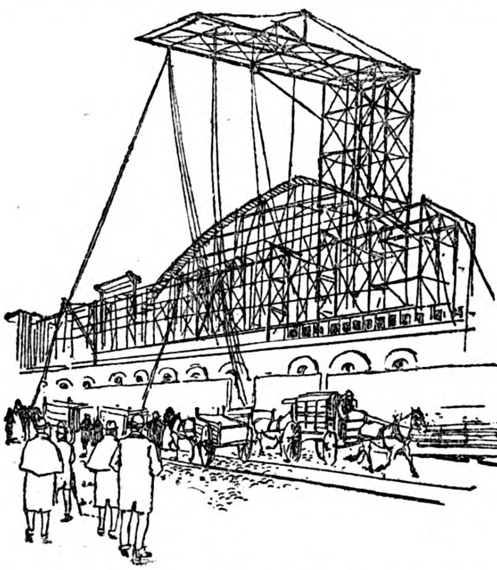
One of the most satisfactory evidences of the practicability of arbitration, as advocated at the fifth annual convention of the National Association of Builders, is shown in the result of its application between the Mason Builders' Association and the Bricklayers' and Building Laborers' unions of Boston. Ever since the establishment of the joint committeee all matters of mutual concern between the employers and workmen in this branch of the building business have been amicably and satisfactorily adjusted without disturbing the harmony of the organizations in the least degree. The plan under which the arbitration is conducted is one that is eminently just and fair in all its conditions, giving to the workmen the same right of representation as to the employer, and the conditions under which the joint committee is established are such as are applicable to all trades in all localities. There is no reason why strikes or lockouts should continue to disturb the various communities, so long as justice is desired by both sides, for some form of arbitration which is fair and just could always be established, and the one which has proved so successful in this and other cases is always ready at hand.

BUILDING WAYS AND MEANS.

The Reading Terminal.

EVERY NEW BUILDING of importance, no matter what its character, seems to develop some new feature of engineering, or else excels its predecessors of the same class in dimensions, methods of construction or speed of erection. The new passenger station and train sheds of the Reading Railway in the city of Philadelphia, familiarly termed by the citizens of that place the Reading Terminal, is a conspicuous instance in point. The condition of the work at this writing is of a character to command the attention of the observer, no matter from which side he approaches it, and irrespective of his business affiliations. The building in question extends from Market street back to Arch street. The trains come in on an elevated roadbed, thus avoiding grade crossings, and making it possible for the building to span Filbert street, which lies between. The train shed extends to the Arch street limit, and work upon it at this time has reached the commencement of the false work, and the traveling hoisting gear necessary to the erection of the arches of which the shed is composed.

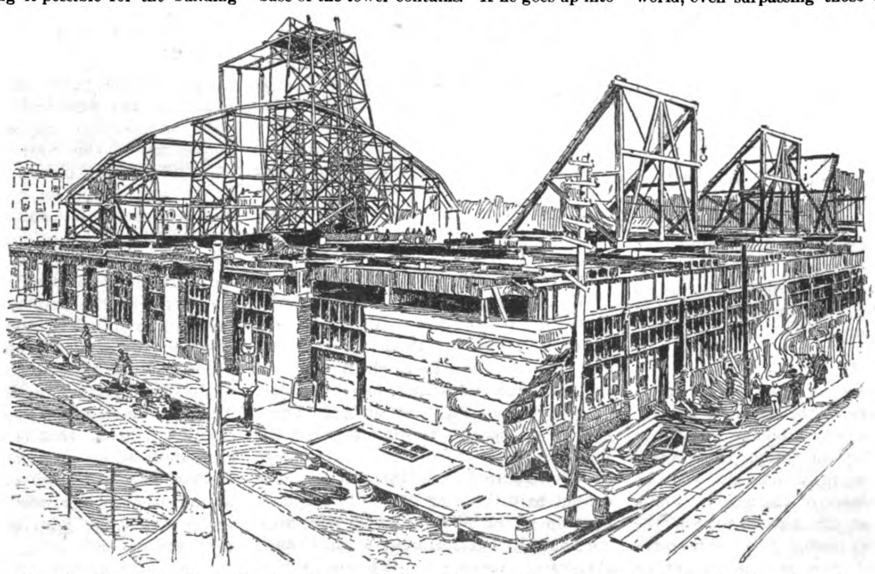
THE OBSERVER approaching the work along Arch street has his attention first called to an overhanging scaffold, as shown in the smaller of the accompanying sketches, 100 feet in the air, which he momentarily expects to see topple over, for there is no apparent reason why it should stand up. Closer scrutiny shows also that ropes hang from its extreme end, as though hoisting were to be done from it, and yet any weight lifted from the point named would evidently tend to tip the steeple-like structure and throw it down. Finding that the thing does not fall, the observer begins to trace out the construction employed. He detects a platform or "boom" extending out from the tower, trussed upwardly, and having light braces below, extending from its center line down against the side of the tower. He finds, also, ropes or rods connecting the inner end of the platform with the lower part of the tower, thus tying it to the weight which the base of the tower contains. If he goes up into the building he will find the tower or "traveler" on wheels, arranged to move laterally, while its foundation and the false work are on another set of wheels arranged to move lengthwise of the building. Here is a description of the work as shown in the sketches :



Hoisting Gear Used at the Reading Terminal, Philadelphia.—Viewed from Arch Street.

"TWELVE TRACKS of railroad iron run lengthwise of the building. Upon this, on small iron wheels, is a frame work of heavy beams, bolted and braced by iron rods, about 256 feet wide and 110 feet long. This frame work is movable, and, as the work of construction goes on, it will be run as required toward the Market street end of the building. On this structure, and movable with it, is built an arch of beams and small timbers trussed with iron rods, 98 feet in hight and 266 feet wide. This is the false arch work on which the iron arches proper will be constructed. Just back of this arch work is the traveling hoisting gear. Across the building, on the beams making up the frame work on which the great false arch rests, 46 feet apart, are laid heavy beams bearing iron rails. On these rails, on small iron wheels, rests a very heavy frame work or platform of timber, 46 x 40 feet square, which can be run back and forth the width of the building. On this platform is constructed a hoisting gear, the largest and most noteworthy of its kind ever erected. This hoisting gear, from the floor of the train house to the top of the boom support, is 122 feet. From the floor of the train house to the boom, or the great frame which projects from the uprights over the wooden false arch toward Arch street, is 110 feet. The frame at the top is 28 x 20 feet square, and is supported by upright sectional joists braced by iron rods and bolted securely. The uprights at the Arch street side of the traveler are exactly perpendicular. On the Eleventh and Twelfth street sides they have a slope of 1 inch to the foot. On the side toward Market street the slope is 3 inches to the foot. The frame at the top is bolted to the top sections of the uprights and double iron rods of great strength extend from the rear corners to the corners of the platform on which the whole structure rests. Extending 60 feet outward from the top platform toward Arch street, overhanging the false arch work, is a frame work of large timbers. This rests on the top platform and is bolted to it. The corners of this frame are connected by iron rods with the rods which extend to the ground, giving it support. Extending upward from the center of the frame work or boom 12 feet are two piers. Large iron rods extend from the corners of the boom frame to the tops of these piers, forming trusses, and thus giving support to the boom. To overcome the weight of this immense skeleton upright structure and the boom frame work, the movable platform on which it is erected is weighted by 6 tons of railroad iron. In addition to this the platform bears two donkey engines and hoisting apparatus."

INASMUCH AS THE ARCHES of this train shed are to be the largest of their kind in the world, even surpassing those of the Pennsylvania Railway station in Jersey City, it is easy to say that this traveling false work and hoisting apparatus is the highest and largest of its kind ever constructed. The speed with which the work is being pushed, evidenced not only in getting these working parts ready, but also in the use that is being made of them, is, however, the best test of the engineering skill of the men in charge. A. O. K.



Erecting the Train Shed, Reading Terminal, Philadelphia.—View from Filbert Street, Toward Arch.

RESIDENCE IN CARTHAGE, ILL.

THE ATTRACTIVE residence which is illustrated in our supplement plates and upon this and the following pages was erected not long since in Carthage, Ill., for William De Hart from drawings prepared by George W. Payne, architect, of that place. One of the supplement plates shows a general view of the house as it stands completed, while the other represents an interior view of the main hall. By comparing the general view of the rooms on the second floor are easily accessible. From the hall to the right opens the front parlor, which is connected with the rear by sliding doors. Both of these apartments have open fire places, which may be employed in mild weather for keeping the apartments at a comfortable temperature. To the left of the back parlor is a large sleeping room with a passage leading to the rear entrance and also to the kitchen. The dining room is beyond the back parlor and to the right bowl and water closet. From the second floor is a stairway leading to the attic, which is floored over and serves as a storeroom. The rear hall on the first floor and the three large sleeping rooms on the second floor are fitted with wash-bowls.

The hall and two parlors are finished in oak, while the kitchen and dining room are finished in Southern yellow pine. The other rooms are finished in white pine. These are in their natural color,

Front Elevation.—Scale, 1/8 Inch to the Foot.

Residence in Carthage, Ill.—George W. Payne, Architect.

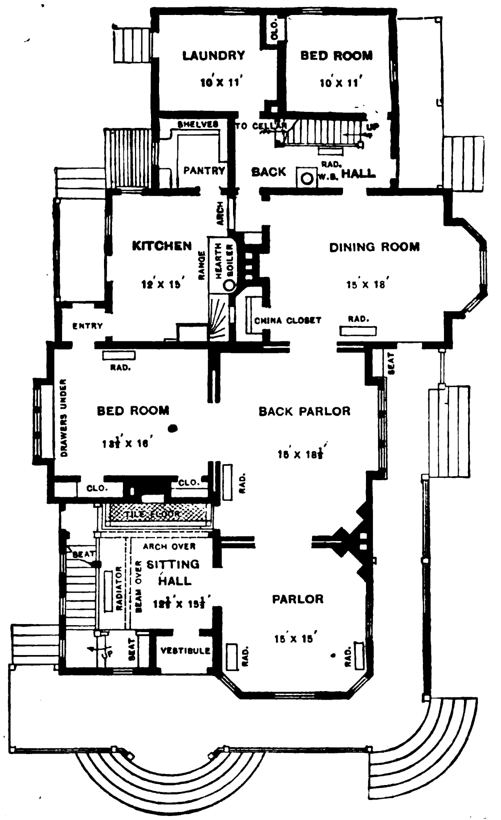
house with the elevations shown upon the following pages it will be found that the oriel balcony in the front gable differs from the original design.

The detail shown in connection herewith represents the balcony as it was constructed. Upon the first floor of the house are eight commodious rooms, including a large reception hall. The view in this room, represented upon one of the supplement plates, is taken with the camera standing near the door opening into the parlor. The hall, which is entered through a vestibule from a veranda, is furnished with an open grate and a cosy arched recess with tiled floor. At the foot of the main stairs is a seat. The windows at the left as one ascends the stairs are of stained glass, producing very pretty effects, as may be seen from an inspection of the supplement plate. This main stairway is of red oak and terminates in a large hall above, from which the of the kitchen, and is fitted with an open fire place and a large bay window. At the left of the fire place is a china closet, having a small window opening into the kitchen just over the draining board of the sink. The dining room can be entered from the outside by way of the rear hall and side porch. The kitchen, which is fitted with all necessary improvements, is easy of access and yet so situated as to shut off all smells from the other rooms on that floor. Opening from the kitchen is a commodious pantry fitted with shelves and provided with a window opening over the entrance to the cellar. Back of the dining room is a small hall, from which a stairway leads to the second floor, while below it are the stairs leading to the cellar. From this back hall open the laundry and a small bedroom.

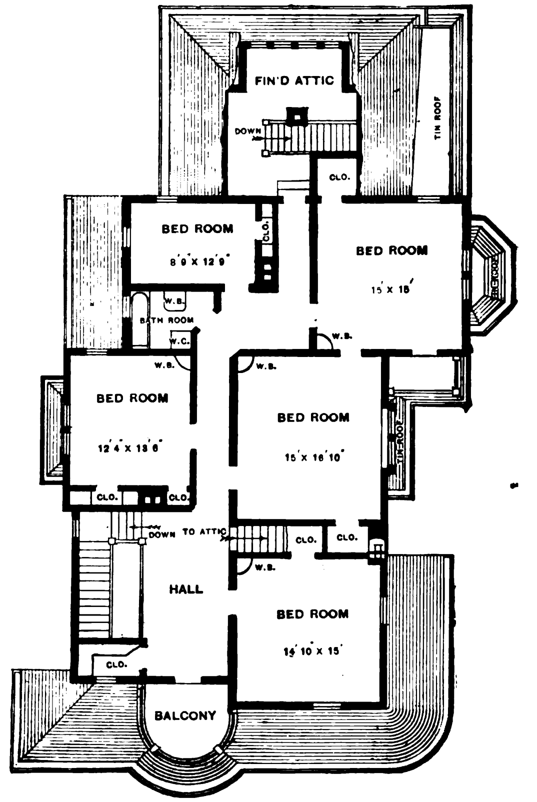
The second floor of the house is fitted with five sleeping rooms and bathroom, the latter being fitted with tub, wash- except the laundry, rear bedroom on the first floor and the attic above these rooms. The house is well plumbed and is heated by hot water, the position of the radiators being clearly indicated on the plans. The first story is 11 feet and the second story 9 feet in the clear. The rear wing is one story in hight, having the finished attic above. The cost of the house in the city named is said to have been a little less than $8000.

Teak Supply of Siam.

The use of teak wood in this country, says a recent issue of the *Journal of the Society of Arts*, has largely increased of late years, and now when builders and architects have had experience of its urability for the stairs of public build ngs, rafters, beams and such like work



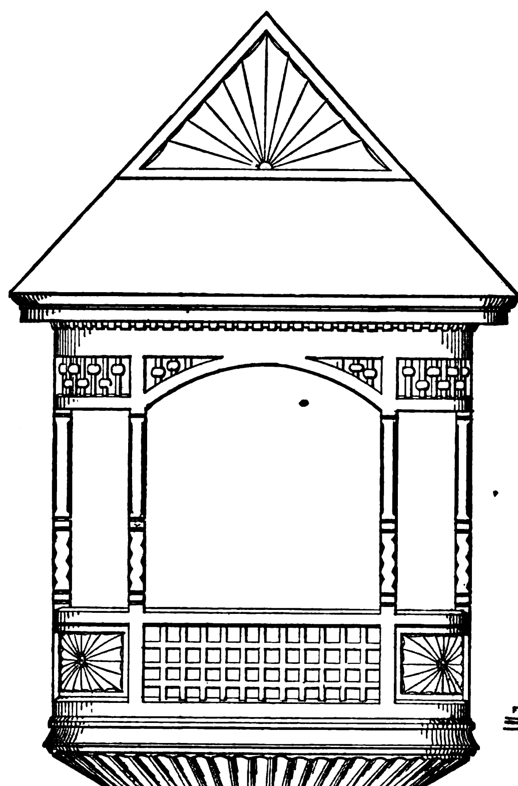
First Floor.

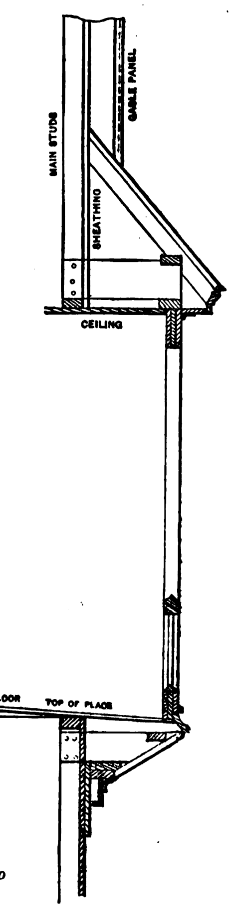


Second Floor.

there are fears of a diminution in the supply of the wood. The teak tree extends through Central and South India, Burma and Siam, and though in the former country the plantations are placed under the careful supervision of the well organized Indian Forest Conservancy, it appears from a report on the trade of Siam, recently furnished to the Foreign Office, that the "number of years which will elapse before the teak forests in the districts become exhausted is variously estimated by the foresters and teak merchants, but 20 years appears to be the longest time allowed, and under present conditions it appears doubtful whether the supply will last so long. In ten years it may not pay to work teak unless prices rise and the method of working it is improved upon, as all the timber near the streams will have been felled and dragged, and only those trees will remain which are far removed from the water, or which are near streams from which timber cannot easily be got out." Further than this, it seems that very little is done by the authorities in the way of conservancy of the forests. No young trees are planted, the natural growth of the saplings being relied upon to keep up the supply of teak, but no measures even are taken to protect the saplings from fire or to insure their growth. Many trees are felled in a green condition, instead of being left girdled for three years until the bark falls off as in Burma. With these conditions working adversely to the cultivation or even to the ordinary growth of the tree, the future prospect of the teak in Siam is a gloomy one.

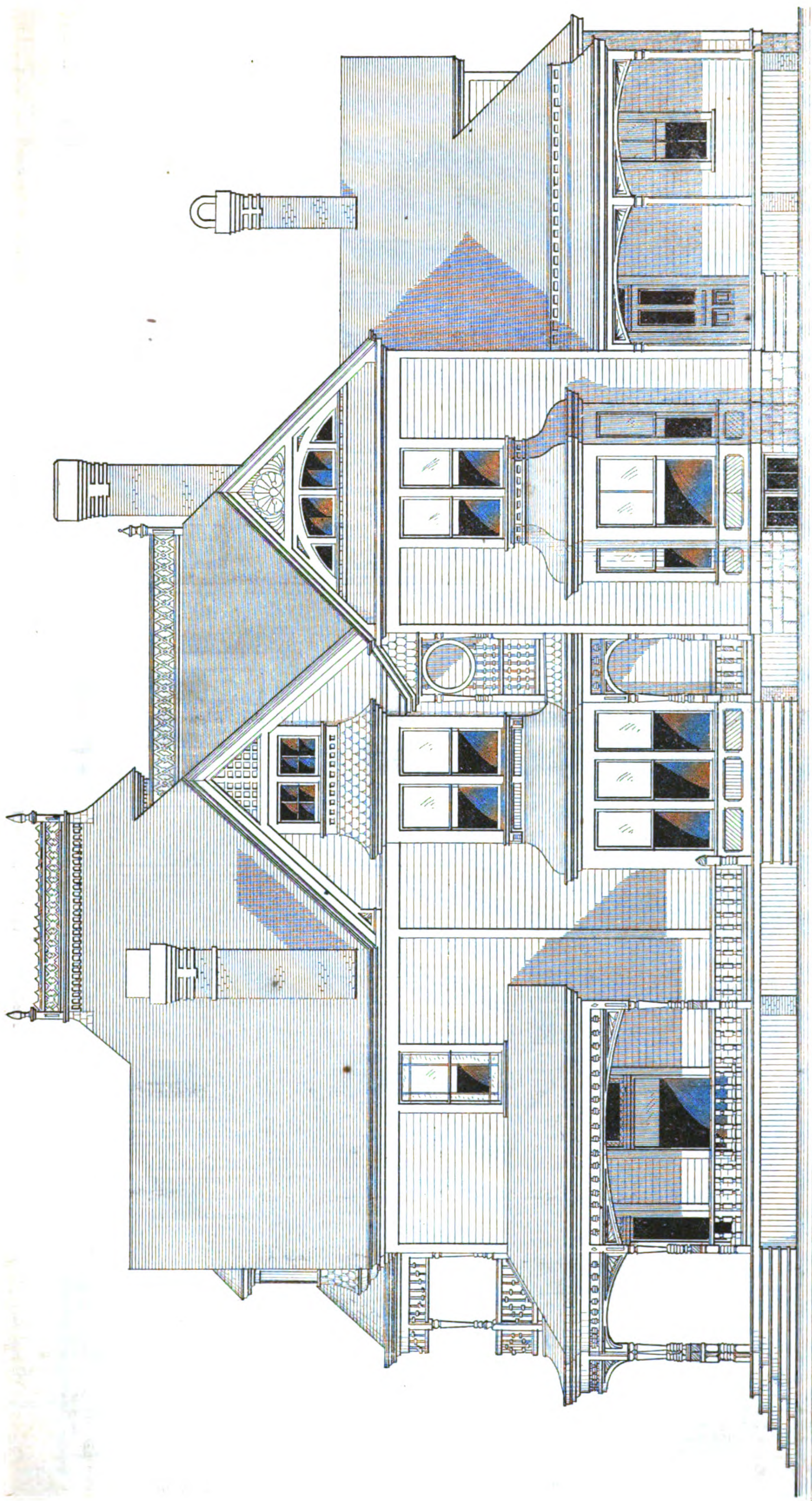
Pyrogranite is said to be a new brick, of Russian origin, that is being tried by English builders. It is made from a combination of fusible and infusible clay, and is strong and hard, resisting a crushing force of five and one-half tons per square inch. It takes a high polish, and the clays may be mixed to give a great variety of colors.



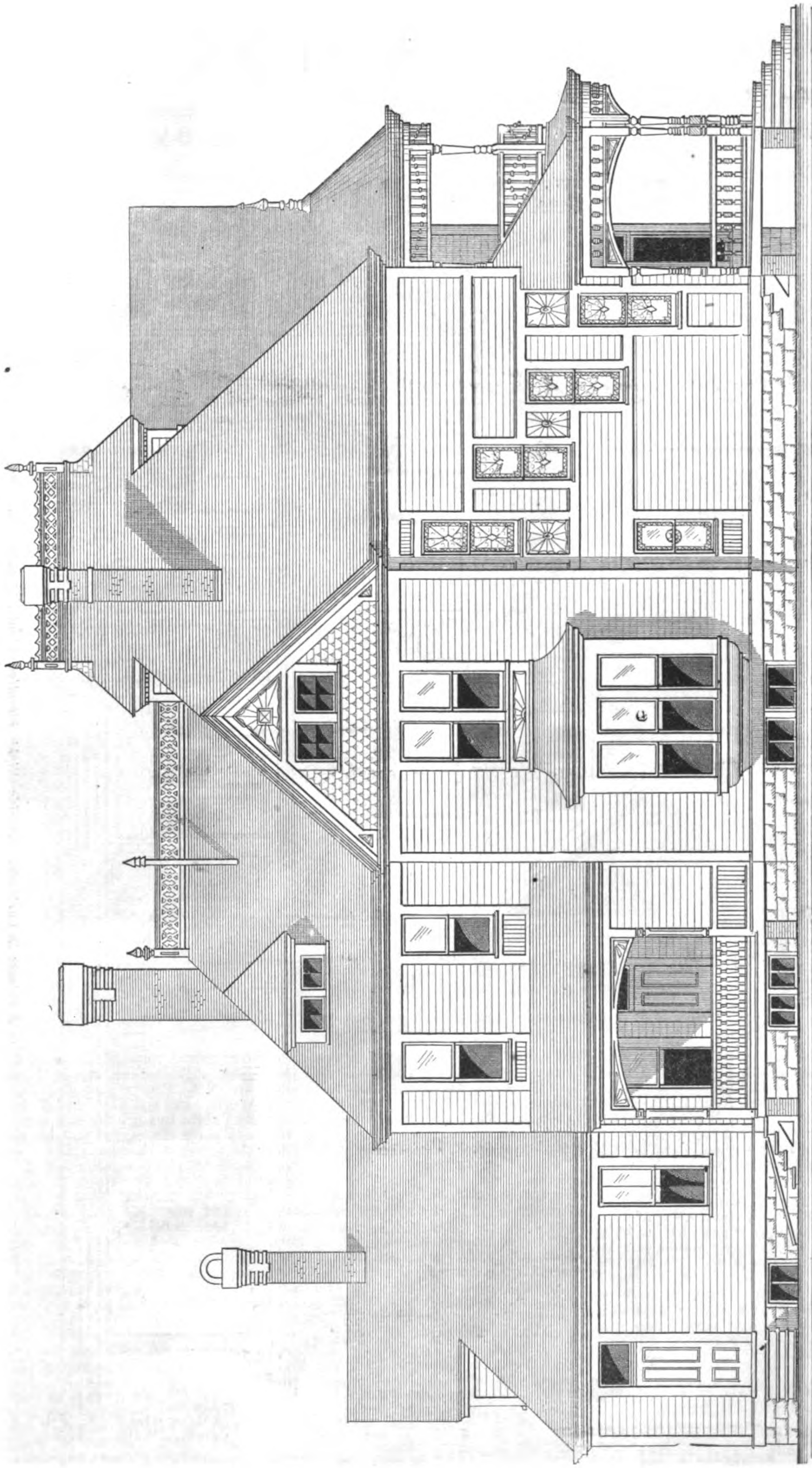


Details of Gable Balcony.

Residence in Carthage, Ill.—Floor Plans.—Scale, 1-16 Inch to the Foot.—Details, 3/8 Inch to the Foot.



Residence in Carthage, Ill.—Side (Right) Elevation.—Scale, 1/8 Inch to the Foot.



Residence in Carthage, Ill.—Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.

CORRESPONDENCE.

Problem in Half-Pitch Roofs.

From E. V. A., *Liverpool, N. Y.*—Replying to the inquiry of "A. W. H.," Los Angeles, Cal., published in the October issue of *Carpentry and Building* for 1891, I send a sketch which represents my idea of the best arrangement for the roof. By referring to the sketch, Fig. 1, it will be seen that the left side is 34 feet 11 inches, while the right side is 34 feet 6 inches, to the rear of the main roof. In other words, the left side of the roof is 5 inches further from the front than the right-hand side. In framing a roof after the plan indicated, I would set the hip and valley rafters marked A and B 5 inches in from the outside plate, which would bring them on a line with the rafter on the right side. The hip and valley rafters A and B are 5 inches lower than the valley C of the jacks running from it to the ridge pole over the gable, as shown in the sketch.

From S. O. C., *Fredonia, N. Y.*—The half-pitch roof plan submitted by "I. N. H.," Galveston, Texas, in the December number of the paper is correct, so far as it goes, but it does not cover the plan submitted in the October issue by "A. W. H." of Los Angeles, Cal. I send herewith a sketch, Fig. 2, which I think will cover the plan of "A. W. H.," and meet the requirements of the case.

From C. D., *Des Moines, Iowa.*—I would like very much to ask the readers of *Carpentry and Building* if any of them have a simple rule for framing such a roof as that indicated in the sketch submitted in the October issue by "A. W. H.," Los Angeles, Cal.? I mean a rule for obtaining all lengths of hips, valleys, jack and common rafters, as well as their cuts and bevels, by using the square and without any further draft.

Equilateral Triangle of a Circumscribed Circle.

From A. H. H., *Kalamazoo, Mich.*—In answer to "J. M." of Cincinnati, Ohio, whose inquiry appeared in the December number of *Carpentry and Building*, I would offer the following rule for finding one side of an equilateral triangle which can be circumscribed by a given circle. Multiply the diameter by 0.86, or divide the side by $\frac{86}{100}$.

Size and Strength of Truss.

From E. E. C., *Whitesboro, N. Y.*—Will some one please tell me through the columns of the paper how I can find the size and strength of a truss which is to hold up a given weight?

Why We Do Not Have Better Workmen.

From J. C. McF., *Richland Center, Wis.*—In the January issue of *Carpentry and Building* is an appeal from a correspondent and seconded by the editor for more correspondence, and as I have had a long and varied experience in building, although of necessity it has been of a local character, I take the liberty of offering a few remarks. Mine has not been what might be termed a city experience, but I would say right here my observations as a rule convince me that country mechanics hold their own in regard to the quality of work performed. We put up all our work nicely smoothed and finished with the marks of the planer all taken out, &c. Of course I speak of the mechanic's own work, for there are botches in country places as well as in towns of larger growth. While I am speaking of botches I may be allowed a few words perhaps in reply to some of the correspondents. I do not remember which one it was, but he appears to wonder or lament why we do not have more and better workmen. As for my part, I am not surprised at it in the least, especially when one sees the system in vogue in the larger places, the system adopted by the trade unions, &c., wherein it makes no difference as to the quality of the work. So long as the workman belongs to the union he gets the same wages as the best of them, and there is no inducement for him to become an expert at his trade. Again, there are the foreign workmen thronging to our shores from all the European countries, knowing that all they have to do is to join the unions and be practically assured of work. It is by such accessions that the unions become strong enough to dictate who shall belong, how many apprentices there shall be employed, and the wages which must be paid, thus leaving but a small chance for our young men to learn a trade and but little inducement to try and be a good workman. Under such conditions is it very strange we do not have more and better workmen? Then, again, the haste that is used in putting up buildings is, in my estimation, another cause for the employment by contractors of any one who may be able to drive a nail or saw a board, if he happens to belong to the union, and, of course, displacing good workmen. The contractor, no doubt, would use good workmen if he could get them. But will he ever be able to do this under the system of which I speak? Now, I do not wish to be understood as opposed to organized labor. On the contrary, I am in favor of it, but not of the system as I understand it to be in vogue at the present time. One thing: I would make quality a requisite for admission to the union, and not numbers, for therein lies the danger and their strength, as I see it. Then, again, I am a free-born American citizen, endowed with certain inalienable rights, among which are life, liberty and the pursuit of—wealth, and consider that I have a perfect right to work for any man or men in any place that they may desire, without the interference of any one. Also that I have the right of protection of our courts of law and the right of protection of my own person. That is my platform, and I may say without egotism that I am considered a good workman, too. I would have no objection to belonging to a union or unions if those principles were incorporated in their constitutions. I would, however, never feel satisfied if I knew there were men belonging to the union who were not workmen in any sense of the word, yet were demanding and receiving the same wages that I was getting, regardless of the quality of work.

Now, I do not propose to start out as a reformer or inaugurate any movement to break up existing practices. Yet, if we want better workmen we must make it an object for them to become such. Employers must be more particular in the quality of the work they have executed. Owners must demand good work, enforce

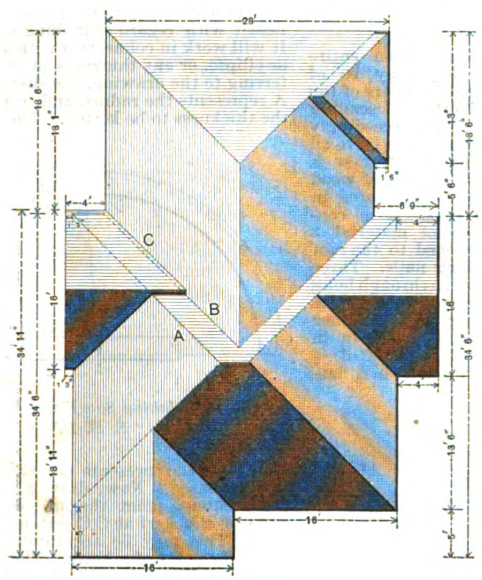


Fig. 1.

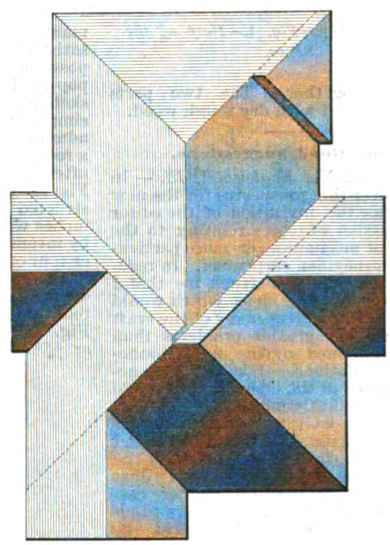


Fig. 2.

Problem in Half-Pitch Roofs.—Solutions Offered by "E. V. A" and "S. O. C."

their demands and at the same time be willing to pay a proper price for such work. Our buildings would then be neater, stronger and more durable and the "Jerry" builder would finally cease to exist.

Design for a Carriage Barn.

From E. E. C., *Whitesboro, N. Y.*—I would be pleased to see in *Carpentry and Building* the floor plan and elevation of a carriage barn with cupola, large enough to accommodate three horses and to cost not more than $1000.

Splicing Timber.

From H. B., *Justus, Ohio.*—I inclose herewith sketches representing a method of splicing timber in this section of the country which may prove of interest to "H. B. M.," Lincolnia, Va., whose letter of inquiry appeared in the issue of *Carpentry and Building* for August of last year. Fig. 1 represents half of the splice, while Fig 2 shows it as it appears

Splicing Timber.—Fig. 1.—Half of the Splice.

when put together. The two parts should be pinned with dry tough wood.

Some Good Suggestions.

From G. L. N., *Englewood, Ill.* — In glancing over the prospectus for the new year I notice the invitation of the editor for a discussion of topics relating to the condition of mechanics, or more particularly of journeymen carpenters. In reading this the thought struck me that I might advance some ideas which would prove helpful to a great many of the craft in working far greater problems than could be obtained by the aid of mathematical calculations. Having been actively engaged in the business for over 20 years and constantly mingling with every nationality as well as men of different disposition and temperament, I feel that I have gained an insight into some of the causes of many individual failures. Just here I want to say that the average carpenter is bound down many, many times by circumstances which might be averted. If his brain were stored with good information, and less recollection of evil associations; if he could and would say "no" to the tempting glass and have less affiliations with evil companions, would he not have greater impetus toward the betterment of his condition in life? I say, yes, verily. I would also

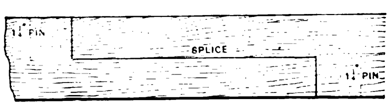


Fig. 2.—Appearance of Timber when Spliced.

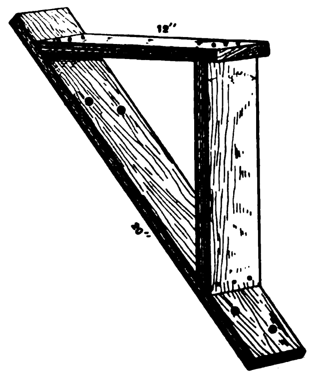
add that the best book of all is right in that it says, with all thy gettings, get wisdom, get understanding.

Dimensions of an Octagon.

From E. A. P., *Carthage, Ill.*—In answer to the inquiry of "R. P. B." in the November number of the paper for a rule for finding a side of an octagon, I would offer the following: Let X equal the diameter and a each side; then $X = a + 2\sqrt{\frac{a^2}{2}}$. Substitute a value for a and find the value of X. Divide the value of a by the value of X and we have the decimal 0.4143, by which to multiply the diameter of any octagon to find the side.

Covenient Carpenters' Appliances.

From A. J., *Elgin, Ill.*—I have been using some carpenters' tools of my own



Convenient Carpenters' Appliances.—Fig. 1.—Roofing Bracket Used by "A. J."

manufacture which have given entire satisfaction, and as they may be of possible interest to other readers of the paper, I take the liberty of sending sketches of them. They are exceedingly simple in their construction, yet serve an admirable purpose. The first of these is a roofing bracket, which is made of wood after the general manner indicated in Fig. 1 of the engravings. It is constructed of three pieces of material 8 inches wide, and is fastened to the roof by means of wire finishing nails. Three or four of these nails driven through holes in the bracket into a rafter renders the device perfectly safe for use. Another tool that I have been using is shown in Fig. 2 of the sketches. It is made of ⅝ or ¾ inch round or oval steel bar, flat-

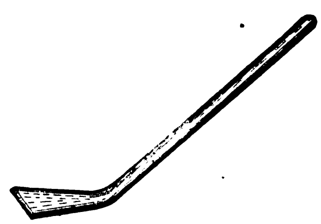


Fig. 2.—Iron Bar for Various Uses.

tened on the end as shown in the sketch. This tool is designed for use in tearing down old work, or it may be profitably employed in connection with certain kinds of new work. It is one of the handiest tools I have in my kit.

Oil for Tools.

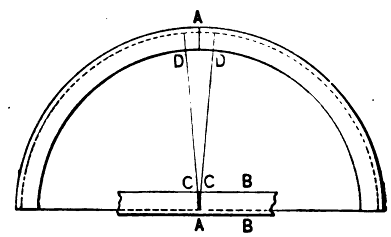
From E. I. H., *Galva, Ill.*—I would like to have some of the practical readers of the paper tell me of a good oil to use in keeping tools bright and clean.

Dulling a Plane.

From J. C. W., *Pine Hill, Pa.*—Will the Editor kindly allow me a little space in *Carpentry and Building* for a few remarks touching the dulling of a plane? In the issue of August for last year I noticed a brief history of the sharpening of a plane, by James Francis, which I consider very good. I think, however, the writer of that article made a mistake in not giving the history in full. I am impressed with the idea that a great deal of dulling as well as sharpening could be avoided if we all knew just how to hold a plane while at work. In fact, the same is true not only with regard to the plane, but also of other tools. I would like very much to have Mr. Francis give the best plan of using a plane in order to keep it sharp as long as possible. If the plane is drawn backward, sliding on the bottom, it will certainly wear a little each time, while if it is raised clear from the surface it is tiresome to the operator. If it is only partly raised in front or rear it will wear the stock more or less, especially if it is of wood. I once heard an old wagon maker say, and wagon makers have hard wood to plane, that the best way was to turn the plane to one side on the corner. This, I think, would soon damage the plane. I would like to have the subject fully discussed, for it is natural if we do not dull our planes we do not require to sharpen them.

Making Saw Kerfs.

From E. D. D., *Washington, D. C.*—I have noticed with a great deal of amusement the different theories and illustrations on the subject of kerfing: but the letter from "M. E. I.," Williamsport, "takes the cake." It is a mystery to me how he finds a straight surface of definite length on the circumference of a circle. The sketch which I send is an accurate and practical solution of the question raised with regard to making saw kerfs. It will work in connection with any circle or ellipse, or any thickness of stuff. Referring to the drawing, the distance A to A represents the radius, and from B to B the thickness to be kerfed. The distance



Method of Making Saw Kerfs, Suggested by "E. D. D."

from C to C represents the thickness of the saw used. Now, draw a line from the trammel point through each outer edge of the kerf at C C, extending them to A. This may be accurately done by using the point of a knife. The distance from D to D will be the exact space between the kerfs.

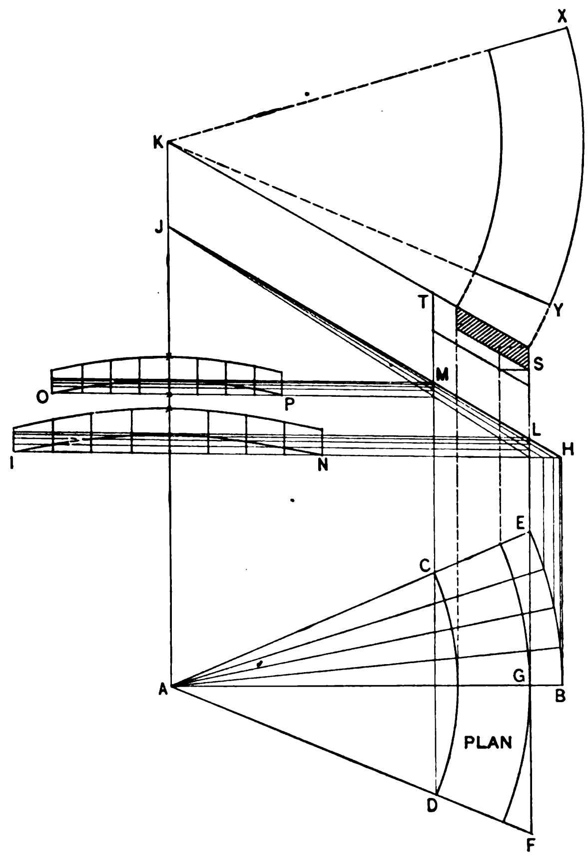
The Tangent System vs. The Falling Line System.

From A. L., *Napa, Cal.*—"W. G. P." may have a reputation as a mind reader, but permit me to say that he missed it sadly when he said I was not open to conviction. I am not only open to conviction but susceptible to conversion to the falling line theory when I see some good arguments in the shape of geometrical figures, &c., which are sufficiently conclusive to convince me of its superiority. I made the remark about the "tangent system in the hands of an experienced man, &c.," as charged, and do not feel like retracting any statements made in that correspondence. "W. G. P." need have no fears that I will not get over it all right, "wavy falling line" and all, and have as graceful a wreath as the falling line wreath. But as to the question, "is it right?" that depends upon the standpoint from which it is viewed. If the balusters "must be exactly one length" (the long and short on flyers), and under easements at the intersection of different pitches, then probably not. If a little variation in length of balusters to secure a neat, graceful wreath is permissible, then I say yes, it is right and will fit. I would ask "W. G. P." what kind of easements he will have on the face and wall strings if he follows a line exactly the same distance from the line of nosing in all cases? Is not some rule applicable to the rail, also to buttresses?

I do not want "W. G. P." to understand that I am riled at his correspondence. Not at all. It is the way we have of taking a huge joke out here in the "wild and woolly West." We have our say and that settles it. I will say that his problem in the October number of the paper is not at all difficult to solve, and I stand ready to do what I can to advance the trade by giving such information as I can to those who desire it, but I do not propose to crack conundrums at command. To draw "W. G. P." out of his "falling line theory," however, I will make a proposition: If he will present his problem according to his "falling line theory" in the columns of the paper, I will do my best to present it according to the tangent system, and, if the editor of the paper will permit, I will try to make it so plain that the readers may judge between the two theories. I will also meet "W. G. P." on the same terms on his "harder one."

Question in Window Sills.

From W. P., *Alfred Center, N. Y.*—In the September number of the paper "Yank" of San Francisco asked for a description of the manner of working out window sills circular in plan and with outward pitch. In reply thereto I send some drawings, which show one way of developing the patterns for the class of work mentioned. Referring to the sketches, Fig. 1 represents the plan, in which the jambs and casings have been omitted in order to avoid confusion of lines. Draw the chord from C to D and the tangent F E parallel with C D and touching the outside of the curve of the plan at G. With A E as radius produce the arc E B. Space the arc thus found into any number of equal parts, producing lines from A to the point of division on E B. Produce the line B to H indefinitely and perpendicular to A B. Let the line H J be drawn to any pitch desirable for the window sill. Now, considering the line H I to be horizontal, produce the lines from the points of division in the arc E B to meet the line H I and parallel with the tangent E F. From the points of meeting with H I produce lines to J. Continue the lines F E to L and D C to M. Make I N equal to E F and let A K bisect I N. The spaces on I N each way from the center are equal to the spaces on the tangent G to E made by intersecting with radials from A. Erect perpendiculars from the point of division on the line I N. Produce the line from L to the perpendicular at I and parallel with I H. Draw the remaining



Question in Window Sills.—Fig. 1.—Plan View with Jambs and Casings Omitted to avoid Confusion of Lines.

parallel lines from the intersections on L E and trace the curve through the points of intersection with perpendiculars on the line I N, as shown. Space above the curve thus found on each parpendicular the plumb hight of the edge of the sill shown at S. Next trace the upper curve, which completes the pattern, to be followed to the outer edge of the beveled plank, as shown in Fig. 2.

The pattern for the inside edge, shown by the dotted lines in Fig. 2, is found in a similar manner, making O P of Fig. 1 equal to C D and producing the parallel lines from M intersecting perpendiculars erected on O P. The spacing on O P is transferred from D C in the same manner as the former pattern was produced from G E. The convex edge of each pattern should be fair with the upper face of the beveled plank at the center, as shown in Fig. 2. The larger parallelogram shown by S T of Fig. 1 is a section through the plank as it should be beveled before applying the pattern to the edge. Fig. 3 represents the plank after being worked down to the lines marked by the pattern applied to each edge. The manner of developing the pattern to be applied to both upper and lower faces of Fig. 3 is shown by X Y K of Fig. 1, which gives the lines on both sides by which to form the edges. The stretchout of the curve X Y of Fig.

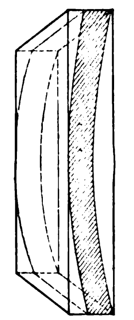


Fig. 2.—Plank before it has been fully worked down to Pattern.

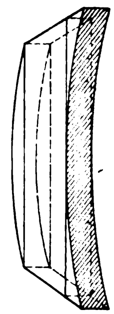


Fig. 3.—Plank after being worked down to Pattern.

1 should be equal to the stretchout of the outer curve of the plan touching the tangent E F at G. This pattern should be cut from stiff building paper and then bent down to the upper and lower sides of Fig. 3.

Bevel of Jack Rafters.

From I. P. H., *Omaha, Neb.*—In the May issue of *Carpentry and Building* for 1891 I notice the letter from "J. H. P.," Grinnell, Texas, with regard to the length of jack rafters. There is no harm in just criticisms, for they help to give tone to the paper and make it more interesting. As "J. H. P." says, mistakes show that we are far from being infallible, and it is also true that very little perfect work is ever executed. Let a person start out with the sole purpose of finding fault or mistake and he will find some faults with the best of plans and work. Again, we do not see our own mistakes as quickly as others see them. Even a compositor will overlook his own mistakes, yet they are perfectly plain when pointed out. Now, I do not mean to be unjust in criticising any one, but I wish to call the attention of "J. H. P." to a point in his plan which is incorrectly applied as the side bevel of the jacks. I submit a small sketch, which has just enough of his plan to illustrate the point in question. In my sketch, which shows the hip and jack on the left end of "J. H. P.'s" plan, A B represents the run of the hip, B C the rise, and A C the length of the hip rafter. The bevel at C gives the down bevel and at A the bottom bevel. Now, D E F shows the run, rise and length of one of the jacks, as illustrated in the plan of "J. H. P." The bevel at D is the bottom bevel and at F the down bevel at the top. The bevel at E is where "J. H. P." shows it for the side bevel of the jack. This, I think, is a mistake. "J. H. P." says that the hip or valley placed plumb over the base line, which is on an angle of 45° with the base plate, would require the ends of the jack to be cut on a miter. I agree with him that they do cut with a miter, but not on a square miter, as shown by the bevel at E. This bevel would miter the jack if the roof was flat and had no pitch at all, but when we give a roof a pitch, this bevel changes with the pitch of the roof, making a sharper bevel than the one at E. Were we to take the bevel at E it would always be the same on roofs of any pitch. The plan of "J. H. P." shows the length of jack correctly, but it does not show the proper bevel across the back fitting against the hip. The hip must be dropped down to the point G, which places it in proper position for finding the lengths and bevels of jacks. Now extend the jacks to the hip line A G, as shown by D H, which represents the length of the jacks. The bevel at H is the side bevel fitting the hip. To show more plainly that it gives the length and bevel, take the length of the jack as shown in "J. H. P.'s" plan, which in my sketch is D F, and swing it around until it joins the hip line. We find that it joins at H and is also of the same length as D H. Therefore D H gives the length of the jack and the bevel at H is the side bevel of the same. The down bevel is the same as that of the common rafter and is shown at F. The run of the common rafter is represented by J B, the rise by B I, while I J represents the length. The bevel at I shows the down bevel at the top and at J the bottom bevel. Swing the common rafter around and it joins at G. It is an undeniable fact that the hip rafter and the common rafter must come to a point at the top end of hip. This brings the intersecting point at G and the hip line in the position shown. It also indicates that the proper bevel for the back of the jack fitting the hip is at H, as shown. The same mistake to which I have referred appears in the side bevel of the valley jacks in the plan presented by "J. H. P." I do not doubt that this correspondent knows how to find the proper bevels for jack rafters, but think that he has been trying to present something original and has merely overlooked this point.

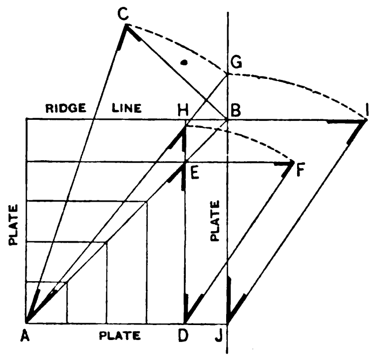
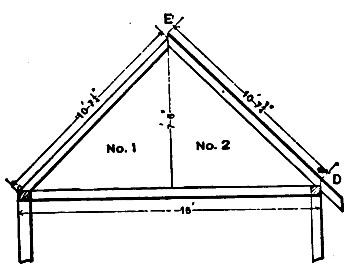


Diagram Accompanying Letter from "I. P. H."

Framing a Roof of One Foot Rise.

From J. W. McK., *Sumter, S. C.*—In answer to the inquiry of "N. E. O.," Portsmouth, N. H., which appeared in the December issue, in regard to obtaining the lengths of rafters, I submit the following as a practical and reliable way of doing the work: In submitting these examples I have made them of the same pitch as the one shown in the sketch of "N. E. O.," but the rule holds good for any roof, whatever may be its pitch. In order to find the length of the rafter, shown in No. 1 of Fig. 1 of the sketches, first ascertain half of the width to be covered by the roof, which in this case is 7 feet 6 inches. The next step is to find the total pitch of the roof, which being 12 inches rise per foot of span equals 7 feet 6 inches. Having found the width to be covered by each rafter to be 7 feet 6 inches, and the entire pitch 7 feet 6 inches, then take a straightedge and large square, and using the side of the square which has the inches divided into twelfths, set off from the corner of the square on the blade the half width of the span, 7 feet 6 inches, and on the tongue the entire pitch of the roof, 7 feet 6 inches. Using a scale of 1 inch to the foot will bring these points to 7½ inches on each. Now place the square on the straightedge, as represented in Fig. 2 of the sketches, with one of the points at *a*, the other at *b*, and holding the square firmly in place draw with a penknife or sharp scratch awl the line *a c* and the line *b c*. This will give the bevels to foot and head respectively of the rafters, which in this case will be the same. Next measure the distance from *a* to *b*, which will be found equal to 10$\frac{7}{12}$ inches full, which by the scale is 10 feet 7¼ inches—the length of the rafter. In No. 2 of Fig. 1 its length is obtained in the same manner, the only difference being that instead of making the horizontal mark at D for the foot cut, make a vertical mark of the same bevel as the head cut, forming the line D E of Fig. 3. After this has been done gauge from the top edge of the rafter the thickness to be left in. From the point where the gauge intersects D E and at right angles to D E draw the line F G, which will give the cut to fit on the plate as shown. In Fig. 4 of the sketches is represented the method of obtaining the lengths of hip and jack rafters. Having found the lengths of the common rafter use this as the base of the triangle to obtain that of the hip rafter. In this case we have the base A B, measuring 10 feet 7¼ inches, and from the point B we set off the pitch, 7 feet 6 inches, which is represented by B D. Using always the same scale draw the line A D, which upon measuring we find to be 12 feet 11⅞ inches. This will be the length of either hip or valley rafter and the line A B will give the bevel to fit, while D B will give that of the top, using A D for the back rafter. To find the length of the jacks for either hip or valley space them off on the line B D, drawing them parallel to A B, until they strike the line marked C′, which is half the thickness of the hip rafter from A D. The length of these lines thus drawn will be the lengths of the jacks and the angle at A will give the bevel which fits against the hip rafter. The horizontal and vertical cuts are the same as those of the common rafter. In the case of the hips the line B D will be the foot of the jacks, but in the case of the valleys it will be the ridge.



Framing a Roof of One Foot Rise.—Fig. 1.—Elevation of Roof.

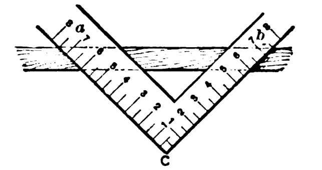


Fig. 2.—Square Placed on Straightedge.

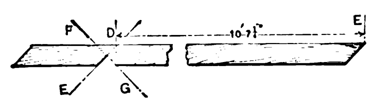


Fig. 3.—Obtaining the Cuts for the Rafter.

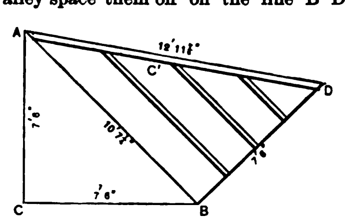
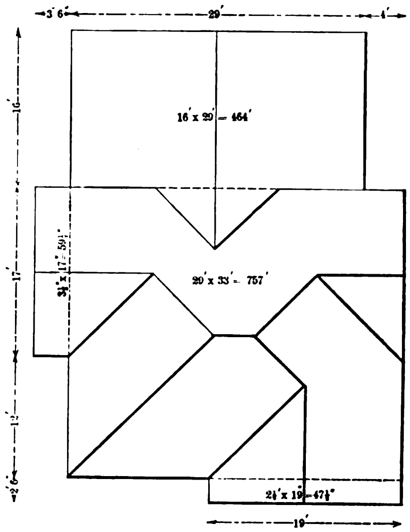


Fig. 4.—Method of Obtaining the Lengths of Hip and Jack Rafters.

Measurement of Roofs.

From D. J. McL., *New Westminster, B. C.*—A new idea has occurred to me for measuring roofs of buildings, which, I think, is of importance to those who estimate quantities, and which may prove of interest to many readers of *Carpentry and Building*. It is this: Find the whole horizontal area of the roof by dividing it into quantities or sections, as indicated by the dotted lines in the accompanying sketch, which represents a roof I recently built. To these quantities add the fractions thereof necessary to raise them to the required quantity, which is in a roof of square pitch $\frac{5}{12}$; in a roof of 9 inches rise to the foot ¼, and so on, according to the varying pitches. This is equal to raising the quantity representing one of the sides from 12 to 17, or 12 to 15, as in the pitches mentioned respectively. This will apply only to a roof in which all the pitches are equal, but can be made approximately correct by taking a mean between, or it may be made correct by considering the different portions separately. If any of the practical readers of *Carpentry and Building* can improve upon this idea, or can offer something better, I shall be greatly pleased to hear from them.



Measurement of Roofs.—Plan Suggested by "D. J. McL."

Framing a Large Dwelling.

From H. R. McK., *Waupaca, Wis.*—I notice in the January issue of the paper a request for more correspondence from the readers of the paper, so I take the liberty of asking through the department how to best frame a large dwelling. My way is to build one story at a time. I lay the sills and floor joists, then put down the floor lining, running it diagonal with the top floor. I then put in place the wall and partition plates. I let the studding run up to the plates which support the second-story joist, and cut and frame the openings for doors and windows. I use a story pole in order to get my measurements, as I take them from the plans and detailed drawings. I then frame the second-story joist for all openings, lay the lining floor again diagonally, run the outside studs to the rafter plates, sheet up the building, and everything is secure. I submit this method to the readers of the paper, and shall be very glad indeed to have from them any suggestions which they may see fit to offer.

Hanging Three-Butt Doors.

From A CONSTANT READER, *Appleton, Wis.*—I would like to ask through the columns of the paper concerning the correct method of putting three butts on a door. I place the upper butt so that there is a space of 7 inches from the top of the door to the top of the butt, and from the bottom of the lower butt to the bottom of the door there is a space of 11 inches. Then I take the center butt and place the top of it at the center mark. This is my way of placing them on the doors, but I am desirous of learning if there is a rule governing such matters.

Action of Pittsburgh Delegation at the Builders' Convention.

From H. R. ROSE, A PITTSBURGH DELEGATE, *Allegheny, Pa.*—The account of the action taken by the Pittsburgh delegation at the Sixth Annual Convention of the National Association of Builders, as reported in the February issue of *Carpentry and Building*, omits the important factors which entered into and formed the basis of said action, and which aside from any feelings of resentment or indignation, that would naturally accrue under such unfair treatment, determined the only course Pittsburgh delegates could pursue in such an emergency.

When they were informed of the action of the Board of Directors of the N. A. B., which met on Sunday afternoon and decided that the Pittsburgh Exchange would have to pay $2200 *per capita* tax on members admitted during the year just closed before her 18 delegates could be seated in the convention, they realized at once that this special legislation was enacted to prevent the Pittsburgh Exchange from inaugurating any reforms, which, as per newspaper reports, was her avowed intention, and which, by the influence of so large a delegation, might possibly be effected.

Such a decision had never before been rendered, although other exchanges had representation in excess of *per capita* tax paid.

Pittsburgh Exchange had paid her *per capita* tax as assessed at the previous convention. She elected her delegates in compliance with instructions set forth in circular of December 1, 1891, from the National Secretary, which quoted the constitution in reference to representation at the coming convention, "One delegate for every 50 members or fraction thereof."

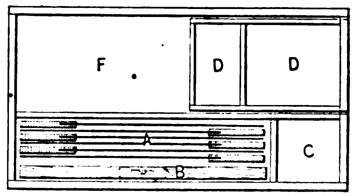
If representation was based on *per capita* tax paid as assessed at the previous convention, why did this circular not so state it? There can be but one answer to this—that has not been the custom or basis of representation heretofore.

Diligent search and perusal of the constitution failed to reveal any word or rule that could possibly be contorted into even an excuse for such an arbitrary decision as rendered by the Board of Directors, nor could a resolution be found favoring it.

The Pittsburgh delegates were in a dilemma. To obtain representation of membership under this ruling would cost Pittsburgh Exchange $5200 for 1892. They knew their exchange would never sanction it. To seat four delegates representing a membership of 150 and pay for 873 members would never be tolerated. They remembered the session of their exchange at which withdrawal from the National Association of Builders was seriously considered. Among other reasons assigned was the unnecessarily excessive *per capita* tax. There was, therefore, but one course open for Pittsburgh delegates. They must present their credentials for 18 delegates to the proper committee, and if rejected, withdraw at once from the convention, and also from the National Association, before their honor would be compromised in regard to the *per capita* tax for the ensuing year. When the vote was taken in the convention and the decision rendered against Pittsburgh Exchange, her delegates withdrew in a body, satisfied that they had done the proper thing under the circumstances.

Convenient Tool Chest.

From J. E. H., *Tallapoosa, Ga.*—I have been a reader of *Carpentry and Building*, off and on, for a number of years, and have found in it a great deal of interest and value to me in my trade. I always turn first to the Correspondence column, but have never yet seen anything relating to tool chests. I inclose drawings of mine, and would like to hear from other readers of the paper touching this subject, as I desire to build a new one. Fig. 1 represents a top view of the chest. The inside measurements of the chest are: Length, 36 inches; width, 19 inches; depth, 17¾ inches. A is the saw till, with room



Convenient Tool Chest.—Fig. 1.—Top View of Chest.

for six saws. This saw till occupies a space 7 inches wide by 8 inches deep. B represents a level in its rack in the saw till. Beneath the level is a steel bar 32 inches long. C is a space 4½ inches square at the end of the saw till for oil cans, &c. D D is the top drawer, which measures outside 12 inches wide by 18 inches long. It contains two compartments, one being for bevels, files, &c., and the other for oil stone, molding box and catalogues. The main body of the chest, represented by F, is intended for planes, &c. Fig. 2 of the sketches represents the bottom portion of the chest. A partition 4 inches high sets off the space A, which is 9 inches wide, extending across the chest. In this space I put such tools as I do not often use. In order to reach the space A it is necessary to pull out all the drawers. Another partition 4 inches high separates the space B and C. The space B is 4 inches wide and is directly under the saw till. It is used for molding planes. Fig. 3 represents an end view of the chest, A being

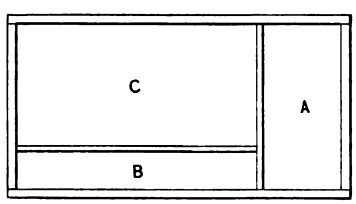


Fig. 2.—View of Bottom Portion of Chest.

the saw till and D D D three drawers. The bottom drawer has four divisions, one being for chisels, one for bits, one for pencils, &c., and one for saw sets, block plane and compasses. The middle drawer has four compartments, one being for long files, pincers, screw drivers and such tools, one for chalk lines and chalk, and the other for odds and ends. The main body of the chest is represented by B, while M indicates the position of the molding planes. I should like very much, indeed, to have other readers of the paper criticise this chest and its arrangement.

Note.—The letter of our correspondent above would indicate that he has not closely followed all the numbers of *Carpentry and Building* during the pa t few years, else he would have discovered a number of designs of tool chests showing the arrangement adopted by different correspondents in various sections of the

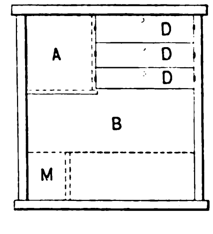


Fig. 3.—End View of Tool Chest.

country. His letter, however, is an interesting one, and shows that the subject of tool-chest construction is not by any means exhausted. We trust that our readers will respond to his request and express their views concerning the arrangement he has adopted and how it differs from their own.

Planing-Mill Work.

From W. H. H., *Seelyville, Pa.*—In the January number "S. E. D." voices my sentiments exactly in the matter of more correspondence for this department of the paper. I have been a reader of *Carpentry and Building* for several years, and, while I have read the correspondence with very much interest, and have been greatly benefited from time to time by following the instructions given, I have contributed nothing to the department. My will has been sufficiently strong, but I have been loth to exhibit my draftsmanship. I will, however, in the future strive to contribute my mite. I would like very much to ask those of the readers who are connected with planing mills and wood-working factories for some suggestions and correspondence relating to this particular branch of work. I am quite sure that an exchange of opinions touching this kind of work would be interesting not only to those connected with planing mills and factories, but also to carpenters, inasmuch as it would, in many instances, enable them to plane their work to conform more exactly to regular sizes of mill work. For example, it frequently happens that a carpenter makes a window frame and calculates something after this method: 2-inch stiles, 26-inch glass (if a two-light window), opening 30 inches, not thinking, of course, about the lap of the glass, which is generally ¼ inch. This would make the sash, when completed, 29½ inches. In this case the sash cost considerably more than would otherwise be the case, for there is little chance of the odd size being in stock. Besides, no little time elapses before the work is completed. There are several workmen besides myself in our factory who are readers of *Carpentry and Building*, and who prize it very highly. A few of them have the volumes bound, and refer to them very often for designs and answers to various problems.

Filing a Rip Saw.

From E. D. D., *Wesley Heights, Washington, D. C.*—As the subject of filing saws seems to have attracted the attention of many of the readers of the paper, I would say that for the past six or seven years I have followed a system of filing a rip saw which is easier and faster than any plan I have ever seen. I drop the hand 24° from the level, but keep the file square across the saw blade, making the tooth as hooking as possible. I always begin at the point and file toward the handle from both sides. I always joint with a flat file before filing. I do not crowd the file, but let it have its own weight.

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

Officers for 1892.

President, ANTHONY ITTNER, No. 9 North Seventh street, St. Louis, Mo.
First Vice-President, I. G. HERSEY, 166 Devonshire street, Boston, Mass.
Second Vice-President, HUGH SISSON, Baltimore, Md.
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.
Buffalo, N. Y.........A. A. BERRICK.
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Chicago, Ill...........C. W. GINDELE.
Cincinnati, Ohio......SAMUEL D. TIPPET.
Denver, Col...........A. J. BAKER.
Detroit, Mich..........ALEX. CHAPATON, JR.
Grand Rapids, Mich..P. C. CAMPBELL.
Indianapolis, Ind.....JAMES MCGAULEY.
Lowell, Mass..........CHARLES P. CONANT.
Lynn, Mass ....FRANK A. KELLY.
Milwaukee, Wis......PAUL REISEN.
Minneapolis, Minn....GEORGE W. LIBBY.
New York, N. Y......MARC EIDLITZ.
Omaha, Neb..........N. B. HUSSEY.
Portland, Maine......N. E. REDLON.
Philadelphia, Pa......STACY REEVES.
Providence, R. I......WM. W. BATCHELDER.
Rochester, N. Y......H. H. EDGERTON.
Saginaw, Mich.......MICHAEL WINKLER.
St. Louis, Mo. ....JEREMIAH SHEEHAN.
St. Paul, Minn........J. W. L. CORNING.
Syracuse, N. Y.......J. E. BAKER.
Wilmington, Del..... A. S. REED.
Worcester, Mass......C. D. MORSE.
San Francisco, Cal...WILLIAM N. MILLER.

STANDING COMMITTEES FOR 1892.

Committee on Uniform Contracts.

GEORGE C. PRUSSING, Chairman, Chicago.
H. H. EDGERTON, Rochester, N. Y.
JAMES I. WINGATE, Boston, Mass.

Legislative Committee.

J. W. L. CORNING, Chairman, St. Paul, Minn.
JEREMIAH SHEEHAN, St. Louis, Mo.
N. B. HUSSEY, Omaha, Neb.

Committee on Resolutions.

GEORGE W. LIBBY, Chairman, Minneapolis, Minn.
W. W. BATCHELDER, Providence, R. I.
A. S. REED, Wilmington, Del.

Committee on Statistics.

S. D. TIPPETT, Chairman, Cincinnati, Ohio.
PAUL REISEN, Milwaukee, Wis.
J. E. BAKER, Syracuse, N. Y.

Committee on Building Law.

STACY REEVES, Chairman, Philadelphia, Pa.
ALEXANDER CHAPOTON, Detroit, Mich.
A. A. BARRICK, Buffalo, N. Y.

Committee on Lien Law.

JOHN S. STEVENS, Chairman, Philadelphia, Pa.
ARTHUR MCALLISTER, Cleveland, Ohio.
JOHN J. TUCKER, New York, N. Y.
C. W. GINDELE, Chicago, Ill.
J. MILTON BLAIR, Cincinnati, Ohio.
C. D. MORSE, Worcester, Mass.

Recommendation of the Legislative Committee.

In concurrence with the report of the Committee on Legislation presented to the sixth convention, the National Association of Builders recommends to its filial bodies that they take action by such means as they deem best to secure to the building contractor a less price on builders' supplies and building material than is quoted to the general public.

This subject will be taken up *in extenso* in the future, and special communication will be made to the filial bodies in regard thereto.

WILLIAM H. SAYWARD, Secretary.

Appointment of Building Inspectors.

The National Association of Builders, in concurrence with the subjoined memorial presented at its sixth convention by the National Association of Commissioners and Inspectors of Buildings, recommends that each filial body take such action as shall secure to the exchange the power to nominate the building inspectors for the city in which the exchange exists.

To the National Association of Builders.—GENTLEMEN : The National Association of Commissioners and Inspectors of Buildings of the United States, in convention assembled, do respectfully call your attention to a resolution introduced by John S. Damrell of Boston and unanimously adopted by this association at New York, February 13, 1891, as follows :

Resolved, by the National Association of Commissioners and Inspectors of Buildings, in convention assembled, recognizing as we do the responsibility resting upon the Inspectors of Buildings appointed or elected to such a position, that their appointment, their qualification shall be competent and reputable architects, master builders or mechanical engineers. Politics should not be considered in the appointment, and an inspector should hold his office as long as he does his duty. And we, as an association, respectfully ask the National Association of Builders to use its influence to bring about the result asked for in the foregoing resolution.

(Signed)
J. M. HAZEN, First Vice-President.
B. F. MORSE, Second Vice-President.
P. THEO. OSTER, Treasurer.
WM. H. SAYWARD, Secretary.

Conditions of Establishment of a Joint Committee on Building Law.

The Joint Committee on Building Law, composed of special committees from the national associations of architects, fire engineers, underwriters, building inspectors and builders, advocated a thorough and exhaustive consideration of the subject, and presented the following plan for the formation of a permanent Joint Committee, which was presented to the sixth convention as the report of the Special Committee of the National Association of Builders. The adoption of this plan by all the associations mentioned will cause the creation of a permanent joint committee on building law, which will make report not less than once a year. The matter is considered of sufficient importance for the report to be printed again, although presented in the last issue among the reports of the committees made at the convention:

1. The committee shall be known as the Combined Committee on Uniform Building Law and Reduction of Fire Waste.

2. The purpose of this joint committee is to investigate and consider the question of construction of buildings, with the end in view of arriving at conclusions which can be recommended to all cities of the country as the consensus of opinion of the various professions and callings represented in this committee, and as the best general methods to adopt for the interests of the people in the matter of construction of buildings and protection against loss of life and loss of property by fire.

3. The Combined Committee shall consist of three members from each of the following bodies, namely : The National Association of Builders, the National Board of Underwriters, the National Association of Building Inspectors, the National Association of Fire Engineers and the American Institute of Architects, who shall be chosen in such manner as may be deemed best by the bodies which they represent.

4. The officers of the Combined Committee shall be a chairman and a secretary, who shall also be treasurer.

5. Regular meetings of the committee shall be held annually, if practicable, at the time of the annual meeting of the National Association of Builders, and special meetings at the call of the chairman, but a sub-committee shall be appointed to act during the recess of the Combined Committee under such instructions as may be given it.

6. Each association shall pay the expenses of its own delegates and one-fifth of the general expenses.

Paid Secretaries for Builders' Exchanges.

One of the greatest needs of every builders' exchange in the country is some active and intelligent man to devote his entire time to the work of the organization. A builders' exchange should be conducted upon the same business principles that govern any mercantile or financial exchange, and should have a paid official, preferably the secretary, to give his entire time and business ability to the furtherance of its welfare. No man who is desirable as the secretary of an exchange can afford to neglect his business for the sake of the exchange, and such devotion to the building interests would be unfair on the part of other builders, for they would be receiving the benefits obtained at the expense of one of their fellows. Every member of an exchange might be willing to devote a year to the association and still not do serious injury to his business, but the exchange would always be in a more or less disturbed condition through change of methods and through the inexperience of the incumbent. What every exchange needs is a permanent paid secretary ; a man of ability and good address, who will make it his business to devise, suggest, improve and carry out every possible plan calculated to improve the exchange as an organization, and benefit the members and community. The consideration of the expense should not weigh against such establishment, for the salary of a good man, not a cheap one who would be of no use to the exchange, when divided among the entire membership would be very small per member, and if the members think that they cannot afford the amount of the assessment, whatever it might be, it would be wise for the builders to devise means to improve their business so that they can afford to pay the assessment. As long as there is any business at all it should be done at a profit, and just so long as the builders try to "paddle their own canoe" just so long will the business continue in its present disorganized, unsatisfactory condition. Something must be done to get the builders together, so that united action can be taken to correct existing evils, and it cannot be done unless some one does it systematically, and that some one cannot be expected to devote the time necessary to bring about results unless he is paid for it.

Builders' Exchange Work in 1891.

The reports of certain of the filial bodies of the National Association of Builders, presented at the recent convention, are likely to prove beneficial to such new exchanges as are now forming in various localities in the country, as well as to those communities of builders which have not yet recognized the advantages of organization. These reports, by showing what has actually been accomplished, should be of great encouragement to those whose organizations have not, as yet, proved thoroughly successful and to those who are considering the importance of effecting organizations. These examples are no longer theory, but are the result of actual practice. The following is the report of the Boston Exchange:

The Boston Exchange has had a very satisfactory year. Business has been fairly good, with no strikes or lock-outs to embarrass the members in the conduct of their work. The mason builders have carried out very completely the recommendation of the last convention of the National Association in the matter of securing co-operation with their workmen in settling all affairs of mutual concern through a joint committee of arbitration. This joint committee has been set up with the workmen of three unions—viz.: The Bricklayers' Union, the Stone Masons' Union and the Building Laborers' Union—and the result has been mutually satisfactory. Petty affairs that might under ordinary conditions have created unnecessary friction have been easily and peacefully arranged. The workmen representing their various unions on the committee have been very fair minded and conservative, and in the matter of non-union men, where much feeling prevails, have exhibited a willingness to move more cautiously and work for a peaceful solution as long as their employers were co-operating with them in an endeavor to solve the problem. This joint committee succeeded in framing a code covering a method of apprenticeship in the bricklaying business which covers more ground and more completely comprehends this question than anything heretofore existing, and it appears to be satisfactory in its terms to all concerned. The code has been adopted by several other organizations in other places.

No other trade in Boston has yet adopted the plan of arbitration referred to. No advance has yet been made by the Boston Exchange in getting established the rules governing sub-estimating passed and recommended at the last covention or the code of practice previously advised, but in the near future a plan is proposed whereby these matters may be more fully and completely discussed and put in operation.

REMODELING OF EXCHANGE BUILDING.

The most important undertaking of the exchange during the year has been the entire remodeling of our building. This is fully completed, and we feel very proud of the handsome quarters we now occupy, where we hope in two years to welcome the National Association at its eighth annual convention. We believe that we shall be able to show the delegates who may then assemble in Boston as complete an exchange for business purposes as any in the country, and the fact that at the present time 400 or 500 people pass our gate during the "'change hour" is testimony enough that our rendezvous is fully appreciated. Our gatekeeper's record frequently shows 200 calls for members during the "'change hour," which indicates that the public recognizes the convenience we offer them to get at builders and others connected with the building trades, all in one place and at a specified time each and every day in the year. Our building is almost fully occupied, and returns us a very handsome revenue over and above our expenses. Our members have increased from 205 at the time of the last convention to 245 at the present moment, with applications for membership still coming in. We do not pretend to admit any and all who are desirous of membership, but endeavor to make skill, honor and probity, good reputation, honest work and honest practice prerequisites for membership. We are not always successful in our effort to keep the standard up to the highest point, but the fact that we have had but five failures among the members during our five years of existence and have but seldom had need to discipline members for dishonest practices shows that our efforts have been fairly successful. We have refused admittance, since our organization, to 125 applicants for admission and all these rejections have been on the ground that the parties did not come up to the standard previously mentioned. Our yearly dues are $100, which gives us a sum large enough to warrant running the association on a liberal plan and still give a good balance in our treasury to apply as we see fit, keeping in mind always the advancement of the building interests into prominence and respect in the community. During the year there have been several cases of dispute between members which have been amicably and satisfactorily settled by the Committee on Complaint and Arbitration.

RECEPTION TENDERED BY THE EXCHANGE.

During the convention of the American Institute of Architects, held in our city, our exchange extended a reception to the visitors and to the Boston Society of Architects, which was largely attended and considered a great success. During the year we have had many visitors from other filial bodies of the National Association, and we always feel very much gratified to receive and entertain them. We desire on this occasion to impress upon our fellow builders from all over the country our wish that they may always make our exchange their business home when in our vicinity. We have room enough, our latch-string is always out, and if we have anything that is admirable we want our brother builders to enjoy it with us. Of one thing we are very certain, and that is that everything we have done in a material way to surround the members of our exchange with conveniences and advantages, with the very best that can be furnished in every way to make the rooms attractive and complete, has more than repaid us in the general satisfaction manifested by the members and the evident respect we have gained in the eyes of the community in which we are placed.

The following report was made by the Philadelphia Exchange:

The Master Builders' Exchange of Philadelphia respectfully report that during the past year the membership of the exchange has been kept up to its usual number, at the present time being 290.

The financial statement of the Finance Committee and treasurer show that our certificates of membership originally costing $200 are now worth $388. The following improvements have been made during the year—to wit:

Additional story on front building (to be used as a public restaurant), costing over $10,000. The enlargement of the exhibition room, and the beautifying of our meeting room with paneled steel ceiling, handsome book cases, and caps and bases to columns, making it one of the handsomest exchange rooms in the country.

Our Trade School has been well attended by intelligent boys, and is attracting much public attention, and we feel encouraged to continue in our good work. Our Legislative Committee have succeeded, after much labor and expense, in restoring the lien law of 1806 to its former status.

One of our prominent railroads solicited the assistance of our exchange to prevent the passage by the Pennsylvania Legislature of the Personal Liability bill, and our committee now have under consideration, in confidence with the chairman of the Property Committee of the Board of Education, the awarding of contracts for the erection of public school buildings. Our Complaint Committee have acted upon two cases referred to them, and they have been amicably settled. Our Committee on Labor had one case before them which was fully investigated, and also amicably disposed of. Our Committee on Press, Printing, Room and Rules, Historical, Exhibition, Mechanical Trade Schools, and Entertainment, have all performed the duties assigned them with great satisfaction to the Board of Directors and members. Our board have recommended that subjects emanating from the National Association, be taken up at our conference meetings of all members of the exchange, when a light lunch and cigars are to be provided. We have elected to honorary membership in our exchange Col. R. T. Auchmuty of New York, who made a handsome donation to our trade school, and Dr. E. H. Williams of Philadelphia, who presented the exhibition department of our exchange with a costly model of a Japanese temple, and we intend having the portrait of Col. R. T. Auchmuty placed upon our walls. Our exchange is not so well attended during 'change hour as we would desire, but every effort is being made to increase the attendance. We are of the opinion that the Master Builders' Exchange of Philadelphia is now recognized as a power in Philadelphia, being called upon very frequently to assist the authorities in shaping legislation, serving upon various boards, &c. The exchange has, without doubt, been of great benefit in placing the mechanic in that position in society to which he belongs.

Notes.

The Builders' Exchange of New Haven has issued in pamphlet form the proceedings of the recent annual meeting, which includes a very interesting letter from the secretary, J. Gibb Smith, who was sick at the time. The president's address was very able, and covered the principal points of the work of the exchange during the past year and suggested opportunities for improvement and increased benefit in the year to come. The exchange has attained a position of importance and influence in the city and is continually moving in the line of progress. Among other subjects being considered at present are affiliation with the National Association, the establishment of a trade school and others of a similar nature. The following officers were re-elected to serve for 1892: William M. Townsend, president; David H. Clark, vice-president; J. Gibb Smith, secretary and treasurer.

One of the most interesting reports from filial exchanges presented at the convention in Cleveland was the verbal report of E. D. Miller, secretary of the Builders' Exchange of Baltimore. The showing was exceedingly satisfactory, much actual work having been done, of which the beneficial results are already apparent. The passage of the building law, which was fathered by the exchange, is alone enough to repay the members for the labor and time expended, beside which the purchase of a site for a building to be owned by the exchange and other matters of equal importance have been accomplished.

A vote of thanks was passed by the Sixth Convention of the National Association of Builders to Col. R. T. Auchmuty of the New York Trade Schools, for his generous treatment of the Philadelphia Exchange in contributing a large sum of money to its trade school.

One of the pleasing features of the reports from filial bodies was the hearty welcome extended by each exchange to the members of the other exchanges to avail themselves of the association rooms while visiting sister cities. The liveliest feelings of friendship and hospitality seemed to prevail.

The Master Builders' Association propose to place a bust of Col. R. T. Auchmuty in its exchange rooms, as a token of gratitude and appreciation of his work in the interest of the rising generation of builders, and his generous interest in the Philadelphia trade schools. The exchange also proposed to create a galaxy of photographs of all its officers, directors, &c., past, present and future.

The types in the February issue made Richard Snell appear in the place of Richard Smith of Omaha as a member of the Committee on Lien Law and misspelled the name of Wm. P. Jungclaus in the resolution submitted by the Indianapolis Exchange.

The builders of Covington, Ky., have formed a Builders' Exchange and have filed articles of incorporation with the officials of the state. Pending permanent organization George W. Howell has been elected president and H. W. Culbertson secretary and treasurer. The building business has drifted into a very unsatisfactory condition through an irresponsible class of sub contracting and the organization of the exchange is the result of an effort to establish a better condition of affairs.

The Builders' Exchange of Braddock has elected the following officers for the ensuing year: President, James Rankin; vice-president, Joseph Price; secretary, D. M. Kier; treasurer, John McNulty. A board of 15 directors were also chosen.

The Builders' Exchange of La Crosse, Wis., held their annual meeting and election of officers recently. The report submitted by the secretary indicated the organization to be in a flourishing condition, and the work accomplished by the exchange exceeded the anticipation of many of its officers. The amount of contracts through the medium of the exchange during the past six months is $166,782. The following officers were elected: President, C. A. Krebrum; first vice-president, Fred. Dittmann; second vice-president, James Drake; recording secretary, Bert. C. Smith; financial secretary, George Drake. re-elected.

BUILDING A CIRCULAR FRAMED TOWER.

ARCHITECTS of the present time who are desirous of producing the most artistic effects are gradually recognizing the value of polygonal and circular details, and are beginning to appreciate more and more the varied effects of light and shade which are created by the presence of towers thus formed, especially when they are made a distinct and prominent feature of a design. As a result of this tendency there are few dwellings of any pretensions which are erected at the present day without this distinguishing feature, the tower as a general rule being hexagonal, octagonal or circular in plan. The position of the tower is usually on one of the front angles of the house and is shingled or paneled on the outside and finished either with straight, pyramidal, conoidal or molded roof. Towers of this description are not what might be termed ordinary carpenters' or builders' practice, but rather involve a great deal of study and careful consideration. The subject of tower construction is one, therefore, in which carpenters and builders are deeply interested and one which would appear to be a fitting topic for consideration at this time. What follows is an explanation of the best methods which have been met in the experience of a practical carpenter. Towers having straight sides or which are polygonal in form may be passed over as they have already been treated in previous issues of the paper.

Circular towers in framed construction may be divided into two classes—namely, those which have their foundations on a line connected with the main foundation of the house, and second, those which are carried up from the second floor, resting on, or being supported by, the floor beams of the second story. The latter class will be considered, as it embodies more important construction, although some of the matters which will be treated are applicable to all circular towers. The first thing for the practical carpenter or builder to consider is how to so construct the floor as to support the tower in a proper manner; that is, so that it will sustain with perfect safety the weight to be placed upon it.

Referring to the accompanying illustrations, suppose Fig. 1 to represent the general appearance of a tower built on an angle of a house. It is placed at the right hand of the front of the building and is designed to form an alcove closet, or an extension to the corner room. Its plan, as may be seen from an inspection of Fig. 3 of the engravings, is a three-quarter circle, the apex of the angle at the corner being the center from which the circular plan is struck. The radius of the plate outside is 3 feet 9 inches, thus making the tower 7 feet 6 inches in diameter. It is intended that the tower floor shall be level with a room in the second-story, and the beams or joists must be framed in such a manner that the flooring can be laid in the circle of the tower, while at the same time being so secured as to support the weight of it. The form of construction indicated in Fig. 3 of the engravings is well adapted for the purpose, and an inspection will show that it consists of a double header made of 2 x 10 inch timbers placed diagonally across the corner at a sufficient distance back from

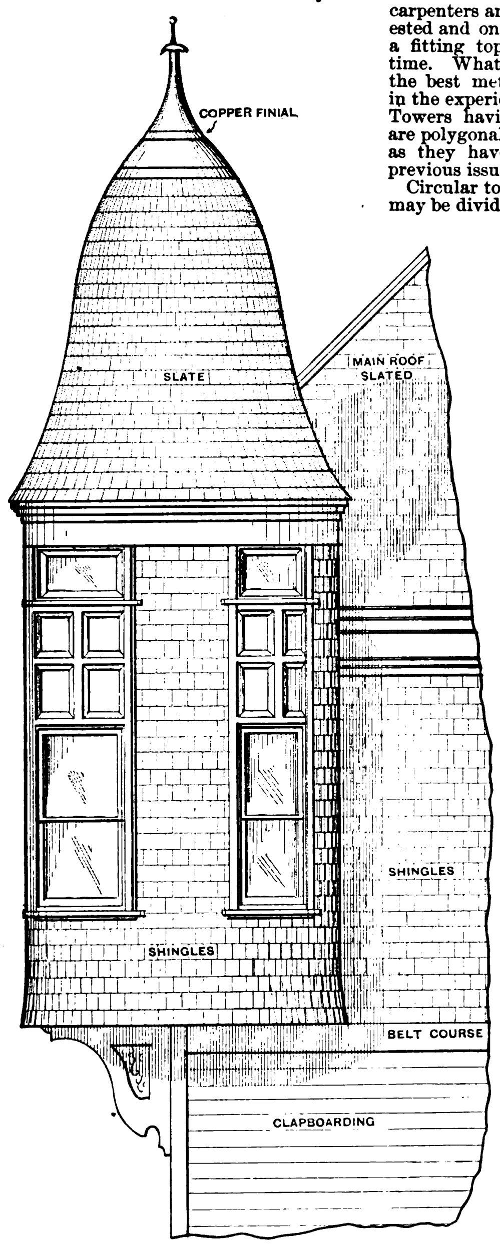

Fig. 1.—General Appearance of Tower Built on an Angle.

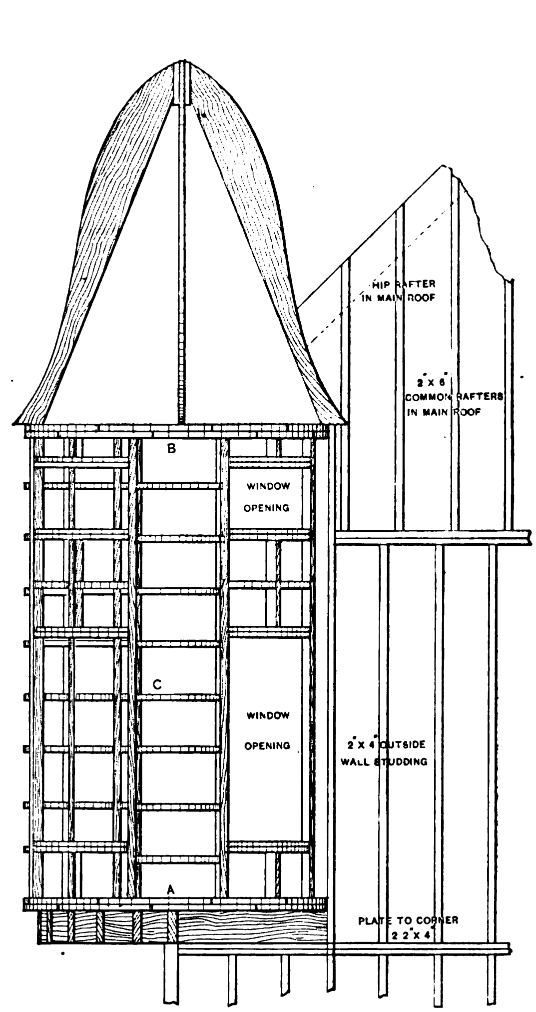

Fig. 2.—Elevation of Tower Framing.—Scale, ¼ Inch to the Foot.

Building a Circular Framed Tower.

it to give ample leverage to counterbalance the weight suspended outside the plate. The tower beams are framed square into this header on the outside and the floor beams are framed into it on the inside. By this construction a cantilever is formed, for the header in carrying the main beams forms a counterpoise for the superadded weight which is borne by the unsupported beams which project outside. It will be readily seen that this, obviously, is a good construction, and much better than introducing many short timbers after the manner indicated in Fig. 4 of the engravings. In the latter case the leverage outside being much greater than that inside, the plate being the fulcrum, there is a strong probability of its tearing away from the main framing, rafters. This plate will be a complete circle measuring 7 feet 6 inches in diameter and struck with a 3 foot 9 inch radius rod and laid out upon the floor, as indicated in the roof framing plan, Fig. 5. The pieces necessary to form the upper and lower plates may be sawn out of rough 1-inch pine boards from one pattern, which may be any one of those drawn in the plan, and a number of which go to make up the whole plate. The studding are cut 11 feet 8 inches, which being added to 4 inches, the thickness of the plates, makes the entire hight 12 feet. The window headers, both at the top and bottom, are likewise circular and are framed in after the manner represented in Fig. 2 of the illustrations, to form the openings and cripple or short studding sweeps may be sawed out at the mill with a band saw, although it can be done in pine with the compass saw.

With regard to the molded roof, it may be said that having a molded outline it will necessarily require molded rafters sawn to the curvature called for in the elevation. As a general thing, architects furnish a full size working detail for roofs of this kind, but it often happens that it

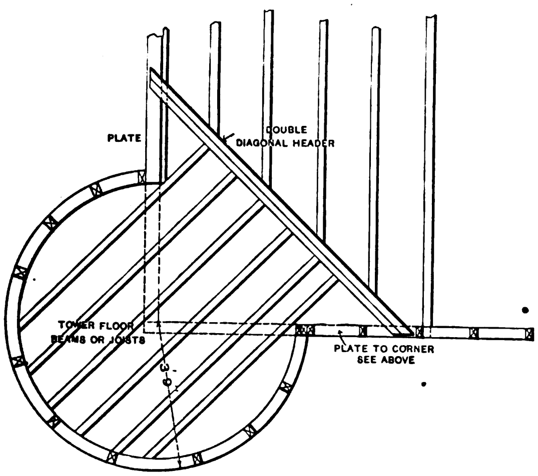

Fig. 3.—Plan of Tower Framing.—Scale, ¼ Inch to the Foot.

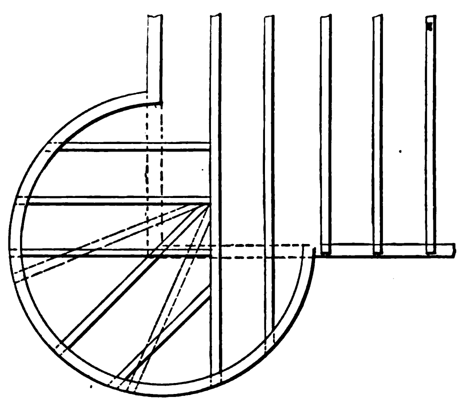

Fig. 4.—Imperfect Form of Floor Construction.—Scale, ¼ Inch to the Foot.

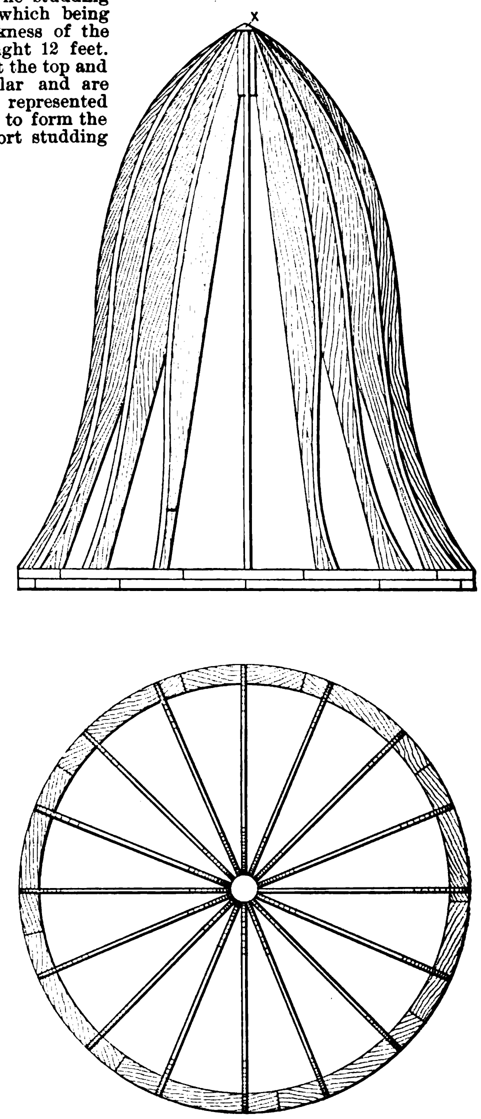

Fig. 5.—Plan and Elevation of Plate and Rafters.—Scale, ⅜ Inch to the Foot.

Building a Circular Framed Tower.

For the same reason it is regarded as a serious mistake to attempt to radiate the timbers as indicated by the dotted lines in Fig. 4. The position of the timbers are better shown in the elevation of the framing, Fig. 2, and we have no doubt that practical builders will fully appreciate what has been pointed out.

When the beams are inserted and the main framing has been nailed, a bottom circular plate, or template, marked A, in Fig. 2 of the engravings, is made from two thicknesses of 1-inch stuff, and nailed on exactly the size required. The position of the window studs is also marked on it, as represented in Fig. 3 of the engravings. The upper plate, or which is really the wall plate proper, and indicated by B in Fig. 2 of the engravings, must also be made, and this will rest on the top ends of the studding and support the cut in under them in the center. All studding must be set perfectly plumb and all plates and headers perfectly level. In order to insure this it is well to be certain that the bottom plate is level by placing a parallel straight edge with a spirit level on top of it, across the plate at different points. Then, if the studding be cut of equal length the upper plate must, in consequence, be placed in a level position. A number of horizontal sweeps, 2 inches thick and 4 inches wide, as indicated at C in Fig. 2 of the engravings, require to be cut out to form ribbing or pieces nailed in 16 inches apart, to which the vertical boarding outside and the lath and plaster inside are fastened. It will be seen that if this construction is followed the whole cylindrical wall can be very strongly and economically built up. To save time and labor and also to expedite matters, the is not forthcoming and the carpenter or builder is obliged to strike out a pattern rafter himself. To do this quickly and as accurately as possible, it is well to lay out the whole roof on a floor, something after the following manner: Referring to Fig. 6 of the illustrations, draw any base line 7 feet 6 inches in length, as A B, and divide exactly in the center, or at 3 feet 9 inches, as C. From C square up the line to 9 feet high, as C D, and divide this line into 13 equal divisions, as 1, 2, 3, 4, 5, 6, &c. Through these points draw lines parallel to A B, or square C D any length on each side of C D. Now, from the point D dress the curve of the rafter, as indicated by the letters E, F, G, H, I, J, K, L, M, N, O and P, as near to the outline as possible. A very good method of obtaining these curves is to divide the architect's 4-inch scale drawing by horizontal division lines similar to those in Fig. 6, and to scale off the lengths from the axis or vertical line C D. By setting off these measurements on a full size lay-out, points will be obtained through which the flexure of the curves may be very accurately determined.

The 16 rafters may all be drawn from the one pattern, as they are all alike and should be framed to fit against a 3-inch wood (boss), as indicated by X in Fig. 5, in order to obtain a solid nailing at the peak. They are struck from different radii, which shorten as they go upward. It will be noticed that each set of sweeps is consecutively numbered with the lines C 1, 2, 3, &c., from C to D of Fig. 6. There will be 15 sweeps in each course and, therefore, 15 different patterns. They may be conveniently numbered and marked in the following manner: For No. 2, for example, a pattern can be cut and marked "Pattern for 15 sweeps, No. 2." There will, therefore, be 180 altogether to be cut

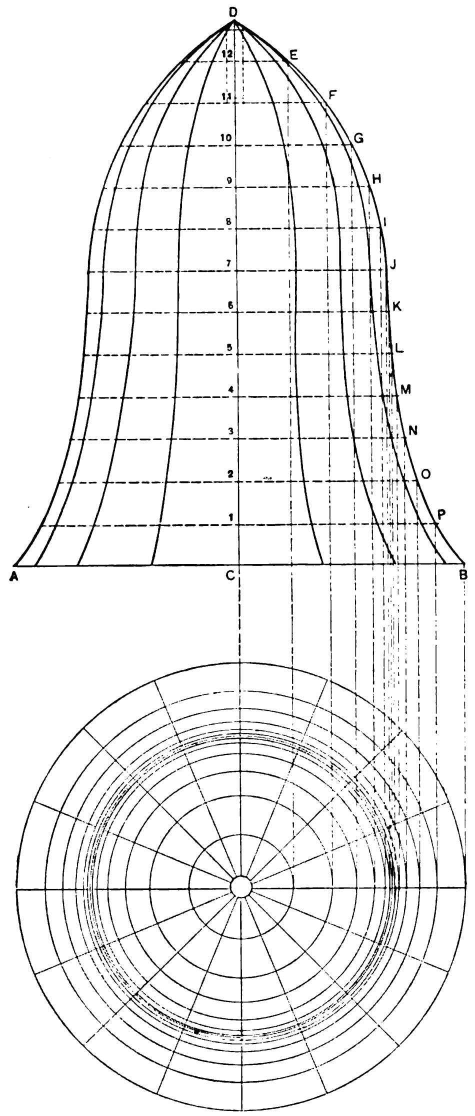

Fig. 6.—Outline Plan and Elevation of Rafters and Ribbing Sweeps.—Scale, ⅜ Inch to the Foot.

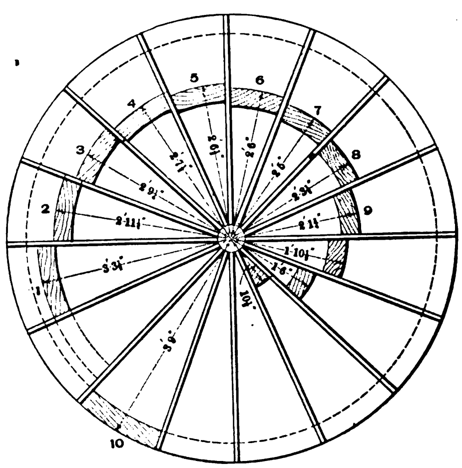

Fig. 7.—Diagram Showing Position and Radii of Ribbing Sweeps.—Scale, ⅜ Inch to the Foot.

Building a Circular Framed Tower.

In this engraving rafters are shown in position in elevation and also in plan, as well as the way they radiate or are spaced around the circle 16 inches apart on the plate. As it is always best to board such roofs as this vertically, ribbing or horizontal sweeps will have to be cut in between the rafters, and as there should be as many of these as possible for the purpose of giving a strong framework to hold the covering boards, it is advisable to cut in one at each of the divisions marked on the elevation shown in Fig. 6. The outline plan of this figure represents the top lines of these sweeps, which are well nailed in between the rafters. Fig. 7 of the engravings shows the exact size of the headers and their positions when nailed in. out, and these should be cut a trifle longer than the exact size, in order to allow for fitting.

Metal for Decorative Purposes.

Metal is being used decoratively to a great extent every year, says a writer in a recent issue of *Painting and Decorating*. Not only the precious metals in the form of gold and silver leaf, but brass, copper and iron, all of them being used for every conceivable purpose. Iron wrought into various delicate forms, vines clambering over trellis, or twisted into innumerable graceful curves, is used for light partition work, around elevator wells, cashiers' desks in stores, or simply to fill in the arched tops of circular-headed doors. When this iron work is combined with twisted work of copper wire, the decorative effect is very much enhanced. Plates and bands of ornamental copper, brass or iron work can also be used very effectively to add or heighten the decorative effect of the room by being fastened to the panel of the wainscot or on the doors. The color of the metal used should be in harmony with that of the decorations, or else should gain its effect by contrast. Silver contrasts well with black woodwork, or may be used as well with pale blue. Iron used with most effect in conjunction with oak, also looks well with dull Indian red, though brass properly goes better with that color. Copper, especially in antique finish, looks well with green tones, especially with oak that has been filled with greenish filler, but on a dark olive or bottle green front door nothing looks so well as polished brass. In selecting hardware, which when judiciously done adds so much to the decorative effect of a room, special care should be taken to choose the metal and finish that will harmonize best with the color combinations of the room. The decorator must not think his task is done when paint and wall papers are chosen, but he must study everything that goes into the fitting and furnishing.

It is often bothersome to know what color to paint the galvanized iron rain-water conductors that needs must run down the sides of our houses. Some painters cut the Gordian knot by leaving them unpainted, giving as an excuse that it would be no use galvanizing them if they were to be painted; but left standing out in all the rawness of unpainted zinc, they form ugly streaks down the houses. Other painters look upon them as part of the trim, painting them the same color as cornices, window trims and corner casings. It seems to me the best plan is to carry them down the side of the house, instead of trying to merge them into the corner casing, and then to carry the color of the house boldly across the conductor pipe. When the pipe crosses the cornice, let it be painted the cornice color. If a molding runs round the house at the floor level, let a band of color, the width of the molding, sweep round the pipe. Sometimes the rain conductor is made a special architectural feature, forming a part of the general design, instead of being allowed to come wherever it may happen, as is the usual case. Then it may appropriately be painted either the color of the trim or some distinctive color, as may be thought best, for in this case it is intended to be conspicuous.

WHAT BUILDERS ARE DOING.

THE BUILDING INTERESTS of Baltimore, Md., are reported as being in good condition for this season of the year, with an excellent prospect for the coming summer. The builders of Baltimore have benefited themselves and their business in many ways through their exchange, by which they have been enabled to secure desired reforms and improvements in the customs which have heretofore controlled the transaction of their affairs. The report of the secretary, E. D. Miller, to the recent convention of the work done by his exchange during the past year was one of the most interesting that was presented. Through the existence of the exchange, the builders of that city have been accorded a recognition in all matters of importance to the welfare of the city which they had never before received as individuals. The exchange has been consulted on prominent subjects and committees of conference invited to act with other important bodies. The result has been a great and perceptible improvement in the condition of the business generally.

The exchange as a body represents the very best element in the building interests of the city; is progressive and active, and is in excellent financial condition. The method employed in securing the property upon which it is proposed to erect a handsome building, as a home for the exchange, was the establishment of a stock company, all of the stock to be held by members of the exchange. The ground is at present occupied by buildings which are unsuitable for the use of the exchange, and they will be pulled down immediately after April 1, to make room for the new structure mentioned.

The uniform contract is in general use, and, as has been previously mentioned, the exchange has been instrumental in securing the passage of a satisfactory and much needed building law. There were no labor disturbances of any kind in Baltimore last year.

The Builders' Exchange has done all in its power to pay a heartfelt tribute to the memory of Chas. L. Carson, whose recent death is so greatly deplored, and passed the following resolution:

BALTIMORE, December 19, 1891.

At a special meeting of the Board of Directors of the Builders' Exchange, held this morning, the following resolutions on the death of Charles L. Carson were unanimously adopted:

The building community of this city and the members of this exchange are called upon to support a great disaster in the loss of our member, Charles L. Carson. Since the inception of this body he has been a warm supporter and encourager of every effort to raise the standard of mechanical work, to improve, simplify and regulate methods of business, and to this work relating to building he has brought all the resources of his cultivated mind, his lofty personal character and his undaunted energy.

His life furnishes us with a vivid picture of sterling worth, combined with talents of the highest order. His artistic appreciation of the beautiful and his successful application of his knowledge needs no further comment than his work's display, and against all obstacles opposing his rise to eminence in his chosen profession he opposed unfaltering energy and tact, unfailing courtesy and courtly address, placated his opponents and made them his friends. We, who know him well, join with his bereaved ones in deepest sympathy, that when his fame was most aspiring the Supreme Architect should have called him hence.

E. D. MILLER, Secretary.
HUGH SISSON, President.

A resolution of similar nature was passed by the architects of Baltimore, whose appreciation of the public loss sustained in the death of Mr. Carson was equal to that of the builders.

Boston, Mass.

The prospects for the building season of 1892 in Boston, while not promising unusual activity, indicate that business will be fair throughout the year.

The Committee of Arbitration of the Master Builders' Association are at present at work with committees from the several labor unions with which joint consideration has been established, fixing the hours and wages for the ensuing year. The membership of the association is continually increasing, and it is steadily growing into greater prominence as one of the solid institutions of the city, as well as in importance to its building interests. The membership held by the association in the Boston Board of Trade, which is composed of delegates from 20 prominent business organizations, allies and identifies it with every movement undertaken for the welfare of the city or the State. Such alliance and connection with the mercantile and manufacturing interests of the city works great benefit to the builders in placing them, through the medium of the exchange, before the public in a position to command the respect yielded to any other mercantile organization.

The Mason Builders' Association and Bricklayers' Union of Boston have recently held several conferences for the purpose of adjusting the rate of wages and hours of labor in their branch of the building business for 1892.

At the first meeting in 1891 the two committees formed a joint committee and appointed sub-committees to consider all propositions and make recommendations to the joint committee.

The first article adopted stipulates that the rate of wages for 1892 shall be 42 cents per hour; the same rate for overtime, holiday and Sunday work as during 1891.

It was agreed that for the months of April, May, June, July, August and October the working day should be limited to nine hours, all work beyond those hours to be considered overtime; and that during November and December eight hours should constitute a day's work.

The joint committee stated that in its opinion "the time has arrived for the adoption of an eight-hour day." The committee, therefore, recommended that the Mason Builders' Association and Bricklayers' Union No. 3 give the problem careful consideration during this year, with the view of enforcing the eight-hour day permanently in 1893.

The committee unanimously recommended that journeymen bricklayers join their trade union; also that preference be given by members of the Mason Builders' Association to union men.

Buffalo, N. Y.

At the annual meeting of the Buffalo Exchange, which was held early in January, the following officers and trustees were elected: President, A. A. Berrick; vice-president, George Duchscherer; treasurer, Charles A. Rupp; secretary, J. C. Almendinger; trustees, John Feist, J. H. Tilden, H. C. Harrower, James Bowland, George F. Frank, John Henrich, Wm. H. Schmidt, John Wolsley.

President Alfred A. Berrick appointed the following committees: Admission, Messrs. Hoefler, Close, Schumacher, Lyth, Geiger, Maltby, Keller, Jameson and Reiman. Room, Messrs. Harrower, Tilden and Hendrick. Arbitration, E. M. Hager, G. W. Carter, Charles Geiger; for delegates to the National Convention, A. A. Berrick, Charles Geiger, Jacob Reiman. These officials hold office for one year or until their successors are elected.

The retiring secretary, E. L. Cook, presented a very interesting report of the work of the exchange during the past year, which included the adoption and establishing in actual use of a code of practice to govern the submission of bids, which was substantially the same as that recommended by the National Association; the formulating and carrying out of a plan for securing a home of its own, and a most satisfactory showing of increased membership, influence and importance.

The report of the treasurer showed that the total receipts in the general fund were $3743.02. The amount received for stock and interest was $5559.60. The disbursements were $2647.48.

Ex-President William D. Collingwood was presented with an elegant Mexican onyx clock, trimmed with bronze, surmounted by a handsome onyx urn, and a pair of beautiful candlesticks.

Mr. Collingwood's name was placed at the head of both tickets for re-election, and he would have been elected without opposition, but being of the opinion that he would best serve the interests of the exchange by bringing some of the younger men to the front, he refused to again accept the office.

The present prospect for the coming season in the building business is good, much work already being projected.

Chicago, Ill.

The building business in Chicago is in a very active condition, and promises to hold out through the entire season. Much work is being laid out for immediate execution, and the opening of the building season, it is expected, will see an unusual amount of work begun.

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The practice of general contracting is growing more and more universal, and in cases where in the past contracts were let under direct bids for each branch of work, the principal architects are now asking bids for the entire work from one general contractor.

BUILDING A CIRCULAR FRAMED TOWER.

ARCHITECTS of the present time who are desirous of producing the most artistic effects are gradually recognizing the value of polygonal and circular details, and are beginning to appreciate more and more the varied effects of light and shade which are created by the presence of towers thus formed, especially when they are made a distinct and prominent feature of a design. As a result of this tendency there are few dwellings of any pretensions which are erected at the present day without this distinguishing feature, the tower as a general rule being hexagonal, octagonal or circular in plan. The position of the tower is usually on one of the front angles of the house and is shingled or paneled on the outside and finished either with straight, pyramidal, conoidal or molded roof. Towers of this description are not what might be termed ordinary carpenters' or builders' practice, but rather involve a great deal of study and careful consideration. The subject of tower construction is one, therefore, in which carpenters and builders are deeply interested and one which would appear to be a fitting topic for consideration at this time. What follows is an explanation of the best methods which have been met in the experience of a practical carpenter. Towers having straight sides or which are polygonal in form may be passed over as they have already been treated in previous issues of the paper.

Circular towers in framed construction may be divided into two classes—namely, those which have their foundations on a line connected with the main foundation of the house, and second, those which are carried up from the second floor, resting on, or being supported by, the floor beams of the second story. The latter class will be considered, as it embodies more important construction, although some of the matters which will be treated are applicable to all circular towers. The first thing for the practical carpenter or builder to consider is how to so construct the floor as to support the tower in a proper manner; that is, so that it will sustain with perfect safety the weight to be placed upon it.

Referring to the accompanying illustrations, suppose Fig. 1 to represent the general appearance of a tower built on an angle of a house. It is placed at the right hand of the front of the building and is designed to form an alcove closet, or an extension to the corner room. Its plan, as may be seen from an inspection of Fig. 3 of the engravings, is a three-quarter circle, the apex of the angle at the corner being the center from which the circular plan is struck. The radius of the plate outside is 3 feet 9 inches, thus making the tower 7 feet 6 inches in diameter. It is intended that the tower floor shall be level with a room in the second-story, and the beams or joists must be framed in such a manner that the flooring can be laid in the circle of the tower, while at the same time being so secured as to support the weight of it. The form of construction indicated in Fig. 3 of the engravings is well adapted for the purpose, and an inspection will show that it consists of a double header made of 2 x 10 inch timbers placed diagonally across the corner at a sufficient distance back from

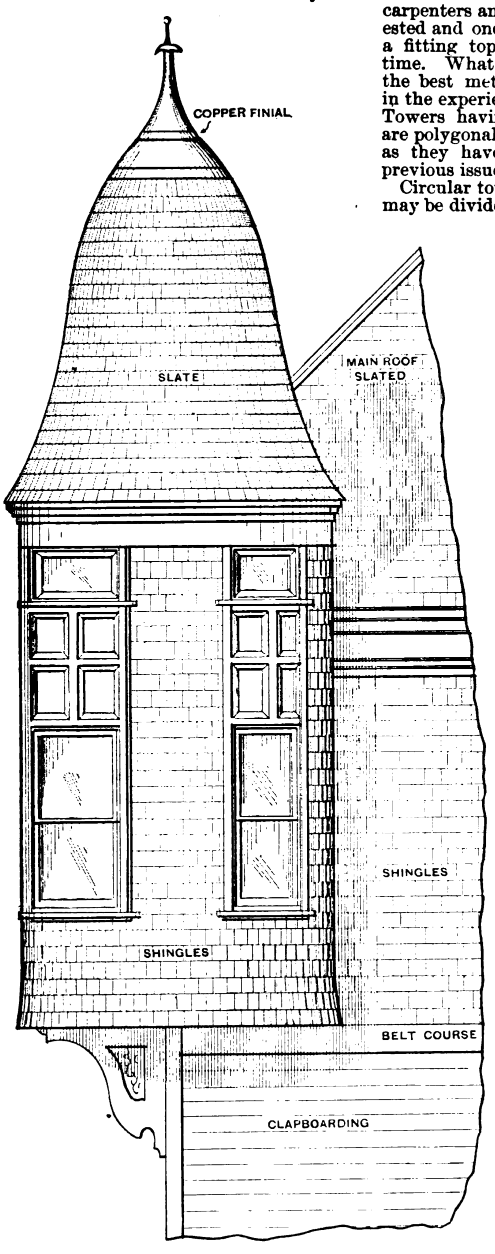

Fig. 1.—General Appearance of Tower Built on an Angle.

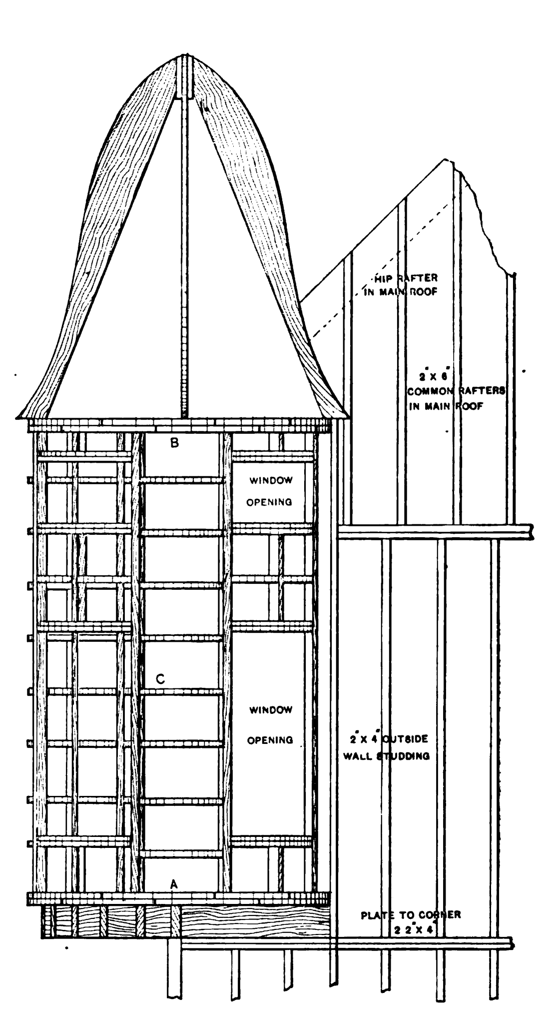

Fig. 2.—Elevation of Tower Framing.—Scale, ¼ Inch to the Foot.

Building a Circular Framed Tower.

it to give ample leverage to counterbalance the weight suspended outside the plate. The tower beams are framed square into this header on the outside and the floor beams are framed into it on the inside. By this construction a cantilever is formed, for the header in carrying the main beams forms a counterpoise for the superadded weight which is borne by the unsupported beams which project outside. It will be readily seen that this, obviously, is a good construction, and much better than introducing many short timbers after the manner indicated in Fig. 4 of the engravings. In the latter case the leverage outside being much greater than that inside, the plate being the fulcrum, there is a strong probability of its tearing away from the main framing, For the same reason it is regarded as a serious mistake to attempt to radiate the timbers as indicated by the dotted lines in Fig. 4. The position of the timbers are better shown in the elevation of the framing, Fig. 2, and we have no doubt that practical builders will fully appreciate what has been pointed out.

When the beams are inserted and the main framing has been nailed, a bottom circular plate, or template, marked A, in Fig. 2 of the engravings, is made from two thicknesses of 1-inch stuff, and nailed on exactly the size required. The position of the window studs is also marked on it, as represented in Fig. 3 of the engravings. The upper plate, or which is really the wall plate proper, and indicated by B in Fig. 2 of the engravings, must also be made, and this will rest on the top ends of the studding and support the rafters. This plate will be a complete circle measuring 7 feet 6 inches in diameter and struck with a 3 foot 9 inch radius rod and laid out upon the floor, as indicated in the roof framing plan, Fig. 5. The pieces necessary to form the upper and lower plates may be sawn out of rough 1-inch pine boards from one pattern, which may be any one of those drawn in the plan, and a number of which go to make up the whole plate. The studding are cut 11 feet 8 inches, which being added to 4 inches, the thickness of the plates, makes the entire hight 12 feet. The window headers, both at the top and bottom, are likewise circular and are framed in after the manner represented in Fig. 2 of the illustrations, to form the openings and cripple or short studding cut in under them in the center. All studding must be set perfectly plumb and all plates and headers perfectly level. In order to insure this it is well to be certain that the bottom plate is level by placing a parallel straight edge with a spirit level on top of it, across the plate at different points. Then, if the studding be cut of equal length the upper plate must, in consequence, be placed in a level position. A number of horizontal sweeps, 2 inches thick and 4 inches wide, as indicated at C in Fig. 2 of the engravings, require to be cut out to form ribbing or pieces nailed in 16 inches apart, to which the vertical boarding outside and the lath and plaster inside are fastened. It will be seen that if this construction is followed the whole cylindrical wall can be very strongly and economically built up. To save time and labor and also to expedite matters, the sweeps may be sawed out at the mill with a band saw, although it can be done in pine with the compass saw.

With regard to the molded roof, it may be said that having a molded outline it will necessarily require molded rafters sawn to the curvature called for in the elevation. As a general thing, architects furnish a full size working detail for roofs of this kind, but it often happens that it is not forthcoming and the carpenter or builder is obliged to strike out a pattern rafter himself. To do this quickly and as accurately as possible, it is well to lay out the whole roof on a floor, something after the following manner: Referring to Fig. 6 of the illustrations, draw any base line 7 feet 6 inches in length, as A B, and divide exactly in the center, or at 3 feet 9 inches, as C. From C square up the line to 9 feet high, as C D, and divide this line into 13 equal divisions, as 1, 2, 3, 4, 5, 6, &c. Through these points draw lines parallel to A B, or square C D any length on each side of C D. Now, from the point D dress the curve of the rafter, as indicated by the letters E, F, G, H, I, J, K, L, M, N, O and P, as near to the outline as possible. A very good method of obtaining these curves is to divide th architect's 4-inch scale drawing by h

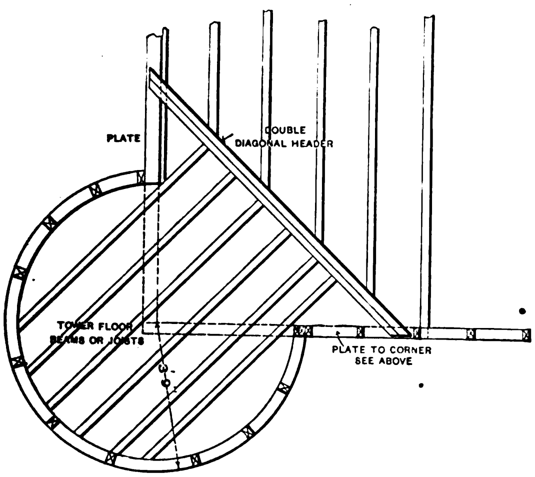

Fig. 3.—Plan of Tower Framing.—Scale, ¼ Inch to the Foot.

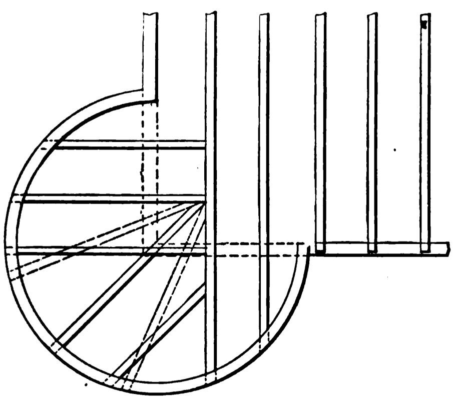

Fig. 4.—Imperfect Form of Floor Construction.—Scale, ¼ Inch to the Foot.

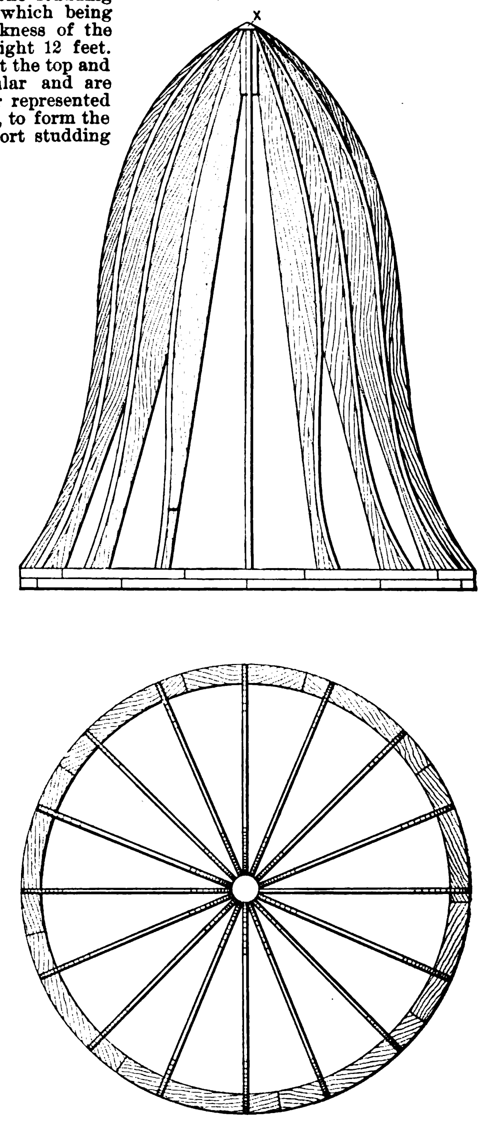

Fig. 5.—Plan and Elevation of Plate and Rafters.—Scale, ⅜ Inch to the Foot.

Building a Circular Framed Tower.

zontal division lines similar to those in Fig. 6, and to scale off the lengths from the axis or vertical line C D. By setting off these measurements on a full size lay-out, points will be obtained through which the flexure of the curves may be very accurately determined.

The 16 rafters may all be drawn from the one pattern, as they are all alike and should be framed to fit against a 3-inch wood (boss), as indicated by X in Fig. 5, in order to obtain a solid nailing at the peak.

They are struck from different radii, which shorten as they go upward. It will be noticed that each set of sweeps is consecutively numbered with the lines C 1, 2, 3, &c., from C to D of Fig. 6. There will be 15 sweeps in each course and, therefore, 15 different patterns. They may be conveniently numbered and marked in the following manner: For No. 2, for example, a pattern can be cut and marked "Pattern for 15 sweeps, No. 2." There will, therefore, be 180 altogether to be cut

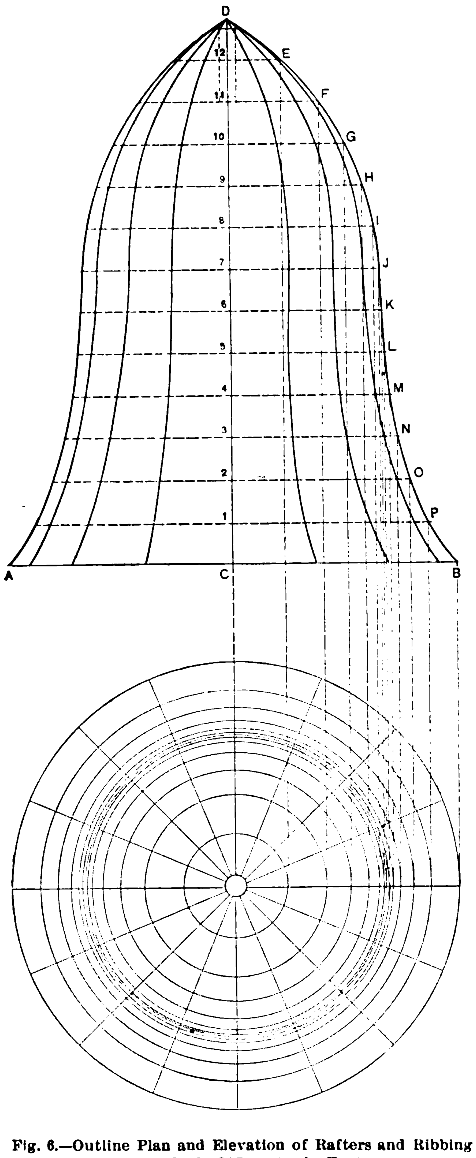

Fig. 6.—Outline Plan and Elevation of Rafters and Ribbing Sweeps.—Scale, 3/8 Inch to the Foot.

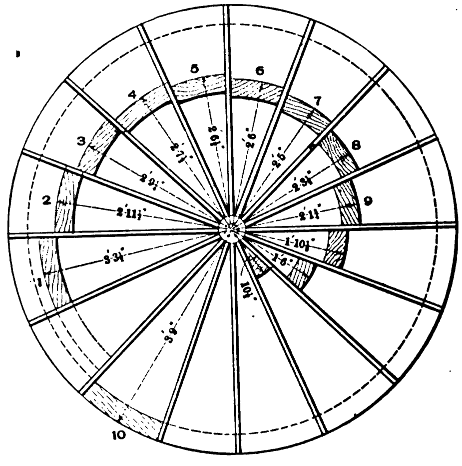

Fig. 7.—Diagram Showing Position and Radii of Ribbing Sweeps.—Scale, 3/8 Inch to the Foot.

Building a Circular Framed Tower.

In this engraving rafters are shown in position in elevation and also in plan, as well as the way they radiate or are spaced around the circle 16 inches apart on the plate. As it is always best to board such roofs as this vertically, ribbing or horizontal sweeps will have to be cut in between the rafters, and as there should be as many of these as possible for the purpose of giving a strong framework to hold the covering boards, it is advisable to cut in one at each of the divisions marked on the elevation shown in Fig. 6. The outline plan of this figure represents the top lines of these sweeps, which are well nailed in between the rafters. Fig. 7 of the engravings shows the exact size of the headers and their positions when nailed in. out, and these should be cut a trifle longer than the exact size, in order to allow for fitting.

Metal for Decorative Purposes.

Metal is being used decoratively to a great extent every year, says a writer in a recent issue of *Painting and Decorating.* Not only the precious metals in the form of gold and silver leaf, but brass, copper and iron, all of them being used for every conceivable purpose. Iron wrought into various delicate forms, vines clambering over trellis, or twisted into innumerable graceful curves, is used for light partition work, around elevator wells, cashiers' desks in stores, or simply to fill in the arched tops of circular-headed doors. When this iron work is combined with twisted work of copper wire, the decorative effect is very much enhanced. Plates and bands of ornamental copper, brass or iron work can also be used very effectively to add or heighten the decorative effect of the room by being fastened to the panel of the wainscot or on the doors. The color of the metal used should be in harmony with that of the decorations, or else should gain its effect by contrast. Silver contrasts well with black woodwork, or may be used as well with pale blue. Iron used with most effect in conjunction with oak, also looks well with dull Indian red, though brass properly goes better with that color. Copper, especially in antique finish, looks well with green tones, especially with oak that has been filled with greenish filler, but on a dark olive or bottle green front door nothing looks so well as polished brass. In selecting hardware, which when judiciously done adds so much to the decorative effect of a room, special care should be taken to choose the metal and finish that will harmonize best with the color combinations of the room. The decorator must not think his task is done when paint and wall papers are chosen, but he must study everything that goes into the fitting and furnishing.

It is often bothersome to know what color to paint the galvanized iron rain-water conductors that needs must run down the sides of our houses. Some painters cut the Gordian knot by leaving them unpainted, giving as an excuse that it would be no use galvanizing them if they were to be painted; but left standing out in all the rawness of unpainted zinc, they form ugly streaks down the houses. Other painters look upon them as part of the trim, painting them the same color as cornices, window trims and corner casings. It seems to me the best plan is to carry them down the side of the house, instead of trying to merge them into the corner casing, and then to carry the color of the house boldly across the conductor pipe. When the pipe crosses the cornice, let it be painted the cornice color. If a molding runs round the house at the floor level, let a band of color, the width of the molding, sweep round the pipe. Sometimes the rain conductor is made a special architectural feature, forming a part of the general design, instead of being allowed to come wherever it may happen, as is the usual case. Then it may appropriately be painted either the color of the trim or some distinctive color, as may be thought best, for in this case it is intended to be conspicuous.

WHAT BUILDERS ARE DOING.

THE BUILDING INTERESTS of Baltimore, Md., are reported as being in good condition for this season of the year, with an excellent prospect for the coming summer. The builders of Baltimore have benefited themselves and their business in many ways through their exchange, by which they have been enabled to secure desired reforms and improvements in the customs which have heretofore controlled the transaction of their affairs. The report of the secretary, E. D. Miller, to the recent convention of the work done by his exchange during the past year was one of the most interesting that was presented. Through the existence of the exchange, the builders of that city have been accorded a recognition in all matters of importance to the welfare of the city which they had never before received as individuals. The exchange has been consulted on prominent subjects and committees of conference invited to act with other important bodies. The result has been a great and perceptible improvement in the condition of the business generally.

The exchange as a body represents the very best element in the building interests of the city; is progressive and active, and is in excellent financial condition. The method employed in securing the property upon which it is proposed to erect a handsome building, as a home for the exchange, was the establishment of a stock company, all of the stock to be held by members of the exchange. The ground is at present occupied by buildings which are unsuitable for the use of the exchange, and they will be pulled down immediately after April 1, to make room for the new structure mentioned.

The uniform contract is in general use, and, as has been previously mentioned, the exchange has been instrumental in securing the passage of a satisfactory and much needed building law. There were no labor disturbances of any kind in Baltimore last year.

The Builders' Exchange has done all in its power to pay a heartfelt tribute to the memory of Chas. L. Carson, whose recent death is so greatly deplored, and passed the following resolution:

BALTIMORE, December 19, 1891.

At a special meeting of the Board of Directors of the Builders' Exchange, held this morning, the following resolutions on the death of Charles L. Carson were unanimously adopted:

The building community of this city and the members of this exchange are called upon to support a great disaster in the loss of our member, Charles L. Carson. Since the inception of this body he has been a warm supporter and encourager of every effort to raise the standard of mechanical work, to improve, simplify and regulate methods of business, and to this work relating to building he has brought all the resources of his cultivated mind, his lofty personal character and his undaunted energy.

His life furnishes us with a vivid picture of sterling worth, combined with talents of the highest order. His artistic appreciation of the beautiful and his successful application of his knowledge needs no further comment than his work's display, and against all obstacles opposing his rise to eminence in his chosen profession he opposed unfaltering energy and tact, unfailing courtesy and courtly address, placated his opponents and made them his friends. We, who know him well, join with his bereaved ones in deepest sympathy, that when his fame was most aspiring the Supreme Architect should have called him hence.

E. D. MILLER, Secretary.
HUGH SISSON, President.

A resolution of similar nature was passed by the architects of Baltimore, whose appreciation of the public loss sustained in the death of Mr. Carson was equal to that of the builders.

Boston, Mass.

The prospects for the building season of 1892 in Boston, while not promising unusual activity, indicate that business will be fair throughout the year.

The Committee of Arbitration of the Master Builders' Association are at present at work with committees from the several labor unions with which joint consideration has been established, fixing the hours and wages for the ensuing year. The membership of the association is continually increasing, and it is steadily growing into greater prominence as one of the solid institutions of the city, as well as in importance to its building interests. The membership held by the association in the Boston Board of Trade, which is composed of delegates from 20 prominent business organizations, allies and identifies it with every movement undertaken for the welfare of the city or the State. Such alliance and connection with the mercantile and manufacturing interests of the city works great benefit to the builders in placing them, through the medium of the exchange, before the public in a position to command the respect yielded to any other mercantile organization.

The Mason Builders' Association and Bricklayers' Union of Boston have recently held several conferences for the purpose of adjusting the rate of wages and hours of labor in their branch of the building business for 1892.

At the first meeting in 1891 the two committees formed a joint committee and appointed sub-committees to consider all propositions and make recommendations to the joint committee.

The first article adopted stipulates that the rate of wages for 1892 shall be 42 cents per hour; the same rate for overtime, holiday and Sunday work as during 1891.

It was agreed that for the months of April, May, June, July, August and October the working day should be limited to nine hours, all work beyond those hours to be considered overtime; and that during November and December eight hours should constitute a day's work.

The joint committee stated that in its opinion "the time has arrived for the adoption of an eight-hour day." The committee, therefore, recommended that the Mason Builders' Association and Bricklayers' Union No. 3 give the problem careful consideration during this year, with the view of enforcing the eight-hour day permanently in 1893.

The committee unanimously recommended that journeymen bricklayers join their trade union; also that preference be given by members of the Mason Builders' Association to union men.

Buffalo, N. Y.

At the annual meeting of the Buffalo Exchange, which was held early in January, the following officers and trustees were elected: President, A. A. Berrick; vice-president, George Duchscherer; treasurer, Charles A. Rupp; secretary, J. C. Almendinger; trustees, John Feist, J. H. Tilden, H. C. Harrower, James Bowland, George F. Frank, John Henrich, Wm. H. Schmidt, John Wolsley.

President Alfred A. Berrick appointed the following committees: Admission, Messrs. Hoefler, Close, Schumacher, Lyth, Geiger, Maltby, Keller, Jameson and Reiman. Room, Messrs. Harrower, Tilden and Hendrick. Arbitration, E. M. Hager, G. W. Carter, Charles Geiger; for delegates to the National Convention, A. A. Berrick, Charles Geiger, Jacob Reiman. These officials hold office for one year or until their successors are elected.

The retiring secretary, E. L. Cook, presented a very interesting report of the work of the exchange during the past year, which included the adoption and establishing in actual use of a code of practice to govern the submission of bids, which was substantially the same as that recommended by the National Association; the formulating and carrying out of a plan for securing a home of its own, and a most satisfactory showing of increased membership, influence and importance.

The report of the treasurer showed that the total receipts in the general fund were $3743.02. The amount received for stock and interest was $5559.60. The disbursements were $2647.48.

Ex-President William D. Collingwood was presented with an elegant Mexican onyx clock, trimmed with bronze, surmounted by a handsome onyx urn, and a pair of beautiful candlesticks.

Mr. Collingwood's name was placed at the head of both tickets for re-election, and he would have been elected without opposition, but being of the opinion that he would best serve the interests of the exchange by bringing some of the younger men to the front, he refused to again accept the office.

The present prospect for the coming season in the building business is good, much work already being projected.

Chicago, Ill.

The building business in Chicago is in a very active condition, and promises to hold out through the entire season. Much work is being laid out for immediate execution, and the opening of the building season, it is expected, will see an unusual amount of work begun.

The City Council is at work on the consideration of a building ordinance that will restrict the hight of buildings to some limit which is to be determined. A committee from the Illinois chapter of the American Institute of Architects, consisting of Dankmar Adler, L. G. Hallberg, Henry W. Hill, Clarence L. Stiles and George Beaumont, recently appeared before the Council Committee on Buildings to present their views on the question. Mr. Stiles ridiculed the theory that low buildings would relieve the congestion of the central part of the city. He was in favor of lower buildings, but solely from consideration of public health and comfort. The chapter submitted a series of recommendations which the Council Committee will consider later. In effect it says:

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J. M. Blair made a speech of characteristic ability, commending the association most highly and complimenting the delegates and visitors for the city.

The exchange contemplates moving into new and more desirable quarters.

Detroit, Mich.

The condition of affairs in the building business in Detroit is generally satisfactory at present. The relations between employers and workmen seem to be amicable, with no immediate prospect of disturbance.

The practice of general contracting is growing more and more universal, and in cases where in the past contracts were let under direct bids for each branch of work, the principal architects are now asking bids for the entire work from one general contractor.

A banquet was tendered by the Builders' Exchange to its members on the evening of February 13, and was an exceedingly pleasant affair. The work of the sixth convention of the National Association was discussed and lines of action for the exchange to take up during the ensuing year were mapped out. The delegates to the convention seemed particularly impressed with the importance of placing the exchange upon a more beneficial basis, and securing for it the recognition and influence which its membership and purposes deserve.

The exchange has begun in earnest to bring about such changes and improvements in its existence as shall demonstrate to the members the benefits to be derived from such an organization properly conducted. The first step, and one which is in the right direction, is the employment of a permanent secretary who will devote his entire time to the exchange. The new secretary assumed the office on March 1.

Grand Rapids, Mich.

From present indications the builders of Grand Rapids will have enough work on hand, as soon as the season opens, to keep them busy until late next winter. Mr. Dregge, in speaking of affairs in his city, stated that the condition of the labor market was rather mixed, owing to lack of organization on the part of certain of the trades and the consequent impossibility to secure united action from them. The carpenters petitioned the contractors and builders at the close of last season for a nine-hour work day to take effect March 1. The contractors have announced that the nine-hour system is conceded, taking effect February 1, that the pay will be on the nine-hour basis, the "ghost" to walk weekly. Contracts made for next season will be figured according to the new plan.

Indianapolis, Ind.

The Builders' Exchange of Indianapolis received the report of their delegation to the convention with much interest and expressed its gratification at the decision of the directors to hold the mid-year meeting in that city.

The building interests are in a normal condition and the prospect for the spring opening is very satisfactory.

Kansas City.

The reorganization of the Builders' and Traders' Exchange of Kansas City is progressing favorably. Articles of incorporation have been drawn up ready for record and all the signatures of members of the exchange, with the exception of a few who are out of the city, have been affixed. The matter will be completed this week. The capital stock is $20,000.

It is confidently expected that business in Kansas City will recover its usual activity during the coming year and that the season of depression which has existed for some time past will be over.

Louisville, Ky.

The Builders' and Traders' Exchange of Louisville at the annual meeting elected J. H. Murphy to the presidency and Jacob F. Meriwether vice-president. John Baumeister was elected treasurer and Leo P. Kaufman secretary for the year 1892.

The following committees were appointed:

Arbitration.—George L. Smith, Edward Peter, M. M. Taylor, Alex. Mitchell and W. J. Seaman.

Finance.—George W. Schmidt, Geo. Young, Jr., and Joseph H. Peter.

Legislation.—Thomas Armstrong, Samuel P. Snead and John Greiner.

The last-mentioned committee is a very important one, as the compilation of a just and equitable code of lien laws is left to their charge.

An attempt will be made by the Builders' and Traders' Exchange to have the result of the committee's labors adopted by the Legislature.

A committee, consisting of the president and vice-president, was appointed with power to negotiate for the purpose of a desirable property, either ground or building, to be used as the future home of the exchange. If a suitable building cannot be obtained it is proposed to erect one.

Lowell, Mass.

The unusual prosperity in the building business in Lowell during the past year has not injured the outlook for next season, and the builders anticipate plenty of work.

The Builders' Exchange has inaugurated several features in its management which are good examples to others. In an effort to secure to the builders of the exchange lower prices of building material than can be obtained by the owner, or any other infrequent and small buyer, the building material dealers of the city were invited to join the exchange. The invitation was presented to the dealers in a favorable light, and the majority complied, and thereupon recognized the justice of allowing to fellow-members, who were large and constant buyers, a certain discount, such as obtains in other mercantile pursuits. A very desirable plan for bringing the members together, for the purpose of discussing topics of common interest, and creating an increased sense of fellowship and fraternity, has been adopted in the shape of special meetings to be held about once a month, at which a substantial lunch is served.

Lynn, Mass.

Early in February the Master Builders' Association of Lynn met to listen to the report of the delegates who attended the convention of the National Association at Cleveland. Secretary P. S. Curry made an extended report, which was listened to with interest, and very favorably received.

A committee of three was appointed, consisting of A. J. Dearborn, Charles W. Dearborn and P. S. Curry, to explain to the builders of Lynn the benefits to be derived by contractors from the local and national associations of builders of the United States.

As applications for membership are coming in rapidly, the members of the Board of Directors were requested to meet every Tuesday evening to consider applications until further notice.

Votes of thanks to the Mayor of Cleveland, Ohio; to the Building Trades Association of Cleveland, Ohio, and to the Builders' Exchange of Worcester, Mass., were tendered.

The following is a copy of the lien law, which shall give equal protection to material with labor, which is advocated by the Lynn Exchange:

"Every person who, as sub-contractor or a principal contractor, or employee of any contractor or sub-contractor, performs any work or labor for or furnishes any materials to a principal contractor or sub-contractor in any of the cases mentioned in the preceding section, shall be entitled to the lien and remedy given by this chapter, if within 60 days after performing such work or labor, or furnishing such materials, he shall give notice in writing to the owner or his agent, of the property to be affected by such lien, setting forth that he has been employed by such principal contractor or sub-contractor to perform or furnish, and has performed or furnished, such work, labor or material; with a statement of the labor performed or materials furnished, and the amount due therefor from such principal contractor or sub-contractor, and that he claims the lien given by this chapter. In all cases where a lien shall be filed under the provisions of this chapter by any person other than the principal contractor, it shall be the duty of the principal contractor to defend any action brought thereupon at his own expense, and, during the pendency of such action, the owner may withhold from the contractor the amount of money for which such lien shall be filed; and in case of judgment against the owner on his property upon the lien, he shall be entitled to deduct from any amount due by him to the contractor the amount of such judgment and costs, and if he shall have settled with the contractor in full shall be entitled to recover back from the principal contractor any amount so paid by the owner for which the principal contractor was originally liable."

Milwaukee, Wis.

A consolidation of the Builders' and Traders' Exchange and the Builders' Exchange, under the name of the latter, is being planned and will be put into effect soon. The Builders' Exchange is a corporation having a capital stock of $150,000, and was organized by members of the Builders' and Traders' Exchange for the purpose of erecting the new building at Grand avenue and Fifth street, which is already several stories above ground. The report from the Milwaukee Exchange, as presented to the convention, was very interesting and contained much of interest to other associations. Their action in regard to securing a home of their own and also in the settlement of the strike of 1891, both of which have already been alluded to in these columns, are examples that could be profited by, by every exchange in the country.

New York.

At the last regular meeting of the Mechanics' and Traders' Exchange, the delegates to the sixth convention made the following report:

January 30, 1892.

To the Officers and Members of the Mechanics' and Traders' Exchange:

GENTLEMEN.—Your representatives attending the sixth annual convention of the National Association of Builders of the United States, held at Cleveland, Ohio, on the 18th, 19th and 20th inst., do respectfully acknowledge the honor conferred upon them in being selected to represent the oldest organized body of builders in the country, and the one also, from its identification with the great commercial metropolis, receiving fully its share of recognition in the deliberations of the National body.

The unexpected absence of the chairman of the delegation, John J. Tucker, was a source of sincere regret to all, as well as the absence of the director, Marc Eidlitz. These positions were filled by the unanimous selection of our secretary, Stephen M. Wright.

Your entire delegation attended each session of the convention and the programme as published was strictly adhered to, the business conducted with decorum, exemplifying the capability of our craft to properly and successfully conduct its affairs in a becoming and dignified manner.

To epitomize the business transacted is only to anticipate the "Official Proceedings" soon to be issued in printed form, for which we bespeak a careful perusal by each member of this exchange, containing, as it will, some of the brightest thought on the burning questions how agitating the minds of the contemplative builders. The especially prepared paper on "Education of Business Men" will commend itself at once as presenting in the fullest manner the needs for a higher education among builders, in view of the constantly increasing magnitude of the business involvements in these days.

The most difficult matter to emphasize by word is the spirit of fraternal intercourse and brotherly love manifesting itself so abundantly in these national gatherings; the warm hand shake, the cordial greeting and the delightful converse, are the lasting mementoes to every delegate, while the National Association, with its chain of filial bodies stretching across the entire continent, constructs a system of intercommunication as endurable as its methods are beneficial to our entire craft.

Beyond the sumptuous banquet tendered at the close of the convention by the Cleveland Exchange, no general attempt at entertaining was made, but it is pleasing to note the delightful attention paid personally to your entire delegation by the members of the Cleveland Exchange, and every means afforded them to enjoy their brief visit, and we consider it but just to them to recommend the adoption of the following resolution:

Resolved, That the Mechanics' and Traders' Exchange of New York City tender to the Building Trades Association of Cleveland, Ohio, its sincere thanks for the courtesies and hospitalities shown its delegation while attending the sixth annual convention of the National Association of Builders, January 18 to 20, 1892.

Repeating our appreciation of the honor conferred we respectfully submit the above.

The committee appointed to formulate a plan for creating a building fund made report that after thoroughly investigating the subject and taking the best legal counsel it was considered unwise to further prosecute the subject in its present condition, and asked to be discharged. The project is, however, not given up, and further developments are awaited.

The treasurer's report was read, showing receipts of $8388 and disbursements of $7290 during 1891, with a balance of $27,804, an increase of $1098 for the year.

The exchange, being a member of the State Board of Trade, appointed the following members to attend the annual meeting of the Board at Albany on the 17th:

Delegates.—Isaac A. Hopper, Henry A. Maurer and Charles A. Cowen. Alternates.—Stephen M. Wright, John J. Roberts and Ronald Taylor.

The following committees were announced: Legislation.—Frank E. Conover, A. J. Campbell, Wm. Brennan, Marc Eidlitz, T. J. Dunn, H. W. Redfield; Stephen M. Wright, secretary; Geo. Moore Smith, president.

Members.—John J. Roberts, Otto N. Eidlitz, Stephen M. Wright.

Finance.—I. A. Hopper, J. J. Tucker, Thos. Dimond.

Rooms.—John C. Doremus, B. A. Williams, E. A. Vaughan.

Arbitration.—G. M. Smith, J. J. Tucker, J. B. Mulry.

The Committee on Legislation will watch and oppose all bills introduced inimical to the building interests.

The meeting was succeeded by a fine collation tendered to the members by the newly elected officers.

Omaha, Neb.

The prospects for the coming season promise a revival of the activity which has characterized Omaha in the past, previous to the depression of the last year or two.

The Builders' and Traders' Exchange is keeping abreast of the times in everything, and just now the exchange headquarters are being fixed up in a manner that will delight the members and be conducive to the work of the organization. Three rooms are being partitioned off for use as consultation rooms. When a contractor wishes to consult with a prospective builder privacy is assured by taking possession of one of the rooms, where desks, chairs and writing material are furnished.

These rooms are so arranged as to be well lighted and ventilated.

In addition to this a 6-foot partition has been erected in the main room, and within the space thus set off is room for 15 desks. Desk room will be rented to members of the exchange at a nominal figure, and nearly all the desks are already disposed of. The rental of these desks will nearly defray the running expenses of the exchange

A meeting of the exchange was held on February 10, at which the report of the delegation to the sixth convention of the National Association was presented by N. B. Hussey The report was an exceedingly interesting one and was favorably received. A lunch was served at the close of the meeting and all present appeared to thoroughly appreciate the value of the work being done, both by the National Association and the local bodies, for the correction of evils in the business which have been permitted to exist too long already. The exchange is taking active measures to secure efficiency in the Building Inspectors' office, with an excellent prospect of accomplishing a valuable reform. The question of hours of labor per day has been satisfactorily adjusted with the workmen, by arbitration, and action has been taken looking to improvement in the lien law of Nebraska. The code of practice advocated by the National Association and the uniform contract are being brought into general use through the efforts of the exchange, and the business generally is showing the effect of the efforts of the organization.

The committee appointed in January to confer with the architects regarding the adoption of a national code reported that the architects had unanimously indorsed it, and the architects were themselves present to verify it.

A committee consisting of Messrs. Farrell, Robinson and Farrell from the Manufacturers' and Consumers' Association was present to secure the architects' indorsement of the association, and they met with flattering success, as the architects without exception signed the desired agreement.

Secretary Wedge's report for the the committee to consult architects upon the adoption of the code of practice advocated by the National Association, reported the architects had universally adopted it.

Mr. Richards, chairman of the committee to confer with material men in regard to securing special prices for contractors, reported progress, and stated that they are in favor of meeting the contractors in all reasonable demands.

The committee for the Manufacturers' Association was present and addressed the architects, urging them to co-operate with the manufacturers in advocating and urging home patronage.

Philadelphia, Pa.

The condition of the Builders' Exchange of Philadelphia is fully presented in another column of this issue, in the report of that exchange as offered to the sixth convention. Among other matters that are at present being considered are means for securing the establishment of certain alterations and improvements in the building law of the city; a remedy for the undesirable conditions which govern the contracts under which city work is let; a plan for securing quotations of the prices of all building material, to be made daily in the exchange, and the best means for securing better attendance during the 'change hour.

The opposition of the Plasterers' Union to the apprentices from the Builders' Exchange Trade School has worked much injury to the class in that trade, the boys being reluctant to come into open antagonism with the union. The bricklaying class has also been affected in the same manner, although less seriously. It is at present expected that an arrangement will be made with the bricklayers whereby there will be no discrimination against pupils from the school, the subject being at present under joint consideration of the union and the committee of the Master Builders' Exchange.

The exhibition department of the exchange has recently issued a beautifully illustrated souvenir of the permanent exhibit that is one of the most attractive and artistic pamphlets of its character ever put out.

The new Board of Directors of the Builders' Exchange met February 2 and elected the following officers: President, Murrell Dobbins; treasurer, C. H. Reeves, and William Harkness. secretary. This arrangement places William H. Albertson in direct line of promotion for president next year and Franklin M. Harris the following year.

Providence, R. I.

The following are the officers elected for the ensuing year at the annual meeting of the Builders' and Traders' Exchange of Providence: President, Frederick C. Markham; first vice-president, Richard Hayward; second vice-president, William W. Batchelder; treasurer, Freeborn Johnson. Secretary William F. Cady holds office for another year according to the constitution. The Executive Committee elected to serve two years are: H. F. Mahon, Robert Watson, W. N. Chadsey, L. Sweet and John T. McGuire. Those who will continue on the second year of the committee are: James C. Goff, A. C. J. Learned, E. D. Smith, Spencer B. Hopkins and James McCudden.

The secretary, William F. Cady, made an interesting report, which showed the exchange to be in excellent condition financially and numerically. The meeting was concluded by a banquet, which was very enjoyable and successful.

The prospect for the coming year is about up to the mark, and no disturbance in the labor market is anticipated. The painters have issued the following resolution as indicating the demand that will be made for wages and hours for the ensuing year:

Resolved, That on and after March 1 of the present year the organized painters of Providence shall work nine hours, and 54 working hours shall constitute a week's labor. The scale of wages shall be $2.50 per day, or $15 per week of 54 hours.

Portland, Maine.

The Builders' Exchange of Portland has secured several important changes in the customs which have previously obtained in the building business in that city. R. W. Jackson reported at the sixth convention that the exchange had, in conjunction with the architects, secured the adoption of the Code of Practice advocated by the National Association, and had also secured the establishment of an ever-increasing attendance at the exchange rooms during the 'change hour.

No trouble of any importance was experienced with the workmen, and present indications seem to point to a peaceful and successful season for 1892.

Rochester, N. Y.

The outlook for business in the building trades in the city of Rochester for the coming year presents a pleasing prospect. There is no trouble apprehended from the workmen, as the plan of arbitration adopted and in force in 1891 proved so satisfactory that all differences have been settled without dispute.

St. Louis, Mo.

The Mechanics' Exchange of St. Louis reports everything being favorable at present for a prosperous year in the building business. It is expected that no trouble will occur with the workmen, as the eight-hour day prevails in all the trades, and such other differences that may arise will probably be settled, as in the past, by arbitration.

The exchange has already begun to arrange plans for the entertainment of the seventh convention, which is to be held in St. Louis in 1893, and it is proposed to have everything thoroughly systematized and in the hands of various committees, each of which will have some specific duty of its own.

St. Paul, Minn.

The Board of Directors of the Builders' Exchange of St. Paul, at their annual meeting reelected the following officers: J. W. Makinson, president; J. W. L. Corning, C. A. Fowble and J. M. Carlson, vice-presidents, and A. J. Hoban, treasurer; H. R. P. Hamilton, secretary. A committee of five have been appointed to consider matters concerning the appointment of a building inspector.

Business interests generally are brighter this year than they have been for some time past.

Syracuse, N. Y.

The Master Builders' Association of Syracuse have elected for president, Charles H. Merrick; vice-president, George Mahlerwein; secretary and treasurer, C. F. Wisehoon, Jr.; trustees, Patrick Leamy, David Murphy, Thomas Cashman, Thomas J. Timmons, John J. O'Hara, John W. Gee.

Wilmington, Del.

At the fourth annual meeting of the Builders' Exchange of Wilmington, Del., recently held in its rooms, 605 Market street, about 25 members were present, with President J. D. Winslow in the chair. The officers' reports showed the organization to be in a flourishing condition. Secretary A. L. Johnson reported the membership as 55, and Treasurer Henry Evans reported about $400 in the treasury.

The following were elected directors for three years: A. S. Reed, Alfred Gawthrop, Henry Evans, J. M. Bryan, George W. McCauley, A. L. Johnson and Calvin I. Swayne. The Board of Directors comprises 21 members. The term of seven expires each year.

A committee will be appointed for the purpose of looking over the proceedings of the National Association, and present proper portions for the discussion and the action of the local body.

The project of the Builders' Exchange to have a building of its own has assumed a definite phase after having been considered for two years, and a committee has been appointed to look after a site for a building. Everything seems favorable to the project. The exchange, however, still has an unexpired lease for two years on the present building.

It is the opinion of the directors that they are getting the solid business men of the city into the organization, and it shows more prosperity than ever.

Worcester, Mass.

At the annual meeting of the Builders' Exchange of Worcester, which was held just prior to the national convention, the report of Frank H. Goddard, treasurer, showed a balance of between $800 and $900 in the treasury.

Secretary Bouchard, in the course of his report, said: "At the date of the last annual meeting 60 were duly qualified members. Of these, 12 dropped, cutting down the old list to 48. Since then 38 new members have been admitted, but only 29 paid their dues, so that virtually the number of active members is 77. To this must be added 13 honorary members. Since May last some 6000 signatures were registered in the visiting book, making an average of about 27 per day."

Among other matters of interest in the report was a new section in the by-laws, which ran thus: "There shall be a Special Outlook Committee appointed by the Board of Trustees, whose duty it shall be to look after strangers who may come to our city in search of a location to do business; also to encourage any person or persons to come to start manufacturing in Worcester, and do whatever lies in their power for the growth of the city."

The following officers were elected for the ensuing year: President, O. S. Kendall; vice-president, J. T. Darling; trustees for two years, F. B. White, P. L. Paquette, Martin Wilson and George Carr.

A meeting of the trustees was subsequently held, at which Secretary George Bouchard and Treasurer F. H. Goddard were unanimously re-elected.

Notes.

A builder's exchange has been established at Toledo, Ohio, a body of the contracting builders and dealers in building materials having identified themselves with the organization. The undertaking presents every prospect of permanent success. The officers will be elected as soon as the charter is granted, and every effort is being put forward to place the new exchange on a high and influential plane. The movement has been fostered from the beginning by the architects, and represents the best elements of the building interests of Toledo in its membership.

The Federated Builders' and Contractors' Association of Australia is following closely in the footsteps of the American association in the consideration of subjects of importance to the builders of that country. Subjects receiving attention at present are: "Conditions of Contract," "Appointment of Clerks of Works," "Contractors' Lien Law," "The Apprenticeship Question," "Freedom of Contract," "Deposit with Bids," and other kindred topics.

One of the most satisfactory features of the prospective organization of a builders' exchange in Toledo is the fact that the trades unions are decidedly in favor of the movement. One of the officials of one of the prominent unions said in a recent interview: "We talked that matter over at our recent meeting, and every member of the council concluded that it was a good thing. The trouble we have had to contend with in the past was men belonging to the labor organizations and doing contract work at the same time. All good, responsible contractors and material men will become members of the Builders' Exchange, and the laboring men of the city will know whom to trust and whom not to trust."

IT IS REPORTED from Sweden that 20 complete villas in wood have been shipped to Brazil by the Wengstrom Planing Mills. It seems as though, under our new reciprocity treaties, says an exchange, there was a large opportunity for our wood-working factories to compete on ready-made buildings in the South American markets. The making of ready-made buildings has been undertaken from time to time, and at one time there was considerable business of this character, many complete and even very large buildings being sent to the West Indies and elsewhere.

THE BUILDERS' GUIDE.*

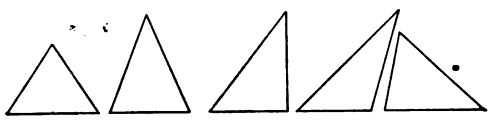
By I. P. HICKS.

Geometrical Measurement of Roofs.

IN THE MEASUREMENT of carpentry work there is probably no part so difficult to master as the accurate measurement of roofs, particularly where they are composed of hips and valleys forming a great variety of irregular surfaces. The shapes of roofs having hips, valleys and gables are usually represented in the form of some triangle. The rectangle. The area of a square or a rectangle, is found by multiplying its length by its breadth. In computing roof measurements all triangles can be reduced to squares or rectangles of equal areas by very simple methods.

FINDING THE AREA OF A GABLE.

Referring to Fig. 13, A B C represents the gable



Figs. 6-10.—Different Forms of Triangles.

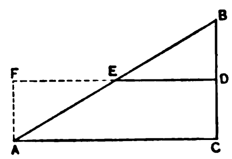


Fig. 15.—Finding Area of a Right-Angled Triangle.

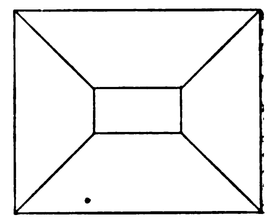


Fig. 21.—Plan of Hip Roof with Deck.

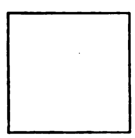


Fig. 11.—A Square.

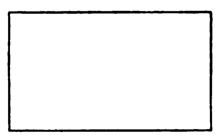


Fig. 12.—A Rectangle.

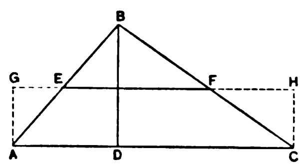


Fig. 16.—Finding Area of a Scalene Triangle.

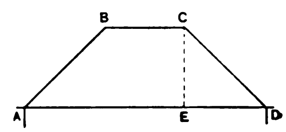


Fig. 22.—Side Elevation of Roof shown in Fig. 21.

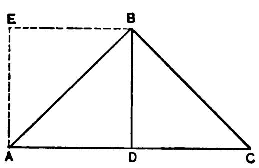


Fig. 13.—Diagram for Finding Area of a Gable.

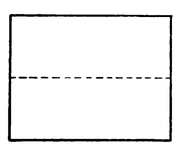


Fig. 17.—Plan of Gable Roof.

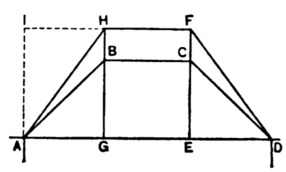


Fig. 23.—Size and Shape Necessary to Cover Roof.

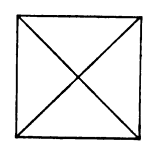


Fig. 24.—Plan of Pyrimidal Roof.

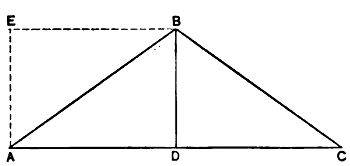
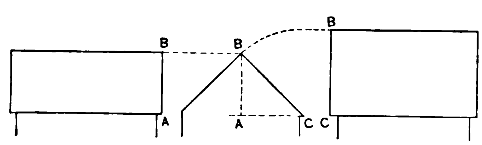


Fig. 14.—Finding Area of Gable when Roof is Less than Half Pitch.



Figs. 18, 19 and 20.—Side and End Elevations of a Gable Roof.

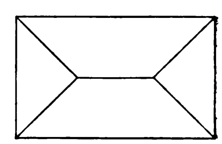


Fig. 25.—Plan of Roof which Hips to a Ridge.

The Builders' Guide.—Geometrical Measurement of Roofs.

different forms of triangles are shown in the diagrams, Fig. 6 representing an equilateral triangle, Fig. 7 an isosceles triangle, Fig. 8 a right-angled triangle, Fig. 9 an obtuse-angled triangle and Fig. 10 a scalene triangle. Figs. 1, 2 and 5 are also acute-angled triangles. Fig. 11 shows a square and Fig. 12 a rectangle. It is a very easy matter to compute the area or surface measurement of a square or a

of a building of which A C is the width and D B is the perpendicular hight. By dividing the gable on the line D B we have two triangles of equal areas and equal sides. It is evident that if the triangle D B C was placed in the position shown by the dotted lines A E B, it would form a square whose side is equal to one-half the width of the gable. This of course applies to gables on buildings of a half pitch roof. With a roof of less pitch a rectangle would be formed

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with A D for its length and D B for its breadth, as shown in Fig. 14. In this figure the triangle A B C is equal in area to the rectangle A E B D. From the foregoing illustrations and principles we derive the following:

Rule.—Multiply one-half the width of the gable by perpendicular hight.

For example, if a gable is 24 feet wide and the perpendicular hight is 8 feet, then $24 \div \frac{1}{2} \times 8 = 96$ feet, the area of the gable.

FINDING THE AREA OF A TRIANGLE.

Let A B C represent a right-angled triangle, as shown in Fig. 15. If we divide the triangle horizontally half way on the perpendicular, then the triangle E B D will equal in area the triangle shown by the dotted lines A F E; hence the triangle A B C equals in area the rectangle A F D C. From the above illustration we derive the following:

Rule.—Multiply the base by one-half the perpendicular hight.

In Fig. 16 A B C represents a scalene triangle which has no perpendicular line in reality, but for convenience in estimating we draw one, which is B D, dividing the triangle into two right-angled triangles of unequal areas. By dividing the triangle horizontally half way on the perpendicular, as shown by E F, the triangle E B F equals in area the two triangles shown by dotted lines A G E and F H C. Hence the triangle A B C equals in area the rectangle A G H C.

Having shown how triangles may be reduced to squares and rectangles of equal areas, the next step will be to show their proper application to roof measurements.

PLAIN GABLE ROOFS.

The gable roof is the most common in use and is formed by two sets of rafters which meet at the ridge. Fig. 17 shows a plan of this kind of roof, Fig. 18 shows a side elevation, Fig. 19 shows an end elevation and Fig. 20 shows the size of roof necessary to cover the side elevation shown in Fig. 18. An error liable to occur in taking roof measurements from architectural plans consists in regarding the line A B in the side elevation, Fig 18, for the length of the rafter. This line is only the perpendicular rise of the roof, as shown in the end elevation, Fig 19, by the dotted line A B. In Fig. 19, B C represents the length of rafter which, when shown in a perpendicular position, is indicated by B C in Fig. 20. This shows the length of roof and of rafter necessary to cover the side elevation, represented in Fig. 18. Hence the area of the roof is found by multiplying the length of the roof by the length of the common rafter, which gives the area of one side. This amount doubled will give the area of both sides.

HIP ROOFS.

The liability to error in estimating the area of hip roofs is still greater than in the case of gable roofs, for no matter from which point we view the elevations the length of the common rafter is not shown in proper position to indicate the true size of the roof. Fig. 21 shows a plan of a hip roof with deck, and Fig. 22 a side elevation of this kind of roof. In this figure some might take the lines A B and C D for the length of the hips, and C E for the length of the common rafter, but such is not the case. C D shows the length of the common rafter as we would see it on the end looking at the side view, hence E D is the run, E C the rise and C D length of common rafter. I will now indicate the method of developing the lengths of the hips, showing the true size of the roof, and how to reduce the figure to a rectangle of equal area. Referring to Fig. 23, A B C D and E represent the same lines as shown in Fig. 22. Now, take the length of the common rafters A B and C D in Fig. 23 and draw them perpendicularly, as shown by E F and G H. Connect F with D and H with A for the length of the hips, then the figure inclosed by the lines A H F D will be the size and shape of the roof necessary to cover the side elevation. The triangle described by the lines D E F equals in area the triangle A I H, shown by the dotted lines. Hence the roof A H F D is equal in area to the rectangle A I F E, whose length is one-half the sum of the eaves and deck lengths and whose breadth is the length of the common rafter. The length multiplied by the breadth gives the area. From the foregoing illustrations and principles we derive the following:

Rule.—Add the lengths at the eaves and deck together, divide by two and multiply by the length of the common rafter. The area of the deck is found by multiplying the length by the breadth.

Example.—What is the area of a hip roof 20 x 28 feet at the eaves, with deck 4 x 8 feet, the length of the common rafter being 10 feet?

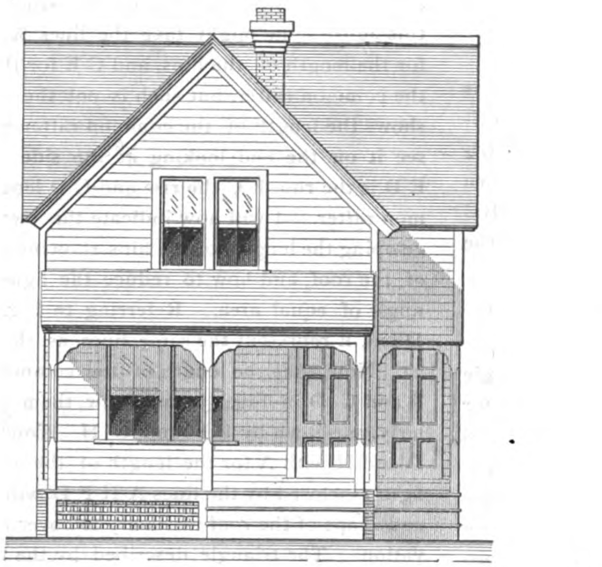
Operation.—$20 + 4 + 20 + 4 + 28 + 8 + 28 + 8 \div 2 \times 10 = 600$ feet, the area of the four sides. $4 \times 8 = 32$ feet, the area of the deck. $600 + 32 = 632$, the total area of the roof.

This rule will apply to hip roofs of most any kind. If the roof is pyramidal in form and hips to a point, as shown by Fig. 24, then there is nothing to add for deck and we simply multiply one-half the length at the eaves by the length of the common rafter. The principles of the three forms of hip roofs are essentially the same.

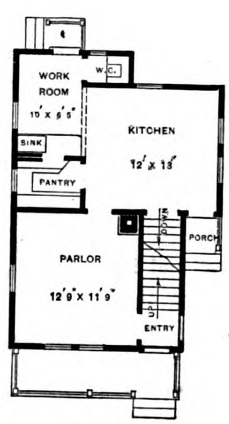
(To be continued.)

VARIATION IN COTTAGE DESIGN.

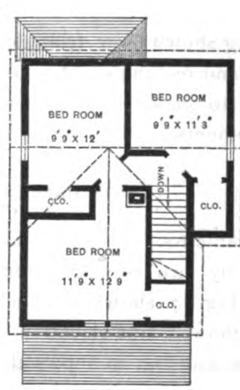
IT IS FREQUENTLY the case that one set of floor plans is used as a basis for a variety of designs in house construction—at least so far as external appearance is concerned. This is partially explained by the fact that while many admire the same arrangement of the rooms tastes differ as to the manner in which the exterior shall be finished. An interesting example illustrating the case in point is found in connection with the elevations and floor plans presented upon this and the following pages, the designs having been prepared by J. D. Sibley, architect, of 70 Church street, Middletown, Conn. The first design shown represents a house of six rooms, estimated to cost about $1000. In its construction the stone walls in the cellar are laid dry and pointed inside with mortar, while the cellar bottom is graveled. One chimney is made to serve the purpose of the whole house, rising, as it does, at a point which practically divides the kitchen from the parlor on the first floor. Instead of brick piers in the cellar for the purpose of supporting the girders, chestnut posts are employed for the sake of economy. The finish throughout is plain, with flat ¼ x 2 inch band molding around the windows and doors. The floors throughout are of spruce, and the roof is shingled. From inspection of the first-floor plan it will be seen that the workroom at the rear of the house is separated from the kitchen by an arch, which may be closed by curtains. In the summer time the kitchen may be used for a sitting or dining room, while making use of the workroom as the regular kitchen. Between the workroom and pantry there is a slide, thus facilitating household work. The water supply is furnished from a cistern or tank. On the second floor there are three sleeping rooms, access to which is made easy from the stair landing by means of its octagonal form. The veranda on the front and the porch at the sides have solid square posts chamfered. From inspection of the elevations it will be seen that the house is finished very plain, the object being to present a design for a cheap cottage in which economy of construction, combined with convenient arrangement, has been constantly kept in view. The second design, it will be observed, is based upon the same floor plans as are shown in the first, while the exterior is of a more ornamental design. It is probable, the author states, that the second design would cost about $1500.



Front Elevation.



First Floor.



Second Floor.

Variation in Cottage Design.—J. D. Sibley, Architect, Middletown, Conn.—Elevation.—Scale, ⅛ Inch to the Foot. Floor Plans.—Scale, 1-16 *Inch to the Foot.*

Masonry and Brick-Laying.

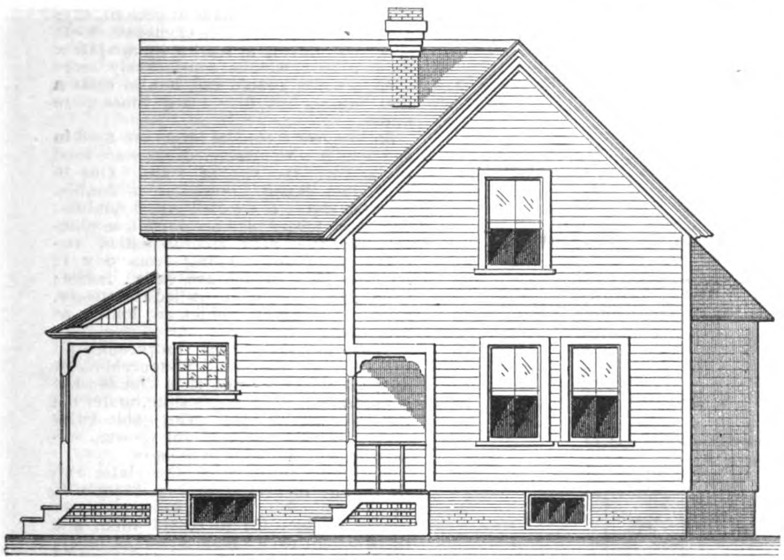
In a recent issue of *Specialties* appeared an article on the above subject by George H. Blagrove, which has much in it to interest American builders, and we take pleasure in presenting the following extracts :

The different densities of building materials have been studied with reference to the weight of their materials, their resistance to crushing and their power of absorbing water. We frequently employ a harder and denser species of bricks in foundations than elsewhere, but beyond this there are few attempts made to dispose the materials of a building according to their density, for structural reasons. If materials of different densities are found in various parts of a building it is usually with regard to their external appearance that they are so arranged. Yet it would not be difficult to design a large building in such a manner that the weight of its materials should be diminished toward the top, not so much by reducing the thickness of its walls as by the employment of lighter materials in their construction, thus combining the advantages of diminished weight with those of statical stability. In damp situations the denser materials are generally preferred on account of their non-absorbent character, but the reason for this preference disappears when the outer surface is vitrified or otherwise rendered impervious.

Hollow walls for the exclusion of damp allow us to vary our materials on the interior and exterior, while the air space serves for protection against changes of temperature. If we build one section of our hollow wall of substantial thickness, the other being only a half-brick or thin stone casing, and the two being connected by means of galvanized-iron bonding cramps, the question arises whether the greater or lesser thickness should be placed outside. It has been maintained by some that the greater thickness should certainly be placed on the outside, because it allows less damp to find its way into the cavity, such damp being quickly evaporated by the warmth of the dwelling. On the other hand, it has been pointed out that under such an arrangement the greater section of the wall must be permanently charged with damp, with disastrous results to any woodwork connected with it, and that if the cavity is to be dried by the warmth of the dwelling, this can only have the effect of drawing the damp inward, to the detriment of health and the destruction of wall paper. It is contended that these evils are avoided by placing the smaller section outward, where, if it is the sooner penetrated by damp, it is the sooner dried in warm weather. Some are in favor of ventilating the cavity for the purpose of keeping it dry, while others contend that this at once destroys the advantage of protection against rapid changes of temperature. It has often been found, however, that the cavity in a hollow wall, when it has no outlet, contains an accumulation of moisture, which gradually soaks through the inner section to the interior of the building. The cavity, if not ventilated at top and bottom, should have outlets for moisture at the bottom ; and some persons go so far as to require that a cement splay be formed at the bottom of the cavity to throw the accumulated moisture outward. It is certainly a good plan, where doors and windows occur, to introduce sheet lead at the head of the opening, the lead being turned up on the inside and down on the outside, so as to afford protection to plates and lintels.

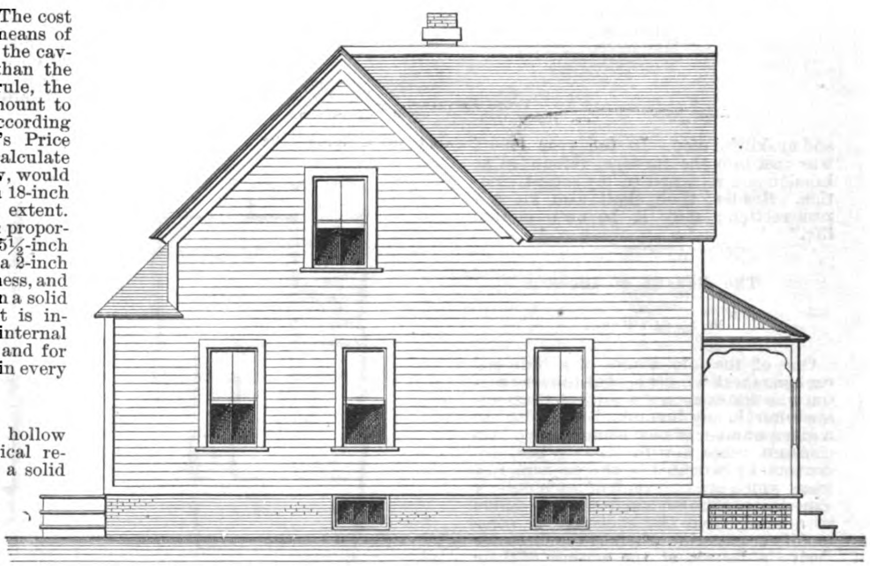
COST OF SOLID AND HOLLOW WALLS.

As to the difference in cost between solid and hollow walls in brick work, it has been calculated that where the inner and outer sections and the intermediate cavity are each of the same width, there is a saving of one-third in the number of



Side (Right) Elevation.

bricks and one-half in mortar. The cost of craps, or any other special means of bonding, must be added, and as the cavity is proportionately narrower than the least thickness of walling, as a rule, the bricks and water economized amount to less than the quantity stated. According to data furnished in "Laxton's Price Book" for the current year we calculate that a 15½-inch wall, built hollow, would only cost one-ninth less than an 18-inch solid wall of the same superficial extent. Thus the cost is about the same in proportion to the total thickness. The 15½-inch thickness comprises a 9-inch wall, a 2-inch cavity and a 4½-inch outer thickness, and it costs just 20 per cent. more than a solid 13½-inch wall. This extra cost is incurred for labor in keeping the internal cavity clear as the work proceeds and for laying one galvanized iron cramp in every three superficial feet of walling.



Side (Left) Elevation.

Variation in Cottage Design.—Elevations.—Scale, ⅛ Inch to the Foot.

THE HOLLOW WALL.

It may be doubted whether a hollow wall built thus presents a statical resistance to thrust equal to that of a solid wall of the same thickness and built of lighter materials so as to be of the same weight. It is difficult to believe that the hollow wall, bonded only with iron cramps, can behave exactly like a solid wall when subjected to thrust. Its resistance, however, is so nearly equal to that of a solid wall containing the same amount of brick work and of less thickness that the two have been pronounced to be of equal strength. A hollow wall with its greater section on the inside obviously opposes a better resistance to the thrust of a roof than it would if the narrower section were placed inward, because in the former case the principal weight is concentrated further away from the fulcrum of leverage. In designing solid walls to resist horizontal thrusts, most architects bear in mind that while the resistance due to weight varies directly as the total thickness of the wall, the resistance due to leverage varies only as the half thickness. For the sake of stability it is to be regretted that modern building owners will not allow us to follow the practice of the mediævalists in placing all set-offs on the outside.

For the exclusion of damp, it may well be asked whether stone can be made as impervious as vitrified brick or terra-cotta, although various processes, such as saturating the stone with drying linseed oil, have been recommended for the purpose. Nor can stone compare favorably with hollow bricks, either for lightness, strength or non-conductivity, whether employed in internal partitions or in the external walls of overhanging upper stories to half-timbered structures.

ORNAMENTAL PORTIONS.

In the ornamental parts of a building, the artistic advantages of stone over terra-cotta are sufficiently obvious. Carved work, coming direct from the hand of the artist, is necessarily superior to that which, though executed in the first instance by hand, is made conformable to the limitations of molded work. Yet, for a variety of reasons, brick work and terra-cotta have so largely superseded stone within recent years, that except in those localities where stone is produced, there has been a serious falling off in the activity of the mason's trade. There is no doubt that the change has been brought about mainly through the desire for economy. Building owners and speculators are not slow to observe that even plain ashlar in Portland stone costs on the average quite 40 per cent. more than stock brick work, while the cost of carved ornament as compared with terra cotta and molded brick is such as causes them to open their eyes. An architect has consequently little power of control in such matters. Where he can, however, it is for him to consider how far it is incumbent upon him in the interest of his art to give encouragement to the mason's handicraft. To this the architect may reply that the products of the kiln are far more durable than any stone, and that whereas it is open to us to know the history of any human production, the works of nature may contain hidden defects which only manifest themselves after a prolonged exposure to climatic influence. He may tell us also that, in addition to other advantages, brick and terra cotta are undeniably preferable to stone for purposes of fire-proof construction.

CONCRETE WALLS.

If brick has so largely superseded stone for economical reasons, it may be matter for surprise that concrete has not more largely supplanted brick. Probably it is no exaggeration to say that the cost of building in good Portland cement concrete is just half that of brick work, and the saving is greater still in buildings where there is much repetition of plan. To concrete walls we have no danger of open joints; we have masses which oppose an enduring resistance to thrusts, the resistance being augmented by 20 per cent. in weight over brick work. We have a substance which excludes damp more effectually than most kinds of stone, and which enables us to cope most satisfactorily with the modern increasing demand for rapid execution in building. We cannot urge much in favor of the external appearance of concrete walls, but with brick and terra cotta quoins, copings, window dressings and other accessories, there should be ample opportunity for the production of artistic effects. One of the objections raised against concrete buildings has been that they are difficult to pull down. This objection may commend it to the attention of those who will regard it rather as an advantage than otherwise.

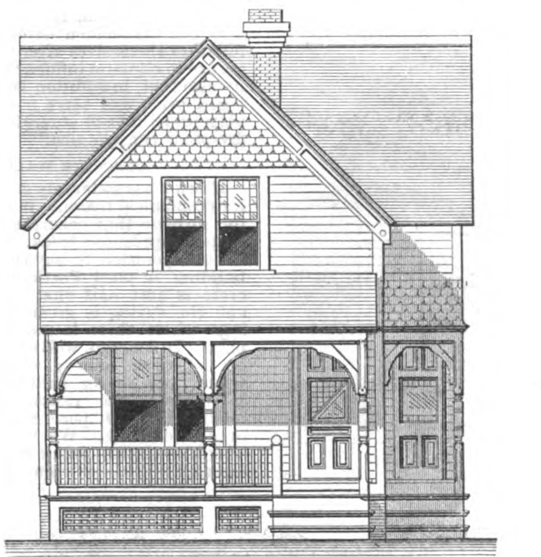
PROBABLY THE LONGEST inscription on any bell in the country, says the London *Daily News*, is that which J. S. Hadden takes from the bell in Glasgow Cathedral. It is dated 1790, and is as follows: "In the year of grace, 1594, Marcus Knox, a merchant in Glasgow, zealous for the interests of the Reformed religion, caused me to be fabricated in Holland for the use of his fellow-citizens in Glasgow, and placed me with solemnity in the tower of their cathedral. My function was announced by the impress on my bosom: 'Ye who hear me come to learn of holy doctrine'; and I was taught to proclaim the hours of unheeded time. One hundred and ninety-five years had sounded their awful warnings, when I was broken by the hands of inconsiderate and unskillful men. In the year 1790 I was cast into the furnace, refounded at London and returned to my sacred vocation. Reader, thou shalt also know a resurrection; may it be unto eternal life."

The Benefit of Ideas.

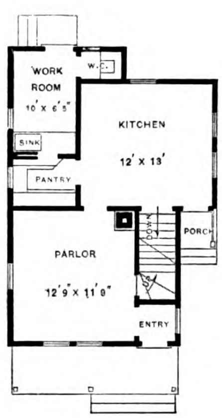
W. H. SAYWARD.

One of the advantages of a builders' exchange which must appeal to every person who thinks upon the subject of associated effort in any direction, is the fact that a given number of men being thrown into constant contact with each other, are continually benefited by the exchange of ideas which are the result of each other's experience. The exchange of ideas differs in a sense from the exchange of commodity or material, whereby the shrewder derive a benefit at the expense of their fellows, for in the exchange of ideas no one is the loser and all are gainers; and inasmuch as ideas are frequently the most valuable of a man's stock in trade it clearly demonstrates itself that a properly organized and conducted builders' exchange, where the members meet daily at a given hour, must continually confer upon its members an immense benefit in the acquirement of ideas, which is frequently inappreciated or entirely lost sight of.

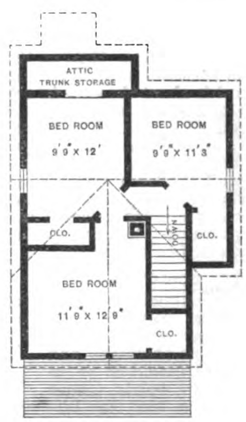
This aspect of a membership in an exchange is so seldom considered that the liberal education acquired from a constant contact with a man's fellow workers and competitors is attributed, very frequently, to entirely different causes. Builders are in the habit of attributing much of the wisdom of their calling, acquired by years of practice in the building business, to the experience gained in the structural and mechanical portions of their work, while it is undoubtedly the fact that the range of man's observation and wisdom is largely increased by absorbing the ideas which are the result of the experience of the many, and this observation is best obtained by association with men of kindred callings and pursuits, such as, for builders, is greatly facilitated by the daily communication made possible in an exchange. Too little attention is given to the consideration of this phase of any man's business life, from the fact that all are in the habit of arrogating to themselves the credit of the knowledge they have obtained as being the direct result of their own personal experience, while in reality probably a large proportion of the knowledge of the best methods of conducting their business has been acquired from the observation of the success or failure of their neighbor in similar undertakings. Builders are in the habit of thinking and saying, "I can run my business myself," and are thoroughly honest in the conviction of their ability to do so, but it must appear as a logical conclusion that daily personal interviews with others engaged in conducting the same line of business must present to them many ideas which would take a lifetime to evolve from the customs under which their individual knowledge of the business has been acquired. This, then, is one of the benefits conferred by a properly organized exchange upon its members, and the fact that the benefit is so little recognized and acknowledged in no sense detracts from the fact that such benefit does exist, and is as tangible as the dollars and cents return from the execution of a contract.



Front Elevation.



First Floor.



Second Floor.

Variation in Cottage Design.—Elevation.—Scale, 1/8 Inch to the Foot. Floor Plans.—Scale, 1-16 Inch to the Foot.

Slates and Slating.

The best and most substantial roof known to the architects at present, says a writer in an English exchange, is the slate roof, having at least a square pitch. Such a roof weighs considerably more than a shingle roof, and it also costs a little more, but it is many times more durable.

Some queer technical terms are used in connection with slating. Names are used to indicate the size of slate. One 10 x 13 inch being known as a double. Smaller slates are called small doubles. The next larger size are known as plantations; the next size is called viscountess. Sizes ranging from 8 x 12 inch to 10 x 15 inch are called ladies; from 10 x 20 inch are called countesses, up to 14 x 24 inch, which are known as princesses.

There are slates that run through all the titles of the nobility—marchioness, duchess, imperial—and then comes what is probably a poor man's slate, under the delicate title of rags. The noble titles are again resumed, and run queens, empresses, and end with princesses.

In American practice the slates run simply by inches, from 7 x 14 inch up to 17 x 24 inch. The thickness of slates ranges from 0.125 to 0.3215 inch, and their weight varies from 2 pounds to 4½ pounds per square foot. A square of slating is rated as any other roofing equal to 100 square feet, the gauge is the distance between the courses, while lap is counted as the distance which each slate overlaps the slate lengthwise next below but one.

Lap varies from 2 to 4 inches, and a standard lap is about 3 inches. As above stated, a good slate roof should have about square pitch, but slates should never be put upon a roof which pitches less than 1 foot in 4 feet. When it is desired to compute the surface of a slate when laid and the number of squares of slating, subtract the lap from the length of a slate which is taken as distance from nail hole to tail, and one-half the remainder will give length of surface exposed; this when multiplied by width of slate will give the surface required.

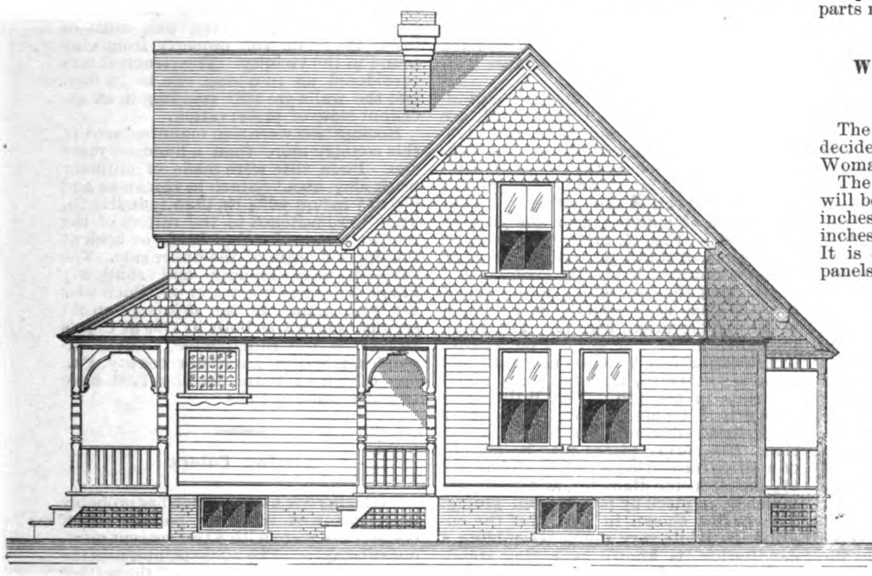
To ascertain the number of slates required for a square, divide 14,400, which is the area of one square in inches by the surface obtained above, and the quotient will give the number of slates required for one square. For an example take a slate 12 x 24 inch, taking a standard lap 3 inches, the number required for a square will be found by subtracting 3 from 24, equal to 21, and 21 divided by 2, equals 10½ inches, which multiplied by 12 equals 126 inches, 14,400 the total area to be covered, divided by 126 which equals the area of one slate, gives 114 29 inch slates required for the square.

Slate weighs from 165 pounds to 180 pounds per cubic foot, and, in consequence of lap, it requires an average of 2½ square feet of slate to make 1 inch of slating. When slate 0.125 inch thick is laid on laths, it weighs 4.75 pounds per cubic foot; when the same is laid on 1 inch boards, it weighs 6.75 pounds per cubic foot. Slate 0.1875 inch thick on laths and boards weighs 7 pounds and 9 pounds respectively. A 0.25 inch slate weighs 9.15 pounds and 11.25 pounds respectively. The thickest kind, gauging 0.3215 inch, weighs 11.15 pounds and 14.10 pounds on laths and boards.

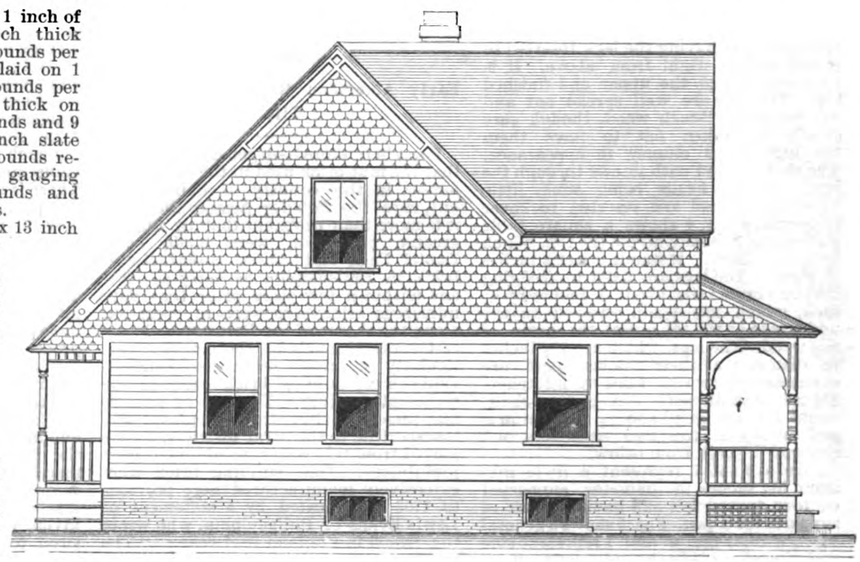
A slate roof composed of 6 x 13 inch slate weighs 1680 pounds per square, and requires 480 slates. A 10 x 20 inch slate weighs 6720 pounds, and requires 171 slates per square. A 12 x 24 inch slating requires 125 slates and weighs 4480 pounds.

Sculpture in Relief.

All works come under the denomination of "relievo" that have the figures or objects attached to a background. However slight this connection may be, says a foreign exchange, the mere fact of touching the background establishes the sculpture as belonging to this class of art. The groups in the metopes of the Parthenon are, as nearly as possible, entire statues. Portions of them are, in many instances, quite free and detached, but still in some parts they touch and are united with the ground, and thus, as a whole, they constitute legitimate relievi. The groups in the frieze of the same building, on the contrary, lie or are attached so closely to the ground that none of the parts exhibited project so far as to be entirely free from contact. Modern art phraseology has supplied distinctive terms to express the varieties and modifications of relievo; and we receive from the Italian nomenclature alto, for extremely high or projecting work, basso relievo for the treatment referred to in the frieze of the Parthenon, and mezzo for the class of relievo which is between the two. There are, however, some peculiar modes of treating basso-relievo which require to be noticed. In works of this class, in Egyptian sculpture, are some that have the representation sunk below the plane or face of the material. The object is modeled or carved not on but in the ground, almost as a relieved intaglio, there being no background; but the face or ground is left up in its original state. Thus no portion of the carved, or what would be called the relieved work, projects beyond the original surface to break the architectural profile. It is a mode of treatment that has its recommendations, and it might be introduced with great advantage under particular circumstances in interior decoration. There is another mode of execution, belonging also to the class of basso-relievo, which might be advantageously adopted where the light is insufficient for giving effect to prominent parts, or where it falls at a very obtuse angle upon the work. This is found chiefly in the compositions of Donatello. The relief is as low as in the Egyptian work before alluded to, but instead of the edges being rounded till the outline is softened to the ground, as in the case with the Egyptian execution, the outline is rather sharply defined against the background, this background being lowered, though very slightly, as in other works in relievo. From the extreme flatness of the execution this style of design is called by the Italian writers on art *stracciato*, which means smashed down or flattened. In these works the inner parts are little more than drawn, being incised or cut in sharply, with no projection even on the parts most prominent in nature.



Side (Right) Elevation.



Side (Left) Elevation.

Variation in Cottage Design.—Elevations.—Scale, ⅛ Inch to the Foot.

Wainscoting for the Woman's Building.

The following specifications have been decided upon for the wainscoting of the Woman's Building of the World's Fair:

The dimensions for the panels, which will be of two sizes, are for the first 20 inches square, and for the second 20 inches high by 3 feet 8 inches in width. It is desirable that the wood for these panels should harmonize in color, and for that reason holly, maple or other light woods of the same tone are preferred. The carving will be in low relief, and uncarved polished panels will be accepted. The designs will be conventional in style, but Italian Renaissance is preferred. This, however, is not obligatory.

The name of the artist and of the State of which the wood is native may appear in a small panel forming part of the design. It has been decided that the different States must procure their own designs, the time now being so short that the Board of Lady Managers cannot undertake to furnish them. It is also recommended that the art schools be invited to furnish designs.

In sending these designs, which must first be submitted to Miss Hayden, the architect of the Women's Building, indorsement from the State World's Fair Boards, or from the Lady Managers of the State, is required as to the ability of the designer to execute the same. An uncarved margin, of at least 2 inches, may be left around the edge of the panels. The designs must be sent in not later than June 15, 1892.

DESIGNS FOR WOOD TURNERS.

THERE ARE A GOOD many articles for household use which may be made from wood with the aid of a turning lathe in the hands of the average mechanic. About all that is necessary in the way of material is a supply of wood adapted to the purpose and a selection of designs. A correspondent recently contributed to one of our English exchanges a series of articles illustrated by a number of designs, a selection from which we take pleasure in presenting in this connection. It will be seen that they are of a varied character and afford good opportunity for the intelligent mechanic in turning out articles which are not only attractive as ornaments, but useful in the household.

Referring to the page of illustrations presented herewith, the first figure represents what may be termed an expanding hat rack. The end arms are about 14 inches long and 1⅝ inches thick, while the center ones are about 24 inches long. These are all halved up the center and crossed over each other, as indicated in Fig. 1 of the cuts. At the intersections are placed hat pegs, while a long stout screw is inserted through the arms and into the hat peg, thus screwing the parts together and yet allowing the frame to be expanded or contracted at pleasure. In Fig. 2 of the illustrations is shown an end view of this rack, which may be made larger by simply adding more of the longer arms.

In Fig. 3 of the illustrations is represented a flower stand supported by three legs. Near the floor is a shelf, while around the top of the stand is a gallery of turned spindles, which serves as a guard for the flower pot. It stands 3 feet high and has a top 11 inches in di ιmeter. The top is made in two parts, the under one having the legs inserted in it and wedged tight from above. It is then screwed to the upper and finished top. The legs are well spread out and are made of 2-inch wood, though care should be taken not to have them too heavy and clumsy in appearance. The shelf is fixed with screws through the legs, and the heads being sunk, little knobs are turned and inserted to cover the heads. Fig. 4 shows a square table measuring 16 inches across the top, which is ⅝ inch thick. It stands 2 feet 2 inches in hight. The legs are fixed by wedging into two cross rails about 2 inches by ¾ inch, which are again screwed to the under side of the top across the grain of the wood. The legs, which are 1½ inches in diameter at their thickest part, are connected in two portions by stretchers 1¼ inches in diameter. A narrow shelf, about 7 inches broad and ½ inch thick is laid on top of the two stretchers and screwed through from below.

Figs. 5, 6 and 7 represent a little inkstand 5¼ inches in diameter, supported on four turned feet and having a pair of supports for a pen. Fig. 5 shows a general view, while Figs. 6 and 7 represent side and plan views. In the side view one of the pen supports only is shown, the other being directly behind it. In the plan, Fig. 7, the four feet are indicated by the dotted lines, while the square hole for the ink bottle is cut through the top and a little bottom ⅛ inch thick is glued on the underside, as indicated in the elevation, Fig. 6. Perhaps one thing that wood turners are more often requested to make than anything else is a handle for some sort of tool. In Fig. 8 are shown a few forms of handles, partly octagonal and partly turned. These afford good subjects for imitation, and when the work is well done very attractive handles are produced. A wall shelf is illustrated in Figs. 9 and 10 of the accompanying illustrations, which show front and side views respectively. The shelf measures about 14 inches long by 18 inches wide, and is 1¼ inches thick. The corner posts are 1½ inches, the horizontal rails 1¼ inches thick, while the spindles are very slender. The spindle set at an angle and shown in the end view, Fig. 10, is intended to serve as a brace. The arrangement at the front under the shelf is intended to be repeated lower down at the back, between the back posts next the wall. The shelf is intended to be fixed in position by means of two brass wall plates.

Some very attractive designs for umbrella stands, made of turned wood, are shown in Figs. 11 and 13 of the cuts. These stands are fitted with a zinc pan, the edge of which is turned over sufficiently to catch on to and be supported by the round rail at the bottom. The arrangement of spindles near the ground, indicated in Fig. 11, gives the stand an appearance of stability, and at the same time necessitates a special arrangement of the lip of the pan, which must be cut away to clear each spindle, as indicated in the end elevation, Fig. 12. The stand indicated in Fig. 13 is of a larger size, measuring 2 feet 7 inches in length and 11 inches in width, and has three dividing rails in the top. The little circle shown is 5 inches outside diameter, 3 inches inside diameter and ¾ inch in section. The corner pieces may be cut out of a circle measuring 8 inches outside and 5½ inches inside diameter, and these are fastened in place by pinning and gluing. The device shown in Fig. 14 of the engravings, while very much resembling a candlestick, is known as a ring stand, and is useful for the toilet table. The rings are supposed to be placed on the little projecting pegs, the entire device being made about double the size indicated in the engraving.

Early American Brick and Roofing Tile.

It has heretofore been generally believed that the first brick used in the erection of houses in this country were imported, but, says the *Popular Science Monthly*, it is more than probable that by far the greater proportion were made here. Daniel Pegg and others manufactured brick in Philadelphia as early as 1685, and within a few years after that date numerous brickyards were in operation along the shores of the Delaware. Many residences throughout the country, particularly in certain sections of Pennsylvania, were built of brick early in the eighteenth century. The cost of importing these supplies from England and transporting to the rural districts, far removed from tide water, would have been prohibitory. That building brick were extensively manufactured here previous to 1753 is indicated by a statement of Lewis Evans of Philadelphia, who wrote to a friend in England that year: "The greatest vein of clay for brick and pottery begins near Trenton Falls and extends a mile or two in breadth on the Pennsylvania side of the river to Christine; then it crosses the river and goes by Salem. The whole world cannot afford better brick than our town is built of. Nor is the lime, which is mostly brought from White Marsh, inferior to that wherewith the old castles in Britain were formerly built."

When burned, as formerly, in "clamps," the brick formed their own kiln, piled on edge, a finger's breadth apart, to allow the heat to circulate between. Those which came in direct contact with the wood fire in the kiln were blackened and partially vitrified on the exposed ends; while the opposite extremities, which were farthest from the heat, were only partially burned, and consequently too soft for external use. The other brick in the kiln which were uniformly surrounded by heat came out red. To utilize all the brick produced, the black ends of the former were laid outward in the wall, thus combining utility with ornamentation. Many of the older houses were constructed in this manner. An old building on the Brandywine, near West Chester, erected in 1724, was built of brick made on the property from clay found in the vicinity. The structure was considered an imposing one in its day, and the walls are still standing in an excellent state of preservation.

Roofing tiles were also manufactured in this country more than a hundred years ago. Plain tiles were made of ordinary brick-clay, about ⅝-inch in thickness and 6½ to 7 inches wide by 13 to 14 in length. They were fastened to the rafters of the roof by means of a clay knob or hook at the upper margin of the under side. The surfaces were broadly and shallowly grooved to carry the water off. Such tiles are still found in the *débris* of an old smithy which was built in 1799 at Cope's Bridge on the Brandywine. Other examples, made in Lancaster county, Pa., one of which bears the date 1769, have recently come to light.

Glazing Colors.

"Glazing" is a term which has probably been borrowed from the potter's art of coating the ware with a transparent vitreous substance. The house painter uses the word "glaze" in speaking of the setting of window panes, and the word is used also by other trades when speaking of a finish that adds luster. Glassy, transparent, is the correct meaning; therefore, glazing colors are those possessing but little body or covering power, and which are employed when richness and brilliancy are desired. Body colors may be rendered transparent or partially so by using but little color to a large proportion of vehicle; but such glazing is of no value except to landscape painters, and not much to them. There is no difficulty in producing a perfect glazing coat when the painter knows how to prepare the foundation colors. The self-taught painter, supposing that all colors are used the same, may worry over his carmine or yellow lake and wonder why they will not cover, and he may give up in despair; but the regular vehicle painter, knowing what is demanded, proceeds with a glaze with as little concern as he would for a body color.

Any body color which is to be used as che color proper, says the *Canadian Architect and Builder*, should be fine, clean and laid on perfectly smooth. This being the practice in good shops, glazing is merely the extra work of laying two or more coats of transparent color. The glaze may be put on thin and but one coat given, which is practiced when it is desired to impart brilliancy to the under coat. Brilliant vermilion is produced by a thin glaze of carmine over vermilion, and the same method may be adopted with the yellow and green lakes. The common practice is to prepare the ground color so that it will closely match the tone of glazing color as it appears when mixed or "wet up," for every color is slightly deeper in tone when wet or mixed in oil or varnish; but the glazing colors are capable of a wider application, for they may be painted over grounds wholly opposite in color. Thus carmine may be glazed over lead color, black and also over white, yellow, pale green, verdigris, blue, purple, violet and yellow lake. Verdigris and ultramarine blue may be glazed over about the same range of colors, but when so used they are better adapted to narrow spaces, striping, ornamental and pictorial work.

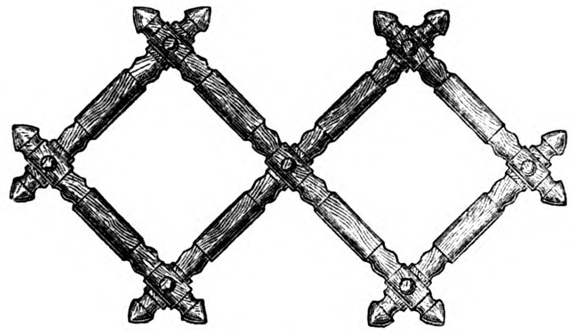


Fig. 1.

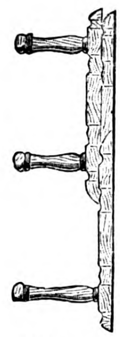


Fig. 2.

Fig. 3.

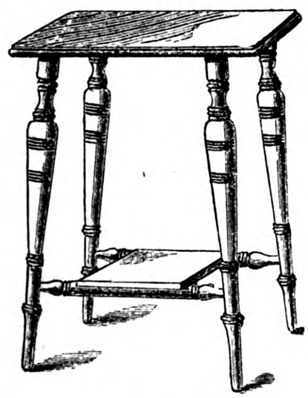


Fig. 4

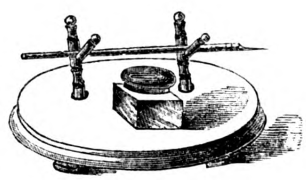


Fig. 5.

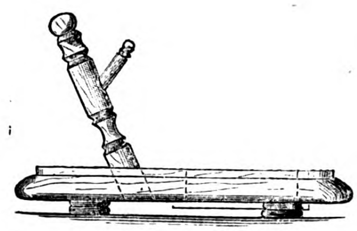


Fig. 6.

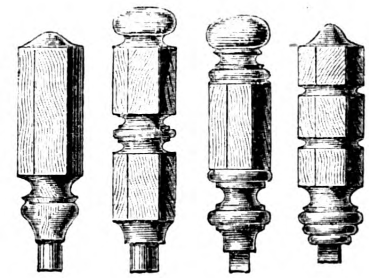


Fig. 8.

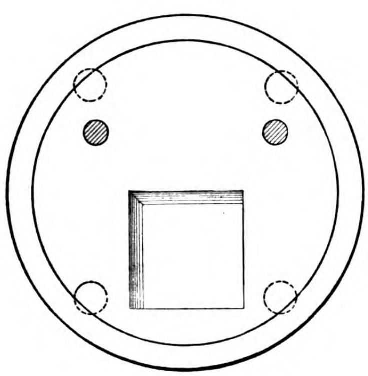


Fig. 7.

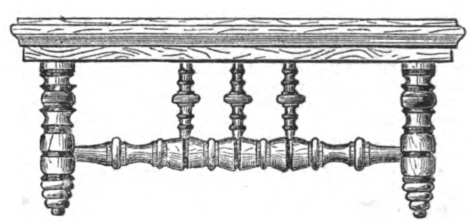


Fig. 9.

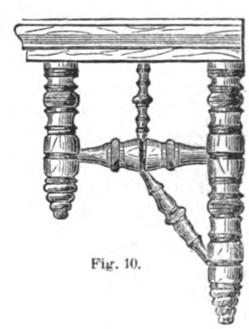


Fig. 10.

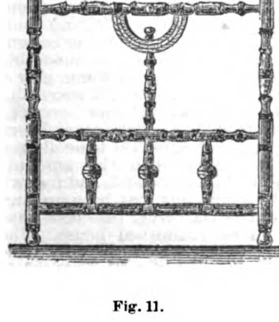


Fig. 11.

Fig. 12.

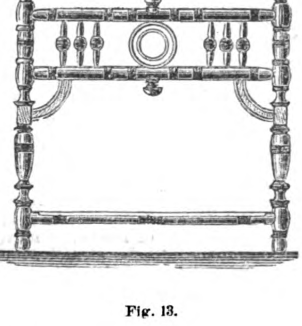


Fig. 13.

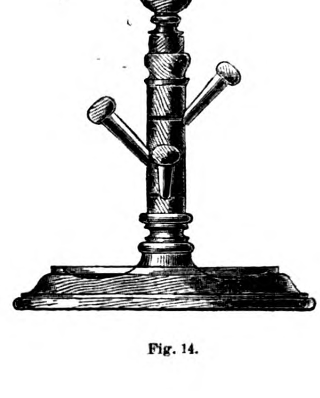


Fig. 14.

Designs for Wood Turners.

MASONRY AND STONE CUTTING.*

CORBEL ARCH UNDER SEMICIRCULAR PROJECTING TURRET.

LET THE PLAN of the turret, Fig. 191, be the arc A D B projecting beyond the face of the wall; let it be supported by a corbel arch formed as follows: In the vertical plane A C, perpendicular to the face of the wall, draw the arc of a circle, as shown in Fig. 192, on which the plane A C has been turned down. Let the delineated arc of circle be the section of a horizontal cylinder parallel to the wall; then the soffit of the corbel arch will be the portion of that horizontal cylinder comprised within its intersection with the vertical cylinder of the turret. The outline of the corbel arch will have for projections the lines A F E D E F B, A' F' E' D' E' F' B'. The elevation of that outline is constructed by observing that the generator of the soffit which passes through the point F'', Fig. 192, has for projections F'' F' and F F; and as the horizontal projection of this line meets the base A D B of the vertical cylinder in the point F, we have only to draw the elevation of that point in F' on the line F'' F'.

Points to be Noticed.—The radius A' C'' of the horizontal cylinder should be larger than the projection of the turret; otherwise the keystone would have a tendency to fall forward. Here the radius A' C'' is taken equal to O D, the radius of the arc A D B, so that the upper part of the face arch may be tangent to a circle inscribed therein of diameter A B, as it gives the neatest drawing. 2. Instead of adopting the section A' D'' of the horizontal cylinder we might take for outline of the corbel arch the curve projected on plan in A D B and on the elevation on the semicircle A' D' B'; then let this line be the directing line of a cylinder, the horizontal generator of which would slide along the outline of the face arch, and draw from this the section by the reverse process used for drawing the face arch.

The bed joints are taken through points found by dividing the semicircle A' D' B' in an odd number of parts and through the line Y Y' perpendicular to the wall. Each of these joint planes, such as F' Y' Y, cuts the cylindrical soffit of the arch along an elliptical line, F n f Y, of which any point, such as n, is found at the meeting of a generator of the horozontal cylinder with the plane of the joint; then the bed joint cuts the vertical cylinder from F' to K' on right-hand side of Fig. 193, and afterward it cuts the face of the wall from K' to G', where it meets the horizontal bed joint of the first course of stones.

The eye of the corbel arch has for joint line a curve, $a\ e\ d\ e\ b$, $a'\ e'\ d'\ e'\ b'$, formed by delineating the arc $a\ d\ b$ concentric with A D B, then taking the intersection of a vertical cylinder of base $a\ d\ b$ with the soffit of the arch. The surface of this joint should be normal to the soffit of the face arch. Therefore, if to cut that eye stone a prism be selected of which the side elevation on section is the rectangular V'' Z'' U'', then the point (ε, ε'') will have to be found where a normal C'' e'' to the soffit pierces the upper face of the eyestone. By a series of such points the intersection $\omega \lambda \varepsilon \delta \varepsilon \lambda \omega$ of the upper face by the surface of the joint will be delineated. In the same way the intersections $a'\ \phi'\omega'$ and $b\ \phi'\omega'$ of the joint with the back of the stone will be also delineated. The surface of that joint is a conoid.

Hence the bed joint (E e E' e') of an arch stone will stop at the point (e e') of the soffit of the arch; then cut the conoid of the eye along a line $e\ \lambda$, and then the upper face of the eye stone along the line λ L parallel to Y Y'. Turn down the plane of that joint, and you get the bed mold $H_2E_2e_2\lambda_2L_2h_2$. By similar operations we get the lower bed mold G_2K_2-F_2f_2. . . .

To cut the arch stone we require the intersection of the cylindrical soffit with the operation plane taken through the chord $e'\ f'$ perpendicular to the wall. This operation plane is turned down round its horizontal trace, which gives the mold $q\ e_3\ f_3\ p$. Then develop the cylindrical soffit of the arch, Fig. 194, taking the distances from A B equal to the arcs on Fig. 192, $Y_4\ f_4$ = A' f'', $Y_4\ e_4$ = A' e'', $F_4\ Y_4$ = A' F'', $Y_4\ E_4$ = A' E'', $Y_4\ D_4$ = A' D'', and the distances from the center line $Y_4\ D_4$ equal to the distances from center line on the plan, Fig. 191, and you will obtain on the development the curve of the face arch and the joint of the eye stone.

Now, to cut the arch stone shaded in Fig. 193, produce a stone prism, the base of which will be the polygon comprising the elevation; then place the upper and lower bed molds on their respective planes: place also the mold of the operation plane $e'\ f$, and guided by the curves delineated and guiding marks thereon, work the cylindrical soffit; the part above the line F'' F' will have to be worked with a square guided solely by the outline of the upper bed. Then squeeze on to the cylindrical part just worked the soffit mold, and delineate the curves $e\ \theta\ f$ and E F, Fig. 195, and guided by the last line and the upper edge H R of the stone work, the cylindrical face belonging to the turret. Lastly, after having worked progressively, the small plane L $\lambda\ \omega$, the mold of which is given on plan, Fig. 191, the entire outline of the conoid joint will be known, and can be worked with the help of a few guiding marks. I shall add that it will be safer to develop also the cylindrical face of the turret, and get thereby a face mold by which the curve E' F' will be exactly delineated; then afterward work the soffit, of which all the outlines will then be known.

I beg to say that I have given the construction of the eye joint as shown by a former instructor at the Paris Ecole Polytechnique, but that I consider his construction unpractical, especially when adplied to other joints parallel to the eye joint which have to be used in dividing the courses of stones of larger corbel arches supporting circular apses projecting 10 feet or 15 feet beyond the face of the wall. The construction I propose is as follows: Draw on Fig. 192 the section of a second cylinder with a radius 3 inches longer than that of the section of the soffit; then draw the intersection $a'\ z''\ b$ of that cylinder with the conoid forming the joint of the eye; take this latter curve as the base of a cylinder which will form the eye stone; draw the development of this cylinder, and place that development on the surface of the cylinder worked; then draw the curve of intersection of the base cylinder with the conoid joint. By means of the soffit mold draw the inner curve of that same joint, and work the conoid with a straight edge laid from one curve to the other through guiding marks. With my construction there will be no more small plane L $\lambda\ \omega$, but a conoid joint only about 3 inches wide, followed by a cylindrical surface easy to work.

In Fig. 196 is shown how a similar corbel arch can be used at the angle of two walls. Often a spherical niche is used for the same purpose, and gives an elegant solution of the problem.

In using these corbel arches considerable attention must be given to studying the equilibrium of forces, so as to make sure that the corbel arch and what it supports will not overbalance the weight of the main wall. In large corbel arches the key stone should always be connected by a metal tie rod to other parts of the building, or to reversed and inverted arches constructed on purpose.

* Continued from page 13, December issue.

Romanesque Windows.

In all periods of Romanesque we find occasionally two or more arched openings comprised under one inclosing arch. This arrangement is more frequent in belfry windows and triforium openings than elsewhere, says an English exchange, but occurs in ordinary windows, especially in secular buildings. The space intervening between the large arch and the two or more placed below it was, even as early as this, occasionally pierced with circles or other forms of opening. Here, then, we have the elements of the mullioned window before even the introduction of the pointed arch. In the same situations it gradually developed itself, step by step, during the Early Pointed period, so that we have in triforium arcades and in other positions a pretty full development of what is called plate tracery, before its use became frequent for ordinary windows. The case was pretty much the same both in France and England, though, on the whole, the love of placing two openings under one arch was greater in France; thus we see in the aisles at Chartres two plain lights under one arch, with a circular opening, and above, in the clearstory, a very large circle with somewhat complex subordinate piercings. The same is the case at Bourges, where three lights are often comprised under one arch, with a single circle in the head. The next great element which aided in producing tracery windows was the wheel, or other richly-pierced circular window. This, again, originated under the Romanesque style, as we may see at Barfreston and elsewhere. It is, in fact, a very close approach to tracery, and when placed in the space between comprising and comprised arches it almost completes the change. All that is wanted is the piercing of the intervening spaces in forms whose outlines are parallel to the main piercings, so as to form what Professor Willis calls bar tracery. It is somewhat remarkable that the French should have made the window over the doorway the most important one in their churches, while the English have made that over the high altar, which had frequently a sculptured reredos.

The Scaffolding Up for Twenty Years.

A man who is frequently called the meanest man in Connecticut, says a recent issue of one of the New York dailies, lives in the southeastern part of that State. A Connecticut statute fixes the rate of taxes on an unfinished house at a lower figure than that on buildings which are finished. This particular man began to build his house about 20 years ago. He put the roof on and made it ready for occupancy in every other way, but did not take the scaffolding down. When the tax collector came around the owner of the place calmly handed over the money which was due under the assumption that the house was still in the course of construction. The collector saw the scaffolding and, after a little argument, decided to be content with the sum. When he made his visit the next year the scaffolding, now a little weather beaten, was still about the house. The owner again handed over the sum he had paid the previous year. There was objection to this, but the tax collector finally went away with the amount. That established a precedent, and for two decades the scaffolding has been up, and for two decades the owner has been paying taxes on an unfinished house. The framework, which was to be only temporary, has grown black with age, and is pointed out to every stranger by the neighbors. "The meanest man in Connecticut" doesn't mind his bad reputation" but thriftily counts up how much the scaffolding has saved him.

Fig. 192

Fig. 193

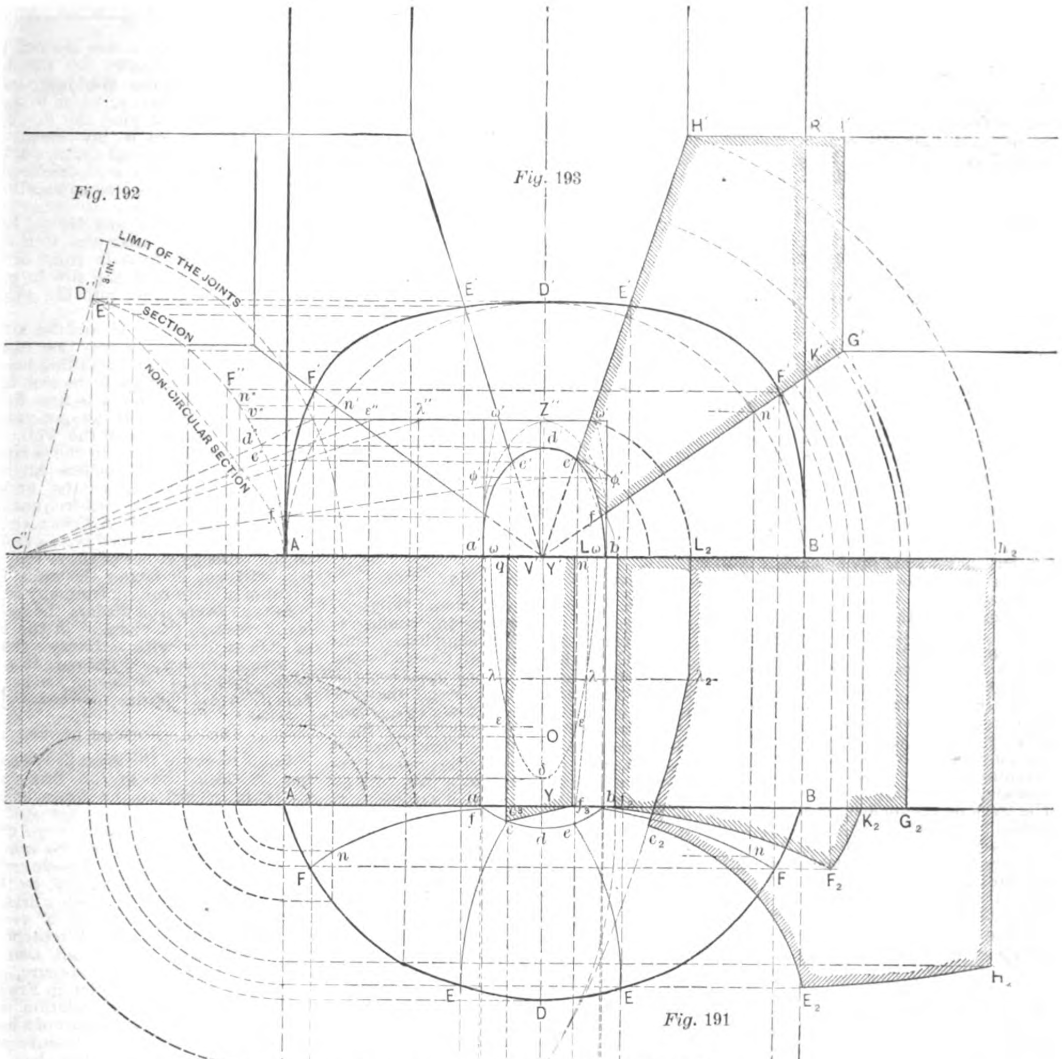


Fig. 191

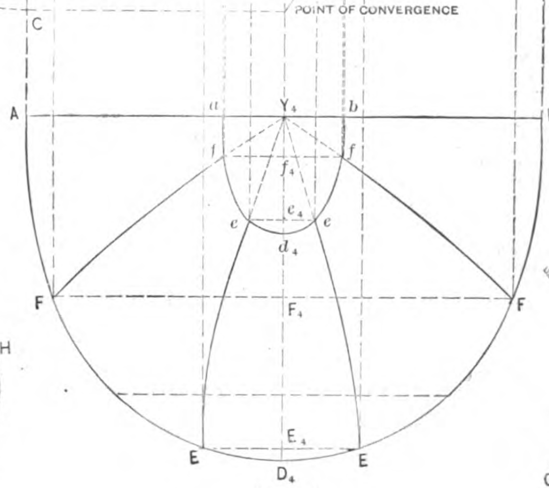


Fig. 194

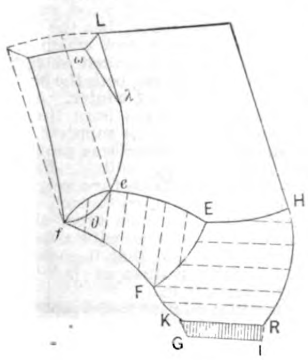


Fig. 195.

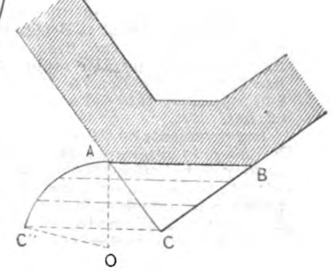


Fig. 196.

Masonry and Stone Cutting.—Figs. 191 to 196 Inclusive.

SAFER METHODS OF BUILDING CONSTRUCTION.

C. J. H. WOODBURY, vice-president of the Boston Manufacturers' Mutual Fire Insurance Company, delivered an address a short time since before the Franklin Institute of Philadelphia, taking for his subject "Conflagrations in Cities." The speaker referred to the manner in which cities in all ages have suffered from fire, and described in an entertaining manner the methods of fighting flames from the days of Sodom and Gomorrah down to the present time. He discussed the question of private and city water works, and dwelt at some length upon the safer methods of building construction. In regard to the latter point the speaker, among other things, said:

While the origin of most fires is due to causes which are in the control of owners or occupants, the destructive extent of nearly half of the fires is due to faulty methods of construction, which might have been prevented in greater or less degree by the adoption of methods not involving excessive expense or unusual appearances in construction. These methods of safer construction are matters of common knowledge among competent architects, but they should not be held at fault for mistakes due to the avarice or prejudice of owners.

Methods of building construction, with a view to the application of methods of the greatest safety, need not interfere with the free exercise of the highest degree of taste. An ugly building is not necessarily a substantial one, any more than a homely person is necessarily good —although the greater portion of humanity willingly find comfort in the proverb concerning the Flemish beauty and the accompanying intrinsic merit.

The work of the underwriter is largely dependent on that of the architect, because every variety of building material and every method of construction, irrespective of the use to which the building is put, is more or less destructible by fire; therefore, the work of the architect must be judged in a certain measure by the methods of the underwriter.

TYPES OF CONSTRUCTION.

There are certain types of construction of commercial and manufacturing buildings in cities which experience has shown to be peculiarly adapted to resist destruction by fire, and a general consideration will be given to some of these methods.

If a building could be so constructed that its contents could burn and destroy the interior without endangering the neighboring buildings, it could never cause a conflagration. A fire-proof building, however, is a commercial impossibility, because if one be constructed so as to withstand the destruction of its contents, it would be good for little else, and the cost would be prohibitive.

When William A. Green was chief of the Boston fire department, he received a letter from an official at Berlin asking for a description of the fire-proof public buildings at Boston. He replied that they had but one, the Beacon Hill Reservoir, and sometimes they did not feel quite sure of that.

Improvements on the score of safety to buildings in cities are feasible only so far as they do not offend the present methods of taste in design, or interfere with the purposes for which such buildings are to be used; and all modifications must be made without undue cost, and under such conditions that any additional expense will prove a good investment in the diminution of the fire hazard, as measured by a reduction in the rates of insurance.

Any other method of treating the question in the attempt to direct the construction of buildings, regardless of all considerations except the reduction of the fire hazard, would be comparable to the answer of Brunel, the civil engineer, when he told the parliamentary commission that he believed the purpose of the Creator in making rivers was to feed canals.

The methods of safe and solid construction are, however, less expensive than the hollowness of alleged decorations, whose only definite characteristic consists in their perfect fitnesss as fire traps.

These questions of safe construction naturally resolve into two classes—the one including measures to prevent fires communicating from one building to another, and the other including measures to obstruct a fire from extending throughout the various stories of a building.

Both of these conditions may be idealities as to their complete fulfillment, but it has been found feasible to reach favorable results in these directions.

Any building ordinances which pertain solely to the entire construction of new buildings will be very slow in their application, but in most instances changes can be readily introduced which would materially diminish both classes of hazard. Any measures which could do away with the conflagration hazard in cities would reduce the fire loss very materially.

REDUCING LIABILITY TO FIRE.

The first consideration should be given to the means of reducing the conflagration hazard. This is accomplished simply by the maintenance of the walls, the protection of all necessary openings, the abolition of wood cornices and the protection of the roof, all of which precautions have been taken in most of the first-class buildings in cities. Brick division walls, heavy enough to withstand the excessive stresses incident to a fire, will be uninjured by flames which cripple iron and decrepitate stone. It is preferable that all walls should extend above the roofs; but where that cannot be done the cornices should be of terra cotta, stone or metal.

All openings in side or rear walls which would become a source of danger in case the adjacent buildings were on fire should be provided with fire-proof doors or shutters, which should always be closed at night.

These doors or shutters should be made of two thicknesses of matched boards, of thoroughly seasoned stock, laid at right angles to each other and covered with sheets of tinned iron laid with locked joints similar to the method generally used in tin roofing. The hangings, whether trucks or hinges, should be secured directly to the wall and fastened to the door or shutter by carriage bolts, not screws.

The butts for outside shutters should be made of galvanized iron, or some other material which would not allow the hinge to stick by rust. In division walls of large buildings these doors should be double, one door at each side of the wall.

Doors made after such a method have resisted the most severe exposure in burning buildings; while it is known that either wrought or cast iron doors cannot withstand the heat of any considerable fire.

TINNED FIRE DOORS

The occupant of a large building in Boston asked advice upon the best methods to render the buildings safer, and among other matters it was suggested that tinned fire doors should be placed at the openings in the division walls in place of the iron doors.

He replied that he would most gladly make the change, were it not that the conditions of the lease make it necessary that iron doors should be kept at these openings. But on being asked if any clause of the lease forbade the addition of tinned fire doors in front of the iron doors, he replied in the negative, and afterward had some excellent fire doors made. They were, however, hung on hinges secured to the furring and not to the brick wall.

In a short time a fire started in the building, and, passing up the hollow spaces between the studding and the wall, caused the whole finish to separate from the wall, carrying the fire door to the cellar, where it lay among some burning anthracite coal for a week, and was then removed to a certain insurance office, where it served as an excellent example for many years.

The iron fire-proof door did not long remain in position after the tinned door was pulled away from in front of it, but yielded and allowed the fire to proceed through the opening into the adjoining building.

The floor supports should be attached to the walls in such a way that the walls shall not be injured by falling beams or girders. The preferable means for accomplishing this result is first to place the beams so they will not penetrate too near to the outer face of the wall. They should then be secured to the walls by a wall plate, with a tongue entering a transverse groove across the underside of the beam, or by the cast-iron anchorage box invented by Henry A. Goetz, the well-known architect. Wood beams anchored to the walls by either of these two methods will not endanger the walls in the event of a beam falling from any cause.

In the case of iron girders the problem is different, as the changes in the length of such girders with ordinary variations in temperature would not permit a rigid anchorage. This expansion has been sufficient in case of fire to produce serious results.

THE QUESTION OF ROOFS.

In his report of the great fire of November 28, 1889, the Boston fire marshal states in regard to the Ames building, which was among those destroyed, that the walls of the building were thrown out by the expansion of the iron roof. Allegations have also been made concerning destructive results caused by the expansion of iron girders at other fires.

The question of roofs is a very important one, both in regard to their yielding from a fire inside, and also their ignition from outside exposure. The statement made by Benjamin Franklin, that "next to a good foundation, a good roof is the most important part of a house," is even more applicable to-day, as the crowded condition of cities has given other functions to roofs than merely those of shelter.

The most substantial roofs for commercial buildings are those constructed of plank, and nearly flat, having a slope of ½ inch to the foot either toward the center or the edges. When the various courses of roof covering comprise a solid thickness of 3 inches of wood without any intervening air space, then the building is covered with a roof which will protect the upper story against extremes of temperature—resisting both the heat of summer and the cold of winter. A fire of the contents would not burn through such a roof so long as the supports were intact, and if the outside was protected by any roof coverings suitable for flat roofs, it would be difficult for a neighboring fire to inflict any injury on such a roof. It is important that such a roof should have an opening covered with a door as thick as the roof, and that it should be provided with a permanent ladder or stairway leading to it.

The questions relative to the protection of buildings against fires originating in them involve matters of detail pertaining to methods of interior construction and occupation, which in themselves would exceed the limits of the allotted time; but, at the risk of making some digressions not strictly bearing upon conflagrations except in that relation which one fire always bears to another, the importance of the subject is offered as an excuse for referring to some of the salient features of interior defense against fires.

(*To be continued.*)

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WITH WHICH IS INCORPORATED

The Builders' Exchange.

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Indications.

One of the best possible indications that the workmen in the building trades are beginning to recognize that the National Association of Builders is favorable instead of antagonistic to their best interests is the fact that the secretary has of late been receiving inquiries from employees contemplating the establishment of unions, and who are desirous of receiving advice as to rules of government, &c., which shall best secure efficiency and permanency to their organization. The secretary has taken particular pains to explain that in seeking to improve the conditions which obtain in the building business the National Association is striving for the welfare of the whole, and is, therefore, working in the interest of the workman quite as much as in the interest of the employer. The National Association knows no individual, and hence cannot legislate in favor of any one employer, nor in favor of any one workman, but seeks through consideration and discussion for lines of action to recommend which shall best conserve the welfare of the whole. The form of arbitration advocated, for instance, recommends itself to the workmen at once, but as the inquiries are received from localities where there are no organizations of employers its application cannot be successfully secured until the employers themselves recognize the value of united action on their own part.

Postal Telegraph Building.

Within a comparatively short time the lower portion of New York will be ornamented with what is said will be one of the tallest and most imposing fire-proof structures of the metropolis. The building is about being erected on the northwest corner of Broadway and Murray street for the Postal Telegraph Cable Company. The new structure will be 12 stories high, rising 165 feet from the curb line, and will cost $700,000. It will be L-shaped, fronting 70 feet 5 inches on Broadway and 155 feet on Murray street. The depth on the latter street will be 100 feet, and the width of the L 50 feet. The building will be constructed of brick, stone and iron, the first four stories being of light colored stone or granite and the upper stories of brick trimmed with terra cotta. The construction will be according to what is known as the "Chicago plan," but in a somewhat modified form. The two lower stories will be each 15 feet high and each of the other stories except the top one, 11 feet in hight. The top floor will be used as an operating room for the telegraphers, and will be 18 feet high. The Broadway entrance will be 30 feet wide and a trifle over 40 feet high, extending to the middle of the third story. The top of the entrance will be square, but the vestibule will be semicircular in shape. The frame of the main stairway will be of iron and the steps of marble. They will ascend in a straight flight to the second story, thence winding around the elevator. The floors will be of steel beams filled in with flat arches of terra cotta. All the partitions will be of terra cotta and the flooring will have a foundation of concrete, over which will be a layer of light-colored Nova Scotia cement. There will be large skylights in the roof over the operating room, and the roof will terminate in a prominent overhanging Roman cornice of molded and decorated copper, supported by carved copper brackets, carrying lions' heads, &c , in relief. The building will be lighted by electricity and gas and heated by steam. The plans have been prepared by George E. Harding and W. Tyson Gooch. It is expected to have the building completed in less than a year.

Labor Outlook in Chicago.

The annual labor agitation in Chicago is now in active progress. The opening of the building season is close at hand, and the labor leaders would find their occupation gone if they were to permit the resumption of outdoor work to take place without some manifestation of their ability to create trouble. For some time meetings have been held nightly in nearly every branch of trade connected with building construction. It is reported that labor agitators from Eastern cities are on the ground working zealously to foment uneasiness and discontent in quarters which have been hitherto comparatively free from disturbances Last year's strikes were almost without exception unproductive of benefit to workingmen, but they do not seem disposed to learn the lesson which that unpleasant experience should have taught them. The bricklayers are almost alone in exercising full control in their branch of trade. The carpenters have a strong organization, but they have not been able to wield the power of which their leaders fondly dream. They effected a compromise with part of the contractors and builders last year, but it was not closely adhered to, and the union had but little influence when the season was well advanced. The iron workers, stonecutters and cabinet makers were badly worsted in their contest for shorter hours and higher wages.

Labor Well Organized.

All this ground is apparently to be fought over again. The carpenters are thoroughly organized and well provided with funds, and mean to establish a uniform regulation of hours and wages without regard to the damage which may be done to great business interests of the city. The iron workers and cabinet makers are anxious to try the contest over again, and claim that they are better organized than before. The journeymen plumbers are also demanding higher wages, as their two year agreement has expired, and threaten to strike if their demands are not conceded. The chances seem strongly in favor of a condition of complete chaos among the building interests of Chicago by May 1 if wise counsels do not prevail in the meantime in the conferences which are to take take place between committees of employers and workingmen.

Position of Contractors and Builders.

A general strike this spring of any great duration would be a most unfortunate thing for Chicago. Very important undertakings are on foot in preparation for the World's Fair, outside of the work now in progress on the World's Fair grounds. It is not likely that any interference with or hindrance to the construction of the buildings will be permitted, as the fair managers cannot afford to have the completion of that work in time for the formal opening endangered. But throughout the city itself there is much to be done by private enterprise. It may be taken for granted that no trifles will be allowed to stand in the way of an adjustment of differences, but, on the other hand, it is doubtful whether contractors and builders will be willing to concede what may cripple them in their operations in the years to follow. There is a point at which exasperation sets in, when unreasonable demands are pressed, and then a man stands on his manhood whether he be a workingman or only an employer.

The Contractor and the Material Dealer.

The building business is one of the very few in which the buyer, upon whom the dealers in material principally depend for the sale of their wares, receives no discount from the standard price at which the infrequent buyer can purchase the smallest quantity. In many parts of the country the man who needs a bunch of shingles to patch his roof can buy the same of any dealer just as cheap as the builder who buys 10,000 bunches every year. In other lines of business there is a wholesale and a retail price, and the wholesaler recognizes the fact that the difference between the price at which he buys and the price at which he sells is the retailer's only means of livelihood. He, therefore, sells his goods accordingly. The contractor and builder stands in the same relationship to the dealer in building material that the retailer does to the wholesaler in any other line of business. In a certain sense the builder or contractor buys for consumption, but he is a consumer only in so far as the material bought of the dealer enters into the construction of the article which the contractor has for sale—that is, the completed building. If the material dealer sells directly to the owner at the figure for which he would sell the same material to the contractor, he is simply joining with an occasional purchaser to deprive the regular buyer of his margin of profit, for in any event the goods would have been sold just the same, being requisites in the construction of the building. If the dealer had refused to sell the owner (the actual consumer) except at a retail price, the owner would have had no inducement to buy of the dealer, as that price would be the same as that at which the contractor who was to construct the building would have furnished the same material; the dealer then would have received his price from the contractor; the contractor would have made his profit, and the owner would have secured his building at no greater proportionate cost than the consumer in any other line of business.

Permanent Art Institute.

The contract for the construction of the proposed permanent art institute, on the lake front in Chicago, Ill., was awarded a few weeks since for a consideration approximating $325,000. This amount, however, does not cover the entire work, as before the structure is completed its estimated cost will reach something like $800,000. The building will be fire proof, and is designed to become the permanent home for the protection and exhibition of the paintings and statuary which may be accummulated by the Art Institute. The building will be 320 feet on Michigan avenue, with a depth of 175 feet. The plan of the structure is that of a parallelogram. The building will be constructed of Bedford limestone, with a base of granite extending to the water table. The lower portion will be rusticated as far as the top of the first floor, above which will be a plain band of chiseled stone. Surmounting this, in turn, will be plain panels filled with statuary, while above these will be an intaglio and richly decorated cornice. The roof will be of copper and glass, and present an artistic appearance. The plans provide for the use of hollow brick walls, overlaid with 1¼-inch planks, covered with canvas, which will allow heavy pictures to be secured to the walls wherever desired. The building will be lighted by electricity and all modern improvements employed. The design was prepared by Architects Shepley, Rutan & Coolidge. The contractors are under heavy bonds to have the building ready for occupancy by the 1st of May of next year.

An Aspect of Employers' Associations.

A particularly gratifying condition of affairs to those working in the interest of organization in the building trades is shown in the establishment of a builders' exchange at Toledo, Ohio. The workmen, who have generally been far ahead of the employers in appreciating the value of organization, have expressed themselves as decidedly in favor of organization on the part of the employers, on the ground that by this means united action can be secured which will control all workmen and all employers, or such proportion of each as shall be sufficient to bring about mutually satisfactory conditions through preponderence of influence and numbers. The union and the exchange are seeking to secure the greatest good to the greatest number, and such good is best secured by the united or joint action of all parties concerned.

Necessity for Sustained Effort.

WILLIAM H. SAYWARD.

One of the conditions most frequently met with in advocating the value of association as a solution for questions that can only be answered by the combined voice of those affected is that of apathy. This is particularly true of builders as a class and is most likely to occur in localities where an unsuccessful effort at association has been made. Certain abuses, for instance, have existed in a given locality until they have become intolerable, and certain persons affected thereby have met together and formed an association for the eradication of these abuses. The association has been founded upon principles which are just and equitable and which are calculated to overcome and correct the evils aimed at. The enthusiasm of the members runs high, and in that enthusiasm the fact may be overlooked that persistent personal effort is necessary to the application of the principles advocated. The fact that the actual working members of any association are few, and that they are unable to immediately accomplish the change desired allows the enthusiasm of the greater number to cool, creating in its place a feeling of apathy on the part of the entire portion of the community affected, with possibly a few exceptions. In all efforts for the reformation of established customs a certain amount of enthusiasm is necessary and the mark must, necessarily also, be placed high, but simply because the gathering together of a class of men into an association and the promulgation of just principles does not bring about immediately and entirely the desired reform, is no cause for discouragement or apathy.

CORRECTING ABUSES.

The failure of abuses to immediately correct themselves upon the announcement that an association has been formed for their correction is no cause for surprise or disappointment, but is too often the cause of complete oversight of the little things which indicate that the leaven is working. The leaven in this case is the few who in their earnest efforts at correction refuse to submit to the abuses in question, and who are often thereby placed at a disadvantage to those equally interested with themselves. Because every architect will not use a certain form of contract, and all workmen will not accept certain conditions of labor immediately upon the same being announced by an association of builders, is no sign that ultimate compliance could not be obtained. When a builder is awarded a contract he sticks to it until the end under every adverse condition that may arise, for he knows that persistence brings the result for which he is striving. At a certain stage in the work he receives part of the result and at another stage he receives more of the result, and so on until the end, when he receives full payment. It is exactly the same with an effort to bring about better conditions for the transaction of his business, and the result is quite as necessary to his welfare and success as that of his completed contract. If the reputable builders of a community associate themselves together for the purpose of securing the conduct of their business upon a more fair and equitable basis, and apply the same steady, persistent effort that they do to the execution of their contracts at a certain stage in the work, they will receive the result, first, in the form of a recognition of their efforts; at the next stage, in the compliance of a few with the changes desired, and so on until the reform has become general and the full payment is gained in the establishment of new customs which greatly facilitate the transaction of their business. The builder cannot, for instance, secure the establishment of a desirable form of contract in general use unless he refuses to sign any other, and so long as he makes no effort to have his brother builders refuse to sign any other, so long will he be obliged to submit to conditions which are irksome.

METHODS OF CONDUCTING BUSINESS.

There are cities in the United States to-day in which the builder conducts his business in a manner both unsatisfactory and unprofitable. He submits to conditions which would not be tolerated in any other vocation, and resorts to methods to secure business which are unjust to himself and which cut down not only his profits, but the dignity of his calling. He is apathetic so far as any actual well-directed attempt at the correction of existing evil practices is concerned, for lack of determined and sustained effort on his own part as an integral part of the community affected. Every builder is willing to work for the securing of a contract; he does it in the regular course of his business, and he should be equally willing to work for the securing of conditions and practices which would facilitate its transaction and enable him to carry it on at a greater profit. That work which will bring about the result so manifestly to be desired, and which up to the present time has proven most efficient, is association, backed up by well-directed, persistent and untiring effort on the part of each individual member. This effort need not in the least degree conflict or interfere with business, but can be made a part of its transaction. The only motive for departing from the rules and principles laid down by the association would be the securing of a contract at an unfair advantage over some other member of the association, and so long as the association as such maintained its principles the work of improvement would go on. It should be remembered, in considering the actual results of associated effort, that the customs attacked are the outgrowth of many years of neglect, and must not be expected to transform themselves. They will only yield to years of persistent and sustained effort at their transformation.

Can a Woman Drive a Nail?

When Mrs. Palmer drives the last nail in the Women's Building of the World's Fair all the World will stand and listen. —*Chicago Paper.*

Now, what is offered on the speed with which Mrs. Palmer drives the nail? Two to one on the nail. Ten to two that Mrs. Palmer hits the building five times for once she hits the nail. One hundred to 25 that she hits her fingers if the nail isn't started for her. Even money that she gets the hammer tangled in the ribbons of her bonnet. Eight to ten that she shuts her eyes for the first blow. Five to four that she wrinkles her nose after the first 25 blows with the hammer. Even money that the world will have to take a recess for lunch before the nail is driven, providing that Mrs. Palmer doesn't begin to hammer at it before 10 o'clock. Even money that after Mrs. Palmer works eight hours the nail will have to be turned over to a carpenter. Ten to one that the nail is leaning to the southwest when Mrs. Palmer quits.—*Detroit News.*

RICHARD SUNDELL, a young Swedish sculptor, has made what is supposed to be a great invention. He has for some time experimented with plaster-of-paris to prepare it for use as a building material. He means to use large chunks of plaster-of-paris instead of brick or stone, and has without doubt solved the problem by making the plaster-of-paris as hard and durable as stone, and causing a house constructed of this material to look as though it were a palace of marble. A house built of plaster-of-paris has the advantage of being cool in summer time and warm during the winter.

MODERN THEATER CONSTRUCTION.

NO ENTERPRISING and progressive carpenter and builder can fail to find both interest and value in a study of the methods employed in different parts of the world in the construction of buildings designed for similar purposes. While it must be acknowledged that in a very general way the results obtained are practically the same in each case, there is, however, a sufficient variety in the matter of details to render the subject worthy of careful consideration. An excellent means of comparing the construction of a fairly typical modern theater building put up in this country with one now in process of erection in London, England, and representing English building practice, is afforded by the engravings which we present in this issue of the paper. The American structure is of such a character as to be readily adapted for erection, on a smaller scale if necessary, in other than large cities and towns, and for this reason is likely to command more than passing attention on the part of those of our readers who, in the immediate past, have made inquiries with regard to modern theater construction.

The picture which forms the subject of our supplement plate represents an exterior view of Edward Harrigan's Theater, erected in 1890 on West Thirty-fifth street, near Sixth avenue, this city. The building, which is located on a lot 75 x 100 feet in size, was erected from plans prepared by Francis H. Kimball, architect, of 40 Broadway, New York City, and was put up in accordance with the then existing building law as it applied to theaters. From an examination of the plan views, Figs. 1 and 2, it will be observed that there is a court 8 feet wide on each side of the auditorium and extending from the proscenium wall to the street. Leading into these courts are a number of iron staircases. There are 18 exits from the auditorium and four from the stage. There are also two escapes from the fly galleries of the stage. The proscenium arch is 28 x 26 feet and a solid brick wall separates the stage from the auditorium. The stage is the full width of the theater and has a depth of 31 feet, the claim being made that it is entirely fire proof. The auditorium is 56 feet wide and 53 feet from the curtain line to the lobby wall. A system of automatic sprinklers is spread entirely over the space occupied by the stage. A sectional view of the building, taken on the line A B of Fig. 2, is presented in Fig. 3 of the illustrations.

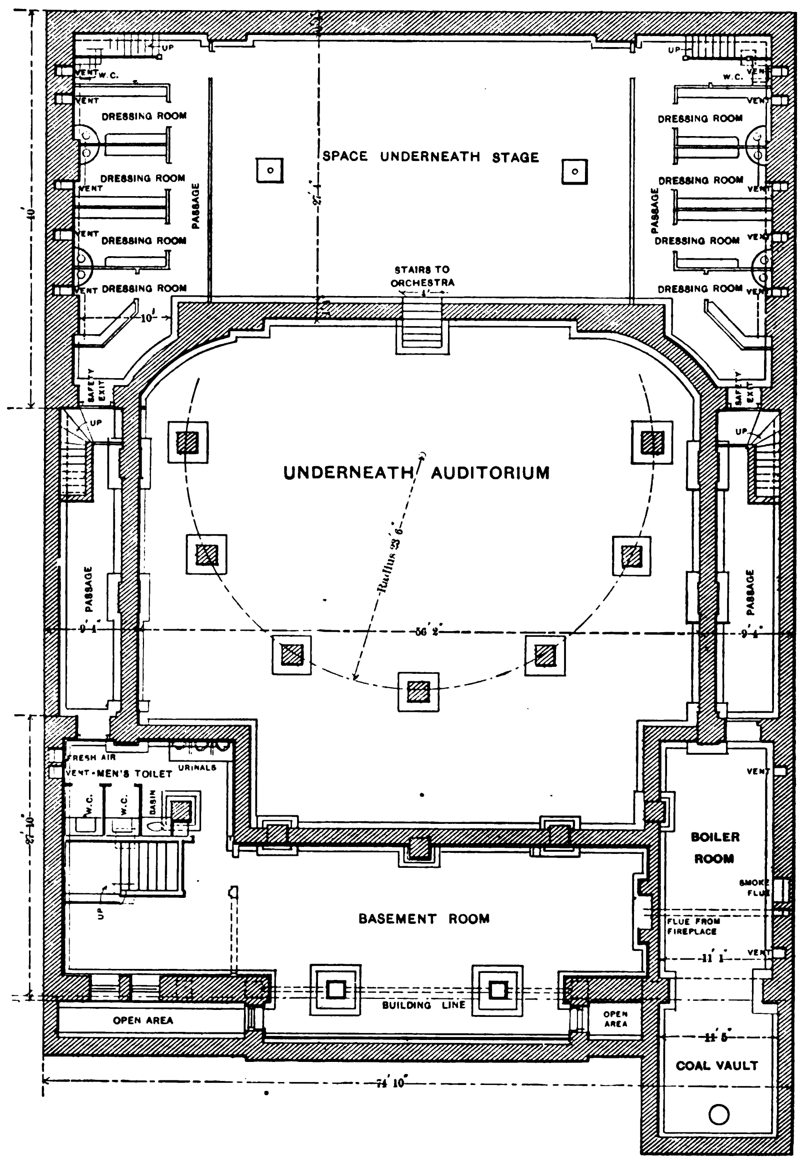


Fig. 1.—Basement Plan of Harrigan's Theater—Scale, 1-16 Inch to the Foot.

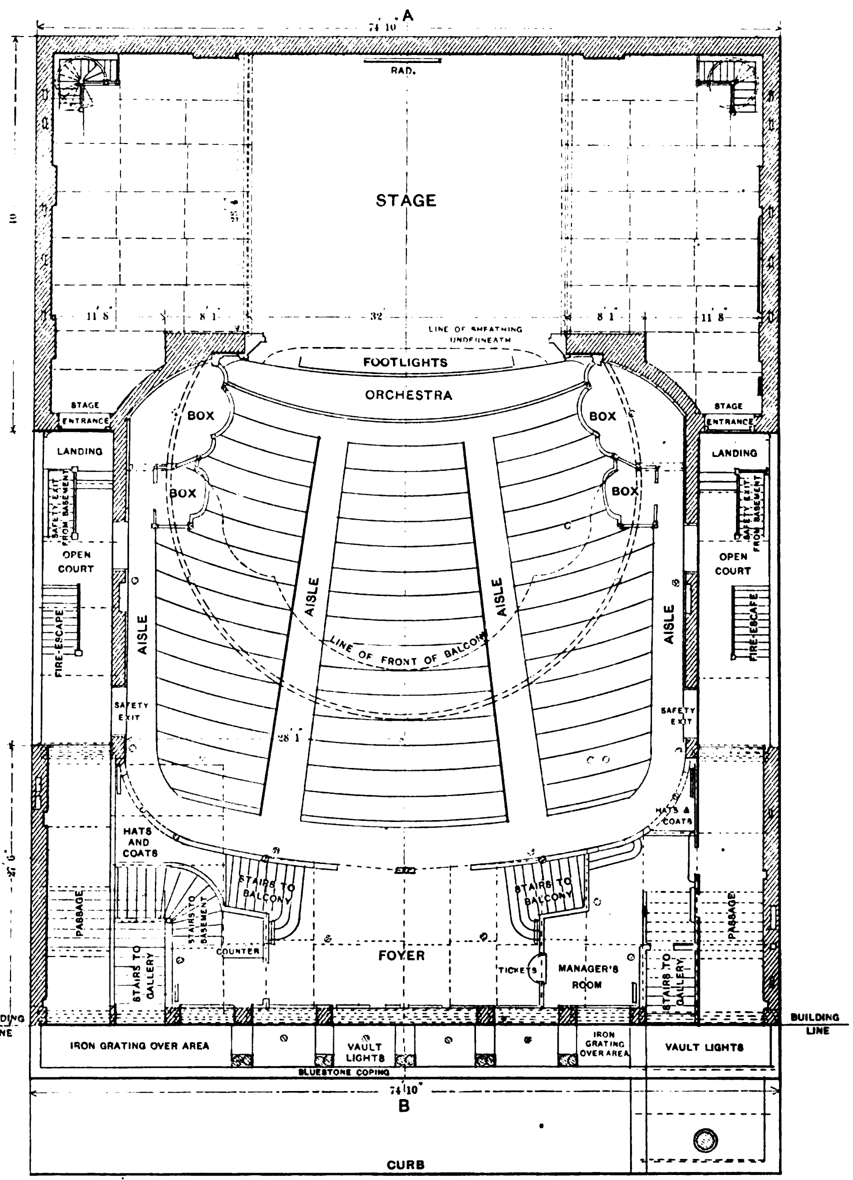
Modern Theater Construction, Francis H. Kimball, Architect, New York City.

A very interesting feature of this building is the exterior ornamentation, an idea of which may be gained from a careful study of the supplement plate. The general style of the building is Italian Renaissance, the exterior as seen from the street being light brick, cream colored in tone, while the cornice and ornamental work appear in terra cotta arranged in two colors. This terra cotta has very much the effect of marble and is said to have been the first instance of its use for such a purpose in this country. The idea of theatrical ornamentation also appears in the side windows of the front, one of which shows the face of "Mulligan," and the other that of "Pete," two of Mr. Harrigan's most famous *rôles*. A view of one of these windows is presented in Fig. 4. In the frieze of the theater front are 80 heads, representing different expressions of the human countenance. In this frieze are also a number of windows for ventilation. The lower division of the exterior shows a large number of exits, the supports of which are of highly ornamented iron columns. That portion of the roof seen from the street is covered with Spanish tiles, and supports two flagstaffs, one being at each end of the ridge.

Upon entering the vestibule it is noticed that the lobby is richly treated with ornamental plaster ceilings and walls, the decoration being in accordance with the general style of the exterior. Panels and fluted pilasters, with carved capitals, are a noticeable feature. The floor of the vestibule is laid in mosaics. The lobby wood work and plaster is finished in an ivory tone, except that the walls are in soft blues and dull reds, with stencil work in silver and gold. On each side of the lobby is an independent stairway leading to the balcony, as may be seen from an inspection of the plan of the main floor, shown in Fig. 2. These are decorated in keeping with the rest of the building. At the right, upon entering the building, are the box office and the manager's room, the gallery box office being in the right-hand corridor leading from the inner court. All the staircases are of iron and slate, while all the partitions are fire proof, there being no wood used for this purpose in any part of the building. The staircases are wide and spacious, with square landings, and all leading in as direct a manner as possible to the street.

The auditorium has four aisles, with standing room at the back of the parquet seats. These number 375, while the balcony will seat 265 people and the gallery 275, making a total seating capacity of the house of 915. The character of the ornamentation employed in the vestibule obtains throughout the auditorium, the prevailing tones of color being ivory and gold. There are six boxes, two on each side on the parquet level and one on each side on the balcony level. The upper boxes terminate in highly ornamental canopies, while the decorations harmonize with the general tone of the auditorium. One tier of boxes with an indication of the style of decoration is shown in Fig. 5 of the engravings. The front of the balcony and gallery are of plaster enrichments. Around the upper portion of the walls is a frieze with panels and fluted pilasters, the panels bearing ornaments and stencils in gold and silver. Above the frieze the ceiling starts in dome form, with a succession of groins enriched with figures in ornament and relief. The figures represent women upholding festoons and garlands. The tympani between the groins show figure subjects in color, representing Poetry, Music, History, Comedy, Tragedy and other attributes of the drama.

There are two curtains, one being of



Modern Theater Construction.—Fig. 2.—Main Floor of Harrigan's Theater.—Scale, 1-16 Inch to the Foot.

asbestos and fire proof, while the other is of rich fabric with gold and silver ornamentation and is intended as the drop curtain.

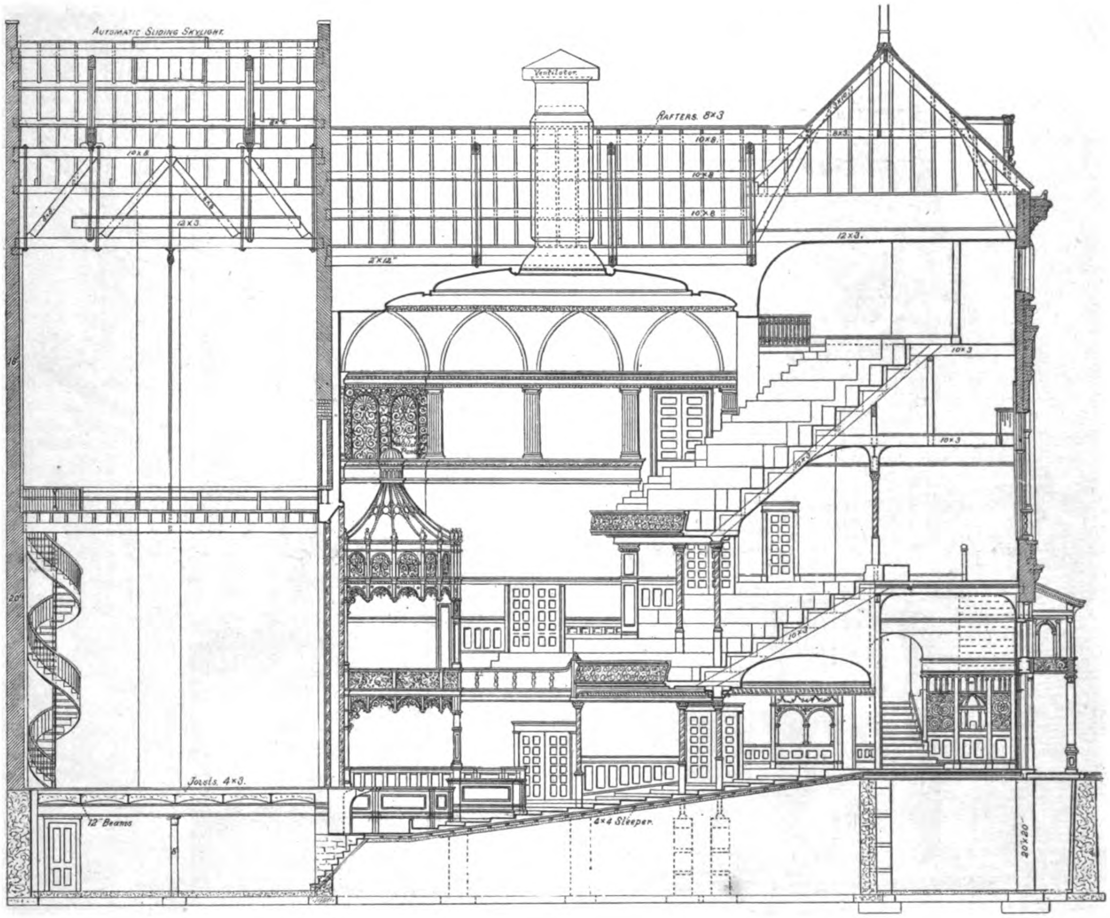
The illumination of the theater is furnished by means of incandescent lights. There is one large central hanging fixture with 60 lights, surrounded by a circle of gas jets, to be used in case of necessity. There are also four other hanging fixtures of ten lights each, together with an abundance of side and staircase lights. The heating is done by steam from a boiler outside the building. The dressing rooms, which are said to be fire proof, are located in the basement, their position being indicated in Fig. 1 of the cuts. Special attention has been given to the ventilation of the building, not only with

into a grand hall, around which extends a balcony forming a foyer promenade. This hall measures 38 x 34 feet and from it rises foyer stairs to the right and a ladies' room to the left, while on either hand are the stairs leading to the stalls. The domed foyer over the entrance is an interesting feature of the design and the point from which the sight-lines radiate in the theater is taken at a lower level than usual for the purpose of insuring a command of the stage from all parts of the house. The entrances to the different parts of the house, as well as an idea of the appearance of the front, are clearly indicated in Fig. 6 of the illustrations, while the plan view, Fig. 8, shows the general arrangement of the building.

The auditorium measures about 60 x 50

cates in a very comprehensive manner many features of interest to carpenters and builders.

The decorations will be, when completed, in the Italian Renaissance style carried out from the special designs of the architect. No little attention has been paid in designing the dome over the auditorium to the acoustic properties of the theater. Everything is being done to admit of the emptying of the building in the smallest possible space of time, the exits being provided in excess of those required by the London County Council. There are 12 exits, being two each from the stalls, dress circle, upper circle, pit, gallery and stage, and it is said that the whole building could, in case of emergency, be cleared within three minutes.



Modern Theater Construction.—Fig. 3.—Section through Harrigan's Theater taken on the Line A B of Fig. 2.—Scale, 1-16 Inch to the Foot.

regard to the use of the structure in winter, but also in summer. Air is taken in by mechanical means, as well as by heating ducts, so that the auditorium may be quickly cooled, and in summer a stream of fresh air passes through the house, rendering it delightful in the hottest weather.

The second building which we present by means of the accompanying illustrations is that now in process of erection in Cranbourne street, London, England, from plans prepared by Spencer Chadwick, architect, of that city. The building is being put up for Augustin Daly, the well-known theatrical manager of New York City. The front of the building is executed in what is called Ham Hill stone, which has been selected as being warmer in color than either Portland or Bath stone. The theater faces the main thoroughfare from Picadilly to Covent Garden, having the principal entrances in Cranbourne street. The main entrance opens

feet in size, and has a seating capacity of 1500 persons. It has been carefully arranged to give a good view of the stage to all the occupants, and the tiers to the different circles are carried on cantilevers without columns. The stage is said to be among the largest in London, measuring 60 x 40 feet, with proscenium opening 31 x 32 feet. It is separated from the auditorium by a fire-resisting curtain of a double thickness of asbestos cloth, inclosed in an iron frame, while the scene dock, property and other rooms connected with the working of the stage are separated by fire-resisting doors. All iron work is incased in concrete, and the building throughout is being made of fire-resisting material. A feature of the equipment will be a thorough system of hydrants. The stairs in all cases are 4 feet 6 inches and 5 feet wide. The floor of the pit has a fall of 1 in 12. Fig. 7 of the illustrations shows a sectional view through the theater building, and indi-

The ventilation and warming of the building will also be carefully considered. In addition to the ventilating system through a large lantern light fitted with louvers and exhaust placed on the roof over the stage, there will be two smaller exhausts in the main building, while the retiring and dressing rooms on each level will be fitted with outside ventilation and light. All drains will be disconnected and ventilated. The contractor of the theater is Frank Kirk of Westminster, S. W., London. The cornerstone of the new theater was laid early in November last by Miss Ada Rehan, leading lady of Mr. Daly's company, and it is expected that the structure will be completed some time this fall.

DISPATCHES from Athens, by way of Paris, announce that Dr. Waldstein, of the American Archæological School, has discovered at Argos the foundations of the temple of Hera, which was burned 429 B.C. He has also found the remains of a second temple, containing vases, bronzes and sculptures, including a beautiful head of Hera.

Safer Methods of Building Construction.*

FIRE RESISTING CONSTRUCTION.

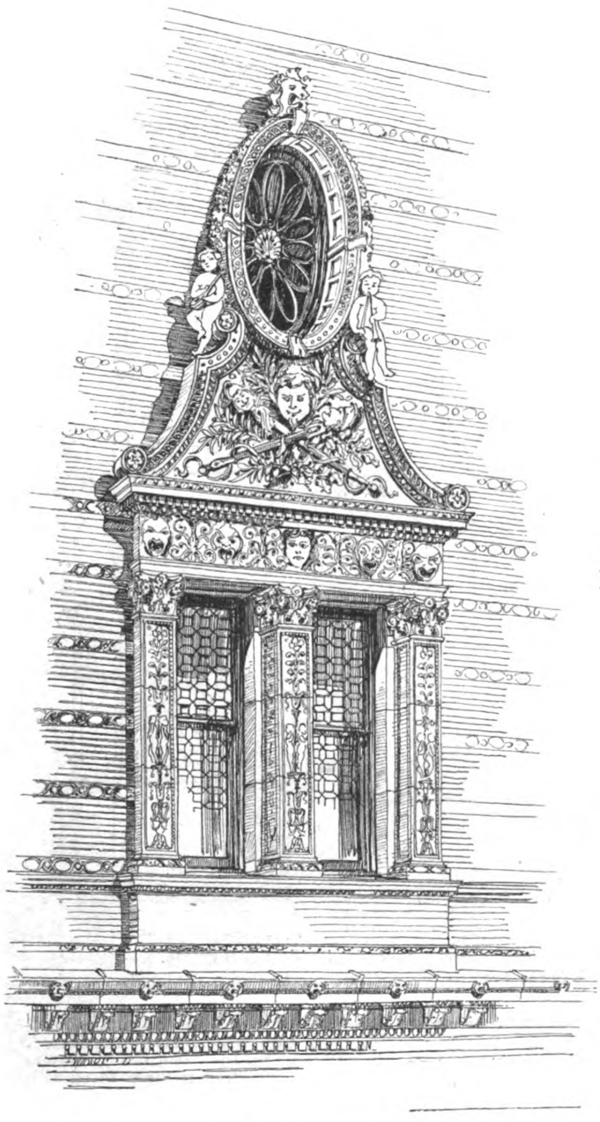
President F. C. Moore of the Continental Insurance Company states in his monograph on "Economical Fire-Resisting Construction" (p. 4) that of the fires which exceed $100 in damage, only one-fifth are extinguished short of total destruction of the building and its contents.

A building made of incombustible material is not necessarily fire resisting, as a combustion of the contents of almost all commercial buildings, except office buildings, will weaken unprotected iron beams and columns, and reduce the strongest stone to powder. This destruction of rock is caused by the conversion into steam of the water absorbed by the stone.

Nearly every city is provided with building regulations, which are generally teeming with errors of omission, and often contain provisions for methods of construction which are as far behind the times as the old buildings which are torn down to make way for the new structures to be erected in accordance with the provisions of the new regulations.

The increasing hight of buildings, whose profitable use has been made possible by the passenger elevator—which was very properly designated by its inventor, Otis Tufts, in his patent as the vertical railway—presents a problem which is not fully met by the use of incombustible material in construction.

This increase in the hight of buildings was clearly indicated a short time ago by one of the magazines, which contained two views of the southern part of New York City—the one being from a daguerreotype of many years ago, and the other from a recent photograph taken from the same place in Brooklyn. Trinity steeple and a few landmarks served as scales by which to estimate the increasing hight of buildings, which appeared to average certainly more than double—with exceptional examples lofty enough to suggest the sin of Babel.



Modern Theater Construction.—Fig. 4.—One of the Windows in the Front of Harrigan's Theater.

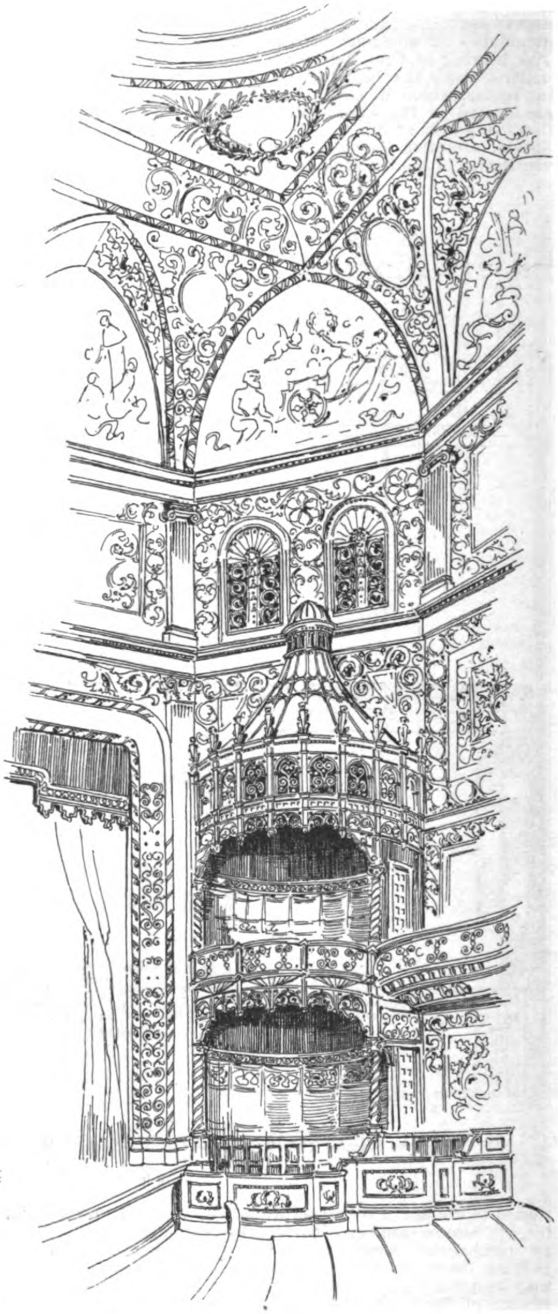


Fig. 5.—Interior View Showing Boxes and Style of Ornamentation.

SOME CAUSES OF FIRE.

Want of care in the construction of flues or chimneys is the cause of an enormous number of fires, especially from cracks caused, in many instances, by girders or beams too near chimneys. Soot deposited in such cracks becomes ignited in the course of time and acts as a fuse to ignite some of the wood work at the

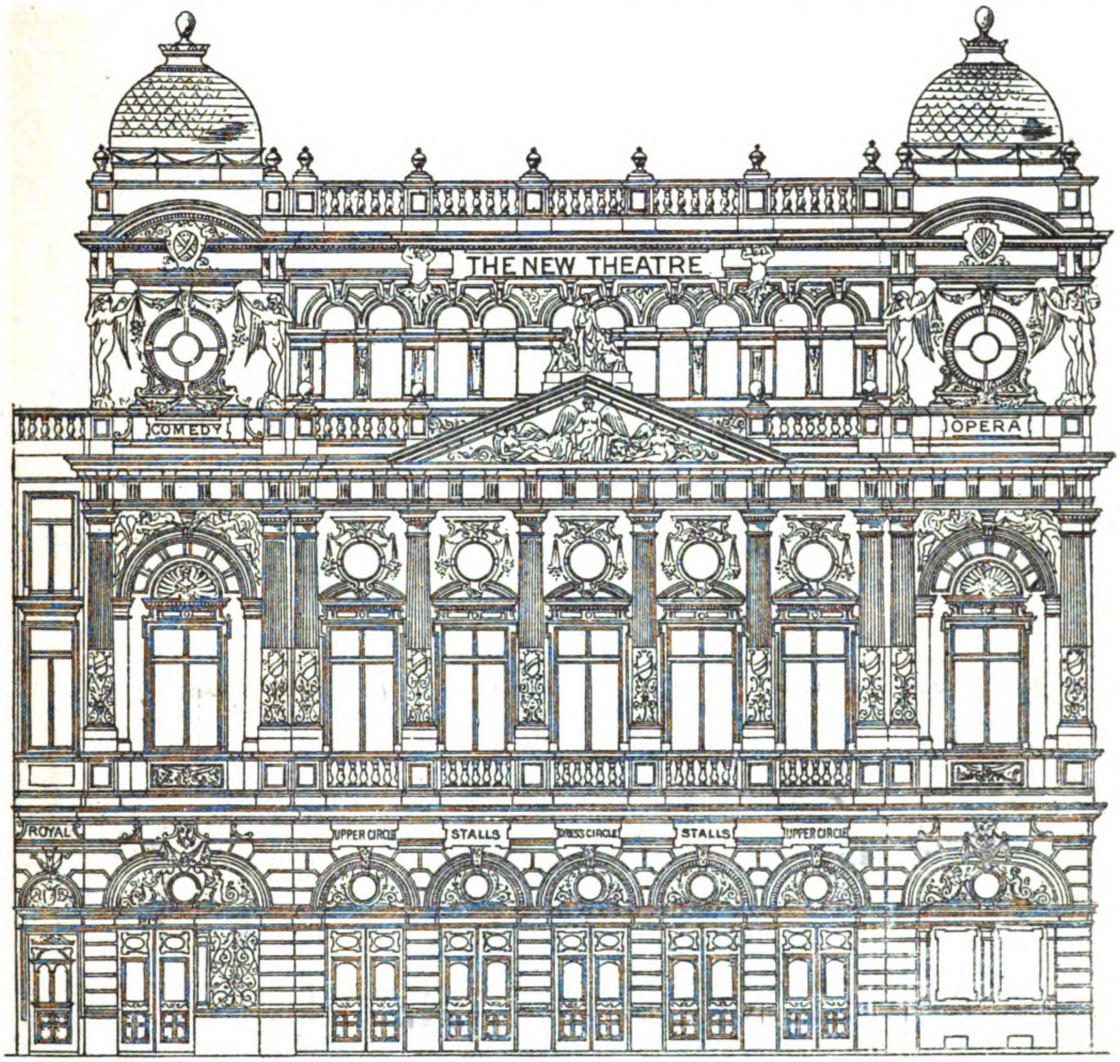
* Continued from page 84, March issue.

floors, or the interior finish of the building.

Hollow concealed spaces in floors and walls are a source of great destruction by fire. It is certainly preferable, as regards matters of safety, to design buildings without such dangerous spaces; but the traditions of construction seem to be so entirely opposed to such methods that they must be recognized, and faulty practice modified as far as possible by the introduction of fire stops in all vertical concealed spaces at each story, and any continuous spaces, particularly in the attic, should be cut off at as frequent intervals as can be arranged.

ONE TYPE OF BUILDING.

The best type of a commercial building is that where the floors are continuous; the openings for elevators, stairs and transmission of power being an inclosed-in tower. This isolation of the various rooms from each other would render such a building well nigh indestructible by fire, but such a separation would not generally be considered adapted to commercial buildings, with the exception of storehouses. During the last year I designed a six-story building of this description, which is situated in the compact portion of a city, and occupied by numerous tenants engaged in various kinds of manufacturing.



Modern Theater Construction.—Fig. 6.—Front Elevation of Daly's Theater, London, Spencer Chadwick, Architect.

The floors of this building are of the usual slow-burning construction type, the timbers consisting of Southern pine beams of 18 feet span, bolted in pairs, making solid beams 12 x 14 inches, and laid 8 feet on centers.

The floors upon these beams consist of 3-inch spruce plank planed underneath and with splined edges. These planks are 16 feet in length, and therefore each one rests on three beams. In order to render the load on the beams uniform, the courses are broken every 2 feet. Two thicknesses of asbestos paper are laid on the plank before the top flooring of birch is laid.

The roof is similar in construction, but only 3 inches thick. It is lowest in the middle, and the brick walls form a parapet around the sides. All windows, except those at the front, are provided with tinned shutters.

The peculiar feature of the building, however, is the means used to isolate the various stories from each other by making the floors entirely continous and without any openings whatsoever.

A tower in the middle of the building, placed 24 feet from the entrance, and measuring 10 by 17 feet, made of brick in the lower portion and 3-inch plank above, extends through the roof and is covered by a large skylight, protected, as all skylights should be, by a wire netting underneath.

This tower contains stairways and elevator; and at the rear of it is another division for the washrooms, and to carry steam and water pipes. Adjoining this is the belt tower, the power being transmitted to each room along a line of shafting. The whole arrangement occupies an area of 10 x 31 feet in the middle of the building, where the light is the poorest, being therefore the space least valuable.

COST AND INSURANCE.

This method of interior construction, instead of being an added expense, cost about $3500 less than the estimates for a similar structure with joisted floors of equal strength and rooms of the same hight in the clear.

The ceilings over furnaces, boilers and hotel cooking apparatus, if near enough to become in any manner a source of danger, require special provisions to insure safety. All hollow spaces should be removed, and wood work is generally best protected by means of lime plaster laid on wire lathing, conforming to the surface of the under side of the floor.

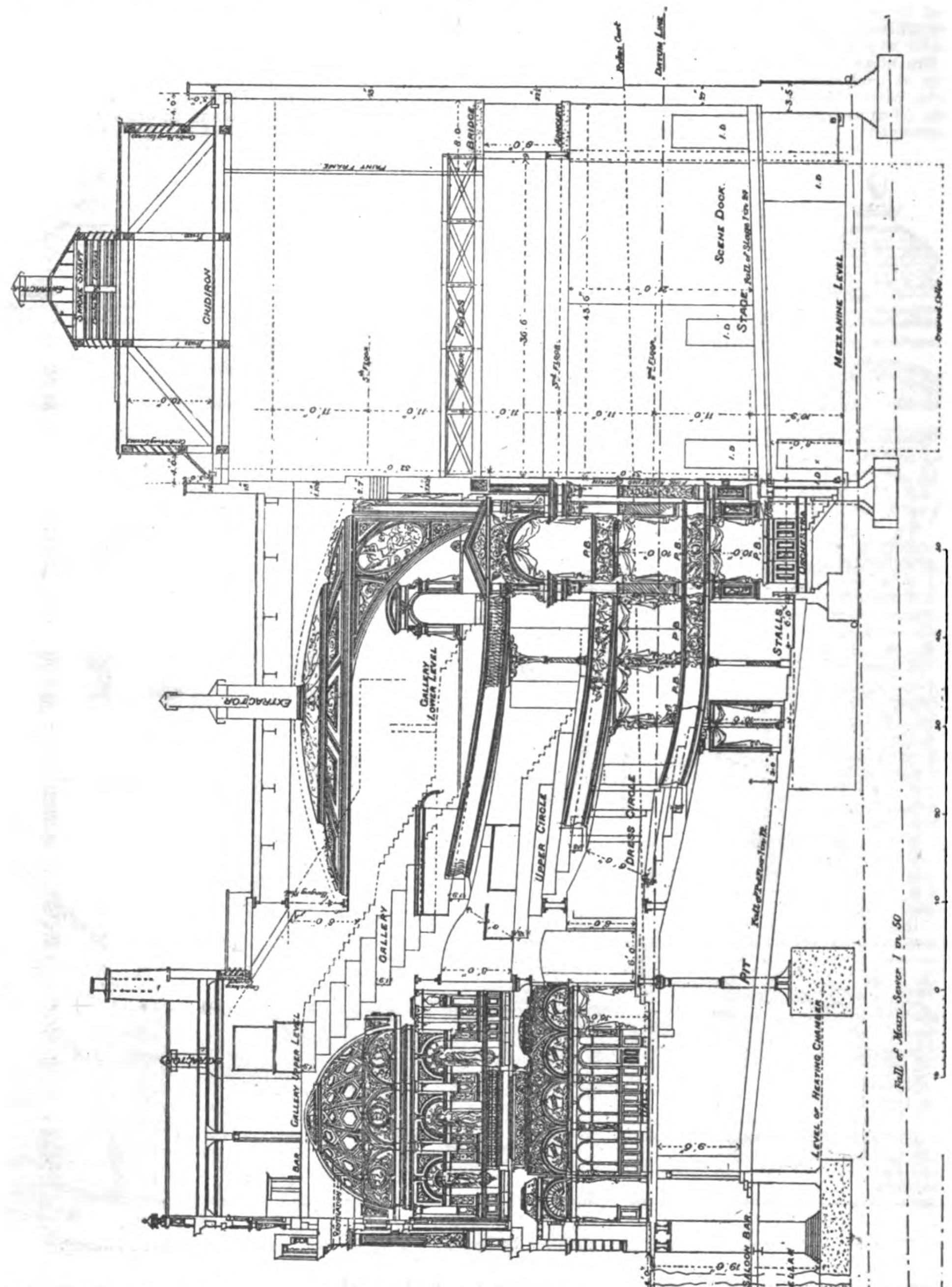
The supports of a building should be arranged to resist injury as a result of the combustion of the contents, or of the lighter portion of the interior. Timber beams and columns fulfill this purpose as well as any material; but it is frequently necessary to use iron or steel to obtain the necessary strength, in which case the metal should be protected with heat-resisting material, generally with special tiles made for the purpose.

The rate of insurance is said to be the lowest ever given to a building under these conditions of occupancy, hight and exposure to conflagration hazard.

Similar methods can be applied to other commercial buildings, but it is doubtful whether this method of arranging a stairway might not interfere with the requirements necessary in many commercial buildings, particularly those devoted to retail business, and buildings where elaborate decoration in interior finish is desired; although in buildings where such displays are necessary, the construction could be rendered more fire resisting by the adoption of methods involving a higher expense than the ordinary methods.

The advantage of sound construction has never been more strongly illustrated than in Paris during the commune of 1871, when the mob sought to burn the city by the free use of kerosene, and only succeeded in burning the individual buildings which were set on fire, notwithstanding that there was no fire department to combat these fires. Photographs of streets taken after these fires show that the front walls of the burned buildings were still intact.

Experience has shown that the most effective measures against the fire hazard are those in the nature of precautions. The inception of fires should be guarded against by taking especial care of all matters tending to originate or spread fires, and, secondly, methods of construction which tend to prevent the spread of fire from one building to another, and also to retard the progress of a fire through the same building, should be used.



Modern Theater Construction.—Fig. 7.—Sectional View of Daly's Theater, London.

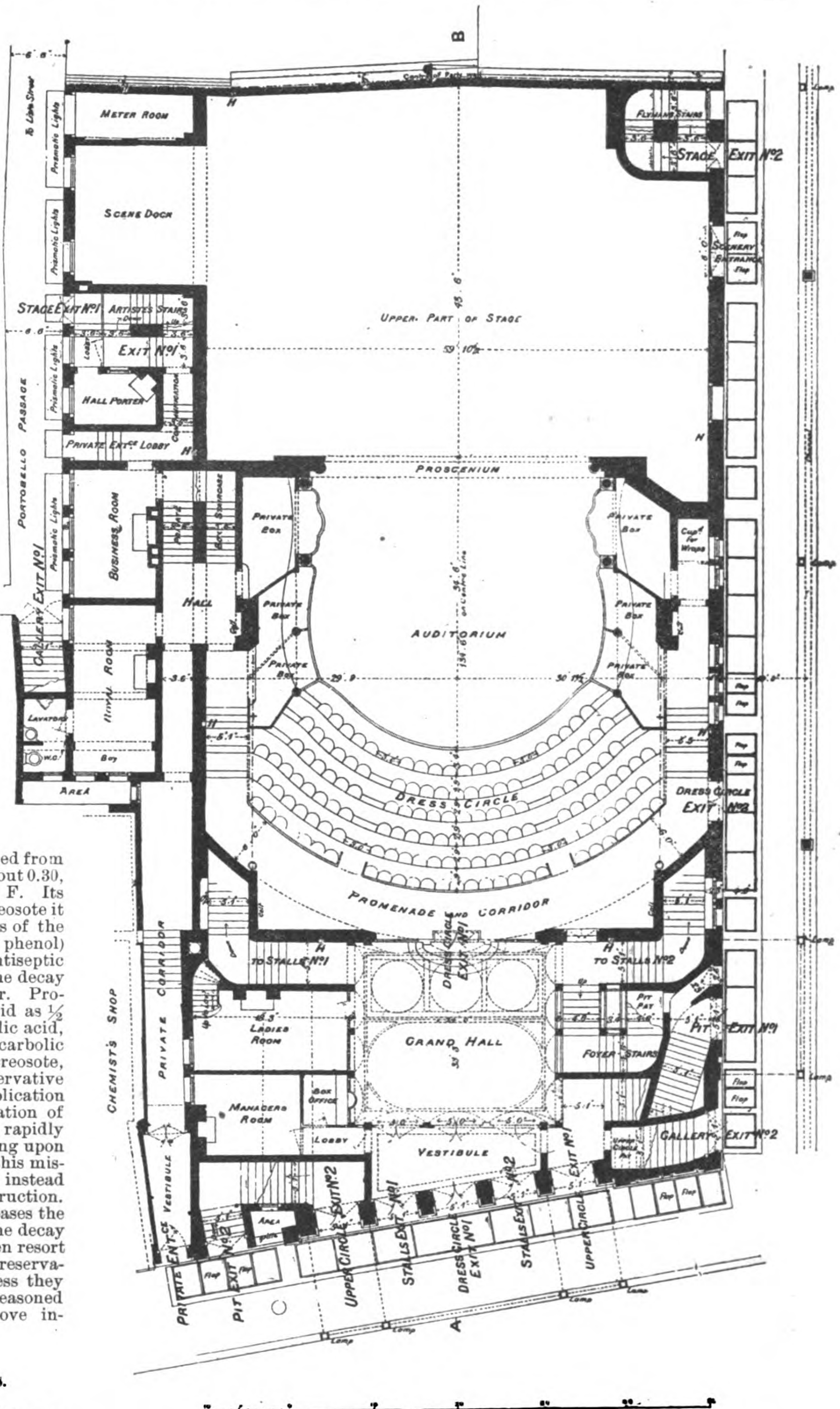
ONE OF THE CHIEF REASONS for the failure of cheap houses to look well, says an exchange, is the fact that they are overloaded with ornament. If those who wish to build cheaply would be content to build plainly, the result would be more satisfactory to the eye. The same fault is noticed in cheap furniture. It is always disfigured with fancy turns and machine carving, while to find a piece of plain, substantial finish one must look at the high-priced goods. Too many men able only to build a cottage, and load it with weak imitations of the palace, the result is thoroughly inharmonious. In the cheap house let plainness of construction reign from foundation to gable. Let the ornamentation be not in the woodwork, but in the painting. Then the effect may be whatever desired, and may be changed at the pleasure of the owner.

Timber in Damp Places.

The surface of all timber exposed to alterations of wetness and dryness gradually wastes away, becoming dark-colored or black. This is really a slow combustion, says an exchange, but is commonly called wet rot, or simply rot. Other conditions being the same, the most dense and resinous woods longest resist decomposition. Hence the superior durability of the heart wood—in which the pores have been partly filled with lignine—over the open sap wood, and of dense oak and lignumvitæ over light poplar and willow. Hence, too, the longer preservation of the pitch pine and resinous "jarrah" of the East as compared with non-resinous beech and ash. Density and resinousness excludes water, therefore preservatives should increase those qualities in the timber. Fixed oils fill up the pores and increase the density. Staves from oil barrels and timber from whaling ships are very durable. The essential oils resinify, and furnish an impermeable coating. But pitch or dead oil possesses advantages over all known substances for the protection of wood against changes of humidity. According to Professor Letheby, dead oil, 1, coagulates albuminous substances; 2, absorbs and appropriates the oxygen in the pores, and so protects from eremacausis; 3, resinifies in the pores of the wood, and thus shuts out both air and moisture; and, 4, acts as a poison to lower forms of animal and vegetable life, and so protects the wood from all parasites. All these properties specially fit it for impregnating timber exposed to alterations of wet and dry states—as, indeed, some of them do—for situations damp and situations constantly wet. Dead oil is distilled from coal tar, of which it constitutes about 0.30, and boils between 390° and 470° F. Its antiseptic quality resides in the creosote it contains. One of the components of the latter, carbolic acid (phenic acid, phenol) C^{12}, H^6, O^2, the most powerful antiseptic known, is able at once to arrest the decay of every kind of organic matter. Professor Letheby estimates this acid as ½ to 6 per cent. of the oil. Chrysilic acid, C^{14}, H^8, O^2, the homologue of carbolic acid and the other component of creosote, is not known to possess preservative properties. While an external application of coal-tar promotes the preservation of dry timber, nothing can more rapidly hasten decay than such a coating upon the surface of green wood. But this mistake is often made, and dry rot, instead of wet rot, does the work of destruction. Carbonizing the surface also increases the durability of dry, but promotes the decay of wet timber. Farmers very often resort to one of the latter methods for preservation of their fence posts. Unless they discriminate between green and seasoned timber these operations will prove injurious.

Accuracy of Slide Rules.

Professor Hammer has been making an investigation of the different slide rules in the Stuttgart Technical School, and has published the results of his inquiry in the German surveyor's organ, *Zeitschrift für Vermessungswesen.* For simple multiplications or with multiplications with three factors, the 25 cm. slide rule gives an approximation of within about 0.1 to 0.2 per cent. of accuracy. Professor Hammer tested a number of German celluloid slide rules, and found the mean error in simple multiplication to be $\frac{1}{800}$ with rapid reading. The less portable office slide rules in use in Germany are the 50 cm. slide rule, giving an accuracy of 0.08 per cent. with rapid reading; others of various dimensions, such as the Landsberg 723 m.m. long; and Beyerlens calculating circle, which represents a length of 754 m.m., and with which the accuracy is 0.07 to 0.05 per cent. The Fuller and Thacher rules are used in England and the United States respectively. Mr. Hammer made careful tests with the former, with the result that it was found to give a mean error of 0.008 per cent., which showed that the accuracy claimed by the makers—*i. e.*, $\frac{1}{10000}$ is not too much. Still, more nearly accurate results were obtained with the Thacher rule, the mean error with careful adjustment being 0.0031 per cent, or approximately $\frac{1}{32000}$ with careful reading.



Modern Theater Construction.—Fig. 8.—Plan of Main Floor of Daly's Theater, London.

THE BUILDERS' GUIDE.*

By I. P. HICKS.

Hip and Valley Roofs.

LET FIG. 26 REPRESENT the plan of a building having a roof of three gables of equal size and one smaller gable hipped on the rear side, as shown in the diagram. Fig. 27 shows this roof as it would appear in the front side elevation. Referring now to Fig. 28, A B and B C represent the length of rafters on the front gable. Next set off the length of the common rafters of both the right and left gable perpendicularly, as shown by F G and shape of the roof and obtain the necessary lengths for finding the area of this elevation. Referring now to Fig. 30, A B and B C represent the length of rafters on the right gable. Next set off the length of rafter on the front gable shown by D E. Then set off the same length in the center of the left gable shown by the dotted line J H. Connect H with E for ridge line of front gable. Connect H with A and C for the valley rafters. Now take half the width of the rear gable, which is to be hipped on the end, and in this

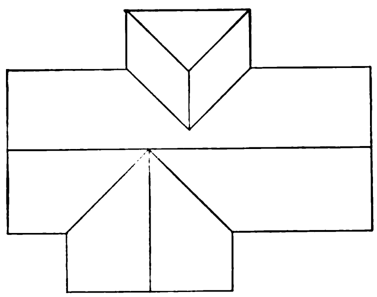


Fig. 26.—Plan of Roof with Four Gables.

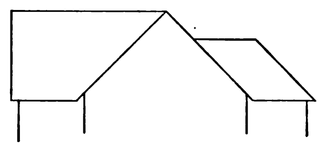


Fig. 29.—Appearance of Roof in Right End Elevation.

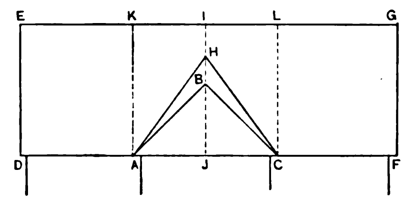


Fig. 32.—Diagram for Finding the Area of the Roof Shown in Fig. 31.

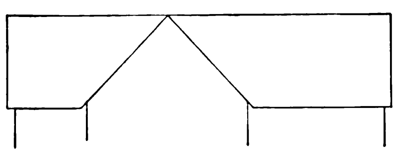


Fig. 27.—Front Elevation of Roof Shown in Fig. 26.

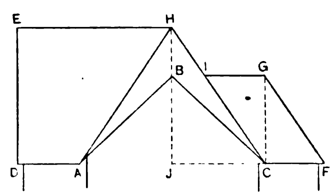


Fig. 30.—Diagram for Finding Area of Roof Shown in Fig. 29.

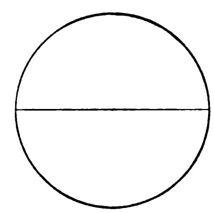


Fig. 33.—A Circle

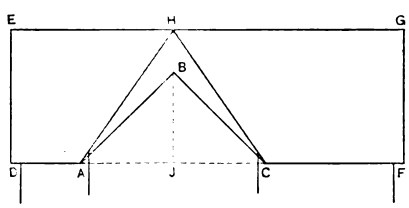


Fig. 28.—Diagram for Finding Area of Roof Shown in Previous Figure.

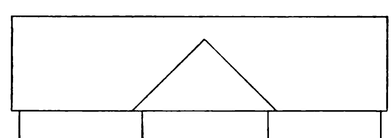


Fig. 31.—Roof as it Appears in Rear Elevation.

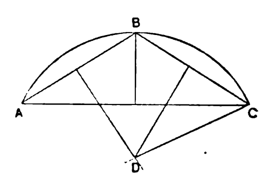


Fig. 34.—Diagram for Finding Radius from a Segment.

The Builders' Guide.—Diagrams Illustrating Hip and Valley Roofs.

D E, connecting E with G for the ridge line. On the perpendicular line of the front gable set off the length of the common rafter, shown by the dotted line J H. Connect H with A and C for the valley rafters, which completes the profile of this side of the roof. The two figures, now represented by A D E H and C F G H, are termed trapezoids. To find the area of a trapezoid multiply half the sum of the parallel sides by the altitude. In this case to make the matter plain we multiply half the length at the eaves and ridge by the length of the common rafter, which gives the area of the roof necessary to cover the elevation shown in Fig. 27.

Fig. 29 shows the roof as it would appear in the right end elevation. We will now develop the case is represented by C F. From C erect a perpendicular the length of the common rafter on this part, shown by the dotted line C G. Connect G with F for the hip rafter and draw the ridge line G I parallel with C F, which completes the profile of this view of the roof. The figure shown by A D E H is a trapezoid, and its area may be found as has been previously described for such figures. The figure shown by C F G I is termed a rhomboid. Its area may be found by multiplying C F by C G, or, in other words, the length at the eaves multiplied by the length of the common rafter gives the area. The areas of the two figures added completes the area of the roof necessary to cover the end elevation show in Fig. 29. As the left end elevation is similar to the right in shape and size the last estimated area doubled will give the area of the roof necessary to cover the two end elevations.

We have now to consider the rear elevation and the roof necessary to cover it. Fig. 31 shows the roof as it would appear in the rear elevation. We will now develop the shape of the roof and obtain the necessary lengths and lines for finding the area of this elevation. Referring to Fig. 32, A B and B C represent the length of the common rafters on the rear gable. From the center of the gable set off the length of the common rafter, as shown by the dotted line J H. Connect H with A and C for the length of the hips. Set off the length of the common rafter on the right and left gable, as shown by F G and D E; connect E and G for the ridge line, which completes the profile of the rear view of the roof. It will be seen that the

THE CIRCLE.

A circle, Fig. 33, is a plane figure bounded by one uniformly curved line called the circumference. The diameter of a circle is a straight line drawn through the center and terminating at the circumference. The radius is a straight line drawn from the center to the circumference and is therefore half the diameter.

To find the circumference of a circle from its diameter multiply the diameter by 3.14159.

To find the diameter of a circle from its circumference divide the circumference by 3.14159.

To find the area of a circle multiply half the circumference by half the diameter, or multiply the square of the diameter by the decimal .7854.

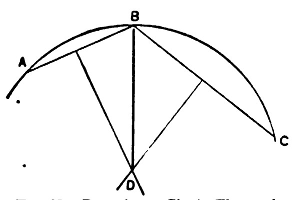


Fig. 35.—Drawing a Circle Through Three Points.

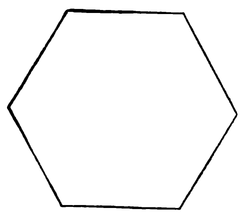


Fig. 40.—A Hexagon.

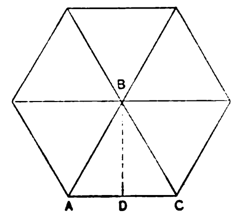


Fig. 41.—Finding the Area of a Hexagon.

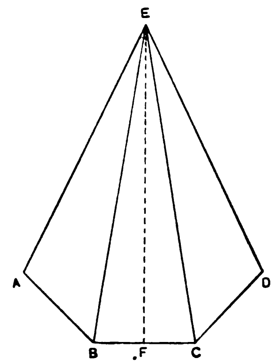


Fig. 45.—An Elevation of an Octogon Tower Roof.

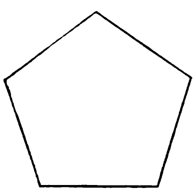


Fig. 36.—A Regular Polygon.

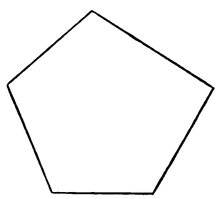


Fig. 37.—An Irregular Polygon.

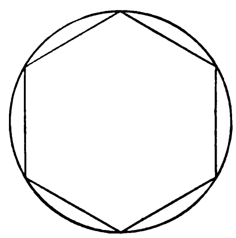


Fig. 42.—Describing any Regular Polygon.

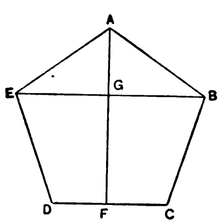


Fig. 38.—Finding Area of Regular Pentagon.

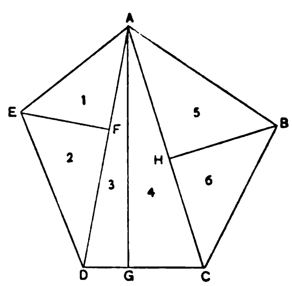


Fig. 39.—Finding Area of an Irregular Pentagon.

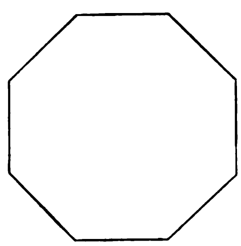


Fig. 43.—An Octagon.

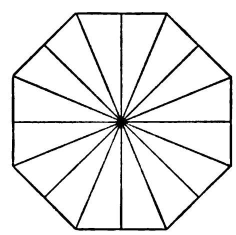


Fig. 44.—Plan of an Octagon Tower Roof.

The Builders Guide.—Diagrams Illustrating Regular and Irregular Polygons.

ridge of the rear gable does not come up even with the ridge of the other two; hence the rear elevation shows a different shape than the front. For convenience in estimating, we divide the roof in the center of the gable, shown by the dotted line H I; then divide the roof perpendicularly each side of the gable, as shown by the dotted lines A K and C L. We now have the roof divided into four figures, of which D E K A and C L G F are rectangles, A K I H and C L I H are trapezoids. As the method of obtaining the areas of such figures has been previously described, further explanation is unnecessary. It has now been shown how to find the area of each side of the roof, as indicated in the plan, Fig. 26. By adding the area of the four sides the total area of the roof will be obtained.

To find the side of the greatest square that can be inscribed in a circle of a given diameter, divide the square of the given diameter by 2 and extract the square root of the quotient.

TO FIND THE RADIUS OF A CIRCLE FROM A SEGMENT.

Let A C, of Fig. 34, represent the chord of an arc. From the center of A C square up the rise of the segment to B. Connect B with A and C. From the center of A B and B C square down the lines as shown. The point of crossing at D is the center of the circle, and D C is the radius.

TO DRAW A CIRCLE THROUGH THREE POINTS.

Set off any three points, as A B C, Fig. 35. Connect A C and B C by straight lines. From the center of A B and B C square down to D, as shown, which will be the center of the circle. D B is therefore the radius of the circle which will strike the three points A B C.

POLYGONS.

A plane figure bounded by more than four lines is called a polygon. It must therefore have at least five sides, and the number of sides which it may have is not limited. In this article will be introduced only the forms in common use, for the purpose of showing simple methods of estimating their areas.

A regular polygon has all its sides and angles equal, as shown in Fig. 36. An irregular polygon has its sides and angles unequal, as shown in Fig. 37. A polygon of five sides, as shown in Figs. 36 or 37, is called a pentagon. The diagonal is a straight line drawn between any two angular points of a polygon. The diameter is a straight line drawn from any angle through the center to the opposite side or angle, as the case may be.

To find the area of a regular pentagon we will let A B C D E represent the sides of a regular pentagon, as shown in Fig. 38. Draw the diameter A F and connect E with B, which divides the pentagon into four figures—namely, two right angled triangles of equal areas and two trapezoids of equal areas. E G multiplied by G A will give the area of the two triangles. Half the sum of D E and E B multiplied by G F will give the area of the two trapezoids. The two areas added will give the total area.

To find the area of an irregular pentagon, we will let A B C D E represent the sides, as shown in Fig. 39. Next draw A D and A C, which will divide the pentagon into three triangles of unequal areas; then draw the altitude of these triangles, which is the perpendicular distance from their vertexes to the opposite sides, called the base and shown by the lines E F A G and B H. This divides the figure into six right angled triangles of unequal areas. A D multiplied by half the altitude E F will give the area of triangles 1 and 2, or A E D; then D C multiplied by half the altitude A G will give the area of triangles 3 and 4, or D A C. Again A C multiplied by half the altitude H B will give the area of triangles 5 and 6, or A B C. The three areas added will give the total area.

A polygon of six sides is called a hexagon, and is shown in Fig. 40. To find the area of this figure draw the diagonals as shown in Fig. 41, which divides the hexagon into equal triangles, the size of which is represented by A B C. Next draw the altitude of this triangle, as shown by the dotted line B D. Now, A C multiplied by half the altitude B D will give the area of the triangle A B C, and this multiplied by six will give the total area. The area of any regular polygon may be found by drawing lines from all of its angles to the center, thus forming triangles of equal areas, which may be estimated by multiplying the base by one-half the altitude, as shown in Fig. 41. To describe any regular polygon draw the circumference of a circle, divide the circumference into as many equal spaces as the polygon has sides, connect these points with straight lines, and the polygon is completed, as shown in Fig. 42.

A polygon of eight sides is called an octagon and is shown in Fig. 43. In Fig. 44 is represented a plan and in Fig. 45 an elevation of an octagon tower roof. In Fig. 45 A B C D represent the plates and A E, B E, C E and D E the hip rafters. The dotted line F E represents the common rafter. To find the area of this roof multiply B C by half of F E and this product by eight, the number of sides. It will now be seen that the area of any tower roof from a square to a polygon of any number of sides may be found by multiplying the length of its side by half the length of the common rafter. If the tower has a round base then the circumference of its base multiplied by half the length of the common rafter will give the area. The reader has now been shown wherein it is possible to make mistakes in the measurement of roofs, as shown by the elevations. It has been shown how to develop the true shapes and sizes of irregular roof surfaces and how to reduce them to squares or rectangles of equal areas, or to figures whose areas are easily calculated. I might go on illustrating and describing roofs seemingly without end, but enough has been illustrated to thoroughly show the principles and methods of estimating roof surfaces. By a little study of the principles and methods, as previously set forth, the reader will be able to make proper application of them to the surface measurement of any roof.

It will be noticed in nearly all cases that the essential measurements for computing the area or surfaces of roofs are—1, the length at the eaves; 2, the length at the ridge or deck, as the case may be, and 3, the length of the common rafter.

In works of this kind it has been customary to show a number of illustrations on geometry, merely indicating how to construct certain figures from a given side or a few given points, while in all cases the most important part which a carpenter requires—that of computing the area of irregular surfaces—has been omitted. In the art of carpentry there is no place in which these irregular-shaped figures appear as frequently as they do in the construction of roofs, and if the carpenter has no accurate methods for computing their areas then he has to make a guess, which is the course taken by many who have never seen a proper application of geometry to the surface measurement of roofs. Roof surfaces have to be estimated in order to ascertain the amount of material required to cover them, as the sheathing, shingles, slate, tin, copper, iron, &c., or whatever may be used for the roof covering. In the illustrations and examples given there might have been presented many rules for finding the length of certain sides of a figure, by having the lengths of one or more of the other sides, but they would be merely mathematical problems, which in most cases could be solved only by square root. As many carpenters are not conversant with square root it has been deemed best to avoid its use as much as possible in this work, and especially in places where it is not needed. It must be generally conceded in taking roof measurements, that if a carpenter can measure one distance he can measure the roof to find any distance he may desire to know. Therefore the illustrations given have been more to show how to measure roofs to obtain the proper dimensions for computing their areas than as geometrical problems and methods of construction. The author has considered the subject of roof measurement worthy a place by itself in estimating, and the subject of roof framing will be taken up, thoroughly illustrated and described in another part of this work.

(To be continued.)

Entertainment of the Building Trades Club.

The members and their friends of the Building Trades Club of New York city enjoyed a very pleasant entertainment at their club house, 117 East Twenty-third street, on Monday evening February 29. The House Committee had arranged an interesting programme of music, both instrumental and vocal, recitations, &c., which were rendered by clever specialists. The early portion of the evening was devoted to social intercourse, some discussing topics of mutual interest, while others enjoyed the privileges of the pool and billiard room. About half-past eight the members and their guests assembled in the parlors, which were attractively decorated. In opening the exercises Secretary Stephen M. Wright read a number of letters from those who were unable to be present, among the number being Mr. Arthur McAllister, Anthony Ittner and William H. Sayward. The letter from the latter gentleman was not only expressive of regret at the writer's inability to be present, but also pointed out the great advantages resulting from social intercourse among builders as a means of improving methods and manners. This letter is of such special interest to the trade that we present the following quotations:

It is a real grief to me that I cannot accept your kind and urgent invitation to be at the Building Trades Club a week from to-night.

* * * * * *

You intimate that if I could be present that an address on the "Need of Social Intercourse Among Builders," would be acceptable. It may seem like egotism in me to say so, but I am honest in expressing the belief that few men among those who will assemble at 117 East Twenty-third street on the 29th. are so well entitled to speak upon that topic as myself. Not because of peculiar fitness on my part, but because I have seen so much in the last half dozen years which has demonstrated the value of social intercourse.

In January, 1887, there gathered in Boston the little coterie of representatives from builders in a dozen cities. Up to that time it may be truly said that little, if any, development had occurred of interchange of friendly thought or counsel among the builders located in the various cities of the country. More than that, it was a fact that builders in each city knew little of each other, looked upon each other more in the light of possible obstacles than helps in a business sense. Now what has grown from that little first meeting? Answering for myself, I can say, without a moment's hesitation, that the truest and most abiding friendships of my life have been builded upon the foundation there made. And I can say for others, who have a thousand times expressed the same to me, that they have realized a condition of confidence and friendly trust which before seemed altogether too good to hope for.

But there has followed a grander result than that which can be specified by individual experience. The general condition has been imperceptibly improved, so that everywhere the attitude of the community of builders is changed for the better, and changed in such a way that it can never go back to the old time exclusiveness and selfishness. To-day, by virtue of all that has been contribued by one and another in the search for better and truer methods, surer and more satisfactory practices, there exists a larger and more perfect confidence in the good intent and honest purpose of the majority of those engaged in the building trades than ever existed before, or could have by any possibility existed without the intercourse our associations have made possible. There is no question that the freedom of social intercourse which has been encouraged by the movement which has been going on all over the country, though our national work, has uncovered treasures of which no knowledge before existed, and which can never hereafter be wholly concealed. Many a man has found that he has unconsciously been traveling along through life within reach of that which is of inestimable value, and now that he is in touch with it he hardly knows how he previously got along with the comfort and cheer which it had brought. People who are inclined to sneer may scoff if they please at business friendships, but I claim with absolute certainty, that business prospers best through friendship, and that the road which is rough and difficult enough at best is made, perhaps, not less rough but less wearisome if it is traveled in company with others, while many of the dangerous places are rendered almost absolutely safe by the union of friendly bands, where the individual traveler would be almost surely destroyed.

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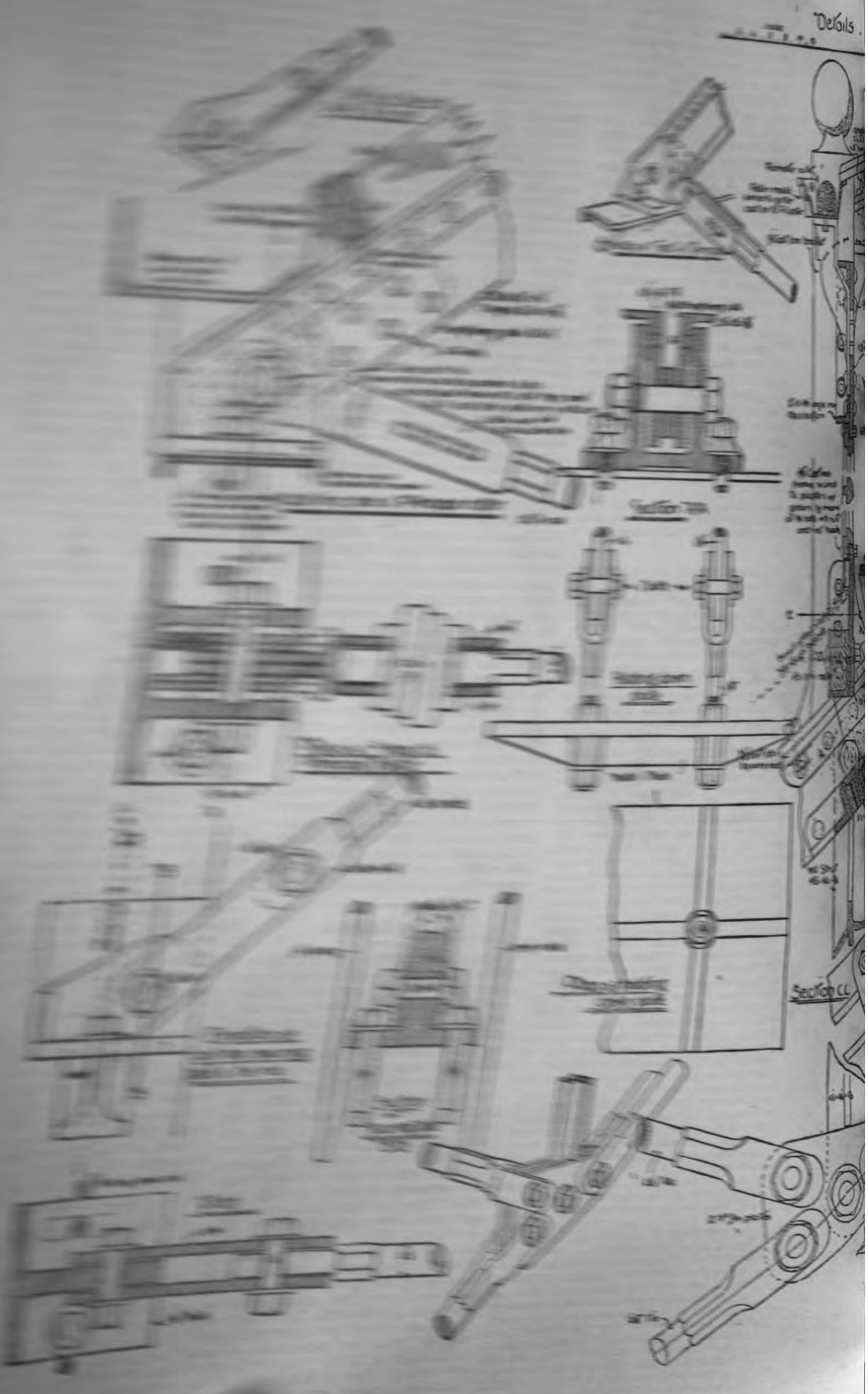

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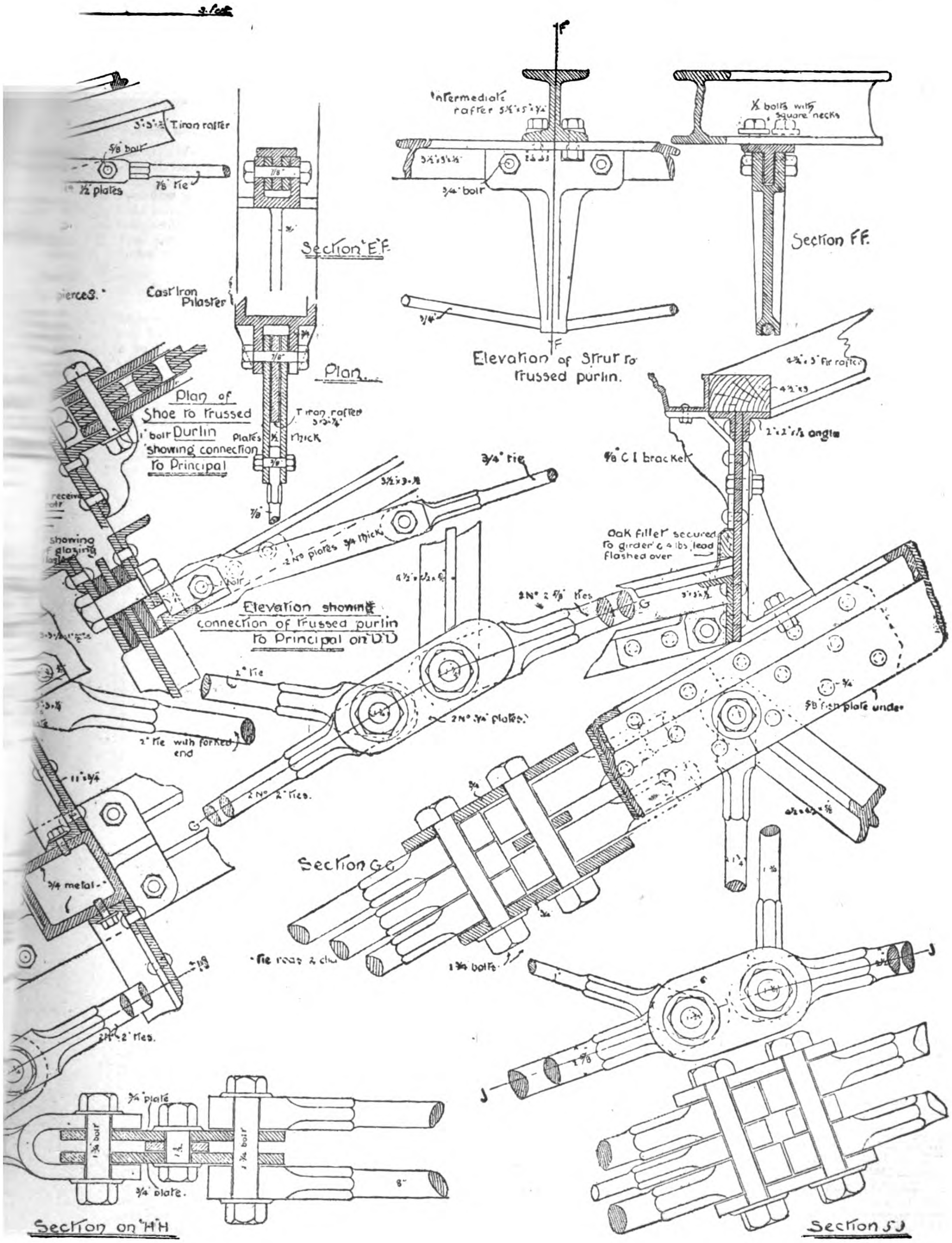

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of A B and B C square down to D, as shown, which will be the center of the circle. D B is therefore the radius of the circle which will strike the three points A B C.

POLYGONS.

A plane figure bounded by more than four lines is called a polygon. It must therefore have at least five sides, and the number of sides which it may have is not limited. In this article will be introduced only the forms in common use, for the purpose of showing simple methods of estimating their areas.

A regular polygon has all its sides and angles equal, as shown in Fig. 36. An irregular polygon has its sides and angles unequal, as shown in Fig. 37. A polygon of five sides, as shown in Figs. 36 or 37, is called a pentagon. The diagonal is a straight line drawn between any two angular points of a polygon. The diameter is a straight line drawn from any angle through the center to the opposite side or angle, as the case may be.

To find the area of a regular pentagon we will let A B C D E represent the sides of a regular pentagon, as shown in Fig. 38. Draw the diameter A F and connect E with B, which divides the pentagon into four figures—namely, two right angled triangles of equal areas and two trapezoids of equal areas. E G multiplied by G A will give the area of the two triangles. Half the sum of D E and E B multiplied by G F will give the area of the two trapezoids. The two areas added will give the total area.

To find the area of an irregular pentagon, we will let A B C D E represent the sides, as shown in Fig. 39. Next draw A D and A C, which will divide the pentagon into three triangles of unequal areas; then draw the altitude of these triangles, which is the perpendicular distance from their vertexes to the opposite sides, called the base and shown by the lines E F A G and B H. This divides the figure into six right angled triangles of unequal areas. A D multiplied by half the altitude E F will give the area of triangles 1 and 2, or A E D; then D C multiplied by half the altitude A G will give the area of triangles 3 and 4, or D A C. Again A C multiplied by half the altitude H B will give the area of triangles 5 and 6, or A B C. The three areas added will give the total area.

A polygon of six sides is called a hexagon, and is shown in Fig. 40. To find the area of this figure draw the diagonals as shown in Fig. 41, which divides the hexagon into equal triangles, the size of which is represented by A B C. Next draw the altitude of this triangle, as shown by the dotted line B D. Now, A C multiplied by half the altitude B D will give the area of the triangle A B C, and this multiplied by six will give the total area. The area of any regular polygon may be found by drawing lines from all of its angles to the center, thus forming triangles of equal areas, which may be estimated by multiplying the base by one-half the altitude, as shown in Fig. 41. To describe any regular polygon draw the circumference of a circle, divide the circumference into as many equal spaces as the polygon has sides, connect these points with straight lines, and the polygon is completed, as shown in Fig. 42.

A polygon of eight sides is called an octagon and is shown in Fig. 43. In Fig. 44 is represented a plan and in Fig. 45 an elevation of an octagon tower roof. In Fig. 45 A B C D represent the plates and A E, B E, C E and D E the hip rafters. The dotted line F E represents the common rafter. To find the area of this roof multiply B C by half of F E and this product by eight, the number of sides. It will now be seen that the area of any tower roof from a square to a polygon of any number of sides may be found by multiplying the length of its side by half the length of the common rafter. If the tower has a round base then the circumference of its base multiplied by half the length of the common rafter will give the area. The reader has now been shown wherein it is possible to make mistakes in the measurement of roofs, as shown by the elevations. It has been shown how to develop the true shapes and sizes of irregular roof surfaces and how to reduce them to squares or rectangles of equal areas, or to figures whose areas are easily calculated. I might go on illustrating and describing roofs seemingly without end, but enough has been illustrated to thoroughly show the principles and methods of estimating roof surfaces. By a little study of the principles and methods, as previously set forth, the reader will be able to make proper application of them to the surface measurement of any roof.

It will be noticed in nearly all cases that the essential measurements for computing the area or surfaces of roofs are—1, the length at the eaves; 2, the length at the ridge or deck, as the case may be, and 3, the length of the common rafter.

In works of this kind it has been customary to show a number of illustrations on geometry, merely indicating how to construct certain figures from a given side or a few given points, while in all cases the most important part which a carpenter requires—that of computing the area of irregular surfaces—has been omitted. In the art of carpentry there is no place in which these irregular-shaped figures appear as frequently as they do in the construction of roofs, and if the carpenter has no accurate methods for computing their areas then he has to make a guess, which is the course taken by many who have never seen a proper application of geometry to the surface measurement of roofs. Roof surfaces have to be estimated in order to ascertain the amount of material required to cover them, as the sheathing, shingles, slate, tin, copper, iron, &c., or whatever may be used for the roof covering. In the illustrations and examples given there might have been presented many rules for finding the length of certain sides of a figure, by having the lengths of one or more of the other sides, but they would be merely mathematical problems, which in most cases could be solved only by square root. As many carpenters are not conversant with square root it has been deemed best to avoid its use as much as possible in this work, and especially in places where it is not needed. It must be generally conceded in taking roof measurements, that if a carpenter can measure one distance he can measure the roof to find any distance he may desire to know. Therefore the illustrations given have been more to show how to measure roofs to obtain the proper dimensions for computing their areas than as geometrical problems and methods of construction. The author has considered the subject of roof measurement worthy a place by itself in estimating, and the subject of roof framing will be taken up, thoroughly illustrated and described in another part of this work.

(To be continued.)

Entertainment of the Building Trades Club.

The members and their friends of the Building Trades Club of New York city enjoyed a very pleasant entertainment at their club house, 117 East Twenty-third street, on Monday evening February 29. The House Committee had arranged an interesting programme of music, both instrumental and vocal, recitations, &c., which were rendered by clever specialists. The early portion of the evening was devoted to social intercourse, some discussing topics of mutual interest, while others enjoyed the privileges of the pool and billiard room. About half-past eight the members and their guests assembled in the parlors, which were attractively decorated. In opening the exercises Secretary Stephen M. Wright read a number of letters from those who were unable to be present, among the number being Mr. Arthur McAllister, Anthony Ittner and William H. Sayward. The letter from the latter gentleman was not only expressive of regret at the writer's inability to be present, but also pointed out the great advantages resulting from social intercourse among builders as a means of improving methods and manners. This letter is of such special interest to the trade that we present the following quotations:

It is a real grief to me that I cannot accept your kind and urgent invitation to be at the Building Trades Club a week from to-night.

* * * * * *

You intimate that if I could be present that an address on the "Need of Social Intercourse Among Builders," would be acceptable. It may seem like egotism in me to say so, but I am honest in expressing the belief that few men among those who will assemble at 117 East Twenty-third street on the 29th. are so well entitled to speak upon that topic as myself. Not because of peculiar fitness on my part, but because I have seen so much in the last half dozen years which has demonstrated the value of social intercourse.

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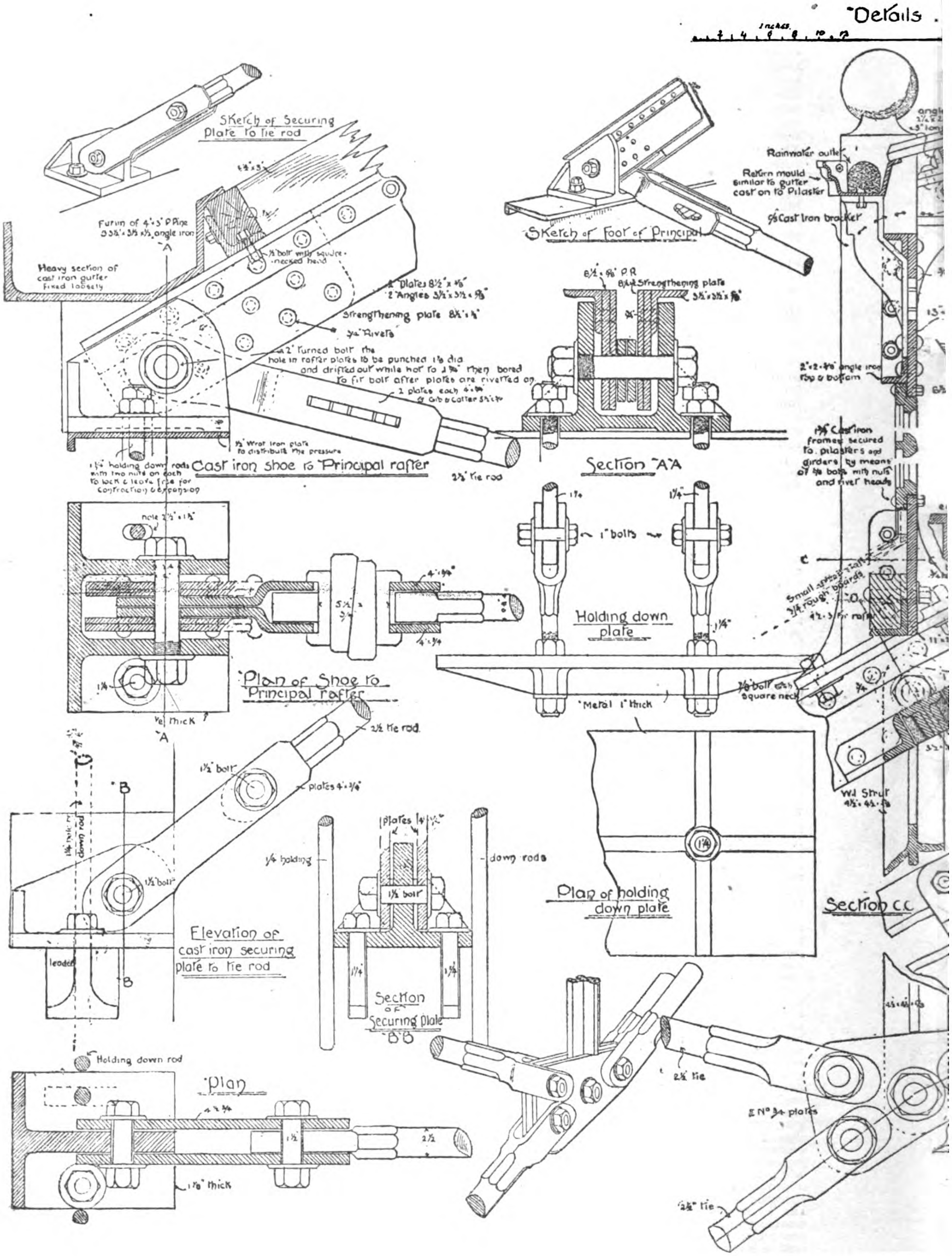

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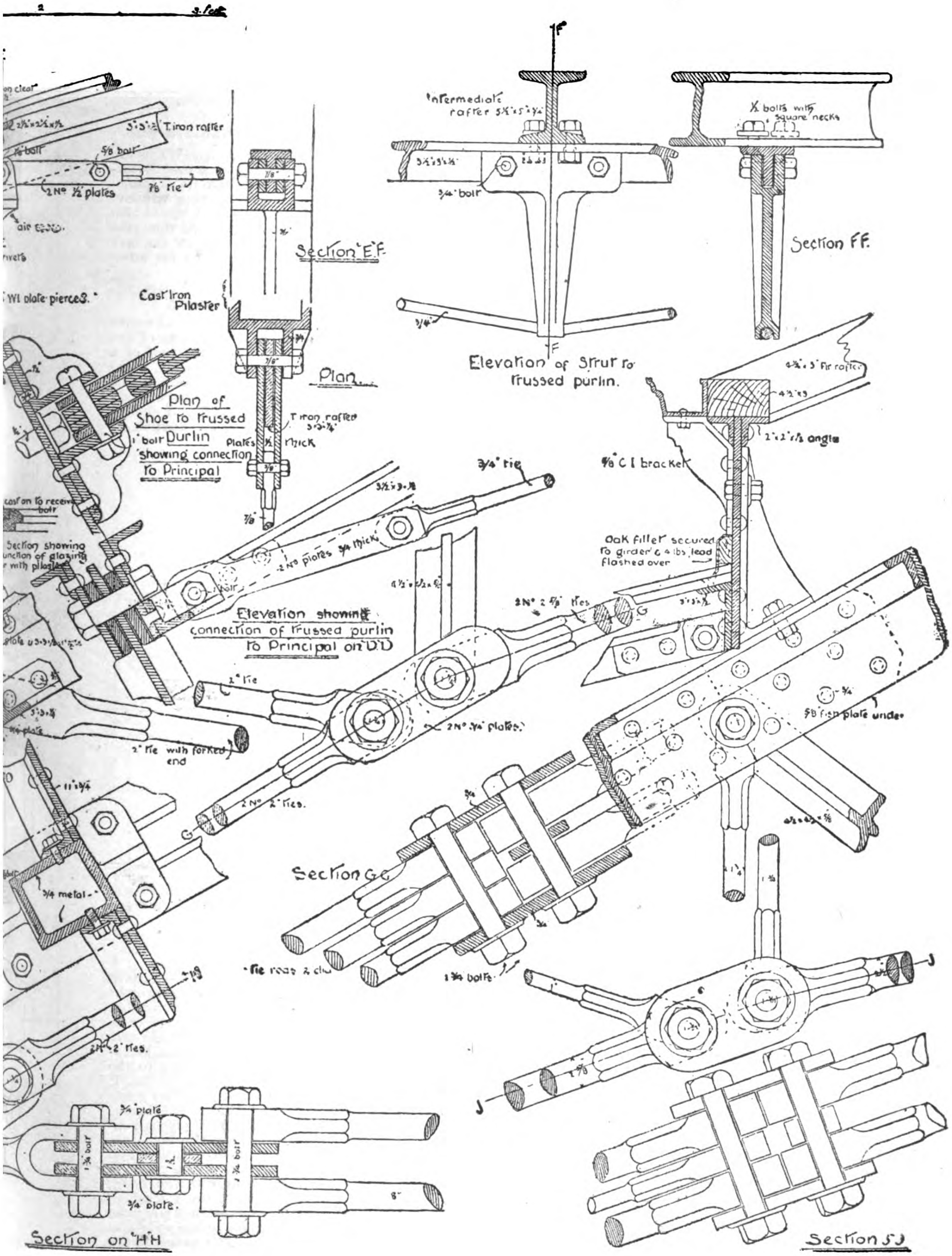

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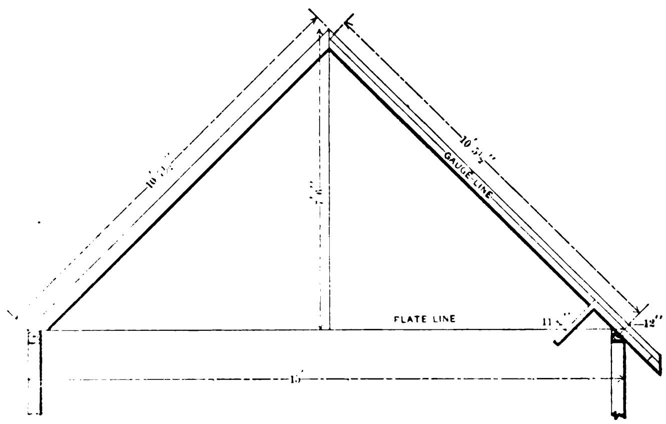
CORRESPONDENCE.

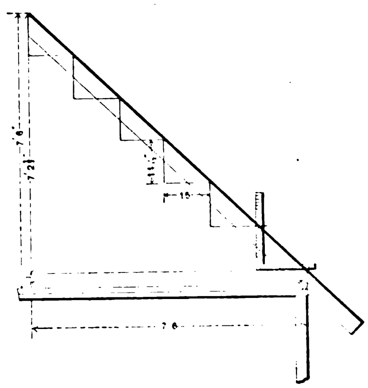
Framing a Roof of One Foot Rise.

From E. K., *Adrian, Mich.*—In the December number of *Carpentry and Building*, "N. E. O." of Portsmouth, N. H., desires to know how to measure the length of a rafter when confined to a certain hight. He must not think because the rise equals the run that 12 inches on the blade and 12 inches on the tongue of the square must be used to obtain the length or give the bevels. As the rafter runs over the plate it rises above it, and this changes the pitch of the roof; therefore the first step is to determine the size of the notch along the under side of the rafter in order to fit the plate, and how much remains of the rafter directly above on the plumb line. This hight must be subtracted from the whole hight, and then we are ready to measure the length by first dividing the remaining rise and run by some number which will divide both into the same number of parts, using inches and fractions of an inch as given on the square. Referring to the sketch which I inclose, suppose the rafter to be 5 inches wide and the notch for the plate be cut to the center of the rafter. As the angle is nearly 45°, half the diagonal distance across 5 inches square is about $3\frac{1}{2}$ inches. This is the rise above the outside line of the plate which, subtracted from 7 feet 6 inches, the whole hight, leaves 7 feet $2\frac{1}{2}$ inches rise and 7 feet 6 inches run, which in this case will divide just six times—$14\frac{5}{12}$ inches on the rise and 15 inches on the run and gives the bevels required. Always begin at the top of the rafter and measure down the plumb line at the heel the $3\frac{1}{2}$ inches and cut the notch for the plate. I measure all kinds of rafters from the back when the stuff is straight. In framing rafters by this method it is unnecessary to know the length, and, when once understood, a man need not be afraid of any kind of a rafter.

From A. S., *Lancaster, Ill.*—I notice the letter of "N. E. O.," Portsmouth, N. H., who asks in the December number of *Carpentry and Building* how to frame a roof having a 12 inch rise and with rafters running over as shown in his sketch. In reply I would say, draw a gauge line as in rafter No. 3 of his diagram, using it as a guide line for the square or for measuring the length of the rafter. If the roof must be 7 feet 6 inches high above the plate and no higher, my way of doing the work would be to make a drawing similar to the sketch which I inclose herewith. First it is necessary to find out what will be the pitch of the roof by running the rafter over. Referring to the sketch, draw a line for the back of the rafter, starting at the desired hight of the roof. Let the run-over lift the rafter 2 inches above the corner plate, as shown in the sketch; then draw the guage line from the corner plate. Lay the square on the drawing as indicated in the sketch with the figure 12 on the blade at the corner of the plate. This will make $11\frac{5}{8}$ inches on the tongue of the square at the point through which the plate line passes. This gives the pitch $11\frac{5}{8}$ inches rise in 12 inches. Now, we can use the square as before. Take $11\frac{5}{8}$ inches for the down cut and 12 inches for the horizontal cut. Use the gauge line or measure the rafter in drawing on the gauge line from the corner of the plate where the line intersects with the center line. This gives the length of the rafter.



Sketch Accompanying Letter from "A. S."



Method Suggested by "E. K."

Framing a Roof of One Foot Rise.—Diagrams Submitted by Various Correspondents.

Shingling A Hip Roof.

From J. C. W., *Auburn, Cal.*—In answer to "A. W. P.," Buffalo. N. Y., I will say that a hip can be shingled so that it will not leak and without the use of water boards in the following manner: First, nail the hip shingle firmly in place, having the hip side of the base about 2 inches from the hip. Take a sharp chisel and pare the shingle neatly close to the hip, taking care to cut the shingle exactly on a line with the roof on the opposite side. Now nail a shingle on the opposite side of the hip and treat it in the same manner, thus continuing up the hip and laying on alternate sides. This will make a roof which will not leak even in this section, where we have very heavy and continuous rains during the winter. I prefer a hip with shingles put on roughly and a piece of tin 5 x 8 inches laid on each course with the lower corners turned under the shingles which it covers. This looks well, is entirely water proof and is very durable.

From J. W. R., *Vandalia, Ill.*—In answer to the inquiry of "A. W. P.," Buffalo, N. Y. I cut tin shingles 5 x 9 and turn the lower corners under, slipping them up beneath the shingles and nail the upper edge, which will be beneath the next course. I think there is no other way that will beat this. It makes a first-class job, besides looking well.

Molding Cutters.

From W. H. H., *Seelyville, Pa.*—I would like to ask for a correct method of making molding cutters. Here we make all our cutters from blanks and the method employed is usually first to draw with a pencil the desired mold on paper and affix it with shellac to the face of the cutter. We then cut to the lines with the wheels, finishing with a fine file. Invariably, however, we have difficulty in getting the exact depth of members, especially for large deep molds.

Window Frames for Mansard Roof.

From A. E., *Ontario, N. Y.*—Will some of the readers of *Carpentry and Building* kindly tell me through its columns the best manner of constructing window frames for a mansard roof? I would also like a neat design of frame. At the same time I should be glad to know the best method of constructing gutters for mansard roofs.

Framing a Barn Roof.

From B. S., *Mason City, Iowa.*—I would like to have some of the readers of the paper tell me how to frame the roof of a building which is 32 x 60 feet wide, without putting in principal rafters. The farmers in this section like to have a hay fork go up as high as possible. I should like very much to see some designs of barns suitable for farmers' use and which, while being strong and durable, are not expensive.

Double Corn Crib.

From J. C. M., *Oregon, Ill.*—I have been taking *Carpentry and Building* eight years, and in that time do not remember having seen but one plan for a corn crib. I inclose rough sketches of a double crib with a wagon shed, the size of the building being 22 x 32 feet. Referring to the sketches, the space marked A, in Fig. 1, is intended for a workshop. The joists are 2 x 6 inches and rest on the beams marked B. The 2 x 4 inch pieces running from the beams to purlin posts are boarded over in order to keep things from falling off the floor while giving room to shovel corn from below into the cribs. There is a swing ladder to the workshop, which can be raised and fastened when not in use. The driveway is 10 feet wide, and each crib 6 feet wide. The beams in the cribs are well spiked through the tenons, beside being pinned, in order to assist in withstanding the strain. The purlin plates are notched for the rafters 2 inches on the rise and 3 inches on the run, being one-third pitch, which gives a good bearing and a chance to nail very strong. This arrangement does not cut away the rafter. C D and H are omitted except in the two end bents. There is a window in each end of the workshop and a door in the end which may be most convenient. Fig. 2 represents a side view, while Fig. 3 is an interior view. The space marked E in Fig. 3 is the door leading to the crib. At G, Fig. 4, is the guard for keeping the corn back and giving room to shovel. The guard is boarded over the top as indicated by the dotted lines. The stop marked I is the same width as the studding. The gain J shows position of the bottom ledge of the door. The dotted lines parallel with the notches show where the slats rest for keeping the corn from pressing against the door. The guards and slats are not nailed in place, but so arranged that they may be moved when necessary. Fig. 5 shows the manner of

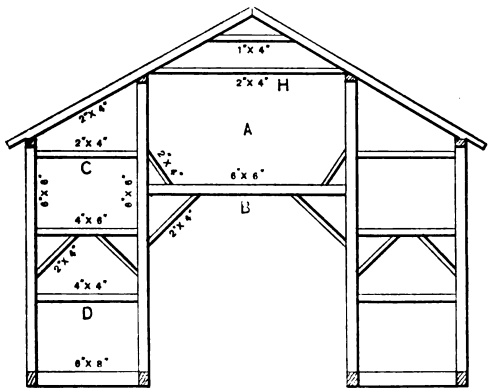


Fig. 1.—End View.

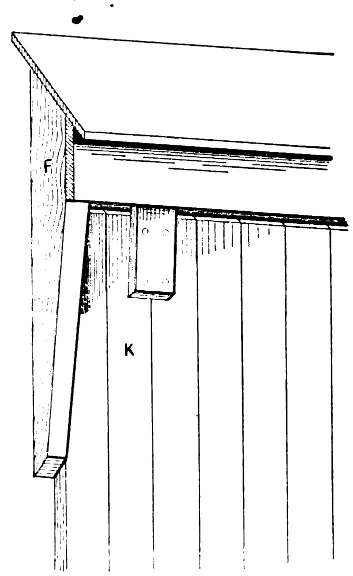


Fig. 5.—Showing Rolling Door Cap and Bumper.

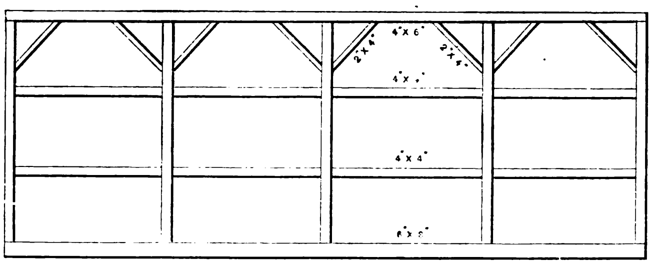


Fig. 2.—Side Elevation.

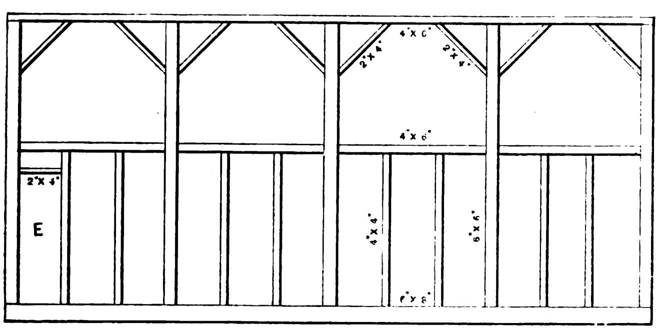


Fig. 3.—Interior View.

Double Corn Crib.—Sketches Accompanying Letter from "J. C. M."

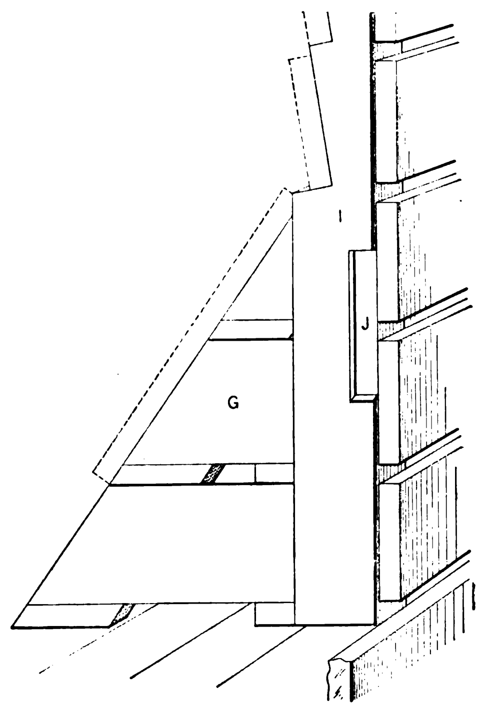


Fig. 4.—Section of One Side of Crib Entrance.

making the rolling door cap. It is readily seen that F forms the end of the door cap and is also the door bumper. Any mechanic knows that placing a bumper in any other position than with the top of the door will allow the latter to jump. In Fig. 5 the door K is represented in its open position. The building has two rolling doors at the end most used, and two swinging doors at the opposite end. The inside of the cribs are boarded lengthwise, as shown in Fig. 4. If the outside is tightly boarded and battened, I would recommend placing a medium size ventilator on the roof.

The Science of Handrailing.

From MORRIS WILLIAMS, *Scranton, Pa.*—In writing on the above subject my aim throughout will be to explain the principles upon which rests the construction of rails. These principles are traceable in every system now propounded by very numerous authors of publications on handrailing. All these systems have their origin in these principles, and all the difference there is between one and another is simply in the mode of handling the principles. I make these remarks more to create ambition in the young student to aim at mastering these principles, than to strip authors of their claim to originality. I promise every reader of my article who will succeed in obtaining a clear conception of the lines of which I make use in my illustrations that he will be able to form a system of his own as correct and simple as any now in use, and, furthermore, he will be able to surmount difficulties however complex the case may be. In my course of studying handrailing I left no system known to me without giving it a few months' study, and invariably I found something worth knowing in each one, but I may say that without knowledge of the fundamental principles preceding, no real benefit is obtainable from any system.

In constructing a wreath the first necessity is a method to find the shape the rail assumes when fixed obliquely to the axis of the figure the plan represents. The template of this shape is called the face mold. The second necessity is a method to square the joints, this including a method of transferring the tangents from the plan to the oblique plane of the elevation, also a method of finding the necessary bevels by means of which the twist in the wreath is manipulated.

Referring to the accompanying illustrations, I will proceed to explain Fig. 1. It represents a geometrical method of delineating the correct shape of an oblique section of a square block. X Y is the intersecting line of the co-ordinate planes. The horizontal and the vertical lines 1 2 3 4 below X Y represent the outlines of the base of the block: 1 4 4 above X Y represents the outlines of the side of block cut obliquely, and 1 2 3 4 above X Y represent the outlines of the section. By the aid of Fig. 2, which is an isometrical view of Fig. 1 in position, the reader will understand my meaning more clearly. The outlines of the section are found by drawing 1 2 and 4 3 perpendicular to 1 4, and making 1 2 and 4 3 equal to 1 2 and 4 3 on the base. It is important to understand this figure thoroughly, because all wreaths that need no twist in their construction have this kind of oblique sectional plane to rest upon. It is oblique to one side only, while all other wreaths have for their position planes oblique to two sides. They are oblique to the vertical and oblique to the horizontal.

Fig. 3 is an illustration of this kind of section. Let 1 2 3 4 below X Y be the outlines of the base; 1 4 above X Y the elevation of 1 4 on the base, 2 3 above X Y the elevation of 2 3 on the base. From 2, perpendicular to 0 1 4, draw 2 2; from 1 draw a line equal in length to 1 0 (being the lower tangent), intersecting in 2; make 3 4 equal 1 2 and 2 3 equal 1 4, which completes the outlines of the section.

Fig. 4 is an isometrical view of Fig. 3 in position, and the numbers correspond in both figures. All wreaths needing spring or twist have their position in this kind of plane, and it is essentially necessary to all handrailers to thoroughly understand every line made use of in developing the section, because the outlines of the section contain the angles and length of the tangents by means of which the joints are squared on the face of the plank.

Fig. 5 represents a right-angle square rail following the pitch and the angle of the plane of the section.

Figs. 4 and 5 are given here as an additional illustration of the value and meaning of the development of the section. I advise every young reader that wishes to master the science of handrailing to have a clear conception of these diagrams.

In my next article I will proceed to develop the sections of blocks having acute and obtuse angles.

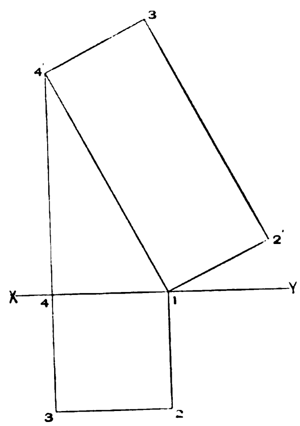


Fig. 1.

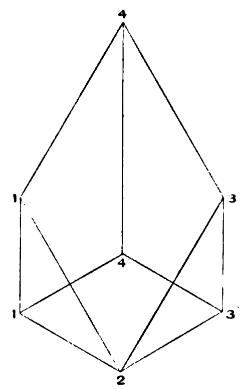


Fig. 4.

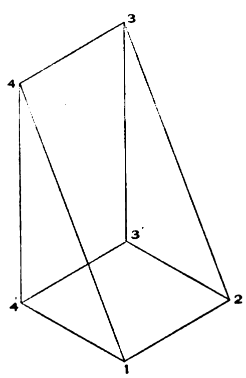


Fig. 2.

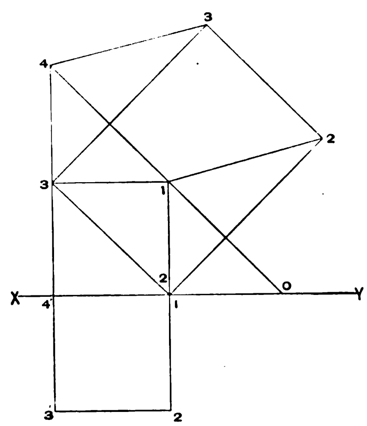


Fig. 3.

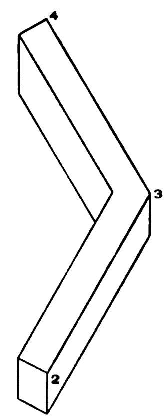


Fig. 5.

The Science of Handrailing.—Sketches Accompanying Article by Morris Williams.

American Shingle Practice.

From G. W. G., *St. Louis, Mo.*—In response to the Editor's note to the communication of W. J. McQuillen, in the February issue of the paper, I submit the following conclusions, reached after 20 years' experience with shingle roofs in Kansas and other Western States. For roofs I prefer sawed shingles to shaved ones. I think they hold paint or oil better and the nappy surface prevents snow from blowing through the joints. All shingles should be under 7 inches wide, 16 to 18 inches long with ½-inch butt and ⅛-inch point, sawed as near the course of the grain as possible. Of course the clearer the material the better it is for the roof. I nail every shingle with wire nails ½ inch from each edge and 6 inches above the butts and 1 inch above the line, so that the next course will cover the nails up that distance. I never nail in the center of the shingle unless it is desired to have a split shingle and a leaky roof. As to the material employed, my first preference is for dry cypress. This is very durable, will not warp, split or shrink, if properly put on. My second choice is dry white pine. This material I consider best for general use, but it is not so durable as cypress. My third preference is white cedar, which is tough and durable; then red cedar, which is durable but very liable to split, while my fifth choice is California redwood. This is durable, but useful only for gable finish and belt course, as it splits too easily for roof purposes. Hardwood splits do not enter into competition with the above-mentioned woods, as they are employed only on barns and sheds. The surface exposed to the weather varies somewhat with the pitch of the roof, but 4½ for 16 inches and 5 to 5½ for 18 inches will insure a good roof. The general pitch is 45°, seldom less and frequently more.

Now with regard to the treatment there are several courses which commend themselves. My first choice is to break the bunches of shingles and dip at least 12 inches of the butts in linseed oil, hot preferred, stand them in a trough to drain off the surplus oil and lay with close joints. This method will cost 3 gallons of oil and one hour's time to each thousand dry shingles. The greener the shingles, of course, the less oil is required. My next plan is to creosote the shingles after the manner just described. If color is desired, mix it with the oil in the bath. A good white pine shingle, well laid, will last in this climate for ten years and still shed rain, but snow is liable to find its way through. Shingles treated with oil as above suggested will add from three to five years to their usefulness. I have not yet lived long enough to be able to tell how long a cypress shingle treated with oil and properly laid will last, but I would be willing to guarantee a roof for ten years and keep it in repair free of expense to the owner. To paint a roof after it is laid is, in my opinion a detriment rather than a benefit, unless the shingles have been dipped before laying. The paint clogs up the joint at the butt of the shingle and holds the water in the joints above, from whence it spreads out under and between the shingles and consequently rots the roof.

With regard to covering hips, what I have to say will also answer the inquiry of "A. W. P." of Buffalo, N.Y. A board-covered hip is an unsightly affair and always warps out of shape. A galvanized iron roll looks well, but does not always prevent leaks. A very neat and tight job is made by laying in tin shingles with every course. I cut the tin shingles 5 x 10 inches and shape the lower end to conform to the lines, according to the pitch of the roof. I bend the lower end down the thickness of a shingle, so it will cover the butt of the hip shingle. Smooth off the hip shingles in the usual manner, and cover each course with one of these tins, nailing securely.

WHAT BUILDERS ARE DOING.

AS THE OPENING of the building season for 1892 more nearly approaches, it is apparent from correspondence and other sources of information that the prospect generally throughout the country is satisfactory. In certain localities prospective operations seem to be below the mark, as the effect of local conditions, but, on the whole, the season promises to be a favorable one. Agitation on the part of the workmen for shorter hours, more pay, &c., is continually growing less aggressive, as the employers are becoming better organized and in a better position to assist at the establishment of conditions that are mutually satisfactory. There are at present a greater number of conferences being held between employers and workmen looking to the settlement of the conditions of the year's work on the basis of arbitration than ever before. Both sides are beginning to recognize more fully the value of a mutual understanding with each other, upon subjects which affect them in common, and each is more willing to assist in bringing about mutually satisfactory conditions, than ever before. The element of coercion is gradually being displaced by arbitration, and although it is still oppressively used in some of the larger centers, it is surely being displaced by better methods of securing desired ends.

Baltimore, Md.

The builders of Baltimore are taking more interest than ever in the Builders' Exchange, new members continually being enrolled and the meetings unusually well attended. At the quarterly meeting on March 1 an elaborate lunch was served and an exceedingly interesting address on "Colonial Houses" was delivered by J. Appleton Wilson, one of the prominent architects of the city. The address was received in the most flattering manner and was thoroughly appreciated by all. J. P. Brady made a report for the delegates who attended the sixth convention, which was received with interest and attention. Three sets of plans for the new building to be erected by the exchange were submitted for consideration and a number of additional subscriptions to the building fund were received. Secretary E. D. Miller states that the exchange is in a flourishing condition and that the prospects for the coming season in the building business are good.

Boston, Mass.

The Mason Builders' Association and the Stone Masons' Union, of Boston, have entered into an agreement relative to the hours of labor and rate of wages for 1892. The agreement states that nine hours shall constitute a day's work for five days in a week, and eight hours on Saturday; that 42 cents per hour shall be the rate of wages for regular working time, and 63 cents per hour for overtime; that all work performed on legal holidays shall be paid for at the rate of 84 cents per hour; that work subject to interference from tidewater, so that full time cannot be made, shall be paid for at the rate of 75 cents per hour. This agreement was ratified at a meeting of Stone Masons' Union.

No trouble is anticipated between employers and workmen during the coming season. The carpenters are working for an eight-hour day but are opposed to strikes and disturbances. It is expected that some arrangement will be made whereby the change will be effected in a harmonious manner.

The sixth annual dinner of the Master Painters' and Decorators' Association, at the American House, March 3, proved to be an enjoyable occasion. At a business meeting held previous to the banquet, the following officers were elected: President, J. B. Hand; vice-president, Henry Harper; secretary, C. J. Campbell; treasurer, Thomas Shay.

The delegates to the National Convention, recently held at St. Louis, made their report, showing the organization to be in a flourishing condition.

Buffalo, N. Y.

At a meeting of the Builders' Association Exchange, held February 29, the subject of manual training was taken up and discussed and referred to a special committee composed of J. J. Churchyard, E. L. Cook, G. M. Stowe, Henry Schaefer, E. M. Hager and James Boland, with full power to take such steps as they deem best to influence the Common Council to establish a training school in Buffalo at which trades shall be taught to boys.

It was also decided by the exchange that a committee be appointed to confer with all other business organizations with a view to uniting and pushing the work of the Grade-Crossings Commission to a completion.

A section of the new charter provides that contractors while doing work for the city shall not work their men more than eight hours a day. This was discussed and referred to the president, who was to call a special meeting within three weeks, when the matter will be considered fully. The question seems to be whether there shall be a uniform eight-hour rule for all work, or whether the charter cannot be changed so that nine hours constitute a day's work on city contract labor. The builders say they cannot hire men to work on outside contracts for nine hours a day and pay them the same wages they do to their men who are working only eight hours on city work.

Chattanooga, Tenn.

The builders are having some little trouble over the wages of stonecutters. All the contracts for the burned district have been let, but the union stonecutters will not be able to do a stroke of work. The union men were barred originally by Contractor Chandler, and and he has given certain stone work to Mr. Troutt, who intends employing men brought in from outside. Last May, by mutual agreement, the price for work was fixed at 42½ cents, and this was entirely satisfactory, although the men believed that they ought to get 45 cents. But the contractors for the new custom house had already contracted for work at 40 cents, and the compromise price of 42½ cents was accepted by the Stonecutters' Union. Some time ago Mr. Troutt wanted to make a reduction to 35 cents, but two stonecutters he had in his employ declined to accept the reduction and were discharged; hence the trouble.

Chicago, Ill.

The working rules between the employers and workmen in the bricklayers' and stonemasons' trades which were in force last year, and which were given in these columns at the time of their adoption, have been ratified for the present year with the exception of Article 4, which reads:

"Eight hours shall constitute a night's work. Night work shall commence at 7 p. m., and shall be paid for at time and one-half. Sunday shall be paid double time." An addition has been made to this rule, which now reads: "Sundays and national holidays shall be paid double time." The addition of the national holidays was made in order that the foreigners among the bricklayers might become patriotic.

The workers in staff, the material with which the World's Fair buildings are to be finished and ornamented, created considerable trouble recently by a strike for more pay. After some delay a compromise was effected and the work proceeded.

The consideration of the proposed limitation of the hight of buildings is still going on, the matter being at this writing in practically the same condition as presented in the last issue of *Carpentry and Building*.

Cincinnati, Ohio.

The Builders' Exchange of Cincinnati has moved from its former location to larger and more commodious quarters in the Grand Opera House block. The new rooms were formally opened on Monday, March 7, that being the date of the annual meeting. The occasion was a very interesting and enjoyable one, a bountiful lunch being served, and the election of officers taking place.

The Builders' Congress, which is composed of representatives from the various branches of the building trade, and which bears the same relationship to the Employers' Association as the Amalgamated Council to the trades unions, was the subject of a very able address by W. A. Megrue. An entirely erroneous impression in regard to the Builders' Congress had been established by one of the Cincinnati newspaper in the minds of those not more correctly informed, and Mr. Megrue took advantage of the occasion to explain the nature and purposes of the organization. The congress and the Builders' Exchange are in the utmost harmony with each other, and they are engaged upon virtually the same objects, the one being more or less dependent upon the other. The representation of the various trades in the congress is secured by the election of delegates from each separate trade connected with building, and the united action of these representative delegations constitutes the action of the congress. Mr. Megrue treated the subject very thoroughly and laid particular stress upon the fact that the congress and the exchange were branches of the same tree, and strongly advocated closer union of action and interest among the employers. The meeting was one of the best that the exchange has held for some time.

Cleveland, Ohio.

The Building Trades Association held a very pleasant informal reception in their new rooms, in the Arcade Building, on the evening of March 1. Ever since the association was founded the offices have been on the third floor of the Arcade, but the growth of the organization has been so great during the past few months, and especially since the national convention, that it was found absolutely necessary to get larger quarters. Consequently five rooms on the second floor of the Arcade were rented, and will in future be known as the Builders' Exchange. The rooms are all large and well lighted, and have been admirably arranged and fitted up for the purpose. The reception in honor of the opening of the new rooms and the change of name was supplemented by a most excellent lunch. The president, E. H. Towson, presided, and made a brief address upon the growth and progress of the organization. He was followed by C. C. Dewstoe, Hon. D. A. Dangler and others. About 150 were present, and the affair was a very pleasant one and thoroughly enjoyed by all. The exchange now numbers about 125 members, and is in a better condition than ever before.

Denver, Col.

The Master Builders' Association of Denver held their regular semi-monthly meeting in their rooms in the Sun Building, March 2, President Baker presiding. The principal topic of discussion was the new mode of conduct in relation to sub-contractors giving their bids to the general contractors. It has been discovered that some of the lowest bidders have not received the contracts they bid upon. It is supposed that the lowest bidder should secure a contract if a responsible, respectable and competent man.

No final action was taken in the matter, but it was referred for settlement to a future meeting, this discussion being only preliminary.

Some talk was had of a banquet to be given soon, but nothing definite was done in the matter.

Detroit, Mich.

The building interests of Detroit seem to promise well for the approaching season. The agitation among the carpenters looking to a strike on May 1 will probably be abandoned, and none of the other trades give any indications of proposed unfavorable action.

At a meeting of the Committee on Ordinances, held March 4 in the City Attorney's office, at which several aldermen were present, together with Building Inspector Simpson, a delegation from the Builders' Exchange was present in advocacy of a petition for the passage of an ordinance for the better protection of life and limb of persons employed by contractors and others in the erection of buildings in the city of Detroit, requiring the laying of permanent or temporary floors during the progress of construction.

Each of the delegation spoke and strongly pointed out the necessity of such regulations for the prevention of accidents. The ordinance, it was claimed, could be rigidly enforced, and the good results would soon make themselves manifest. Such a measure was in force in Cleveland.

Building Inspector Simpson said that at the convention of the Building Inspectors' Association, recently held in Cleveland, the matter was discussed, and all agreed that the laying of floors in new buildings was imperatively necessary for the protection of workmen.

Alderman Buhrer expressed himself as being heartily in sympathy with the movement of the petitioners; he believed that the ordinance would be a very wise one to adopt, but there was a legal question involved whether the Common Council had a right to pass such a measure, and it would only be a waste of time to pass an ordinance which afterward would be declared invalid. However, he gave the delegation his assurance that he would expedite the matter as rapidly as possible, and if a favorable opinion was received from the attorney the ordinance would be immediately reported. This was satisfactory to the callers. The exchange is at present engaged in formulating rules for the government of estimating and the letting of contracts, and there seems to be a movement in favor of direct contracting. The secretary, Joseph Myles, in a letter under date of March 7, says that the affairs of the exchange have been very much improved and benefited during the past two months. Twenty new members were admitted at the last regular meeting, and there are eight applications now posted awaiting action. The whole tone of the exchange has been greatly improved since the last convention.

Grand Rapids, Mich.

Affairs in the Builders' and Traders' Exchange of Grand Rapids, have been undisturbed during the past month, and nothing of importance to the building interests of the city has transpired.

Kansas City, Mo.

The reorganization of the Builders and Traders' Exchange of Kansas City, which has been under way for some time, has recently been effected, and the Exchange has become incorporated, with a capital stock of $20,000. The number of stockholders is limited to 100 and no person who is not a member of the Exchange can hold stock. The Exchange is in a much better condition than ever before and under its present form it becomes an institution of much more stability and influence than under the old form of organization. The past depression in building interests had worked to the disadvantage of the Exchange, and many members were lost from non-payment of dues and similar causes. As the organization now exists, however, such a condition in the future is almost an impossibility.

Lowell, Mass.

The Master Builders' Association of Lowell, is to send a committee to the next meeting of the Building Commission, to revise the charter and ordinances. This committee will consist of Messrs. Conant, Murphy, O'Hearn and Weaver. They want to impress upon the commission the need of an ordinance to provide for an inspector whose duties shall be to look more carefully after all building done within the city limits.

The association wants the inspector to be a master builder, as advocated by the National Association. He shall examine all plans of buildings and regulate the plumbing, and see that proper fire regulations are maintained. He is to look after all buildings that are to be moved and report to the aldermen, who shall act on his report. All requests for obstruction of streets are to be passed upon by him. All these things are to happen if the inspector is made possible under the new ordinances.

It is also thought that regulations should be made so that no tenement block shall be more than 40 feet high, and there should be a brick division every 40 feet in tenement blocks. As reasons for all these things the master builders claim that the reduced rates for fire insurance and the help the assessors will get from the location of new property will more than repay the taxpayers for the outlay in the way of salary for the proposed inspector. This is in the line advocated by the Joint Committee on Building Law, composed of representatives from the National Associations of Building Inspectors, Builders, Fire Engineers, Insurance Men and the American Institute of Architects.

Lowell is the first city to take action in this direction, and the other exchanges would do well to follow her example.

Louisville, Ky.

The Builders' and Traders' Exchange of Louisville is hard at work holding frequent meetings for the purpose of perfecting the plan for erecting a building of its own. The project has been under consideration for some time, and it is expected that the near future will see ground broken for a suitable home for the exchange that shall be its own and shall concentrate the building interests of the city about itself.

Milwaukee, Wis.

The new building being erected by the Builders' and Traders' Exchange of Milwaukee is progressing finely, and the exchange is receiving due benefit from the increase in its influence caused by its becoming more prominently identified with the commercial interests of the city.

So far as the amount of building is concerned the contractors expect a very favorable season, but at the same time they expect trouble with their men this spring, although it is not yet known what the demands of the labor organizations will be. It is probable that there will be a demand for an increase of wages from the carpenters and masons. There is no complaint from the men as to hours, as the building trades have all adopted the eight-hour day, so that whatever demands are made will be on the question of wages. The carpenters will probably ask that the minimum rate be fixed at the Chicago figure, 35 cents per hour. The lathers have asked that their wages be increased from $2.40 to $3 per day after May 1. The present schedule is: Stonemasons, 40 cents per hour; bricklayers, 45 cents; plasterers, 40 cents; lathers, 30 cents; hod carriers, 22 cents. Carpenters, rough, 25 cents; regular, 27½ cents; finishers, 30 cents; stonecutters, 45 cents; house painters, 25 cents. The masons and bricklayers struck about March 1 for double time on Sunday instead of time and one-half, and the matter is still in abeyance.

Minneapolis, Minn.

The Builders' Exchange of Minneapolis reports everything in its usual condition, the only ripple in the labor market being the demand of the painters for 30 cents per hour. They are now receiving 25 cents, and say that unless the advance is granted by April 15 they will strike.

The members of the Painters' Union have been wise in their selection of a time limit in their demand for an advance from 25 to 30 cents an hour. There ought to be plenty of work for them by April 15, for if the signs do not fail the coming season is to be a busy one in the building trades. That there is to be an advance all along the line in the building trades does not of necessity follow, although it is believed by a great many that the activity in building will be sufficient to warrant some stiffening of prices.

New York.

In such large centers as New York City there are complications continually arising in the field of labor that affect only a small portion of the great community and are not of sufficient importance to attract general attention, either as indications of the condition of workmen or the existence of radical wrongs, and have no particular significance. A peculiar condition of affairs has recently resulted in that city from efforts of one union to raise the wages of another which was contented with its wages, and as a result of the disturbance created by the Board of Walking Delegates other disinterested trades were brought into trouble and ordered to strike. This latter condition provided an excellent opportunity for establishing a plan of arbitration between the employers and workmen. The contractor for the wood work on the Astor Hotel and other buildings employed in his shop both carpenters and cabinet makers, paying the former $3.50 per day and the latter $3 per day of nine hours, with which the cabinet makers were contented. Shortly before March 1 the carpenters demanded that the cabinet makers be paid $3.50 per day, the same amount paid to the carpenters, which the contractor refused to do, considering it outside the province of one trade to demand an increase of pay for another trade, the members of which appeared to be satisfied with their wages. The matter was carried before the Board of Walking Delegates, in which each trade was represented, and after a stormy time the cabinet makers were ordered to demand the raise on pain of expulsion, which demand being finally made was conceded by the contractor after a short strike. While the strike was in force the walking delegates made several attempts to call out other trades on the buildings being erected by the contractor in question, but without success, except in the case of the members of the union of Eccentric Engineers. This union comprehended in its membership all kinds of elevator engineers, and as a whole did not represent a building trade union, although the hod elevator engineers were included. When these engineers struck the opportunity presented itself for the formation of a union that should have arbitration as the means of settling future differences with its employers, and at the request of A. E. Pelham, of the principal hod elevating company, the men met, and with the assistance of Stephen W. Wright, the secretary of the Mechanics' and Traders' Exchange, withdrew from their old alliance and formed a new union upon the basis mentioned, calling themselves the Brotherhood of Elevator Men. The new union agreed to settle all differences directly with employers without outside interference and immediately resumed work. The trade principally affected by disturbances among hoisting engineers is the masons. The following communication was sent by the Mason Builders' Association to the Pelham Company:

The Pelham Hod Elevating Company, New York City.—GENTLEMEN: At a meeting of the Mason Builders' Association, held at the Building Trades' Club on Thursday evening, March 10, the following resolution was adopted:

Resolved, That the Mason Builders' Association is in favor of an independent organization of hoisting engineers, and that the secretary notify the hod elevator companies of New York City to that effect.

Truly yours,
CHARLES T. WELLS, Secretary.

The Iron League passed the following resolution about the same date:

Resolved, That the Iron League extend its sympathy to the Pelham Hod Elevating Company in its struggle against the unwarranted and intolerable interference of the Union of Eccentric Engineers with its legitimate business

"*Resolved*, That the Iron League and the members thereof give every possible aid to the Pelham Hod Elevating Company in its endeavor to conduct its business in its own way.

J. E. CORNELL, President.
B. E. J. EILS, Secretary."

The following letter is given as an indication of the value and appreciation of earnest, effort to secure better and more just conditions in the interest of both workman and employer. Mr. Wright was largely instrumental in securing an amicable adjustment of the affair, and such power rests in the hands of the secretary of every exchange in the country and should be used earnestly on every opportunity.

PELHAM HOD ELEVATING COMPANY.
New York, March 11th, 1892.

Stephen M. Wright, Secretary Mechanics' and Traders' Exchange.

MY DEAR SIR: I desire to express thanks both for myself and the Brotherhood of Hoisting Engineers for the active interest you have manifested in their new movement. I refer more particularly to your having obtained the consent of the Mason Builders' Association to receive a committee of the Brotherhood, and to hear what they had to say for themselves in justification of the step recently taken for independence.

I hope you will continue the active sympathy, which is very highly appreciated.

Yours very truly,
ALPHONSO E. PELHAM, President.

Since the above was written, fresh trouble has arisen, but at the hour of going to press a speedy settlement of the difficulty seems probable.

Omaha, Neb.

The Builders' and Traders' Exchange of Omaha is continuing its monthly meetings, at noontime, with great success. Topics of importance are considered and thoroughly discussed, and lunch and cigars are served At the meeting held March 10 the subjects up for discussion were: "The opening of all bids in architects' offices to take place at a specified time and in the presence of the bidders."

Complaints are made that bids are frequently put in to be opened at some unknown time, and that outside parties—usually friends of the owner—put in bids and capture the contract in various ways unjust to the contractors.

The question was ably discussed from all sides, after which F. Dellone introduced a motion calling for the appointment of a committee of three to call on the architects in the city and see if they will sign an agreement to receive bids on certain days at certain hours, and to have the same opened in the presence of owners and contractors.

The motion prevailed and the chair appointed F. Dellone, William Arthur and Jacob Jobst.

The next question was, "What is a legitimate percentage of profit for a contractor?" No particular figure was settled upon by the body, but the discussion called out a general condemnation of the present lien law, as working hardship and injustice to honest contractors, for the reason that it opens the field for dishonest and irresponsible men to come in and get work at less than cost. The voice of the meeting seemed to be that to-day responsible and honest contractors in Omaha are paying for the privilege of doing work. This law was represented as being the capital of irresponsible contractors and the sentiment was strongly for its repeal.

These meetings have created a greater interest in the exchange than has previously existed, and the members are beginning to recognize the importance of identifying themselves with an organization that is seeking to correct the evils which exist in their business.

At a meeting of the Brick Manufacturers' Association it was decided to adopt a uniform size of brick. After considerable discussion the National standard size was adopted and an ordinance has been drawn up, with the endorsement of the Building Inspector, and placed before the City Council with the petition that it be adopted. From present indications the ordinance will pass.

The exchange is continually growing in size and importance and is rapidly assuming an important position among the institutions of the city. Several new members were added last month.

Philadelphia, Pa.

At a meeting held in the latter part of February the subjects of the relations between architect and builder, forms of contracts, &c., were under consideration, and during the discussion much fault was found with the existing requirements of bidding.

For instance, nearly every contract signed by builders in Philadelphia contains this clause: "And all other work necessary to complete this building must be done at the behest of the architect, without extra cost." When the building nears completion a thousand and one things may turn up which are necessary to entirely finish the structure, but which were not in the plans or specifications. The architect then, when appealed to as arbitrator, having at heart the appearance and finish of his building rather than the contractor's interest, in nine cases out of ten decides that these additions must be made, thereby involving material added expense for which no calculation was made in the bid.

Another cause of cavil consists in the great ambiguity which is the rule in plans and specifications. Builders are asked to estimate upon work the quality of which is not specified, and which varies often from 200 to 300 per cent. Under other specifications sometimes submitted an intelligent bid is impossible.

The address of President McAllister of the National Association at the sixth convention furnished a basis for much argument in favor of greater equity in bidding.

The consideration of the subject of a builders' bank, which was scheduled for the meeting was postponed on account of the absence of the member who had the matter in charge but will be brought up at the next conference meeting. These conference meetings are called for the purpose of debating the best means for carrying out plans that have been proposed for the welfare of the builder and the exchange, and are always accompanied by a lunch. It is expected that future conference meetings will be addressed by some prominent person on topics of importance.

The Legislative Committee is at work drafting a bill to be presented to the State Legislature to provide for the reconstruction of the building laws.

The builders suffer most from the faulty laws, and it is proposed that a bill shall be drafted by John G. Johnson, attorney for the exchange, which will be presented to the Legislature for passage. At the next meeting of the exchange all the provisions of the bill will be considered, and it is quite likely that a section will be introduced providing for the condemnation of poorly constructed and other dangerous buildings. If the bill drafted is finally approved by the exchange the Legislative Committee, of which Franklin M. Harris is chairman, will take charge of it and endeavor to have it passed and approved early in the next session of the Legislature.

An effort is being made by the exchange to secure more explicit and satisfactory plans from architects, and the movement bids fair to assume far more importance than was originally anticipated, and will doubtless culminate in an early conference between the committees of architects and builders respectively.

The attempt to secure a separate building for the trade schools is still being prosecuted, and it is not unlikely that President Dobbins will eventually secure a building for the exclusive use of the Master Builders' School of Mechanical Trades.

The exchange placed its seal of condemnation, as one of the prominent institutions of the city, on the trolley wire system of street car operations at a special meeting called for the purpose of considering the subject.

St. Louis, Mo.

The Mechanics' Exchange of St. Louis was called to order for the last time on March 11, and adjourned as the Builders' Exchange of the city of St. Louis. The change has been quietly contemplated for some time, and was made on the date mentioned and carried by a very large majority. The exchange will also occupy new quarters after April 1 in the Bell Telephone Building, recently completed at the corner of Tenth and Olive streets.

The new location is much more desirable than the old one and the rooms are a very great improvement over the old quarters. The entire second floor of the Telephone Building has been rented by the exchange for a term of years and has been handsomely fitted up with every possible convenience for the comfort of the members and to facilitate the transaction of their business. The building itself is located in the very center of the business portion of the city, which fact will doubtless be of great benefit to the exchange.

Secretary Walsh writes that the exchange is in excellent condition and that the prospects for the coming season are good.

San Francisco, Cal.

A special meeting of the members of the Builders' Exchange was held March 2 for the purpose of nominating a Board of Directors to serve during the ensuing year. There was a good attendance of members, Charles C. Terrill presiding.

The old Board of Directors was unanimously named for the ensuing term, but A. Hosmer declined a renomination, and J. P. M. Phillips was nominated in his stead. The annual election will be held on the 21st inst.

The ticket nominated is as follows: Charles C. Terrill, C. C. Morehouse, William Cronan, J. F. Riley, M. J. Donovan, A. Hosmer, J. K. Firth, O. Lewis, William N. Miller, A. W. Starbird, T. W. Peterson.

The Building Trades Council is seeking to abolish sub-contracting on all city work, affirming that when a large contract is let to one contractor and sublet by him, the better class and better paid workmen are discriminated against in favor of inferior workmen for the sake of cheapness. The matter is now before the City Council.

Syracuse, N. Y.

The Master Builders' Association of Syracuse has been holding meetings about once each month for some time past for the purpose of listening to addresses upon pertinent topics by prominent men. "The Rights of the Lowest Bidder," by William Crabtree; "Homes for Workmen," by C. N. Sims, and an address from Architect Archimides Russell, are some of the subjects and speakers that have been presented.

The stonecutters of Syracuse have addressed a protest to the Mayor against the use of stone dressed in other cities, and have requested all architects and builders to assist them in their efforts to have the stone used in the city cut in the city.

Pueblo, Col.

James Allan, the secretary of the Master Builders' Association of Pueblo, reports the following officers as being elected at the recent annual meeting for the ensuing year: President, M. J. Kean; vice president, Andrew Glover; secretary, James Allan; treasurer, Daniel Mahoney. The building interests of the city are rather dull at present, and it is feared that the prospects for the coming year are unfavorably affected by the mining excitement in the vicinity.

Wilmington, Del.

The Builders' Exchange of Wilmington is perfecting the plan, which has been under consideration for some time, for creating a building fund with which to erect a building of its own.

The Committee on Site reported progress at the last meeting of the Board of Directors, March 7, and suggested the formation of a stock company, the stock to be held by the members of the exchange. The committee was authorized to continue its investigations and report again at the next meeting. The directors approved and indorsed the Wilmington Industrial Improvement Society, which has a manual training school in contemplation.

The building interests of the city are rather quiet just at present, but it is expected that there will be plenty of building after the season fairly opens up. Membership in the exchange is continually increasing, there having been several desirable additions during the past month.

The Board of Directors of the Builders' Exchange has adopted the following resolution; which is self-explanatory:

Whereas, The impression has been made upon the minds of some that there exists a feeling of antagonism between this exchange and the Wilmington architects, we desire to disclaim any such feeling on the part of the exchange. While some of our members have felt personally aggrieved at the treatment they have received, feeling they have not been treated fairly, and while in some cases which have been cited this seems to be true, and has doubtless inured to the disadvantage of the architect, as a body we have no animosity, and having no control of individual sentiment we are not responsible for their private action, unless in violation of our rules. The interests of the architect and builder being mutual, we desire such friendly relations as will insure a perfect understanding and harmonious action between the two.

As an earnest of this feeling we have each year issued annual tickets to all city architects inviting them to a free use of our rooms to exhibit their plans, or for business or social intercourse. Candor compels to admit that the acceptance, or lack of acceptance, of this invitation by our home architects has been rather disappointing. We have received more from those from whom we could expect less and it is very natural to warm toward those who show us the greatest friendship. In consideration of these facts be it

Resolved, By the Board of Directors of the Builders' Exchange, that we desire a more cordial co-operation between the architects of this city and the Builders' Exchange.

Resolved, That to this end we pledge our hearty support and confidence to that profession which does so much to beautify our country and adorn our homes, asking only in return that consideration for justice and fair play that will enable us to hew to the lines and rear the structure wherein shall be interwoven beauty, strength and goodness.

Worcester, Mass.

The members of the Builders' Exchange of Worcester held a banquet in their rooms on Thursday, March 31. The invitations were issued by George Bouchard, the secretary. The gathering was one of the most important of the organization that has taken place for a long time. The managing committee was composed of George W. Carr, Thomas J. Smith and E. A. Walsh, with George Bouchard as secretary. The exchange is in excellent financial condition and the membership is constantly on the increase.

Peoria, Ill.

The following officers were elected for the ensuing year by the Builders' Exchange of Peoria, Ill.: President, C. J. Sutter; vice-president, J. D. Peck; treasurer, R. Strehlow; secretary, M. E. Bixler. The opening of the building season promises well for business.

Notes.

The builders of Hartford, Conn., are seeking the appointment of a building inspector, and the matter is now before the City Council.

The employers and workmen of Jackson, Tenn., are at work on the formation of an association that shall provide protection for the workmen.

A Builders' Exchange has been formed and incorporated at Covington, Ky., and the following officers have been elected for the ensuing year: President, George D. Loder; vice-president, John Craig; directors, John Steffen, Thos. J. Keily, Wm. Bueter, Fred. Rasche, R. Welling, Chas. Kershaw and C. Pohlman.

The Builders' Exchange of Toledo was formally organized at a meeting held on the evening of February 23. A large number were present and the receipts of the cash book, aggregating $3500, showed that 140 members were on the list. The result of the meeting showed the election of John C. Romeis, president; A. Bently, first vice-president; W. J. Spear, second vice-president, and E. J. Weis, treasurer. For some time the matter of appointing a secretary was delayed, but on Monday evening, March 7, a special meeting of the Board of Directors was held and John Stolberg was appointed official secretary, with power to appoint an assistant at a salary of $700 a year. A large force of painters, paper hangers and decorators is at work fixing up the new headquarters for the exchange, on the third floor of the Blade Building. The secretary's room will have blue paper on the walls, the business room a light drab, and the room in which the weekly sessions will be held will have a light gray colored paper on the walls and ceiling. The rooms, when finished, will be as neat and cozy as any in the city.

Builders' exchanges are being organized at Decatur, Ill., Springfield, Ohio, and South Norwalk, Conn.

The Builders' Exchange of Scranton, Pa., is now fully established. The membership roll consists of about 35 contractors and those who have not yet joined state that they will do so. Officers have been elected as follows: President, John Benore; vice-president, Frank M. Moyer; secretary, James Collins; treasurer, Thomas Lyddon.

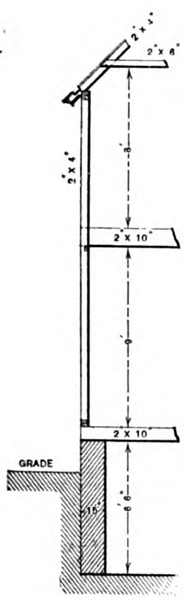
For some time past the builders of Spokane, Wash., have been at work forming a Builders' Exchange and are now fully organized and ready for business. At a meeting held Saturday evening, March 5, the following officers were elected: Frank Johnson, president; Robbert Russell, vice-president; H. C. Ashenfelter, secretary and treasurer. A large number were present and great interest is being taken in the exchange. Among the other things to be discussed at the next meeting are the recommendation of the National Association which endorses the apprentice system and the establishment of training schools wherever practicable. Material men are eligible to membership. Five firms have applied already and it is expected that all responsible firms will become members.

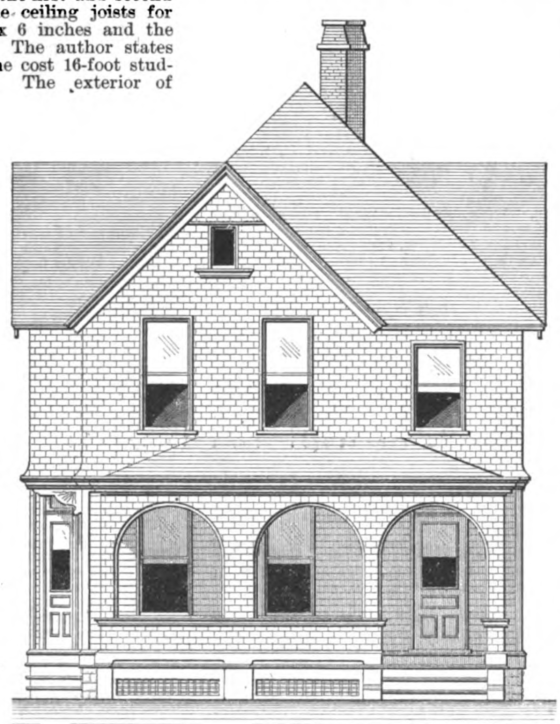
A very convenient manner of keeping information relative to the filial bodies of the National Association of Builders before its members has been adopted by the Building Trades Club of New York City. Everything published in *Carpentry and Building* which relates to the National Association, its recommendations and action is carefully cut out and pasted in a scrap book, which lies on the center table for the ready reference of all.

Sample copies of the Uniform Contract are still being asked for by builders and architects from all over the country, and the national secretary keeps a supply on hand at all times in anticipation of future requests.

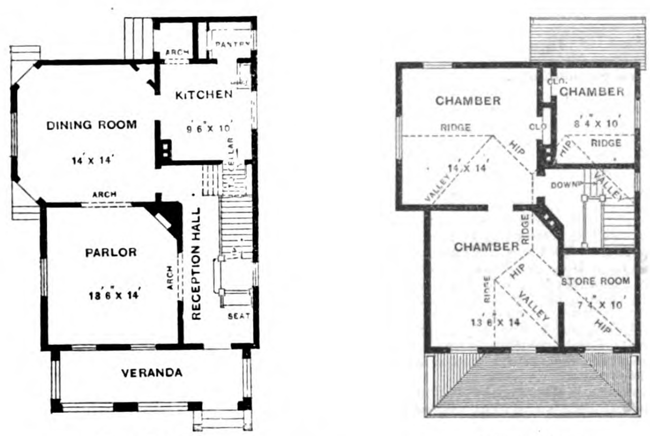
DESIGN FOR A FRAME COTTAGE.

THE DESIGN of the two-story frame cottage illustrated upon this and the following pages represents the efforts of George Barkman, architect, of Hamilton, Ohio. The house is built on a 12-inch stone foundation and has a cellar 6½ feet deep in the clear under the hallway. The joists for the first and second stories are 2 x 10; the ceiling joists for the second story 2 x 6 inches and the rafters 2 x 4 inches. The author states that in estimating the cost 16-foot studding is employed. The exterior of





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



First Floor. Second Floor.

Scale, 1-16 Inch to the Foot.

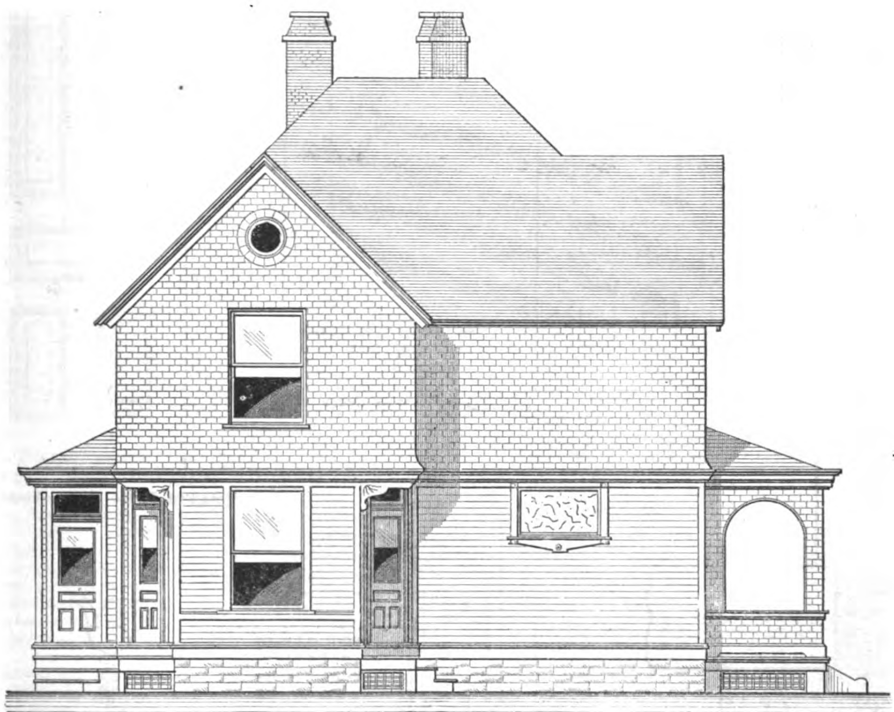
Design for Frame Cottage.—George Barkman, Architect, Hamilton, Ohio.

the building is covered with common sheeting boards and heavy building paper, upon which are laid ½ inch siding. The shingles employed are of the best 18-inch pine butts. The exterior is covered with three coats of white lead and best linseed oil. An idea of the general appearance and arrangement of the house may be gathered from an inspection of the elevations and plans presented in connection herewith. It will be seen that from the large reception hall, which is entered from a veranda extending across the front of the house, one may reach the parlor and dining room. The parlor opening is an arch which may be closed by *portières*. In this room, which measures 13½ x 14 feet, is a slate mantel. Communication between the parlor and dining room is afforded by means of an arch, from which may also depend *portières*, according to the taste of the owner. The kitchen is in the rear of the house and is provided with sink and pump which connects with a 15-barrel cistern in the yard. A pantry lighted by an outside window opens from this room, as does also a rear entry. On the second floor are three sleeping rooms and a storeroom. The interior finish of the parlor, dining room and reception hall is of oak, while the balance of the house is finished in yellow pine. The hardware for the three rooms first named is of imitation bronze, while for the rest of the house it is of japanned goods. The glass employed throughout the house is American double strength AA grade. The open stairway is of oak, with seat and turned balusters and newels. The floors are of No. 1 white pine 4 inches wide. The estimated cost of the building, which is piped for gas, is $1500 in the locality named. The author states that this figure can be considerably reduced by running the siding all the way up, leaving off the belt course, making the stairway plainer by omitting the seat in the hall and by dispensing with other things which will readily suggest themselves to the practical carpenter and builder.

Cob Walls.

The cob walls of the West of England, says the *Architect*, are composed of earth and straw mixed up with water, like mortar, and well beaten and trodden together. The earth nearest at hand is generally used, and the more loamy the more suitable. These mud walls are made 2 feet thick and are raised upon a foundation of stone work. The higher the stone work is carried the better, as it secures the cob work from the moisture of the ground. After a mud wall is raised to a certain hight it is allowed some weeks to settle; this period varies according to the damp or dryness of the atmosphere. The first layer or rise (Devonicé raise) is from 3 to 5 feet high; the next is not so high, while every succeeding raise is diminished in hight as the work advances. The solidity of cob walls depends much on their not being hurried in the process of making, for if hurried they will surely be crippled and swerve from the perpendicular. It is usual to pare down the sides of each successive raise before another is added on it. The cob parer (the instrument then used) is like a baker's peel—the shovel for removing the bread from the oven. The lintels for the doors, windows, cupboards or other recesses are put in as the work advances, bedding them on cross pieces. The walls are carried up solid, and the respective openings are cut out after the work has well settled. In forming these walls one man stands on the wall to receive the cob, which is pitched up to him by another below, the man on the work arranging and treading it down. Each workman generally uses a common pitchfork. The whole is then covered with thatch. Devonshire thatching is very superior to that in most parts of England. It is done with combed wheat straw (Devonicé reed), which consists of the stiff, unbruised, unbroken stalks, which have been carefully separated by the thresher from the fodder straw and bound up in large sheaves called nitches. The outer walls are plastered the following spring, and this plaster covered with a whitewash of lime or roughcast (Devonicé slap dash). These are dangerous processes in the hands of a builder without a cultivated taste, for such a wall, to use the metaphorical language of London, "has no beauty because it has no expression."

The whitewashing this inexpensive cob pleases the eye of ordinary tourists by the contrast it produces with the surrounding scenery, but it is condemned by the tasteful Gilpin as the most inharmonious of tints and productive of a disagreeable glare. That glare, however, is soon mellowed by the hand of time, and toned down by dirt and damp. The building then appears in most artistical and picturesque keeping. Rough cast and slap-dash are terms which accurately describe the action and effect. The wall is plastered very smoothly with lime and hair mortar; as fast as this coat is finished a second workman follows with a pail of roughcast which he throws on the soft plaster. The materials for rough-cast are composed of fine gravel reduced to a uniform size by sifting or screening, and by washing the earth carefully out. This gravel is then mixed with pure, newly-slaked lime and water, till the whole becomes of the consistence of a semifluid; it is then forcibly thrown, splashed, slap-dashed upon the wall with a large trowel. The workmen then brushes over the mortar and roughcast with the lime liquid in the pail, so as to make all, when finished and dry, appear the same color. The building is then complete; this plaster and roughcast gives the last finishing touch of beauty, the *coup de grâce*, to cob. It is like the sprinkling with comfits the sugary chalk plaster of the indigestible twelfth cake, that confectionery cob. The real worth of cob, however, consists not in these outward charms, but in the intrinsic merits of the facility and cheapness with which it is made. It will cost, speaking roughly, about three times less than stone and five times less than brick work; it requires, however, considerable time in the construction. A cob house of two stories ought not to be built in less than two years, in order that the work may settle completely. Cob is extremely durable when protected from wet above and below, for, as Hamlet's grave-digger has it, "your water is a sore decayer." This is implied in the Devonshire adage, that "all cob wants is a good hat and a good pair of shoes" Instances occur of cob houses built in the time of Elizabeth being found at this day in perfect preservation.



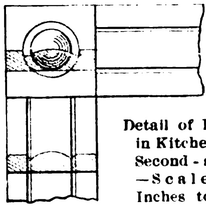
Design for Frame Cottage.—Side (Left) Elevation.—Scale, 1/8 Inch to the Foot.

Designing A House.

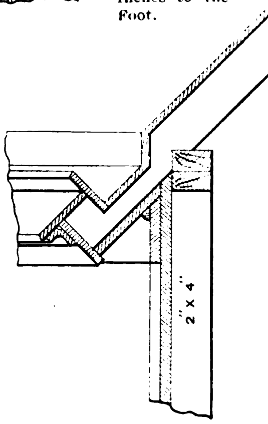
A writer in the February issue of the *Magazine of Art* says:

In the actual process of designing a house, the plan cannot be separated from the elevation and sections; the architect's mind keeps playing backward and forward from the one to the other, so that the building grows up in his mind as an organic whole. To put it in other terms, while he is at work on the plan he is constantly considering the effect of his plan on his elevation, and *vice versa*. The results of the work are duly displayed in plan, elevation and erection; and this, no doubt, leads to the false impression in the lay mind that the plan and elevation can be considered apart, and are not in necessary relation to each other. As the plan is embodied in the elevation and sections—that is, in the actual walls of the building—the two must be considered together in practice. With this provision, there are one or two matters which more particularly concern the plan. The main points to aim at are simplicity and compactness of arrangement and plenty of light. A long, crooked passage, with constant changes of level, may be very romantic and admirably adapted to the habits of the "Decameron," but with the hurry of the modern household and the unadroitness of the domestic servant, it means cold dishes and disasters with crockery, and general discomforts and ill-temper. There has been a tendency lately to overdo the queer corner and the curious passages. I have a book before me, sent out by a well-known firm of furnishers, in which there are half a dozen or more designs for ingle-nooks and bays and recesses which do not result from any necessity of the plan, but are placed at random with no particular object but that of looking queer. The real old ingle is quite delightful, with its great cambered oak-beam across the opening, 14 feet wide or more, and its red-brick floors and the old muzzle loader over the chimneypiece, and the little lead-glazed lattice with its dimity curtain; but how far away from this is the affectation of a modern ingle-nook, with its aggressive grate and mechanically stamped paper frieze and frillings of "art fabrics." If you are going to have an ingle-nook, at least keep it plain and solid and comfortable, and have a hearth before which you can stretch your legs, and a fire place big enough to burn a reasonable, good oak log. So, too, with the passages; let them be wide enough for two people to pass, and light enough to prevent their falling into each other's arms. In country houses the position of the sitting room is usually determined by the aspect, and in a house of any pretension there is sure to be a good-sized hall and an ample staircase; but the hall is worth a sacrifice, even in smaller houses. The first impression you form of a house is very often the last, and your first impression is formed in the hall. It is not in the least necessary that it should be two stories high. Some of the most charming little halls in seventeenth century and modern work are long, low rooms, sweet and homely to live in, places never haunted by the *ennui* of magnificent dreariness. For a moderate house the one-story hall is rather an advantage, because it practically gives another sitting room; and in quite small country houses, such as those that are used, say, for summer holidays, why not return to the plan of the yeoman's house of the sixteenth century and earlier, when one great hall was the general living room, and at one end were the kitchen and offices and the servants' rooms, and at the other the solar and the rooms of the master and his family? A house costing less than $5000 could have room enough for a billiard table or a dance, such as would be quite impossible in the stuffy, respectable house up the village built by the squire when he came of age. The reason for such a room would not be mere picturesqueness, but its manifold uses, its essential reasonableness, and the same reasonableness would not be afraid of the plainest work; of showing the rafters or the ceiling joists, or of lining the back of the fire place with honest red brick.

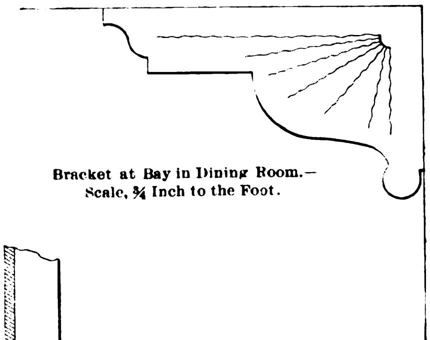
A NEW SYSTEM of builders' scaffolds is said to have been invented by a Duluth, Minn., man, who claims that his device will save at least 30 per cent. of the cost of laying brick walls by the use of the present system of lumber scaffolding. The new scaffold is made of aluminum and steel, is light, strong and durable, and is moved upward by a set of simple levers as the wall progresses upward, always keeping the bricklayer's material directly in front of him.



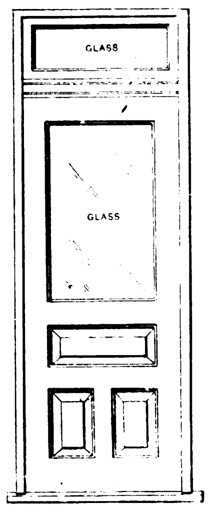
Detail of Finish in Kitchen and Second-story.—Scale, 1½ Inches to the Foot.



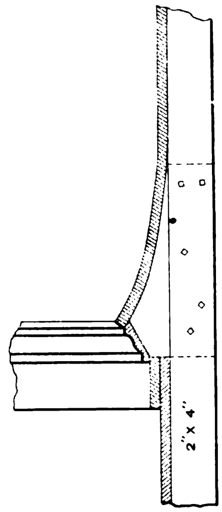
Section at Cornice.—Scale, ¾ Inch to the Foot.



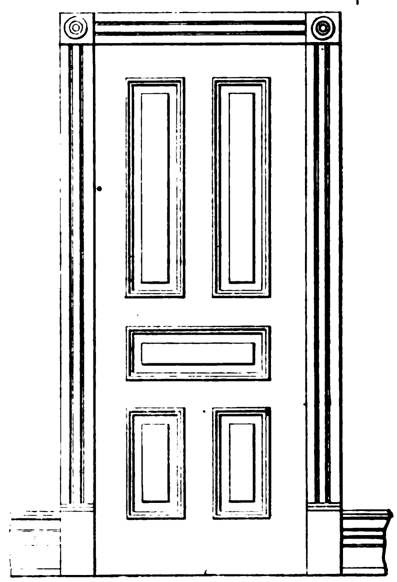
Bracket at Bay in Dining Room.—Scale, ¾ Inch to the Foot.



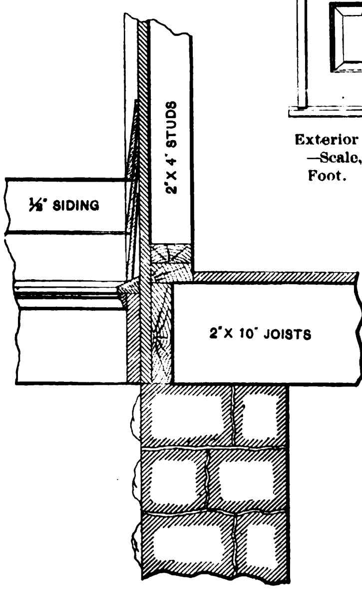
Exterior of Front Door.—Scale, ⅜ Inch to the Foot.



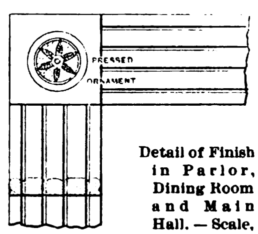
Section of Belt Course.—Scale, ¾ Inch to the Foot.



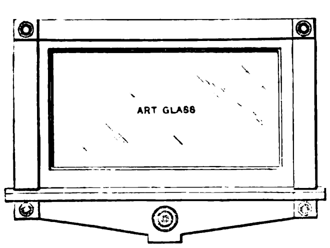
Detail of Inside Doors.—Scale, ½ Inch to the Foot.



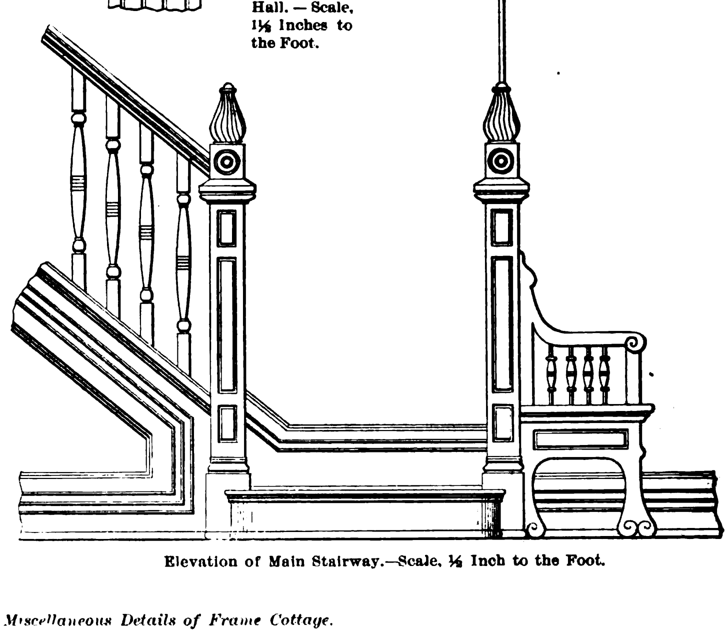
Section at Water Table.—Scale, ¾ Inch to the Foot.



Detail of Finish in Parlor, Dining Room and Main Hall.—Scale, 1½ Inches to the Foot.



Detail of Exterior of Art Glass Window.—Scale, ⅜ Inch to the Foot.



Elevation of Main Stairway.—Scale, ½ Inch to the Foot.

Miscellaneous Details of Frame Cottage.

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

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To Secretaries of Filial Bodies.

Secretaries of all filial bodies are requested to forward to the secretary of the National Association, the result of action taken by their exchanges at all regular or special meetings. The national secretary should also be included in notification of meetings that are to come, in order that he may be kept aware of the position the various exchanges may elect to maintain upon subjects of either local or national importance.

To all Officers of Filial Bodies and Directors of the National Association.

The national secretary desires to be informed regarding any and all changes and improvements that may be taking place in the local exchanges, to the end that successful plans for improvement may be transmitted to all filial bodies for their benefit and use. Directors are particularly requested to keep the national secretary informed of all matters transpiring in their various localities that in any degree affect the builders of their community.

Changes.

The filial body in St. Louis has changed its name from the Mechanics' Exchange to The Builders' Exchange of the City of St. Louis, and has moved from No. 9 North Seventh street to the second floor of the Bell Telephone Building, on the corner of Tenth and Olive streets.

The Building Trades Club of New York City has adopted the following as a portion of its by-laws: "The president, vice-presidents, secretary and treasurer of the National Association of Builders of the United States, while holding such positions, shall be honorary members without any action of the club.

The Builders' Exchange of Cincinnati, has moved from Sixth and Vine streets to the Grand Opera House Building, corner of Vine and Longworth streets.

The Building Trades Association of Cleveland, Ohio, has changed its name to The Builders' Exchange, and moved into much more commodious quarters on the second floor of the same building formerly occupied, the Arcade.

New Exchanges.

The Builders' Exchange of New Haven, Conn., has made application for membership in the National Association of Builders.

It is expected that before the month is out two if not three exchanges of recent formation will become affiliated with the national body.

President McAllister's Address.

The address on "The Business Methods and Relationships of Builders," delivered at the sixth convention, by President Arthur McAllister, has been printed in pamphlet form and is now in the hands of the secretary for distribution. Persons desiring to use the address in separate form from the entire report will be supplied with a limited number upon application to the national secretary.

The Sixth Annual Report.

The report of the sixth annual convention of the National Association of Builders is now ready for distribution. It has been deemed best to issue the report directly from the secretary's office to the individual members of the filial bodies so far as is practicable, in order that the local secretaries may be relieved of the labor of handling the reports, and also to have the report placed, as far as possible, in the hands of the members at their private addresses.

COLONIAL ARCHITECTURE AND CONSTRUCTION.

THE FOLLOWING PAPER on the above subject was read by Architect J. Appleton Wilson before the Builders' Exchange of Baltimore, at their quarterly meeting, March 1 of the present year:

The term Colonial, as generally used, is somewhat misleading. Aside from the fact that it has of late become a kind of popular slang, as were the Queen Anne and the Eastlake a few years since.

It seems necessary to say at the start that of the buildings erected during the Colonial period in this country, or previous to the year 1775, but few remain. In Boston, which was the largest and most wealthy city at that time and which naturally contained the most costly buildings, we can only name three churches and two public buildings as examples of actual Colonial structures. A few brick and a number of frame dwellings remain, but these are too simple and unpretentious to merit remark as to their architecture. This so-called Colonial style was derived first of all from England, and was founded upon the Five Orders as interpreted by Vignola and Palladio. It has been well defined as "a free handling of Classic detail." The "orders" gradually became changed, as they were used with more or less license by Sir Christopher Wren, Jingo Jones, Gibbs, Batty Langley, and others. James Gibbs wrote his work on architecture in 1728, and Batty Langley in 1739. The result, as transplanted to America was the only individual style worthy the name which we have ever boasted as a nation.

This manner of building was in vogue up to about the year 1825, when a decline set in, which finally caused its abandonment, and in its place came the rage for sham Gothic and Grecian structures, often of pine boards made to imitate stone.

REVIVAL OF INTEREST.

Within the last few years, owing chiefly to the research of a few architects, and lovers of the antique, there has been quite a revival of interest in this style, and much of the modern work rivals the original. Though, as in all revivals, numerous and rank are the sins which have been committed in this name.

The style under discussion is largely dependent for interior detail, upon the styles of Louis XIV and Louis XVI of France, much of which is of great delicacy and refinement.

The customary method of brick work was the well-known Flemish bond, in which every course is composed of alternate headers and stretchers. The headers in one course coming directly over the stretchers in the course below. These headers are often darker from their nearness to the fire in burning, and give the work a very picturesque effect. The floor lines are generally indicated on the exterior walls by a flush band of stone, or by a projecting band of brick. The basement walls are often thickened on the outside, and the offset finished at the first floor line, by a molded course of brick. The window heads are sometimes segment brick arches, but more often flat, bonded arches, ground or rubbed to fit the splay. A favorite finish is a flat arch of stone in three sections, the key often fluted or otherwise ornamented. The true stone lintel is very rare. The mortar joints are thick, and generally as hard as stone. The window frames were molded and very heavy, mortised and pinned together at the angles, and sometimes framed into a molded wooden sill. The roofs are steep in the earlier examples, with gables, or else hipped from the four corners, often with a deck for observation surrounded by a turned balustrade. The roofs were always covered with slates or shingles, and the flashings and gutters were of lead, while the spouts and hanging gutters were of copper.

FEATURES OF CONSTRUCTION.

The main doorway was always enriched by an "order," with pilasters, entablature, and often a pediment, and we generally find a small entrance portico, supported by columns, the Ionic order seemingly the favorite. Large porches are rare, except south of this State. Mount Vernon has a fine example extending the length and hight of the river front. This house is noteworthy, too, in being covered with boarding, cut in blocks to imitate stone. The only other instance which occurs to me is the Vernon House at Newport. Many of the houses in Virginia and Maryland are built with a center and wings, as the Harwood, Brice and Randall houses at Annapolis, the Bernard House at Fredericksburg, and the Westover House. As an instance of the care with which the old work was done, it was not uncommon for the subsills of the window frames to be either of walnut or of red cedar, so as more successfully to resist the weather. These that I have examined are as bright beneath the paint as when first put in. The flooring is sometimes joined by square dowels in lieu of the ordinary tongue and groove. The larger timbers always show the marks of the broad axe, and many houses in this and adjoining States have all the woodwork of yellow pine, which is usually as hard as bone. White pine was apparently difficult to procure, as it all grew at a distance, and there were no transportation facilities. It was a serious matter to build a house one hundred years ago, but time does not seem to have been taken much into account, provided that everything was sound and good when the job was done. Aside from the care given to them, probably one reason why these old constructions have lasted so well is because they were not subjected to the blasting breath of the hot air furnace, and certainly the danger to ceilings and walls from leaky pipes was not taken into consideration.

The exterior cornices are usually heavy, with modillions and dentils, but rarely a well defined frieze. A favorite member is composed of fluted dentils, alternately horizontal and vertical. The central window is often beautifully designed and richly carved. The prevailing spirit of the best interior work of this period is of great refinement and delicacy.

MATERIAL EMPLOYED.

In Virginia, and in our own State, the common material was brick, while in Pennsylvania and New York it is stone, and in New England very largely frame. The most prominent characteristic of the Colonial dwelling was undoubtedly its stateliness and repose. This was attained partially by the exact distribution of the features of the exterior (one side being the counterpart of the other), and partially by the massing of the ornament in the doorway and the window above it, and leaving the wall spaces almost bare.

The plan is usually very simple, with a wide hall through the center and the apartments symmetrically arranged on either side. The staircase often has a triple window in the rear wall, opening on a landing. If there were wings, one of them always contained the kitchen and laundry, and the other generally the office or business apartment of the owner, or the school room for the children.

Mahogany was much used for the hand rails, and often for the doors and newels. The doors of the Chase House at Annapolis have latches and rings of wrought silver, and those of Mount Vernon and Monticello are beautifully designed and of polished brass. The large brass locks on the outside of the doors, with their delicate drop handles, as well as the massive brazen knockers, are familiar to us all. Many of the stairways have the steps and nosings formed from solid blocks of wood, their ends making the brackets. These were put up like stone steps, the lower edge of the rise resting on the tread below. The soffit was sometimes smooth, but we often find each step finished square, and paneled behind, as in the Lee House at Marblehead. The balusters were usually plain, sometimes not more than 1 x ¾ inch, and three and even four to a tread, but many stairways, as that in the Longfellow House at Cambridge, the Lee House and the Boston State House had elaborately carved and twisted balusters. Those on each step being of three different patterns. The newels sometimes have the center hollowed out and filled with a twist running contrary to the outer twist. The best stairways have numerous landings and the rails are always ramped and mitered around the newels, even on the level runs at the well holes.

The pulpit stairs, as in King's Chapel, Boston, and St. Paul's, New York, are often very beautiful examples of curved work with double rails. The old Boston State House has a very delicate detached spiral stair of this character.

An interesting feature of Colonial houses is the transom and side light lead work. This was usually heavier than our modern work, and was provided with a rib of tin which formed the sash and into which the glass was puttied. The joinings were concealed by cast lead ornaments and some of the lead lines were often formed with beads or other enrichments. The patterns were of endless variety and very many examples can still be found. This feature has survived longest and much of it was done not more than 40 or 50 years ago.

COLONIAL CHURCHES.

A number of well preserved Colonial churches are still standing. They all partake of the character of the work done by Sir Christopher Wren, after the great fire in London. The spires are of different stories, one upon another, each embellished with an "order" and diminishing as they ascend. An elaborately wrought and gilded vane is the usual termination, and quite an article could be written on these alone. Some of the best churches are St. Paul's, New York, declared by Richard Grant White to be the finest Wren church in America, and not surpassed in London; St. John's, somewhat similar, but not so good; the First Baptist, in Providence, R. I., built of frame in 1776; the Old South, 1729; Christ Church, built 1723, and noted as being the point where the lanterns were hung to guide Paul Revere as to the embarkation of the British before the battle of Lexington; King's Chapel, of granite, and with the spire never completed, built 1754, and Park Street Church, built 1809, these four being in Boston; Trinity Church, Newport, 1726, and the Seventh Day Baptist, in the same town, built 1729; Christ Church, Philadelphia; First Church, Wethersfield, Conn., 1761, and the First Parish, Dorchester, 1816.

Some of the less important, but still interesting, churches are Bruton Parish, Williamsburg, Va., 1678, and restored in 1744; Smithfield Church, Isle of Wight Co., 1632; Pohick Church, below Mount Vernon, on the Potomac, 1769, and Christ Church, Alexandria, 1767.

SPECIFICATION FOR ANCIENT CONSTRUCTION.

As a sample of ancient construction the specifications now preserved in this church are interesting. They are dated January 1, 1767, and are as follows:

The church at the Falls and at Alexandria to be 28 feet from the foundation—that is, three bricks and a half to the sleepers, three bricks to the water table, and two and a half from thence. The quoins and arches to be rubbed brick; the pediments to the doors rubbed work in the Tuscan order. The outside of the wall to be done with place bricks; the mortar to be two-thirds lime and one-third sand; the inside, half lime, half sand. Aisles to be laid with tiles or flags. The lower windows to contain 18 lights, each 9 x 11; the upper windows 12 lights beside the compass head; the sashes of the lower windows to hang with weights and pulleys, and to be clear of sap. To have a modillion cornice under the eaves. The roof to have three pairs of principal rafters or, as the workmen call it, a principal roof, to be framed in the best manner and to be covered by inch pine or poplar plank, laid close to shingle on. The shingles to be of the best juniper cypress, ¾ inch thick, 18 inches long, and to show 6 inches. The floors to be laid with 1¼ inch pine plank, and to be raised 4 inches above the aisles. The pews to be 8 feet 6 inches beside the coping, with doors to all; to be neatly wainscoted with quarter-round on both sides and raised panel on one, and to be neatly capped with some handsome molding. The seats to be 12 or 13 inches broad, the outside doors to be folding and hung with proper hinges, locks and bars, to be raised panel on both sides; locust sills to the frames and architraves on the outside. The altar-piece, pulpit and canopy to be completed in the Ionic order. The walls and ceiling to be well plastered in three coats, with a cove cornice. The whole to be neatly painted and finished in the best manner. The aisles to be 6 feet. The modern builder could drive a horse and cart through such a specification, and the spelling and construction are as bad as can well be devised. The church cost £820, or about $5000.

In this city we have few churches which may be classed as Colonial, and none of them particularly interesting. About the only ones meriting notice, are the Otterbein Church, built 1785; Trinity, 1812; and the Associate Reform, 1815. The German Reform, formerly in Second street, built 1796, had a fine spire. The old First Presbyterian, 1791, and the old "Round" Top, 1818, were good examples.

FEATURES OF OLD CHURCHES.

Many of the old churches have vaults over the center and side divisions, formed of lath and plaster, and springing from columns which carry the galleries. King's Chapel and Christ Church in Boston, and Trinity in Newport, are examples of this. The entrances were often in the sides, as well as in front, and the plan in many cases is almost a square.

Great cut glass chandeliers, resplendent with prisms and with tall wind glasses to protect the candles, are still to be seen in some churches.

There remain many examples of houses in this style, widely scattered over the Eastern States. Annapolis, in our own State, contains more and probably better examples than any other town in the country. A very interesting article by Henry Randall on this subject has lately appeared in the *Architectural Record*. He gives examples of no less than 16 buildings, all in good preservation, the most recent of which was erected in 1770. This fact seems to prove that our ancestors built well. Some of these houses are faced entirely with headers, and, so far as I know, they are unique in this respect. Mr. Randall describes in detail the Carroll House, or "Carrollton," where the famous Signer lived, and the Ridout, Scott, Randall, Ogle, Harwood, Brice Paca and Chase houses. The latter is probably the finest example in Maryland. He also mentions the old Governor's house, Whitehall, the City Hotel, and, lastly, the State House. In 1772, when the present building was erected, there was probably no finer State Capitol. Its interior was much richer than its exterior, though its massiveness is impressive, and its situation adds greatly to its effect. The rotunda is the most prominent feature, and still retains much of its original decoration. I cannot do better than to quote from Mr. Randall as to the Senate Chamber, "One of the most Historical Halls in This Country," and a room, which, in its present condition, seems to me to be a standing rebuke to us all for our want of patriotism and of reverence for the events which made us a free and independent nation.

THE SENATE CHAMBER.

Mr. Randall says: "On the right is the Senate Chamber. Here it was that the National Congress met in December, 1783, when Washington resigned his commission as Commander-in-Chief of the American Army, and here in the following year the peace with Great Britain was ratified before Congress, thus closing one epoch in our Nation's life, and opening a new one. Here again the first National Constitutional Convention met in September, 1786, to take steps toward forming our present system of Government.

"With the exception of its four walls and the huge portraits of Maryland's 'Signers,' together with the picture of Washington resigning his commission, there is little left of its original charm. The Ladies Gallery, a beautiful work of art, which extended across the Southern wall, has recently been removed to make room for benches, where the idle and the worthless sit and stare and enjoy the staple weed to their heart's content."

What a picture this is and what a contrast it presents with nations across the sea, who guard their venerated historical buildings with the most zealous care. Massachusetts has set us a most worthy example in restoring her old State House as nearly as possible to its original condition, filling it with Colonial relics and preserving it as a museum free to all comers. The same is true of the old South Church and of Faneuil Hall in the same city of Boston, although these buildings occupy ground that is probably 1000 times more valuable than any portion of our ancient capital. Looked at merely from a business standpoint, each of these buildings serves as an attraction to bring strangers within our gates, and but few cities in this country can boast of such a State House as can we. May we not hope that at least our Senate Chamber may be restored to its original condition and so preserved for all time to come?

Hagerstown and Frederick both contain some good examples, and the Lutheran spire in the latter city, erected in 1763, is noticeable.

NOTABLE BUILDINGS.

The Taylor House in Washington was built in 1798. The only exterior ornament is the Ionic portico. There are several very handsome mantels and archways, and the ceilings and wainscoting were formerly beautiful with ornaments and moldings in stucco. The doors are mahogany, and have hinges which raise them to clear obstructions on opening. In the dining room are two secret doors, with washboard and chairboard crossing them, but cut some distance from the true opening. The plan is an irregular hexagon, with parlor and dining room on either side of a circular entrance hall, and at an angle with it. The stairway hall is between these rooms and behind the vestibule. Over the latter is a circular room, with mantel, doors, windows and other wood work made to correspond with its curve. In this room the Treaty of Ghent was signed by President Madison while he was occupying this house, the White House having been destroyed by the British troops.

Gadsby's Tavern at Alexandria is closely connected with the earlier history of this country subsequent to the Revolution. It was built in 1793, and adjoins a smaller building erected in 1780 and used as a part of the tavern. It is a massive plain structure and the rear covers two sides of a hollow square used as a wagon yard. There are porches which serve as halls of communication between the rear rooms. In these buildings the fashionable balls of the period were held, and were attended by the most noted persons of the time, General and Mrs. Washington among the number. The rooms are wainscoted to the ceiling, and the ballroom contains a musicians' gallery hung from the ceiling, to leave the floor clear for dancing. The interior detail is rather coarse.

OTHER EXAMPLES.

These buildings should be carefully restored and preserved instead of being used as at present, the one for an auction store and the other for a beer saloon! The old Carlyle House, now inclosed on three sides by the Braddock Hotel, is another interesting building. It is now unoccupied and rapidly going to decay. It is said to date from the year 1752, but the figures 1732 are plainly cut on the keystone of the entrance to the covered way leading to the river. In the northeast parlor was held the council of war, in 1755, which resulted in the Ohio expedition and the death of General Braddock. The room is paneled and has a wooden modillion cornice. The doorways have curved pediments with carved rosettes and pineapples. The spandrel of the staircase is in one panel, of a single piece, about 5 feet long by more than 3 feet wide. The old bank, now the Braddock House, built in 1815, has some beautiful mantels and a curious carved vestibule. The town is rich in Colonial houses. Many of them stand in stately walled gardens, partially concealed from the passer-by, seemingly of another age and time than ours, but very attractive withal in this day of rush and of "hustling." I have only space to mention the old Fairfax House on Cameron street and the bank on Prince street, and must pass the many beautiful doorways and other detail on every hand, inviting the student as he strolls through Royall, Washington, King, Fairfax, Clinton and other streets, whose very names call to his mind the forgotten past. The Cathcart House in Fairfax county, near Alexandria, built in 1800, contains very refined and elaborate detail. The doorway pilasters are fluted and bound with ribbons, and the figures in relief on the friezes of doors, windows and mantels are nearly all different, there being more than 30 varieties. The leaf work on cornices and capitals has so much freedom and individuality that it seems to have been molded in place.

Shirly, on the James River, is of dark red brick, as are all the James River houses. It has a two-storied portico with paneled and plaster ceilings, and the walls forming the back are plastered also. The roof is high and hipped from four corners and has numerous dormers. The window frames are nearly flush with the outside of the wall, giving a broad reveal for the shutters within. The door from the river front opens into the parlor, while that on the rear opens into the great hall which occupies the northwest corner of the house. The building was erected about 1730.

WESTOVER.

Westover was commenced by Col. Wm. Byrd in 1737 and partially burned in 1749. In common with other estates in this region it suffered severely during the Civil War. One wing and its connecting corridor were destroyed at that time and much of the interior work was demolished. The outside is plain and massive, with wide stone steps leading to an elaborate doorway, having the curved broken pediment and pineapple. The roof is hipped, and the four sturdy chimneys tower upward to a hight above the eaves equal to the walls of the house. The great hall runs through the center, with paneled rooms on either side. The stairway has twisted balusters of mahogany. In the great drawing room we find the remains of a beautifully carved marble mantel and mirror frame. Colonel Byrd imported this at a cost of £500, but it was nearly destroyed by the troops during the civil war. A curious iron gate, with leaden eagles on its stone piers, closes the entrance from the rear.

Carter's Hall, upper and lower Brandon, Whitehouse and Berkley were all famous in their day, but we must pass them with only the briefest mention.

MT. VERNON.

Mt. Vernon was built by Lawrence, the elder brother of Geo. Washington, in 1745, and afterwards enlarged by the General himself. It is a typical southern home, with its stately portico, the open-arched colonnades sweeping like protecting arms on either side, and the ranges of outbuildings extending beyond and inclosing the beautiful lawn. The approach from the foot of this lawn is both striking and picturesque to a high degree. The main building is outwardly of two stories and an attic, but in the northern end is the State drawing room, running through the two stories. It has a beautifully decorated ceiling and a carved marble mantel. A wide hall runs directly through the ground floor, but nearly every room on this story has an outside door of its own. There are but two chimneys in the house, but the rooms are so arranged that each has its fire place. The details, both inside and out, are generally rather heavy. The cupola has a vane, imitating a flying bird, apparently transfixed by the iron spindle.

JEFFERSONIAN ARCHITECTURE.

Thomas Jefferson was an enthusiastic student of architecture, and entertained very decided notions thereupon. The buildings of the University of Virginia at Charlottesville and the house at Monticello are monuments of his skill and originality. The latter is planned with a central pavilion and wings of one high story and an attic. The great hall occupies the ground floor of the pavilion, and is entered from either front, under lofty porticos. Over the hall, and directly under the low dome, is the ballroom. The house was commenced in 1769, but not completed until many years later. The bricks, the wood work and even the nails, were made on the spot by Mr. Jefferson's workmen. The house is filled with ingenious appliances. A dumb waiter, only large enough to carry four bottles of wine, is concealed in the dining room chimney breast, and runs to the wine cellar. The great clock in the hall has a dial which can be seen from the portico, and its cannon-ball weights show the days of the week, as they pass the names on the wall. The weather vane on the roof had a dial in the portico ceiling, so that the owner could learn the direction of the wind without exposure to its violence.

The drawings for the university buildings were from Jefferson's own hand. They are now in the possession of Miss Randolph of this city, and are accompanied by copious notes in the most minute and careful handwriting, giving the proportions of every part, with exact calculations of the number of brick and other material in each building. The work was commenced in 1817. The main building was modeled from the Pantheon at Rome. There are four parallel ranges of buildings, the two outer for the students and the inner for the professors, with one storied dormitories between. The ranges are 600 feet long and front upon a beautiful lawn 200 feet wide. The professors' houses are of different designs, mostly modeled after Palladio, and intended to exhibit the different orders of classic architecture. In front of these there is a roofed colonnade, forming a walk entirely around the campus. The effect when seen from the foot of the lawn is very striking, and is not equaled in this country for the effect produced by comparatively simple architectural means. The gardens in rear of the houses are divided by serpentine walls of brick only 4 inches thick. According to Mr. Jefferson's calculations these required fewer brick than straight walls built 9 inches thick in the usual manner.

INTERESTING COLONIAL HOUSES.

Georgetown contains some fine Colonial houses. A peculiar feature here is the bringing of two outside chimneys together near the gable into one immense stack, and supporting it on an arch sprung between the two. This saved much interior space, and produced a picturesque effect at the same time. Carpenter's Hall, in Philadelphia, was built 1770 as a meeting place for the Society of House Carpenters. Independence Hall is one of the finest specimens of the style, and also one of the most noted historical buildings in America. It was built in 1732, the wings in 1740 and the tower in 1750. The detail is somewhat coarse, but the mass is good and the situation favorable for showing it to the best advantage.

The Van Rensselaer House, at Albany, is a fine specimen of the period. It was built about 1765. The old State House, built in 1743, and the Vernon and Gibbs houses, in Newport, are interesting. The Hancock House, built in Boston in 1737 and torn down in 1863, had a handsome entrance and carved balcony above it. It was faced with granite, and will be reproduced as the Massachusetts Building at the Chicago World's Fair. I should like to speak of the New York City Hall built in 1803, of the Capitol at Washington, begun in 1793, and of the White House, commenced the year previous, but time will not allow. I will only say that the south portico of the latter is one of the most effective pieces of work in this style in the country.

In Baltimore we have a few relics, but they are rapidly passing away. Fells Point probably contains the oldest houses now standing, and some of them still retain fragments of their former splendor. A few years ago it was my good fortune to find some of the most refined detail I have ever seen in one of these old houses.

The Oliver House, on South Gay street, and the house of Charles Carroll of Carrollton, on Lombard street, are fine examples of town mansions of the olden time. The latter is another building, which should by all means be restored and preserved. Two houses on Baltimore, near Exter street, one of which is now being altered into a shop, are among the oldest here. They contain very rich mantels, arches and niches with shell heads. There are many handsome doorways scattered over the older portion of the city. The old Maryland Club Building has two of the most interesting. The Taney and Brice houses at Lexington and Courtland streets and the houses on Lexington, west of St. Paul, are worthy of notice. The building at the corner of Baltimore and Harrison is a splendid piece of construction and a fine example. The lower story is destroyed, but the upper stories and the elaborate but refined dormers show the greatest care in design. Several houses on Center Market Space, which, though weather beaten, still show unmistakable signs of former grandeur.

COLONIAL INNS.

One of the features of the style was the severity of the exterior as compared with the interior. Many houses which are most elaborate give no outward indication. There were formerly a number of Colonial Inns, but few remain. The General Wayne, with its great swinging signboard, can be remembered by us all. It was built about 1788, and was more quaint than good in detail. The Lorman mansion, erected 1804, was as solid when torn down as when built. The doors of the main floor were of mahogany, with panels edged with satinwood. They were fitted with solid brass locks and hinges. Even the grounds for the plastering were of clear white pine, secured by irons to the brickwork. The Stewart House, built before the War of 1812, on West Baltimore street, had a hip roof and good portico. The Venetian shutters were arranged to slide in the thickness of the walls, instead of being hinged as usual. Beech Hill, not far away, was a fine example in frame of a central building and wings. It was built by the Ridgeley family about 1796. The Carroll House, now in the new Southwestern Park, contains some beautiful detail. The little chamber forming a second story to the north portico, and serving as a protection to the entrance below it, is a curious feature.

Belvidere, built by Colonel John Eager Howard, stood on the summit of the hill which barred the progress of Calvert street at Eager. Large mirrors, framed and hung, served as doors between the principal rooms. The Court House, finished in 1813, is the most prominent example of the style which we have. Its detail is generally well studied, and its construction evidently the very best. The old Masonic Hall, built 1822, while not such a good specimen, is still very quaint and interesting; with its columns in antis, and its tall iron lamp standards. The Union Bank, formerly standing in its garden, at the corner of Charles and Fayette streets, was a notable building in its prime. It was elaborate with sculptured decoration, some of which now adorns the gable of one of the gashouses at the Spring Gardens. The rectory of St. Paul's Church, built 1791, has a peculiar doorway, and is a very good specimen of the plainer character of work.

I have endeavored to give you an outline of what I understand to be the Colonial style, leaving the examples that have been cited to point their own moral to a great extent. These are rapidly passing away, but if what I have said will serve to call your attention to the refinement of detail, and the wonderful care and pains taken by our forefathers in the selection of their materials and in the construction of their buildings, and will lead us to emulate them in spirit, if not in letter, this paper will not have been entirely in vain.

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CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED

The Builders' Exchange.

DAVID WILLIAMS, - - PUBLISHER AND PROPRIETOR.
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SECRETARY NATIONAL ASSOCIATION OF BUILDERS,
166 DEVONSHIRE ST., BOSTON, MASS.

MAY, 1892.

New York Trade Schools.

In his address at the closing exercises of the New York Trade Schools Thursday evening, April 7, Colonel R. T. Auchmuty, the founder, made the announcement that J. Pierpont Morgan had given $500,000 to the schools. It is with much pleasure that we record this, for so princely a gift means assistance to increasing numbers of young men who, as the schools become better known, and as the facilities through this endowment are enlarged, will come year after year to benefit by their instruction. For some little time there has been a rumor in the air that the New York Trade Schools were about to receive some very substantial help, but nothing definite was known until the formal announcement made on the occasion above named. Among all those present at the closing exercises there was probably no one who felt such keen gratification in the good fortune of the schools as Colonel Auchmuty, who for so many years now has been giving his time and money to their upbuilding. The start of the schools was not at all propitious, for the antagonism of the unions interfered with their popularity. By persistent effort, however, this opposition has, at least in some measure, been overcome, and several organizations, to their credit, be it said, are giving the schools much assistance. The rapid growth in their popularity during the past few years has brought such large classes that the facilities were becoming taxed, so this gift of Mr. Morgan's comes most opportunely, and, it is needless to say, will be used to the best advantage possible. We do not know what will be the distribution of the money, but with so large a sum to make use of the future of the New York Trade Schools is abundantly assured.

Builders' Methods.

In his address to the sixth convention of the National Association of Builders, President McAllister, while referring to the manner in which builders generally conduct their affairs, said that "we have not yet reached ordinary business methods." Builders have for years been in the habit of signing contracts, in which they agree to build anything at any price. The fact that they agree to erect a specified building for a certain sum of money does not mean anything, for they also agree to build any additions thereto which the owner may desire, and to accept the price therefor which the owner may choose to pay. They also agree to submit absolutely to the direction of a person who is in the employ of the owner, and are in reality party to a contract in which they have no voice whatever. The fact that contracts have been executed in the past to the satisfaction of all concerned, under requirements which if submitted to a court of equity would immediately be declared unfair and unjust, is no argument in favor of the continued use of such forms of contract. An example of such a form of contract and conditions of competition is given in another column of this issue, with brief comment upon some of the most prominent of its inequalities. The case cited is one which was drawn by the city architect in one of the most prominent cities of the country. It seems strange indeed that a city should require one of its citizens to submit to unfair conditions in order to carry on business with its representatives. Individual cases excite less comment. There is little excuse for the builder in submitting to such conditions, for the largest body of builders and the largest body of architects in the country have conjointly framed, and advocated the use of, a form of contract which is undoubtedly very satisfactory for the purpose. In all localities where the Uniform Contract has been used the result has been most satisfactory, and in all sections where a determined effort has been made to secure its use, to the exclusion of other forms, it has been adopted.

Schools of Architecture.

It is evident from the number of inquiries which are constantly being received from young men all over the country that good schools in which architecture is taught are a growing necessity. The wants of those desirous of pursuing the art of house building in the proper channel are supplied in some measure at the present time by several institutions in the country, a majority of which perhaps are located in the extreme East. One of the institutions which is doing good work, and of which comparatively little is probably known to many of our readers, is the School of Architecture in connection with the Metropolitan Art Schools in New York City. This was founded some years ago by the late Arthur Lyman Tuckerman of the Paris School of Fine Arts, who was manager of the art schools as well as of the course in architecture. The objects of the course instituted by Mr. Tuckerman are to perfect the student in architectural drawing and also to refresh his artistic knowledge of designing. The school is modeled as nearly as possible after the School of Fine Arts in Paris. There is one head teacher and one assistant teacher, who superintend the work, but each of the pupils becomes in effect a teacher in being permitted to assist his less comprehensive fellow-students. The course opens in October of each year and terminates May 1 following. On entering the school the student is first taught the use of instruments, after which he is instructed in drawing in plain, clear lines the elements of architecture—that is, the five orders, arches, windows, &c., as outlined in Vignola. This standard work is also used at the celebrated School of Fine Arts in Paris. When the student has become a fair draftsman he is instructed in shading and painting in India ink. From this he progresses by degrees to original designing and at which he continues until he has drawn and designed to a large scale the most difficult problems. The course is two years, and during this period the pupil is thoroughly drilled in draftsmanship and designing, Greek and Roman architecture being thoroughly investigated and studied in all their details. Half-hour lectures are given once a week on the history of art and designs, and these prove very interesting and instructive. In order to stimulate students to greater efforts and to excel in their work, prizes are given, the first being the $100 Hoe Prize, offered by Robert Hoe, chairman of the Executive Committee, for the best original work in designing. To the student who has done the best general work and drafting through the scholastic year a prize of $80 is given. At the close of the two years a diploma is awarded to students who have passed the requisite examinations.

Rights of the Lowest Bidder.

It is only by unrelenting insistence that the builder can secure what are justly his rights. Customs which are inequitable and unjust have been permitted to spring into existence and have become firmly established. Architects are in the habit of requiring very one-sided conditions of competition and agreement, and it is only by insisting upon his rights that they can be obtained by the builder. The architect is protected in his position by the idea which seems to exist very generally in all communities, that if one builder will not comply with his requirements, there are plenty of others who will. A case has recently transpired wherin the lowest bidders on a building to be erected by the State refused to refigure the job with other contractors, demanding the contract and the right to reestimate without competition, on the basis of the principles advocated by the National Association of Builders. The contractor firmly maintained his position, claiming that he was entitled to the contract and that a proposition to refigure in order to secure certain reductions in the cost without material change in the plans should be presented to him only. The State authorities, seeing the justice of the position taken by the National Association, in addition to the fact that the contractor would not yield his rights in the case, conceded the point and awarded him the contract without further competition. The final yielding by the State of the position which it maintained established the fact that the same was unjust and untenable, but had the contractor been a person of less persistence the competition would have been reopened upon the unjustly acquired information as to amount below which bids must have been submitted. The correction of such conditions remains solely with the builder, and he is to be blamed for not declaring his rights before a competition and insisting upon obtaining them afterward.

Idle Workmen.

The assertion is very common among labor agitators and others who desire to foment disturbances among workingmen that there are 30,000 to 50,000 men out of employment in Chicago at this time. It is difficult to disprove statements thus made, as the facts are not directly ascertainable, and the belief obtains that the leaders of the workingmen are in a better position than anybody else to get at the truth, at least approximately. Some light, however, is cast on the subject by the general agent of a large employment agency, who stated last week that he could have furnished in March situations for hundreds of men more if he had been able to find them. In other words, the demand for workingmen was found by him to be greater than the supply available. One great fact like this casts doubt on the correctness of the claims made as to the great number of men out of work in leading cities.

Statistics of Wages.

A bill is now before Congress to provide for the continuance of a particularly valuable investigation. For the tenth census, Joseph D. Weeks of Pittsburgh, a recognized authority, prepared a volume on the statistics on wages, the report covering the rates of wages paid to persons in different employments in the permanent industries of the United States for a series of years. In many cases these tables went back 30 years, and in others 40, 50, 60, and even 70 years. The bill in question has been introduced to provide for the continuance of this investigation by Mr. Weeks, under the supervision of the Secretary of the Interior. The plan is to bring the tables prepared in 1880 down to the present time and to extend the scope of the work, which hitherto dealt, in addition to wages, with the unit of payment, the opportunity for extra earnings, the advantages and disadvantages of overtime, the method and interval of payment, the hours of labor, the regularity of employment, the prices of product and the labor cost. The report covered iron and steel, boots and shoes, flour and grist mills, cigars and tobacco, glass, foundries and machine shops, rolling mills, mining, pottery, textiles of all classes, tanneries and wood working. We need hardly emphasize the great value of such a monumental work, or the importance of bringing it up to date. Great historical interest attaches to the former volume, but it should be made directly and practically available to present conditions by the addition of the data which have accumulated during the past decade. We are convinced that the record would be a flattering one to our mechanical industries.

BUILDING WAYS AND MEANS.

A DECIDED NOVELTY in the way of house moving recently occurred in Allegheny County, Pa., when a combination house of good size was towed across the Allegheny River from Allegheny to the Pittsburgh shore. The building moved was a long frame structure consisting of four separate dwellings 100 x 46 feet in size, containing 84 large rooms, and was originally three stories in hight. In the process of removal, however, the lower story was cut away, leaving in the remaining portions 48 rooms. The first step in accomplishing this somewhat novel undertaking was to secure six barges each 16 x 90 feet. These were placed side by side extending about 95 feet into the river. By the usual process of powerful hydraulic jacks and immense rollers, the building was moved from its location to the river bank, and after being blocked up to a distance of 22 feet above the water's edge, was moved on to a massive trestle work resting on the six barges, which had been securely fastened together by means of chains. Towboats were the instruments employed in drawing the barges to the Pittsburgh shore, where it now rests, says the Pittsburgh *Leader*, at the foot of Fifty-fifth street. A peculiar feature in connection with the removal of this building was the necessity of elevating the structure after it had been blocked to a certain hight and moved on to the barges, so that it would be sufficiently high to permit of its landing on a level with the Pittsburgh shore in order to prevent destruction. This, it was stated, was the most difficult part of the undertaking. The distance to be covered in transferring the structure from where it now stands at the foot of Fifty-fifth street to the site intended for its permanent location is about one-tenth of a mile, and in its progress it will be necessary to cross the tracks of the Allegheny Valley Railroad.

THE PRESENT APPEARS to be an age of rapid work in all branches of industry, and there are constantly springing up instances which show in a very forcible manner the celerity with which buildings may be erected under favorable conditions. A case in point is a furniture factory recently put up in Owasso, Mich. This structure, exclusive of engine room and dry kilns, is 256 x 80 feet in size and three stories in hight, while it is said that 600,000 feet of lumber, 4 tons of nails and bolts and one carload of glass were employed in its construction. The time required to raise this building from its foundation is said to have been 57 hours and 30 minutes. This probably is one of the most remarkable examples of rapid building construction of which the country has any record.

IT IS INTERESTING to note the different forms of building construction employed in various parts of the world, and to compare one method of accomplishing a piece of work with that in use in some remote section. In the matter of brick work there are numerous methods of

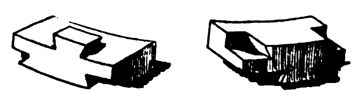


Fig. 1.—Two Views of Dovetail Brick.

construction employed in putting up walls, building cisterns, erecting chimneys, &c. There are also many novel forms of brick used in accomplishing work of the kind referred to. An instance which has recently come to our notice is the manner of using dovetailed bricks as practiced in India. Two views of the individual brick are shown in Fig. 1 of the

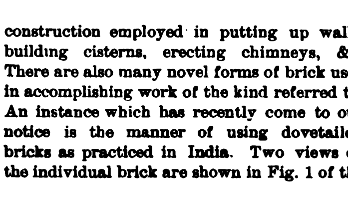


Fig. 2.—Manner of Using the Brick.

cuts, while the manner in which they may be employed in the construction of a circular piece of work is shown in Fig. 2. It will be seen that two bricks laid side by side form a dovetail mortise at the point of union, while the tenon of another brick in the course above fits into its mortise and firmly binds the wall together.

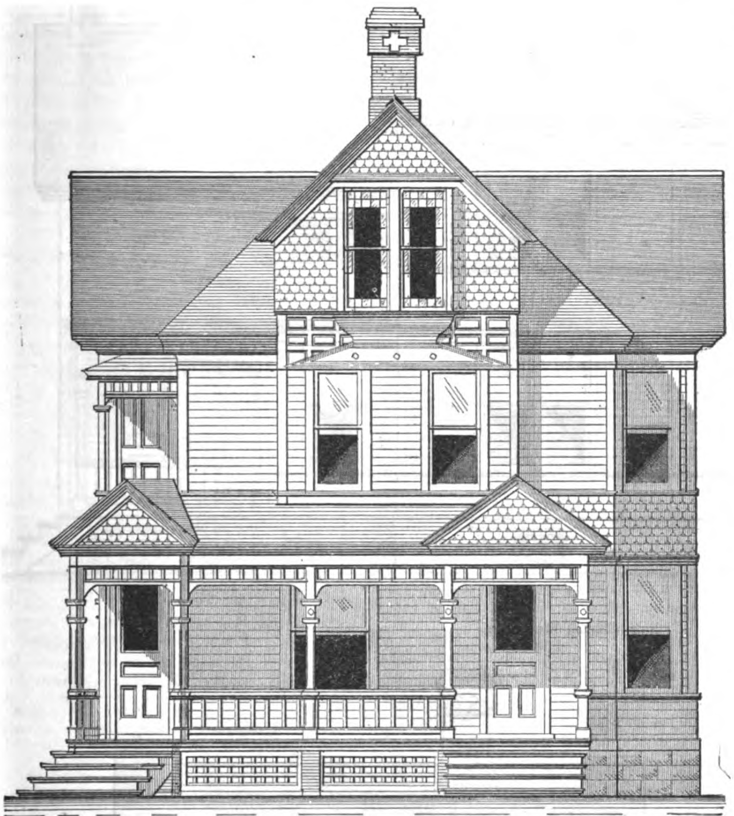
ONE WHO HAS NOT SEEN it done can scarcely realize what a vast amount of work is necessary to again render habitable a flat house that has been gutted by fire. For a case in point take a certain building up in 104th street, out of which ten families were driven one Sunday morning last November, says a recent issue of one of the New York dailies. The fire started in the basement, burned through five floors and came out of the roof. When it was through burning there were three brick walls left practically uninjured, and a brown-stone front that was badly damaged from the cornice down to the tops of the third-story windows. Inside was ruin, charred wood work, remains of furniture, a tangle of gas pipe and steam pipe, and a crumpled tin roof that had dropped through the great hole the fire had made. The owner almost wept as he viewed the wreck, but there was only one thing to do and he did it. He set a builder at work. First the building must be cleaned out. A gang of Italian laborers, with picks, shovels, crowbars and axes, were set at work. Before they were through they turned into the adjoining vacant lot enough *debris* to make a mountain half the size of Ararat. It seemed as though there was to be no end to the blackened timbers that they were throwing out of the windows. Of ashes mixed with lime from the walls and the partitions there was seemingly enough to fill up Harlem River. Somebody carted it away, but not before the junkmen had picked it well over for nails, bits of iron and other articles that anybody not in the junk business would suppose absolutely worthless. To get the old tin roof out of doors was a job that was both tedious and exasperating. Ropes were hitched to it, poles were punched into it, clubs were thrown at it and all hands swore at it, but it held its own for a full half day, "stage thundering" all the while so loudly that some of the people in the neighborhood crawled under feather beds and went to dodging imaginary lightning, actually believing that a great midwinter thunder storm was on. Finally the boss of the laborers set his men hacking at the old thing with their shovels, and they cut it up into squares which were rolled up and thrust out of the window. Pretty soon great stacks of new lumber were piled up all over the adjoining vacant lot, and a force of carpenters was set at work putting in new joists. Then came the brownstone men, who took down the damaged front and built it up again; next some of those artist-artisans whose business it is to make things out of galvanized iron which, when painted, look like massive cornices worth not less than $20 a running foot; and then came a man to repair the iron fence in front of the building that had been knocked out of shape by something that had fallen on it. It will take fully two months to do what remains to be done, for the building must be fitted with an entirely new set of insides—new partitions, new stairs, new heating apparatus, new everything. Really the operation, take it from start to finish, suggests that wonderful performance in cooperage, the building of a new barrel about an old bunghole. So long as a flat house must be built of inflammable material it seems a pity that it should not be built throughout in such a way that once well on fire all of it would go and leave a clean lot to build upon anew.

COTTAGE OF MODERATE COST.

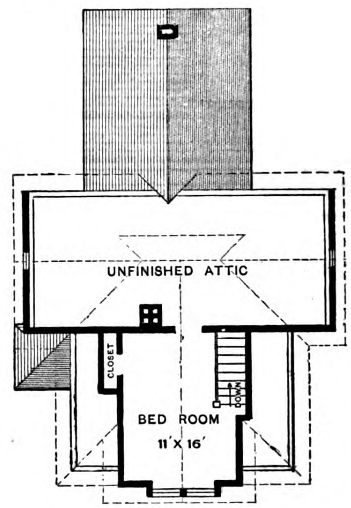
THE COTTAGE which we show upon this and the following pages will no doubt prove interesting to those of our readers who, during the past few months, have made inquiries for designs of dwellings suitable for erection by people in moderate circumstances. The building which we here illustrate was put up during the summer of 1891 for M. W. Ryan, Du Bois, Pa., from plans prepared by A. D. Orner of that place. The structure stands on the corner of Main street and Washington avenue, is well built throughout and is arranged as regards its various rooms with a view to convenience and economy of space. Extending under the entire house is a cellar 6½ feet in depth. The first story is 9 feet 6 inches high and the second story 9 feet in hight. The building is of frame, constructed in the usual manner. The sills are 6 x 8 inches and the joists 2 x 8 inches, placed 16 inches from centers, doubled at all openings, while the corners are formed solid. The rafters are 2 x 6 inches and 2 x 4 inches. The house is plastered three coats in the old-fashioned way, has hot and cold water throughout and is piped for gas. The exterior is painted three colors. All windows in the attic and the one on the stairs have cathedral glass border lights.

An inspection of the plans shows provision for four rooms and a hall on the first floor, so arranged as to be convenient of access and economical in the use of space. Entering the hall from the veranda, one may pass directly to the dining room, or, turning to the left, enter the parlor. Beyond the latter apartment is a sitting room 13 feet square and communicating with the dining room by an opening closed by heavy portières. Beyond the dining room is the kitchen, from which the second story may be reached by back stairs or the basement by cellar stairs. The kitchen is provided with the usual appliances for domestic purposes, while opening from it is a large pantry provided with shelves, &c., and lighted by a window. Ascending to the second story we find four sleeping rooms and a bathroom, some of the apartments being provided with closets of ample size. The attic has one large room, which may be used for sleeping or storage purposes. The first story is finished throughout in hardwood, while the second story and attic are finished in pine and poplar, painted and grained. The author of the design states that the building cost completed $2200. An idea of the appearance of the house as it stands to-day may be gathered from an inspection of our supplement plate, which is reproduced from a photograph.

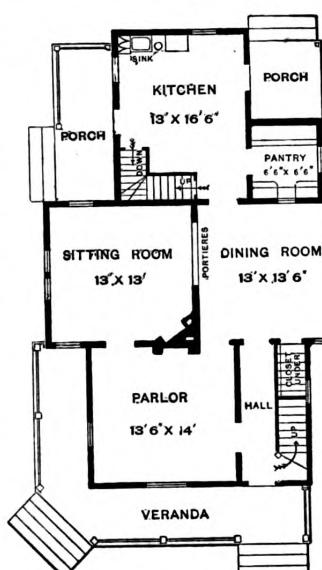
AN ENGLISH FIRM is said to be introducing window frames of pressed steel, intended to supersede the cast iron now frequently used. These new frames have the advantage of lightness, strength and cheapness, as compared with other material.



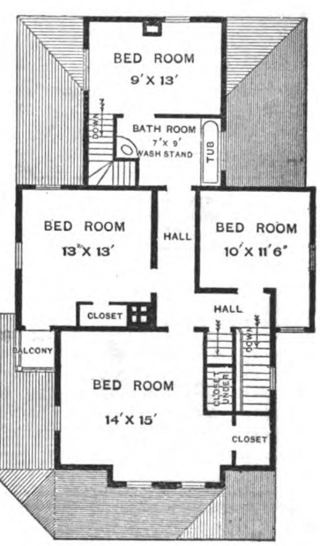
Front Elevation.



Attic Plan.



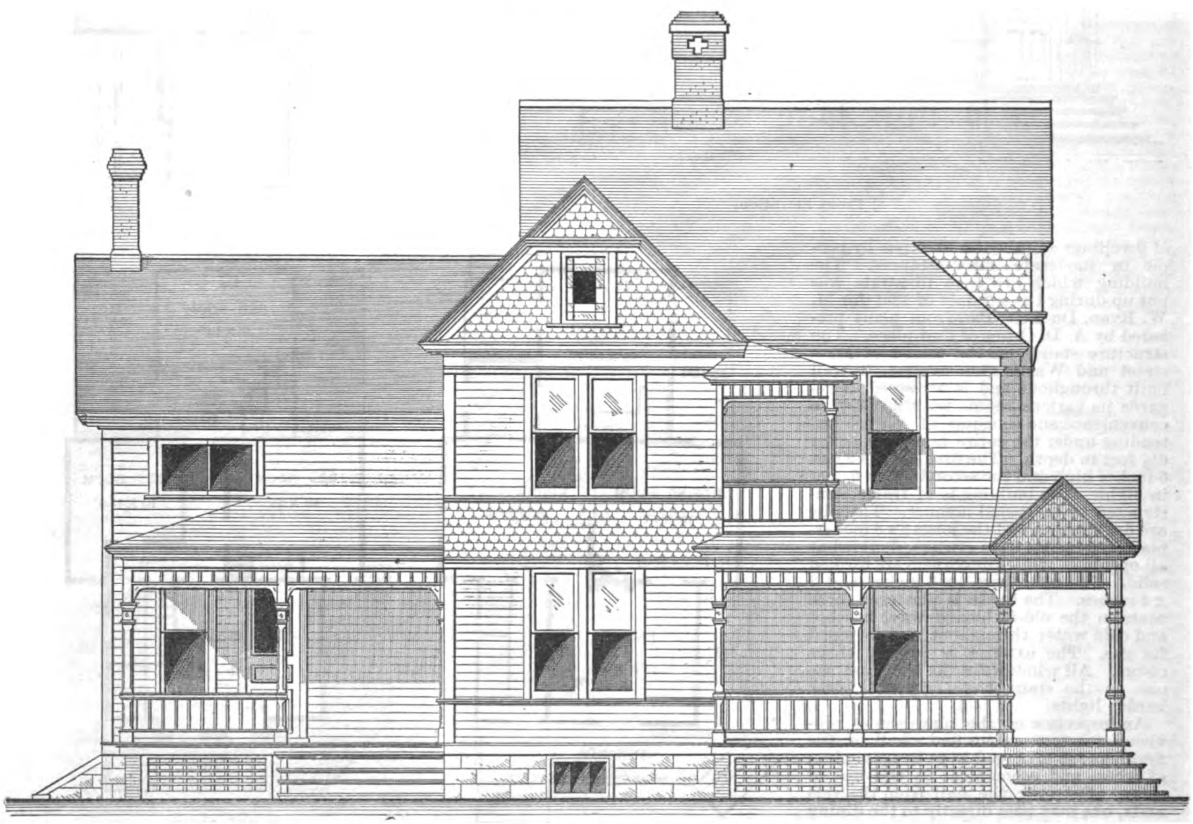
First Floor.



Second Floor.

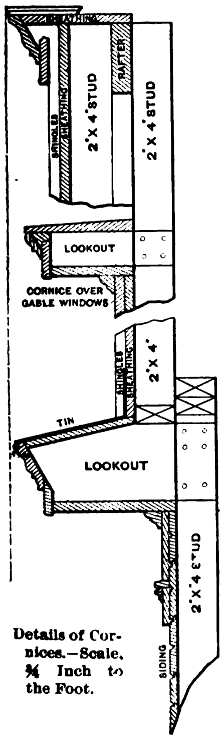
Cottage of Moderate Cost.—A. D. Orner, Architect, Du Bois, Pa.—Elevation.—Scale, ⅛ Inch to the Foot.—Floor Plans.—Scale. 1-16 Inch to the Foot.

Side (Right) Elevation.

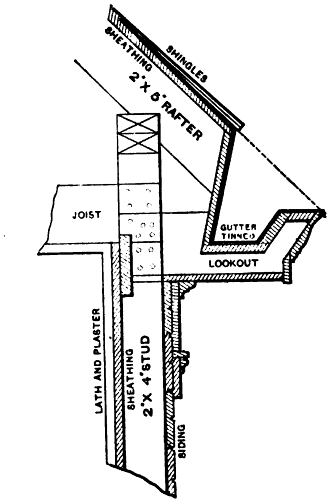


Side (Left) Elevation.

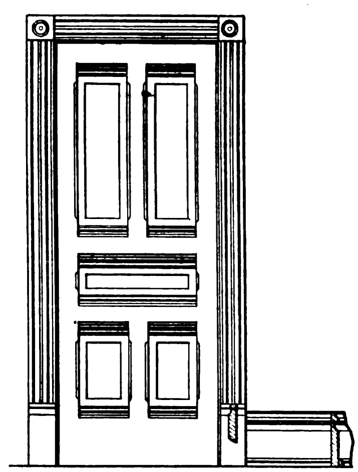
Cottage of Moderate Cost.—Elevations.—Scale, ⅛ Inch to the Foot.



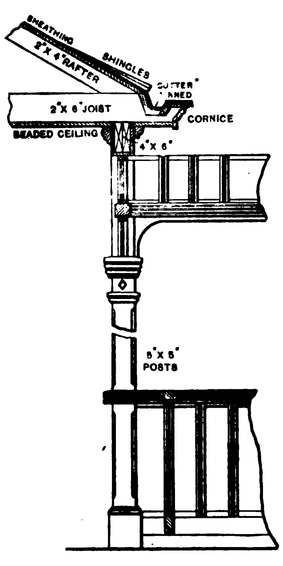
Details of Cornices.—Scale, ¾ Inch to the Foot.



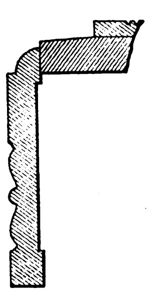
Details of Main Cornice.—Scale, ¾ Inch to the Foot.



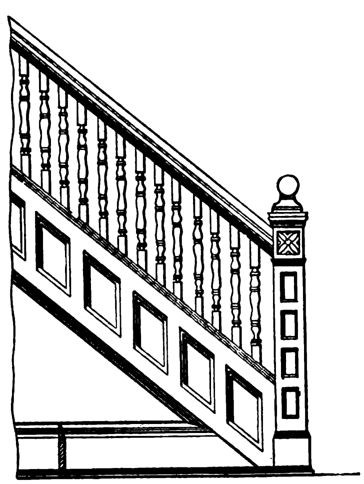
Detail of Door and Finish.—Scale, ⅜ Inch to the Foot.



Detail of Veranda.—Scale, ⅜ Inch to the Foot.



Detail of Casing.—Scale, 3 Inches to the Foot.



Detail of Staircase.—Scale, ⅜ Inch to the Foot.

Miscellaneous Details of Cottage of Moderate Cost.

Uses of Burnt-Clay Mortar in Italy.

The United States Consul at Catania, in his last report, says that visitors to Catania invariably notice and remark on the peculiar soft pink color of all the unpainted buildings. This coloring is the result of using cement or mortar of proved value, found in the vicinity, and which is nothing more nor less than burnt clay. In the frequent eruptions of Mount Etna in times past great beds of clay were covered and buried from 20 to 200 feet by the lava streams, with the result, when the eruption happened in the dry season, of burning and converting these clay beds into a fine red gravel or powder. These deposits are mined, and are considered very valuable. The material, mixed with a little lime and the usual amount of water, forms a mortar or cement considered superior to any other cement for building purposes, and has been used in Catania to the exclusion of all other materials for centuries. Every building in Catania is constructed of lava liberally cemented with this mortar. In building, small irregular stones are used, just as they happen to come, and a smooth surface is afterward given by a thin coating of mortar, inside and out, which can then be divided by a trowel to imitate blocks of stone, if desired. This burnt clay, with lime, makes a very strong and adhesive mortar; no other material would hold together the large four and six-story apartment houses, which are built entirely of small irregular stones. It also has unequaled wearing and resisting power, as the extensive harbor breakwater proves. This breakwater was built some ten years ago, and extends for three-quarters of a mile out into the sea, and is said to be as good to-day as when first built. It is composed entirely of lava, and for a foot below water-mark to a sufficient hight to protect the shipping, of huge blocks of small lava rubble liberally cemented with the mortar. The constant wear and tear of the sea for ten years has only damaged the cement in insignificant places, and probably only where there happened to be an air-space between the mortar and stones caused by faulty construction of the blocks. Consul Heath adds that the more he looks into the matter the more he is convinced of the value of this mortar as an economic substitute for all the high-priced hydraulic cements now used, and that it might well be adopted in other countries besides Italy.

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We ar Jus getin to build som good hous in our nabhor hood

Write soon to — — —— —— ——

via ——

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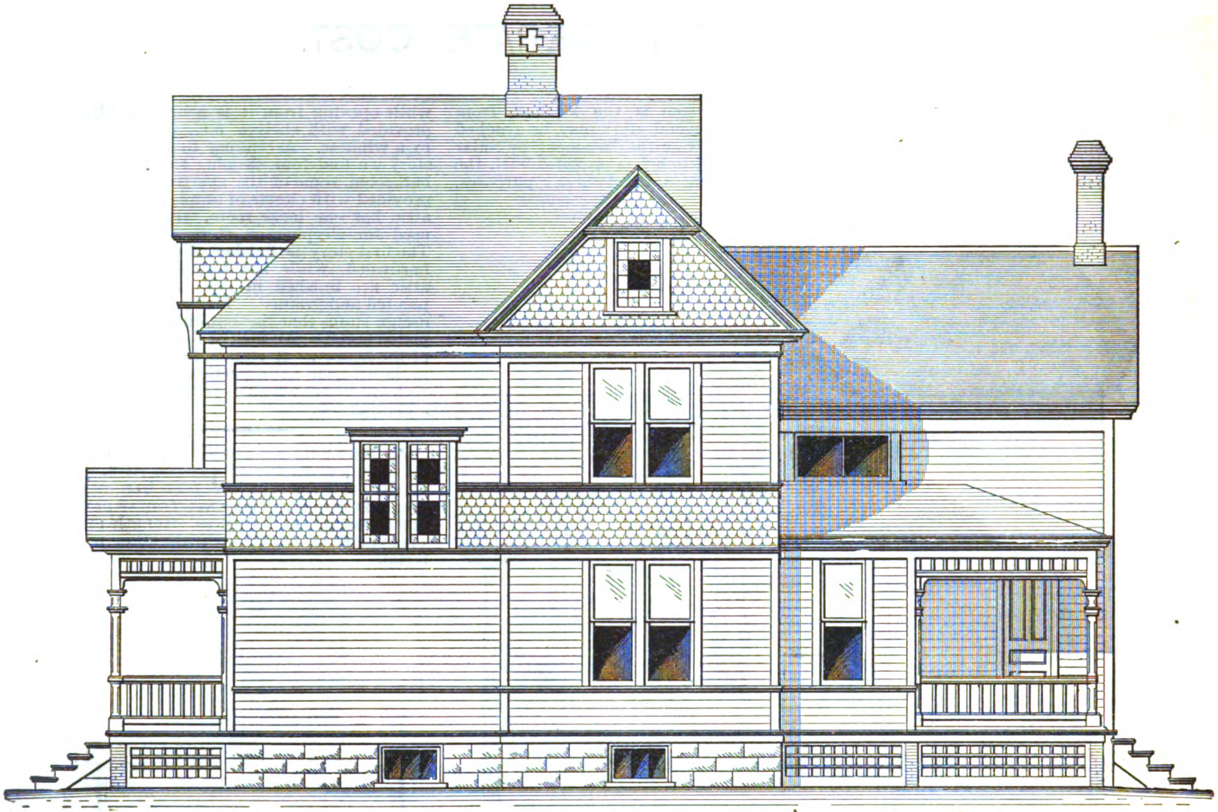
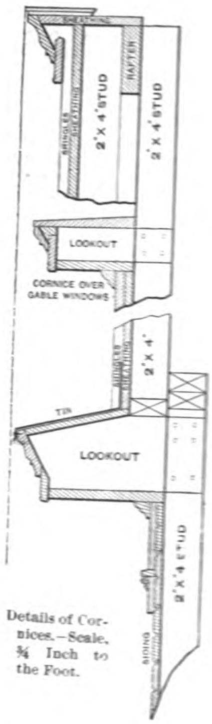


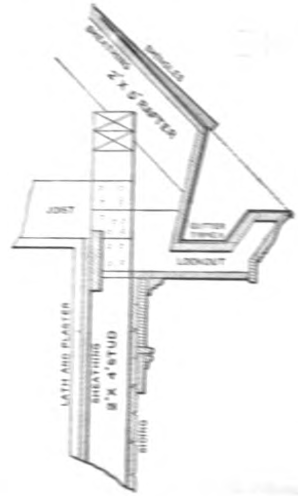
Side (Right) Elevation.

Side (Left) Elevation.

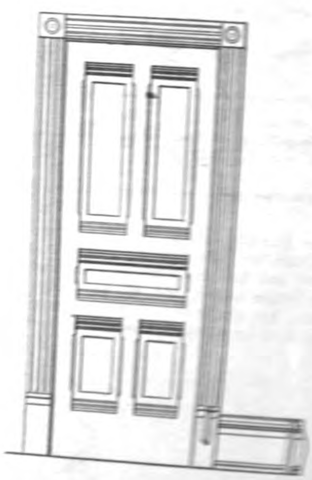
Cottage of Moderate Cost.—Elevations.—Scale, 1/8 Inch to the Foot.



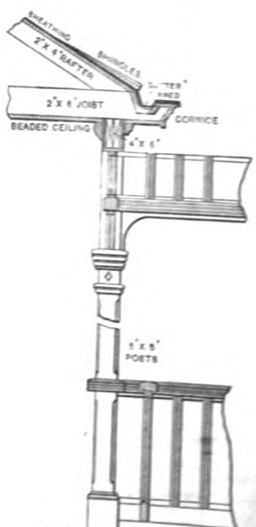
Details of Cornices.—Scale, ¾ Inch to the Foot.



Details of Main Cornice.—Scale, ¾ Inch to the Foot.



Detail of Door and Finish.—Scale, ¾ Inch to the Foot.



Detail of Veranda.—Scale, ¾ Inch to the Foot.

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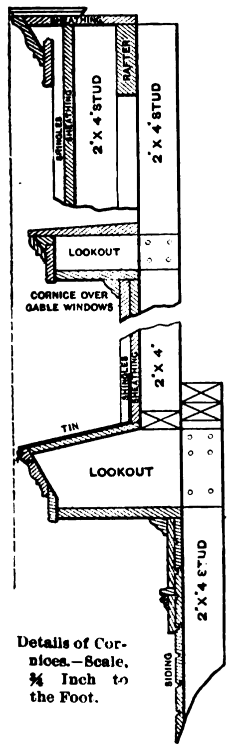
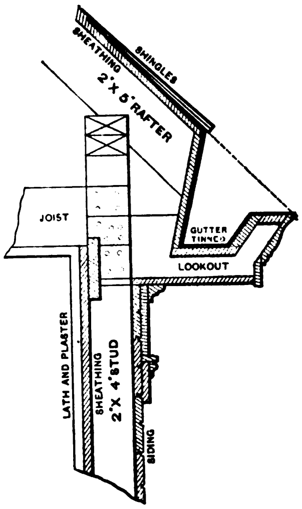
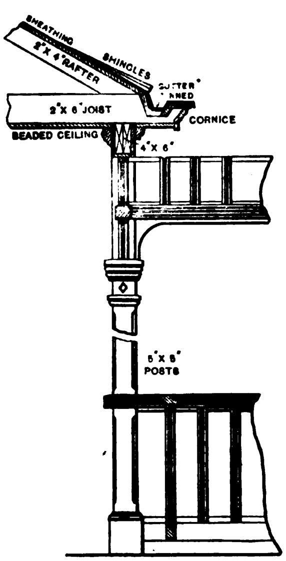
Cottage of Moderate Cost.—Elevations.—Scale, ⅛ Inch to the Foot.



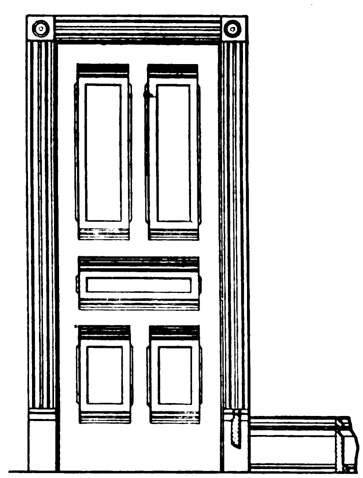
Details of Cornices.—Scale, ¾ Inch to the Foot.



Details of Main Cornice.—Scale, ¾ Inch to the Foot.



Detail of Veranda.—Scale, ⅜ Inch to the Foot.



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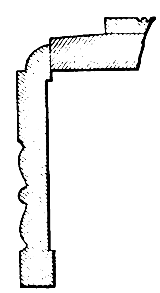
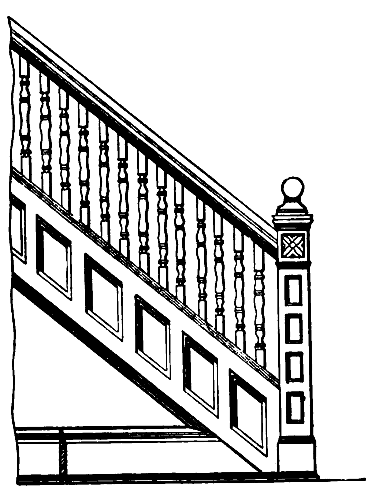


Detail of Casing.—Scale, 3 Inches to the Foot.



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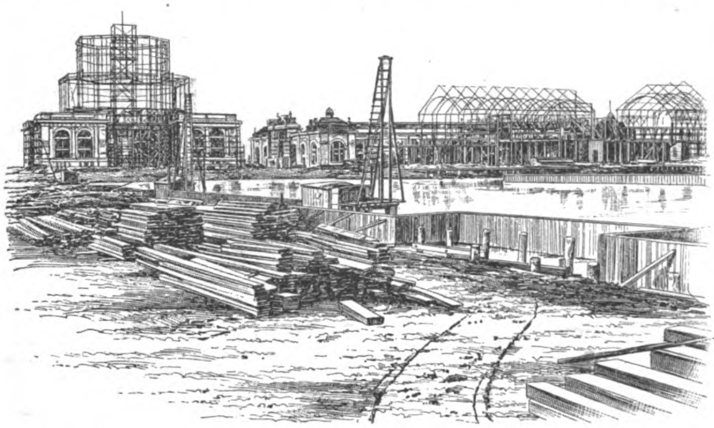
PROGRESS OF THE WORLD'S FAIR BUILDINGS.

DURING the latter part of February a representative of this journal visited the grounds of the Columbian Exposition in Chicago and took a series of photographs illustrative of the condition of some of the various buildings in process of erection for the World's Fair. From these photographs the engravings herewith presented have been made, showing in each instance the stage of the work in progress. Some of the buildings of the Exposition not shown in this connection, as, for example, the Woman's Building and the Mines Building, are much nearer completion than those illustrated herewith.



Progress of the World's Fair Buildings.—Fig. 1.—View Across one of the Lagoons.

Referring to the engravings, Fig. 1 represents a view across one of the lagoons, showing on the left the Administration Building, in the center the end of the Mines Building, and on the right the frame work of the Electrical Building.

Fig. 2 gives a view of the Administration Building, whose most conspicuous feature will be the great gilded dome, 120 feet in diameter and 220 feet in hight.

Fig. 3 represents the central portion of the Horticultural Building, which will be 1000 feet long, with an extreme width of 286 feet. Its center pavilion is roofed by a crystal dome 187 feet in diamter and 113 feet high, under which will be exhibited the tallest palms, bamboos and tree ferns which can be procured,

The Fisheries Building will have an extreme length of 1100 feet and a width of 200 feet. It will be observed that the view was taken when a part of the iron work of the dome was in place.

The present condition of the Electricity Building is shown in Fig. 5. It has a central nave 115 feet wide and 114 feet high, and is crossed in the middle by a transept of the same dimensions. It is 767 feet long and 351 feet wide.

Our sixth engraving is particularly interesting, since it shows in position the first great steel arch of Machinery Hall, the structure back of it being the traveler.

Fig. 7 illustrates the beginning of the work on the great traveler which is to put up the great steel trusses of the Manufactures or Main Building. There are 27 of these main trusses, each with a span of 380 feet and a hight of 211 feet. The traveler is 50 x 260 feet and will be 120 feet high. On top of it will be raised a central tower of 135 feet high, so that the total hight will be 255 feet.

The essential particulars of the principal buildings at the World's Fair will be found in connection with the engravings of 15 of the structures presented in our issue for January of the present year.

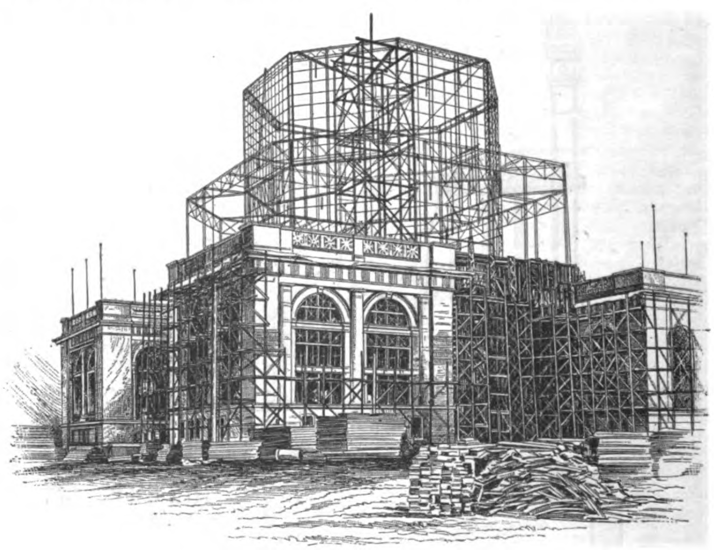


Fig. 2.—The Administration Bui ding.

Simple Method of School Ventilation.

From an address delivered by J. F. Brown before the sanitary convention held at Centreville, Mich., we print the following interesting extract:

It is surprising how recently the ventilation of schools and other public buildings has attracted our attention. We have erected our colleges and churches with a view to every convenience and left out the prime necessity—fresh air. How many ministers are preaching to sleepy audiences, and how many teachers are teaching listless classes, and all no fault of theirs, but simply because the necessary conditions for attention, thought and mental development are wanting. A schoolroom or other public building that is fit to be occupied should have two essential provisions: 1. There should be an adequate supply of pure warm air, and, 2, there should be some means for removing the foul air. This should be accomplished without drafts, and should be a continuous process by which the air should be constantly changing

In building an ordinary single-room district schoolhouse a good system of ventilation may be secured at small trouble and expense. Let a brick flue be constructed, 2 x 3 feet in the clear, and in this flue should be placed an 8 inch heavy iron pipe for conveying the smoke. This smoke pipe should extend 2 feet or more above the brick flue. The brick flue should extend into the basement and there be connected, immediately under the floor, by means of pipes, with two or more registers placed in opposite parts of the room and directly in the floor, being careful not to place them under the seats. These registers should be about 16 x 20 inches, and should be opened immediately after the fire is started in the morning. When the iron pipe becomes warm it will cause an upward current of air, which will remove the foul air near the bottom of the room. The iron pipe should be heavy, both for durability and to prevent the burning of dust in the ventilating shaft by contact with a red-hot smoke pipe.

To get the fresh air in the room is equally simple. If an ordinary stove is used an opening can be made directly under the center of the stove, about 12 x 16 inches, and fitted with a pipe extending through the basement to the open air—never open in the basement. This pipe should contain a damper that can be opened or closed at will, and so regulate the supply of air to be heated. If this pipe is brought within 4 inches of the bottom of the stove, and there fitted with a flange extending over the entire bottom of the stove and about 2 inches up on each side, our ventilating apparatus is complete. Buildings containing more than one room, if not too large, can be ventilated in the same way, and the plan for cheapness and simplicity commends itself to private use.

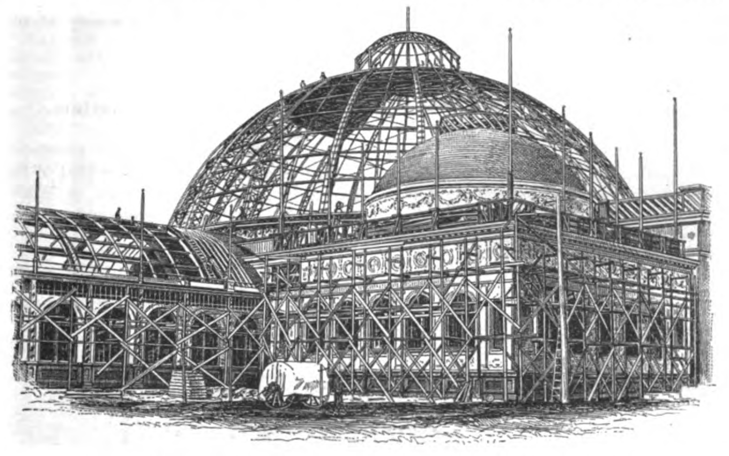
Where furnaces are used the air is too often taken from the basement, a practice that cannot be too strongly condemned. A recent examination of the fresh air boxes in the basement of our school building revealed the fact that the openings, through which the boxes were intended to be cleaned, were open; so instead of the fresh air from out of doors passing up to the rooms above, the vitiated air of the basement, that is used as a playroom, was allowed to pass up.

The same principles apply to buildings of two, three or more rooms. These principles briefly summed up are as follows:

1. Let the room be of ample size. The York State Board of Health recommends 200 cubic feet of air space to each person, providing the air is constantly changed.

2. The foul air should be removed at or near the floor.

3. The ventilating shaft should be large enough to take out the foul air.



Progress of the World's Fair Buildings.—Fig. 3.—Horticultural Hall.

4. The ventilating flue should always be heated to be of service.

5. The supply of fresh air should be warmed, and the amount admitted should just compensate that exhausted by the ventilating flue. . . .

The question of ventilation is one deserving of greater attention than it receives from those in whose charge is entrusted the care and construction of public buildings. We are proverbially careless of the needs of the body for pure air even in our own homes.

Of course there are scoffers who will tell us that this fresh-air craze is merely a mania, a mere matter of habit; and that, because our fathers slept in a 7 x 9 bedroom and lived to a hale old age, we can do the same thing. These will relate with great glee the story of the man who, finding himself unable to sleep at his hotel, because he had been unable to raise the window in his room, at last arose and tried again in the darkness, and failing, broke a light of glass, after which he had no difficulty in sleeping. Imagine his dismay in the morning to find that he had broken into the glass book case in the room.

Nevertheless science, before whose decrees we all bow, estimates that 40 per cent. of all deaths occur through neglect of this sanitary precaution of ventilation in the homes of our citizens. Before we go to Germany in search of the wonderful lymph of Dr. Koch, had we not better secure the life-giving lymph that is at our own doors?

Stability of Domestic Chimneys.

In the design of buildings, as in all structures of masonry, the relation of thickness to hight is a very important matter, says a recent issue of the *Building News*. The architect designs largely by the eye. The visible qualities as expressed in his elevation and section are generally sufficient to enable him to dispense with those delicate computations of stability which the engineer so frequently calls to his assistance. The proportions of a well-designed structure give a full margin to stability, as they also satisfy the eye, which intuitively exacts a certain relation between hight and width. Many of the proportions of brick buildings are regulated by bond—that is, the number of bricks and half bricks. In the framing of the building acts the thickness of walls is thus regulated in the schedules. These thicknesses are sufficient for party walls, which mainly sustain a vertical weight; but in the construction of chimney stacks there is no clear rule. Under the 18 and 19 Vict. cap. 122, section 20, it is enacted that "every chimney-shaft shall be carried up in brick or stone work all round, at least 4 inches thick, to a hight not less than 3 feet above the roof, flat, or gutter adjoining thereto, measured at the highest point in the line of junction with such roof, flat or gutter;" but it goes on to give the maximum hight, which is that it shall "not be built higher above the roof, flat or gutter adjoining thereto, measured from the highest point in the line of junction of such roof, flat or gutter, than a hight equal to six times the least width of such chimney shaft at the level of such highest point in the line of junction, unless such chimney shaft is built with and bonded to another chimney shaft not in the same line with the first, or otherwise rendered secure." This regulation applies to the metropolis. The proportion thus given as a maximum hight is safe under ordinary circumstances, and in positions where the full force of the wind is not experienced; but it is rather too much in situations exposed to high winds or hurricanes, such as that which visited these shores a week or two since, and which blew down numerous stacks on houses. When we take into account the age and decayed nature of some bricks, the perishable mortar used in the joints of the stack, each of which conditions considerably reduces the margin of safety, we shall have no difficulty in coming to the conclusion that a large number of chimney stacks are in a very risky state, and that sudden gusts of wind render them exceedingly dangerous to the inmates, and also to persons who happen to be near the buildings.

RULE TO INSURE STABILITY.

The only rule to insure stability is to take moments about the center of gravity of the shaft where the wind pressure acts. The stability of a chimney stack, of course, depends on the weight of the brick work above the joint at the base being such that it preponderates over the wind pressure at the center of gravity of shaft to such a degree that the resultant of the two forces shall fall within the base of stack at the said joint sufficiently to prevent crushing of the material on that side, or tension on the opposite or windward edge. For the sake of stability, the line of pressure or resultant of the weight and wind pressure should fall within the shaft thickness at the joint level by at least one-quarter of the whole width of chimney. If we suppose an ordinary brick stack composed of 9-inch flues and 4½ inches of brick work on each side, the total width of stack would be 18 inches, so that the line of pressure should come within the joint by at least 4½ inches. The hight of the chimney above the joint would be 9 feet if the maximum statutory limit is allowed; and if we say there are five flues in width, the stack would be 6 feet wide. It is easy to find the weight of the brick work above the level of joint, which may roughly be put at 80 hundredweight. Then, if we multiply 9 feet by 6 feet and by the wind pressure, we shall obtain the total force which acts against the side of the chimney at its center of gravity, and this force has to be counteracted by the 80 hundredweight acting through the

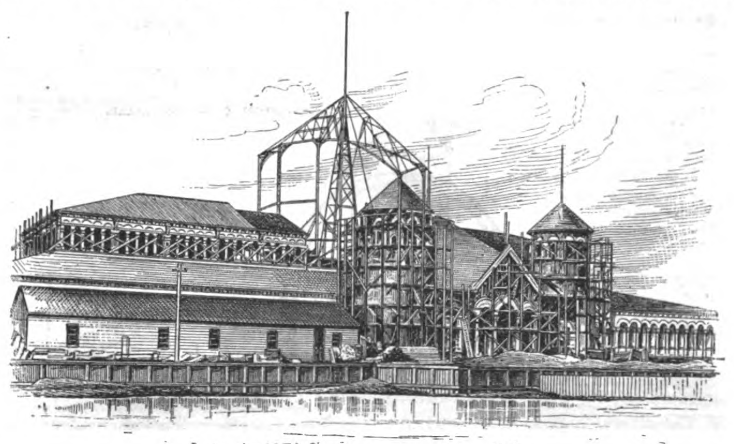
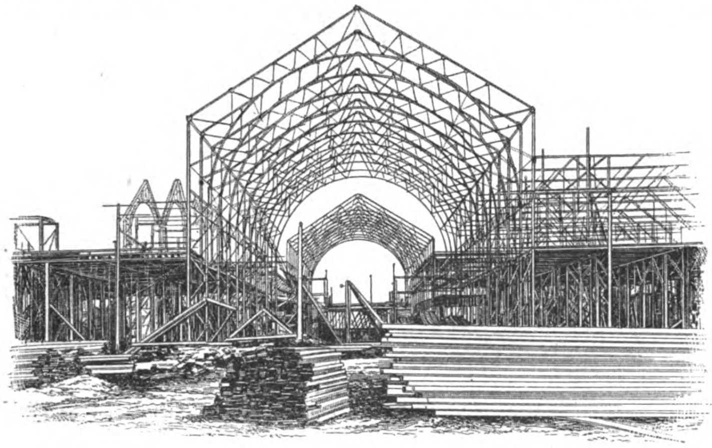


Fig. 4.—The Fisheries Building.

center of the chimney's thickness. There are thus three external forces acting upon the stack exposed to the wind; the weight of chimney acting vertically, the wind pressure acting horizontally, and the reaction of the resultant. By taking moments about the center of gravity, and assigning definite values to each force, the actual stability of the chimney can be found. It will be found from this investigation that chimneys of this hight scarcely fulfill the conditions of stability, especially when the tenacity of the mortar at the joint is small or impaired by age. Of course the tenacious property of the mortar has something to do with the question, as good mortar would increase the resistance to its overturning, but little dependence can be placed on this alone, as it would be extremely unwise to trust to the tenacity of a joint.

STRENGTHENING CHIMNEY STACKS.

We frequently see chimneys which rise from the eaves level to a hight of 10 feet or 12 feet above at the side of a house slightly inclined, partly by the action of the sun and moisture. These ought to be thicker or buttressed. Iron stays are abominations and should not be tolerated. We think the only proper means of strengthening chimney stacks of this hight is to give them more base—to add, in fact, piers or half-brick projections between the flues on each side. The subject is one that demands attention from the London County Council, and from all local authorities who have the administration of building by-laws. Several fatal accidents from falls of chimney stacks have been reported lately which call for some attention on the part of officials.



Progress of the World's Fair Buildings —Fig. 5.—The Electricity Building.

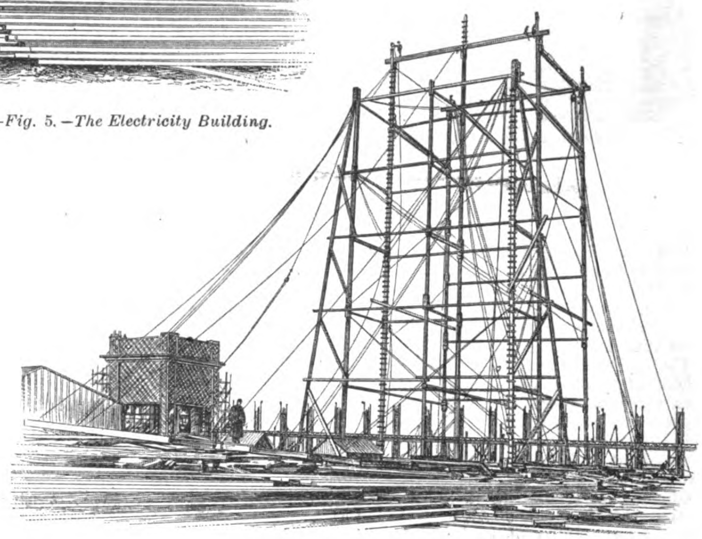


Fig. 7.—A Part of the Traveler for the Main Building.

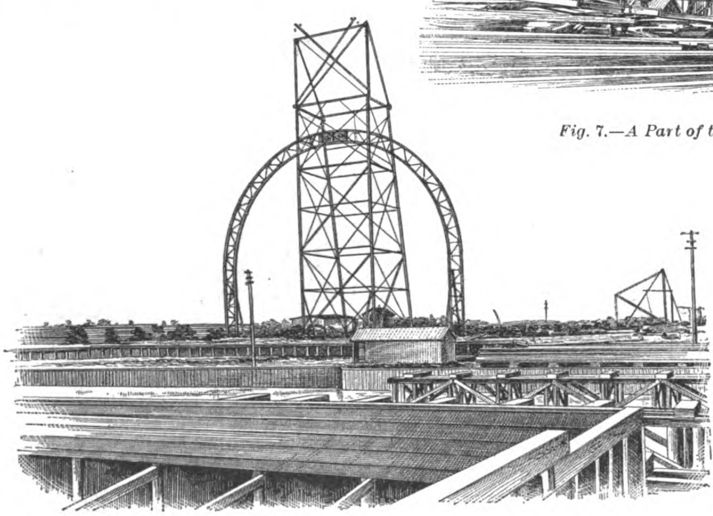


Fig. 6.—The First Arch of Machinery Hall.

Finish of Wrought-Iron Work.

The use of paint or varnish as a protective coating to wrought iron work has heretofore been a matter of necessity, even in many cases where the work was not exposed to the weather. None the less, says *Trefoil*, the use of any plastic material on the surface of wrought metal work tends to obscure or conceal its intrinsic qualities, and is therefore undesirable. In this respect the use of paint on handsome metal work is as objectionable as on handsome wood work. No one now thinks of covering a beautiful piece of wood with anything to conceal the true texture of the material. For the same reasons it is even more desirable, in the case of wrought metal work, to retain with all possible freshness the texture of the metal and the individuality given by the marks of the hammer.

Happily, science, in this as in so many other matters, has come to the relief of art. The method of treatment known as the Bower-Barff process, by which the iron work is subjected in a furnace to the action of certain gases which produce on its surface the unchangeable magnetic or black oxide of iron, has given us a metallic surface unique in tone and texture, which preserves intact all of the original freshness and life of the metallic surface, and which constitutes a perfect protection against rust and other chemical change under all ordinary conditions of inside use. Its brittleness precludes its employment where the work is very delicate or liable to bending, but otherwise it is applicable to all kinds of iron work, either wrought or cast. No one who has not seen iron work treated by this process can fully realize the perfection and beauty of the finish it affords.

The Bloomingdale Asylum.

One of the most interesting groups of buildings recently projected is that of the Bloomingdale Insane Asylum at White Plains, N. Y. Twenty-five years ago the corporation bought 300 acres of high ground overlooking the town, and this spring they will begin an elaborate series of buildings with the object of moving there within the next two years. James Brown Lord has drawn the plans for 15 buildings. Twelve will be built at once, the others when needed. These buildings are designed after what is known as the pavilion plan—that is, each is separate, but all are connected by covered ways. They will form, roughly speaking, a diamond, inclosing three courts or open plots, each about 136 x 144 feet. The central structure, at one of the apices of the diamond, will be known as the administration building. There will be three elaborate structures on each side of this, their fronts receding sharply both ways. Thus seven buildings will face the visitor approaching from the front.

The buildings are all of the Spanish renaissance style. Each will rise from a foundation of rough field stone two stories in red brick, with terra cotta and brownstone trimmings. Under the sweeping roofs will be broad open roof stories for exercise in unpleasant weather. The administration house in the center will have a commanding square tower. The two end buildings will have tall towers also, and the intermediate structures will have towers of less hight. All will be of the most modern fire-proof construction. The cost of the whole will be about $1,000,000.

CONTRACTS AND CONDITIONS.

By WM. H. SAYWARD.

THE HABIT of the contractor in signing anything in the shape of a contract presented to him in order to secure a job has resulted in the acceptance of certain forms of agreement as being the only ones under which building operations can be conducted. President McAllister in his address to the sixth convention of the National Association of Builders made the apt statement that "the man who submits to abuse invites abuse, and is certain in the end to be abused," and in the form of contract cited in the following the truth of his statement is apparent.

The conditions and contract referred to were drawn by the City Architect in one of the principal cities of the country and exemplify many of the contracts drawn by architects in private practice. Only a few of the salient points are touched upon, those being very briefly treated and in a spirit entirely devoid of partiality or personality, in an effort to point out some of the defects which exist in the builder's methods of transacting his business, as well as to urge upon his attention the desirability of employing the Uniform Contract in preference to any other. The consideration of this question premises, of course, that both parties to a contract are thoroughly honest and equally desirous of effecting the completion of the contract in a successful and mutually satisfactory manner. This being the fact, there is no reason for the inequalities in the conditions and contract, and the reverse being the case, there is all the more reason for absolutely just protection for each.

GENERAL CONDITIONS.

. . . The contracting party is to do all heating required to dry the plastering and for finishing the building, and provide fuel and attendance, up to thirty days from the completion of the building, contractor to provide heaters or stoves when required by the City Architect. . . .

In this clause the contractor is required to estimate upon an unknown quantity. The architect may consider one stove for one day sufficient, or 100 stoves for 100 days necessary. Provision should be made for the contractor to be paid upon a basis of the amount of heat actually provided.

Said plans and specifications, together with this contract, of which they are to be deemed a part, are to be construed together, so that any work shown on the plans, though not mentioned in the specifications, or *vice versa*, or any provisions of the contract not repeated in the plans or specifications, or *vice versa*, is to be executed by the contractor as a part of this contract. Figured dimensions are to prevail over scale. All things which in the opinion of the architect may fairly be inferred from the plans and specifications are to be executed by the contractor as a part of this contract. If complete drawings of detail have not yet been made, the same, when made and conforming to said plans and specifications, are to constitute a part of this contract, the architect being the sole judge as to whether said detailed drawings conform to said plans and specifications. The plans and drawings received by the contractor at any time during the continuance of this contract are at its termination to be returned to the City Architect, the same to be the property of the city.

The first part of this clause provides specifically for the work to be done under the double precaution of including all work set down in the specification even though not shown on the plans, and *vice versa*, and further states that "all things which in the opinion of the architect, may fairly be *inferred* from the plans and specifications are to be executed by the contractor as a part of this contract." If the contractor must build according to what the *architect* considers may be fairly inferred from the plans, where is the need for specifications at all? In what other business contract does an *inference* figure? In the event of detailed drawings being lacking at the time the bid is made up by the contractor, he must execute the contract in accordance with the later drawings under any circumstances, as the clause provides that the architect shall be the sole judge as to whether or not these later drawings conform to the plans upon which the contractor based his estimate. The plans, in reality, are but the delineation of the specifications and it does not seem unfair to maintain that the specification should at least mention everything that is to be introduced into the building, in order that the contractor may not be required to scrutinize the plans, to determine whether or not items there appear which are not called for in the specification, and *vice versa*.

The contractor shall dismiss any of his employees if the architect considers said employees incompetent or careless or disobedient, or to act in a disorderly or improper manner, and so informs the contractor, and such persons shall not again be employed on the work.

The contractor shall make good all defects, omissions and violations of the terms of this contract, whensoever discovered, during the progress of the work or afterward, notwithstanding any payments that may have been made, or any certificates of payments that may have been given, or possession or acceptance of the work by the city, and shall be responsible for any damage that may be caused in making good said defects, omissions or violations.

The contractor shall clean away all dirt and rubbish caused by his operations as often as requested by the architect, and shall leave the premises, at the termination of this contract, free from such dirt and rubbish, and in a clean and neat condition.

The first clause of the foregoing is an interference with the contractor's affairs that is not justified by the other conditions to the contract, for the architect has to do only with the satisfactory completion of the work, or any part of it, and not with the person who does it, or how it shall be done. Provision is made for the architect to condemn any portion of the work improperly completed.

The operation of the second clause is such that the contractor is afforded no security whatever from being compelled at any time to tear down and rebuild, at his own expense, portions of the building discovered to be defective, and which defects are the fault of the architect; for if the conditions of the contract are properly carried out the architect approves of nothing but what is satisfactory. If the work was satisfactory at the time of approval by the architect, then the defects must have existed in the plans, and are therefore faults of the architect. In either case the contractor is required to repair a fault that is not his own. The clause is also vague in that the supremacy of the architect is, in this particular, abandoned, and any one can discover at any time defects for which he (the architect) is alone responsible, either during his term of admitted responsibility or after it has ceased to exist.

The third clause is an unwarrantable interference with the work of the contractor, except in so far as it refers to leaving the building clean at the termination of the contract.

INSURANCE.

The contractor must deposit an insurance policy covering the full amount of the contract at the time the first order for a payment on account is given by the City Architect.

While the cost of insurance is a definite amount that can be added by the contractor to his bid, the question arises as to why the contractor should be required to deposit an insurance policy, at the time of the first payment, which covers something that does not exist. In a case where the amount of the contract is, say, $500,000, and the time for completion is two years, the contractor is compelled to effect insurance for the completed building at the date of the completion of the excavating or when the first story is up, at which time he receives his first payment, and is thereby deprived of the use of his money which he has paid to some insurance company for the protection of something not in existence. This clause is inoperative from its own conditions, as it is unlikely that any reputable insurance company would insure a building that did not exist. There is also no requirement as to whom the policy shall be drawn, whether in the name of the contractor or the owner.

In any case it is only a roundabout way on the part of the owner of securing insurance on his property at the expense of the contractor. The contractor should only be liable for such work under the contract as has not yet been approved by the architect, the rest having become the property of the owner, as in reality every particle of material has, as soon as placed in the building. The insurance should be effected by the person who owns the building, in such manner that the contractor shall be protected for work not yet approved, and which is virtually the property of the owner as soon as it is placed in the building.

THE CONTRACT.

.... contractor, and the city of .... on this .... day of .... A.D. 1892, agree as follows:

1. Said contractor shall furnish all the materials and labor and do everything required for .... in all respects in accordance with the specifications hereto annexed and the plans for the said work, prepared by the City Architect of said city, and said architect may make alterations in the plan, form, dimensions or material of the work herein contemplated, either before or after the commencement of construction, and if such alterations increase the quantity of work to be done, such increase shall be paid for according to the quantity actually done and at the price established for such work under this contract, and if there is no price established, then the price shall be fixed by said architect, with the approval of the Mayor of said city, in writing; and if they decrease the quantity of work to be done, any damage actually done to said contractor thereby shall be estimated and fixed by said architect, with the approval of the Mayor of said city, in writing; and if they make the work less expensive to the contractor, a proportional deduction shall be made from the contract price as determined by said architect, with the approval in writing of the Mayor of said city. The decision of said architect in regard to additions to or deductions from this contract shall be *final*. All materials and workmanship must be the best of their class throughout and be furnished and done under the supervision and to the entire satisfaction in every respect of said architect.

The terms of this clause permit the paid agent of one of the parties to the contract to become the sole judge as to the value of alterations in the work to be executed under this contract by the other party thereto. In case the specifications are changed after the contract is signed the architect, who is employed by the owner and acts for him in all transactions relating to the execution of the contract, becomes the sole and only person who shall determine the cost of the changes or alterations, provided a price is not already fixed upon which to base the cost, and which price is not fixed in 1 per cent. of the contracts let. If either of the parties to the contract is entitled to a voice in fixing the value of work to be done under alterations or additions to the original design, the one who performs the work (the contractor) should be that person. Again, if one of the parties is entitled to a voice in the matter, the other should also be entitled to the same privilege. The adjustment of the price on all work done outside of that which was comprehended in the contractor's original estimate should be provided for through disinterested persons, to whom the contractor and the architect may appeal in the event of their being unable to agree between themselves, and whose decision in the matter should be final. There is no equity in a contract which involves a sum of money to be paid for work done, to give one of the parties to the agreement powers which are not equally conceded to the other. The provision, "The decision of the said architect in regard to additions to or deductions from this contract shall be final," is the acme of unfairness.

2. Said contractor shall do everything necessary to the completion of the work, drawn on plans and not specified or described, or specified or described and not drawn on plans; shall follow accurately the plans, but shall follow figured dimensions in preference to scale dimensions; shall construct the detail work in accordance with full-size drawings to be furnished by the said architect, and shall take down and replace at his own expense any work constructed without such drawings or not in accordance with them.

This part of clause 2 of the contract is contradictory to the general conditions under which the contract must be executed, for after doubly providing for any errors on the part of the architect, as previously alluded to, it goes on to require that the contractor "shall take down and replace at his own expense any work constructed without such drawings or not in accordance with them." Without referring to the fact that the preceding sentence states that work which is specified and which does not appear in "such drawings" *shall* be performed, the portion mentioned is in direct contradiction to that part of the conditions which states that "all things which in the opinion of the architect may fairly be inferred from the plans and specifications are to be executed, &c.," thereby stipulating that certain portions of the work must be done by inference, and the contractor is expected to infer in harmony with the architect; if he does not, the architect may order that portion of the work taken down and reconstructed. The entire construction of the clause is intended to protect the architect from the result of his neglect or oversight in drawing the specification and plans, and to compel the contractor to estimate and build, not only in accordance with his (the architect's) design, but in accordance with his intentions also, whether expressed in the specifications or not.

Under such a contract as this, one party thereto agrees to produce a building completed according to certain specified requirements for a stipulated sum of money; but in order to secure this contract he must also agree to submit to any change in the requirements which the other party may see fit to make after the contract has been signed and the price fixed, and must agree to let the party who makes the changes be the "sole judge" as to the cost of such changes. The owner, through the architect, virtually says to the contractor (under such a contract): "Build me a building according to these requirements at the lowest market price, but anything that I have forgotten or any change I may desire to make, you must also build, for which I will pay you whatever price *I* see fit."

ARBITRATION AND APPRENTICESHIP.

ARBITRATION as a factor for harmonizing the interests of employers and workmen in the building trades is appreciated by very few. In a general way and for the settlement of some particular deadlock its utility is conceded, but with no comprehension of the breadth of its scope or of the importance of the permanent existence of facilities for its use. There are various subjects in the building trades which are the source of continual complications between the employers and the workmen, because each side thinks the other is encroaching upon its rights, and each maintains its opinion from an entirely one-sided point of view. In order that each may fully comprehend the rights of the other, the two must come together to consider and discuss the points at issue. So long as the points of variance are not jointly considered, so long will they remain stumbling blocks in the path of harmony, to be temporarily pushed aside by the stronger party, only, however, to again present themselves at the first opportunity. The winning of a point by force convinces no one of the justice of the point gained, but rather creates enmity on the part of the side forced to yield toward that which is successful. Arbitration provides a means for the adjustment of affairs of mutual concern, in which each side has an equal voice, and in which mutual satisfaction must be gained.

The two letters appended hereto show an important feature in harmonizing the interests of the employers and workmen, which is the direct result of the existence of arbitration as the method of settlement of differences between the two in the trades mentioned. The Joint Committee of Arbitration was established as an institution which would greatly facilitate the conditions under which work was to be carried on, and at a time when the relations between the employers and workmen were as satisfactory as they had been for some time previous to its creation, and was, therefore, established not as a last resort for the settlement of some long-fought-over point, but as a wise provision for the future.

The mutually satisfactory adjustment of the apprenticeship question was one of the direct results obtained through arbitration. It was one of the many subjects, the settlement of which was possible through the joint consideration of all its aspects, by the absolutely fair means presented by the plan of arbitration adopted. A permanent joint committee of arbitration, having equal numbers from the employers' organization and the workman's union, creates a medium through which more perfect understanding and greater harmony can be obtained.

The following letters are given as showing the opportunity that is open to every community of builders to bring about a condition of affairs that will render their business not only more profitable, but more just to the workmen and to all concerned:

HALL OF THE JOURNEYMEN BRICKLAYERS' PROTECTIVE ASSOCIATION. PHILADELPHIA, March 25, 1892.

W. H. Sayward, Esq., Secretary National Association of Builders, Boston, Mass.:

DEAR SIR.—Will you please forward to the above address copies of the agreement entered into last fall by the Mason Builders' Association and the Journeymen Bricklayers' Association of Boston, in the matter of receiving apprentices from the trade schools. A local newspaper reports that "all regular indentured apprentices are to be given instruction therein; none but regular indentured apprentices shall be allowed to enter these schools." Anything you may have to suggest in addition to the above will be heartily welcomed by one who feels himself, by virtue of his position, bound to study the apprenticeship question from a practical standpoint in a progressive spirit. I heartily concur in your ideas of thorough organization. Let me have a full expression of your views on this and allied topics.

Very truly yours,
D. M. ANDERSON, President,
Also secretary of the Joint Committee of Conference.

The reply of the secretary of the National Association of Builders is as follows:

BOSTON, April 12, 1892.

D. M. Anderson, Esq., President Journeymen Bricklayers' Protective Association, Philadelphia, Pa.:

DEAR SIR.—I take pleasure in sending you a copy of the Apprenticeship System as adopted by the Joint Committee established by the Mason Builders' Association and Bricklayers' Union No. 3 of Boston and approved by both bodies. I think you ought to understand, in the first place, in what manner the coalition of these two associations has been brought about, so that not only this important question of apprenticeship, but all matters of mutual concern, are amicably considered and settled. It will not be necessary to explain in detail all the difficulties which have had to be slowly overcome, for you are undoubtedly aware of them, but I will simply say that our National Association of Builders has been doing a great deal of preliminary and educational work in this direction, and at the annual convention, held in New York in February, 1891, a plan was finally adopted as a proper one to recommend to all filial bodies as a rational method of preventing all difficulties between employers and workmen in the building trades. You will find this plan (printed in *Carpentry and Building* in the issue of August, 1891) on pages 46 to 49 inclusive of the official report of the fifth convention of the National Association of Builders, a copy of which I send you under a separate cover, in which you will also find the full discussion of the plan and its adoption. Taking this plan as a basis, the Mason Builders' Association and the Bricklayers' Union of Boston entered into an agreement soon after that convention, and, further, a similar agreement was entered into with the stone masons' and with the building laborers' unions, all of which have proven eminently satisfactory. I inclose also herewith a copy of the agreement made with the Bricklayers' Union, which, you will see, is word for word as recommended by our National Association. The agreements made with the other two unions are identically the same. I also inclose a copy of the agreement and recommendations of the Joint Committee of Mason Builders and Bricklayers for 1892.

After reading the apprenticeship system you will discover that the newspaper reports to which your letter refers were not accurate. Our system for Boston treats the question of trade schools only in a tentative way, for the reason that we have as yet no trade school in existence here, but, believing as I do that such institutions can be made of much value, and believing as I do that in this department, as in all others of mutual concern, the employers and the workmen should frankly work together for the best good of the craft, I conceived it to be eminently important, while framing a comprehensive system of apprenticeship, to include some recognition of the fact that a more regular method of instruction in the fundamental features of the building trades is desirable for all concerned, and that employers and workmen alike should lend their hearty support to it.

When the workmen and employers are of one mind in this matter, and join hands in systematic and definite instructions during the early stages of the youth's appprenticeship, such as schools of this nature give peculiar opportunity for, many of the objections which have been made to independent trade schools, on account of an effect inimical to the interests of the workmen which they have been supposed to create, will be entirely obliterated.

There is much I would like to say in regard to the establishment of just relations between employers and workmen, but time will not permit. I shall be glad, however, to answer any further questions which you may desire to present, and beg you will believe me a very sincere worker in behalf of harmony between the employer and the employed. Yours very truly,

W. H. SAYWARD,
Secretary Nat'l Ass'n of Builders.

AMONG THE interesting buildings of a thoroughly modern character which will be put up this year in this vicinity may be mentioned the new abattoir of the New York and New Jersey Abattoir Company, the Seventy-first Regiment Armory, the Charities Building on Fourth avenue and Twenty-second street and Mr. Dinkelberg's big office building at the foot of Broadway, adjoining the Washington Building. The Armory Board has deferred the matter of the Seventy-first Regiment Armory for a time, but the plans are ready. Mr. Dinkelberg has been forced to modify the plans for his huge office building, described in these columns some months ago, but it will be one of the great buildings of the city, having thirteen stories to the main cornice, and a sky-scraping tower over all.

CYCLONE ARCHITECTURE.

EARTHWORK, SPLIT TREE TOWNSHIP.—*To the Editor of Carpentry and Building* :

DEAR SIR.—Knowing the world-wide circulation of your paper, I was not surprised to find a copy of it here in this out-of-the-way locality. Perhaps that was written unadvisedly, however, as this little—town shall we call it? is located on a main branch of one of the largest railroads and boasts the possession of a post office, church, grocery store, and several other buildings intended to echo to the genial rattle of trade and as places of residence. Among the latter we must include the sod houses, built in most instances by their owners. When I gazed at the stucco designs of floors laid in hard earth, and the bird-nest frame works with sod shingles, it occurred to me that this wasn't much of a place for the ambitious carpenter and builder. The time is long past when the man of chips received $6 for a day's work here. Thinking it might interest your readers I send a photograph of one of our best houses. (See Fig. 1.)

This building cost, a few years ago, $1000, and in size is about 18 x 30 on the ground. The first floor is partitioned off into two rooms, the upstairs being one apartment divided by curtains into two bedrooms. The stove used to heat one of these is "connected with the air" by a common stove pipe running directly through a hole in the roof. The fire regulations of the place are not so strict as to interfere with the divine right of a man to do as he likes, in this respect at least.

Cyclone Architecture.—Fig. 1.—View of one of the Best Houses at Earthwork, Split Tree Township.

At the time this house was constructed materials for back plastering were as difficult to procure here as Rhode Island Johnny cakes, and the following means were adopted to supply the deficiency and keep out strong winds: The inside of the walls was sheathed up, the space between same and the outside walls being filled with sand. Sand there was in quantity; sand to spare—to lease, to let, to give away. The result was quite satisfactory and wholly economical; besides which it served to anchor the building to a given locality, not a small consideration in these festive parts.

Fig. 2.—View of a House from a Photograph Taken During a "Little Stir."

High buildings are dangerous here. The one shown was as high as any I saw. Our West, you know, is noted for great things: Great farms, miles in extent; great harvests (when the weather also happens to be great), great air, and great stretches of grass and plain and sky. To this list I must add the great cyclone. In Fig. 2 is presented a view of a house from a photograph taken during one of the "little stirs." Without our cyclone we would be as lonesome and un-celebrated as California without her wet seasons.

Some of the veteran houses, which for years have stood the general shaking up of this cheerful visitation, are models of angle work. The old dwellings seem to have started off in several directions at the same time, and got a little distance in each, until they look "ready to go" in more senses than one.

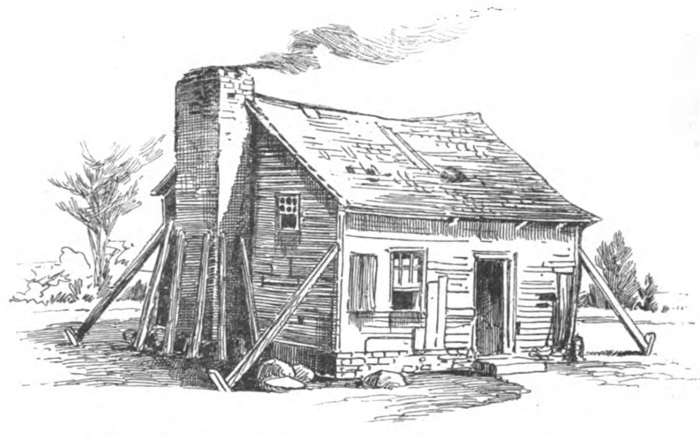


Fig. 3.—Representative Example of Western Cyclone Architecture.

I have secured a sketch of one of these last-mentioned houses, which (see Fig. 3) is submitted to your readers as a representative example of Western cyclone architecture.

Yours respectfully, W. C. S.

Note.—In connection with the article of our correspondent above we present a reproduction of a grotesque illustration of an elastic rubber house, advertised some months since in *Scribner's Magazine*. This house is represented in the fourth sketch and is worthy of more than passing notice in treating of the unique subject of "Cyclone Architecture." The supposed makers refer to these dwelling houses in the following humorous vein: "They are constructed entirely of India rubber and are specially recommended for settlements in regions visited by tornadoes or earthquakes. They are much superior in comfort and appearance to cyclone cellars, and as they most gracefully adapt themselves to the fury of the elements will outride the most severe tornado. The elasticity of the floors makes them admirably adapted to dancing or athletic sports, and the saving in broken crockery alone is a large item in these houses. Falling down stairs is a luxury. Elastic Asbestos Foundry Chimneys are a specialty."

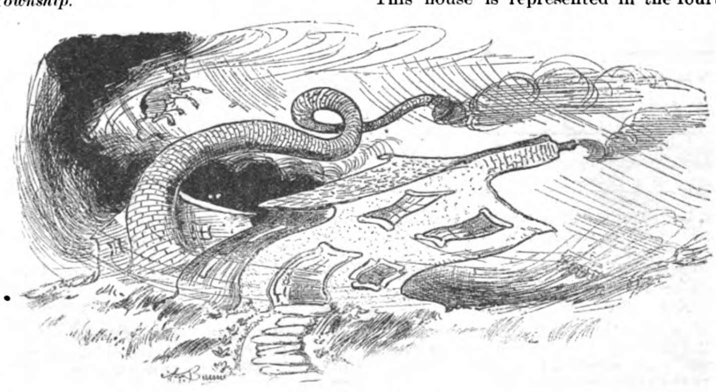


Fig. 4.—Appearance of an Elastic Rubber House and Factory Chimney During a Cyclone.

CORRESPONDENCE.

Shingling Hips.

From W. T. J., *Tucola, Ill.*—In answer to "A. W. P.," whose inquiry appeared in the February issue of the paper, I will give my method of finishing hip roofs without the use of weather boards. I have used this method for the last five years and know it to be entirely satisfactory. We use shingles at least 6 inches wide at the hips, stained back about 1½ inches from the sharp angle of the hip, carrying up both sides and weaving together. When carried to the top, strike a line 2 inches from the sharp angle on each side, after which proceed to dress down the corners of each course, as shown in Fig. 1 of the sketches, until a straight edge laid on will fit close the entire distance. Then with two sixpenny nails lay a course of four round or octagon dimension shingles from the bottom to the top by the lines already mentioned, giving the hip the appearance indicated in Fig. 2 of the sketches. Of course care must be used in nailing where the shingles are to be cut.

From E. M. L., *Indiana, Pa.*—In answer to "A. W. P." of Buffalo, N. Y., I send a sketch, shown in Fig. 3 of the illustrations, which may prove of interest. This method I obtained from *Carpentry and Building*, and was there called Holcomb's patent, but if it was ever patented the patent has probably long since expired. Take an even width of shingle, say 6 inches, and instead of dressing off to a point let it extend down to the bottom of the row below, thus giving the short side to the weather. Keep both sides driven evenly, pare off carefully, and a perfectly tight and neat job is the result.

From A. S. A., *Cherryfield.*—Concerning the inquiry of "A. W. P." of Buffalo, N. Y., I would state that the best method I have ever seen or used can be found in *Carpentry and Building* for March, 1884.

Note.—For the benefit of those of our readers who were not subscribers to the paper in 1884, and also of those who have not access to the volume for that year, we have reproduced the article mentioned, together with accompanying illustrations. It was contributed by "W. A. Y." of Price's Landing, Pa. We also submit, with sketches, an article by "S. H. G.," Groton, Conn., relating to the same subject and published in *Carpentry and Building* for January, 1881.

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

From S. H. G., *Groton, Conn.*—I have just commenced taking *Carpentry and Building* and am well pleased with all that I have seen. Perhaps some of my brother chips would like my method of shingling regular hips. It is not original with me, but it is the plan which I prefer using. Sometimes it is real bother to find wide shingles enough, and the old way demands too much cutting. I snap a line 4 inches from each side of the hip, as indicated by the dotted lines in Fig. 6, and bring the corner of the shingle of each course to the line, as shown in the sketch. When all through with the plain shingling, I make a pattern and cut the top only in this manner. The bottoms will break joints every time, and the hip shingles will lay square with the hip, thus making a first class finish at this important place, with no liability of the shingles curling up. I find that the best plan in using shingles in this way is to shingle the two opposite sides first and then line from one corner to the opposite corner. The appearance of the hip when finished is shown in Fig. 7. With reference to painting shingles, I would advise that they be painted before they are laid, or else not painted at all. Paint applied to a shingle after it is in position makes a ridge underneath, and water gets under the paint and cannot escape, thus rotting the shingles. I have taken off a number of roofs that were destroyed in this way, when other roofs which had been laid quite as long without painting were perfectly sound.

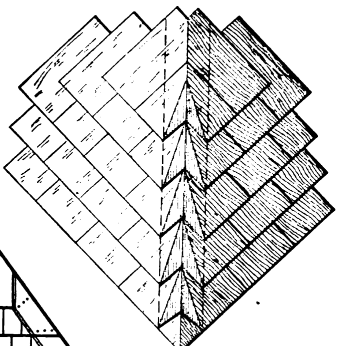


Fig. 1.—Appearance of Hip before Shingling.

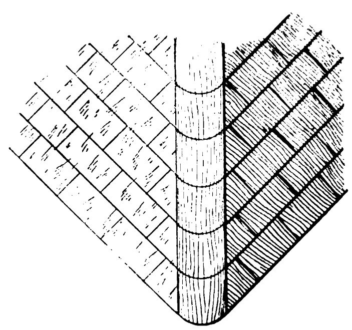


Fig. 2.—Appearance of Hip after Shingling.

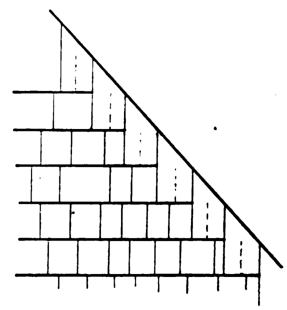


Fig. 3.—Method Suggested by "E. M. L."

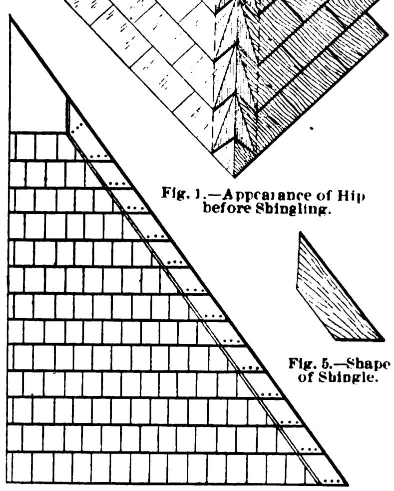


Fig. 4.—Plan of Shingling Hips Recommended by "W. A. Y."

Fig. 5.—Shape of Shingle.

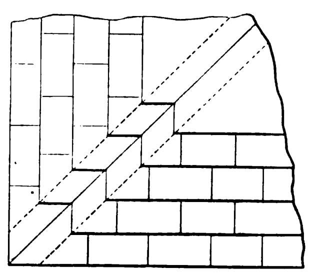


Fig. 6.—Process of Laying the Shingles Suggested by "S. H. G."

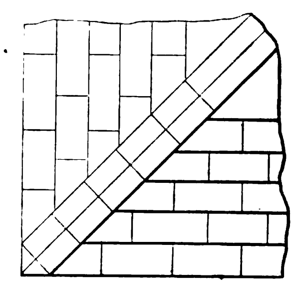


Fig. 7.—Appearance of Hip when Finished.

Shingling Hips.—Sketches Submitted by Various Correspondents.

An Independent Ceiling.

From A. D. PENTZ, *Elizabeth, N. J.*—I am not at the present time interested in architecture or in building, save in the general way that a person who once studies a subject never loses interest in it. But 20 years ago, yes, even 28 years ago, I had some knowledge of these matters. My father was a builder in the suburbs of Boston 20 years ago, and at that time I was employed at a different trade in New York City, but meeting with an accident to one of my eyes, I was ordered to the country "where you can see plenty of green grass and trees," as the doctor put it. So I went home, and there the prescription was filled so well that in a few weeks I was all right. I was advised, however, to stay at home all winter and go to work. Little by little the old facts I had learned 8 and 10 years before came back to me, and in two month's time I was able to open my mouth about carpentry without putting my foot in it. Now, however, after an absence of 20 years from the building trades, I may be pardoned perhaps in describing the device in mind if I call a piece of timber a beam, when I should call it a joist or a girder; for, believe me, I once knew their proper names, but they have been crowded from my memory in their distinctive applications by the nomenclature of another art.

During the winter referred to an architect designed and my father erected a house, the ground flour of which, on one side of the main hall, was made into one large parlor, probably measuring 18 x 30 feet. Over this room were two chambers, with wardrobes, closets, &c., between them. The designer made no framing plan, leaving that to the builders, as was often the case in those times, however it may be now. The foreman in looking over the plan before commencing operations, said that the partitions over the middle of the parlor would, by their weight, crack the plastering of the ceiling below. The designer said the partitions would have to be trussed, and that heavy timbers should be laid for the floor at the points where the partitions were carried. He said it was his idea when making the plan. It was found, however, that the two doors through each of the partitions, the chambers being *en suite*, were so placed that the partitions could not be trussed to advantage.

Now, with that habit of trying my hand at every puzzle presenting itself, and which quite as frequently makes trouble as cures it, I took this problem home and studied it. I had made my sketch and was just ready to explain it when the foreman arrived with another solution of the problem. The foreman's idea was to bolt the partitions to the roof with long iron rods, the partitions on the third floor and the roof favoring this plan. My father liked the suggestion of the foreman, it being cheap and appeared to be effective. He said, however, before he decided to do anything he must consult the owner of the prospective house, which probably would again bring in the architect, who, being responsible, would naturally decide the question. Before the foreman went away I showed him my plan, which is illustrated in the accompanying sketch. He at once condemned it as expensive, experimental and of a character such as he had never seen tried, and one, however, in which he had no faith. My father looked at it, but said nothing, and the foreman departed. Men were encouraged to visit the house, and, whether they had mechanical notions or not, he talked with them on any subject they chose to discuss. If this custom be followed so that all feel free to come and none seem favored, as in this case, it produces good results. If, however, favor be shown, it breeds jealousy and produces harm. After the foreman had departed my father told me to prepare a more careful sketch of my plan, so that if it should be necessary, two ways could be suggested. I did this and kept the sketch in my pocket for more than a week before it was asked for. Then one day father, the foreman and myself went to Boston to the architect's office. Mr. Flint arrived in a few moments and opened his guns on the designer. He was met by his order, which stated explicitly that no framing plan should be made, and retorted by the charge that nobody could make a framing plan to the design. Then the designer alleged that the whole question was of but little moment, as there was not one chance in a thousand of the ceiling being injured by the partitions. To this the wily owner replied that if the architect would so decide and warrant the result he would have the house made with no partitions to protect the ceiling; but if the ceiling should crack at that place or at any place from the weight of the partitions above, or from the rigidity at that point, the designer should be responsible and pay all expenses involved in making the ceiling as it should be. This proposition was not pleasing to the designer and he demurred, asking if he should be held responsible in case the foundation settled, if there was water spilled and soaked through, &c. Then he stopped short and turned to our group, saying:

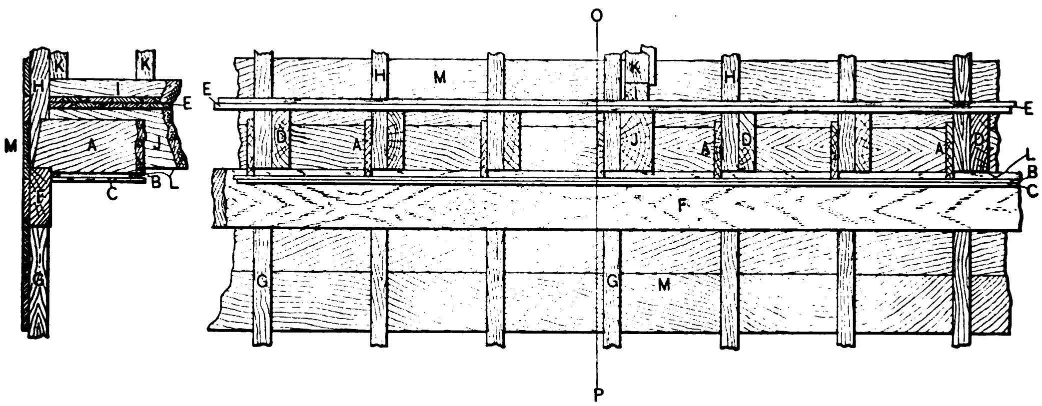
"Mr. Pentz, you're a builder of experience, and of course have had difficulties of this kind before to contend with. Now, what would you do in this case?"

My father stated that, there being an architect for the building, he would do nothing which that architect did not unqualifiedly sanction and indorse. He then showed the foreman's plan, while the foreman expatiated as to its merits. The designer said that he did not, as a general rule, like iron rods, but he saw very few objections to their use in the case under discussion. Mr. Flint was neither an architect nor a builder, but he said if the partitions made one part of the ceiling rigid and the other parts remained elastic, the tendency would still be to crack, while iron rods were in danger of rusting off after a time, and then there would be a collapse. My plan was then shown and stamped as "too expensive," both by the designer and the owner. "It will make a good ceiling, though," said the architect, after a more extended and careful examination, which included me from head to foot.

"How much will it add to the contract price?" asked the owner. This had all been calculated. "It will take about 700 feet of lumber, and that is all there will be to it. It is proposed to put the floor timbers 16 inches apart, and this will obviate the necessity of strapping the ceiling. I see no benefit to be derived from furring."

It was furred, however, because the architect desired it and the owner insisted upon it. Right here it may be said that this ceiling was a success; that the absence of connection between it and the floor made a surprising good deafener, and that the amount taken from the hight of the parlor was not more than 1¼ inches. It has always seemed to me that if this kind of ceiling be generally adopted, it would be of value where the partitions above crossed, as in this case, and where there are heavy objects to be placed on the floor or moved about in the rooms above. My reason for this view is that the floor may be depressed the space marked L in the sketch before the ceiling can be destroyed at all. In case of a dancing floor over a hall, it would seem to be a cure for many evils.

In explanation of the accompanying drawing, I would say that the ceiling C, made of lath and plaster, is attached in the usual manner to the furring B. The scheme of timbers A A A, which is the distinctive feature of this ceiling, are of plank 1½ inches thick and as wide as their length demands—say 12 inches wide for 20 feet of length. If they be placed 12 or 15 inches apart, no furring will be required on which to lath. They are notched at each end, where they rest on the beams or girders, so that their lower edges are about 1 inch below the lowest of the floor timbers D. The floor timbers D should be as wide, or even wider, than ceiling timbers, so that there shall be no possible approach of any portion of the floor to any part of the ceiling. The construction of the wall F G H M is supposed to be that in general use, which provides the girder E to support both the floor and the ceiling. The cross partition, indicated by the studding K K, and the stringer I, is supported by the heavy timber J. To prevent sagging in that part of the floor, owing to the weight of the partition, it will be seen that this floor is practically distinct from the ceiling, except that in both the timbers are upheld by their ends on the same supports in the frame of the building; also that both occupy the same space with the exception of about 1 inch of greater depth, which perhaps could be safely subtracted from the width of the timbers, as it seems to be a fact that the stiffness of a floor is as much a matter of safety to the ceiling below it as its own rigidity.



Method of Making an Independent Ceiling, Suggested by A. D. Pentz.

American Shingle Practice.

From E. M. L., *Indiana, Pa.*—In answer to W. J. McQuillen, Port Blair Andeman Islands, E. I., I will say that in this part of old Pennsylvania our shingles are made of white pine and are cut with a saw. They are 18 inches in length and vary from 2 to 18 inches in width, or whatever the saw "will reach" as a "bolt," as it is called, stands on end and runs up to the center of the saw only. Four inches is the standard of measurement, while the standard thickness is 5 butts, equal to $2\frac{1}{4}$ inches. The pitch of roof may be from 6 to 12 inches, or any pitch desired. We seldom use anything in the way of a preservative, although sometimes the roof is painted for the sake of appearances. This, however, does more harm than good, I think, as far as the durability is concerned ; for when they are so treated the water draws up under the courses and causes the shingles to rot much faster than when they are not painted. In this connection, it may be stated, we usually lay the shingles from 5 to $5\frac{1}{2}$ inches to the weather.

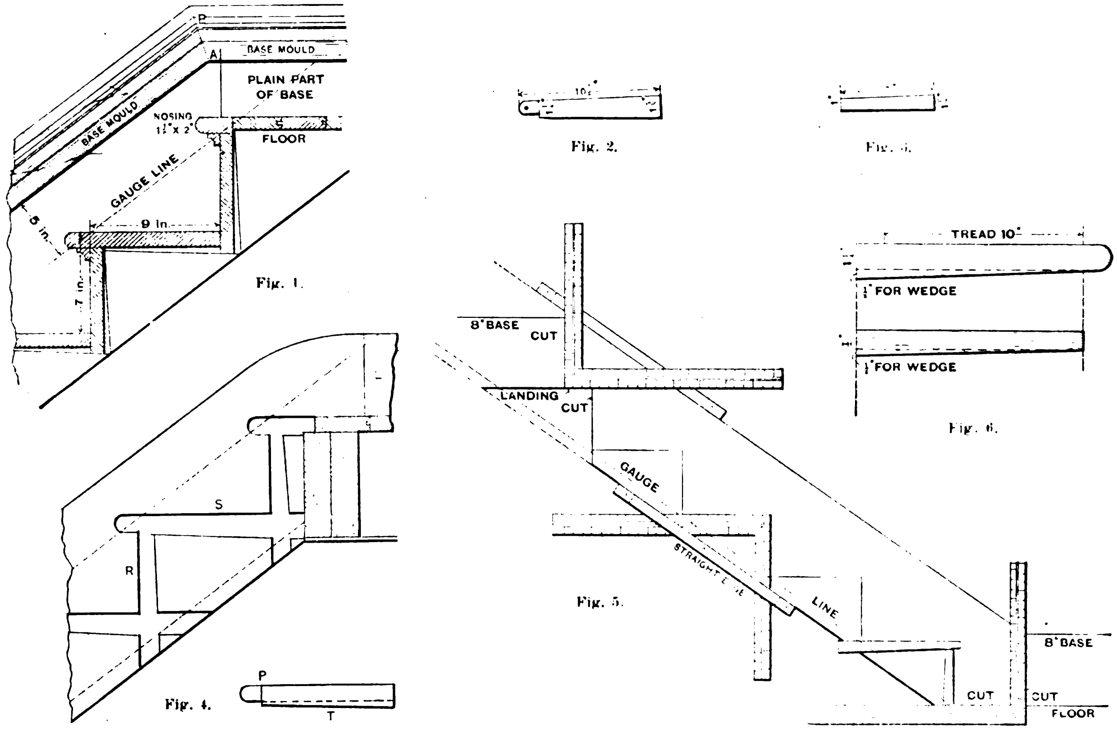
From J. M. B., JR., *Burlington, Pa.*—In reply to W. J. McQuillen of Port Blair, East Indies, with regard to shingling practice in this section, I would say that at the present time we use shingles ranging from 16 to 18 inches in length. We lay them from $4\frac{1}{2}$ inches to 6 inches to the weather, or about one-third of their length on roofs having a pitch of 25 to 60°, or, as we say here, from one-quarter to three-quarter pitch. We usually consider 4 inches wide as one shingle, although they generally average wider than that. We use pine for the most part, but as pine becomes more scarce other woods are employed to some extent, such as chestnut, hemlock, &c. In this section of the country nearly all of our shingles at present are sawed with a circular saw. There has been some improvement made in the manner of sawing within the last few years. Formerly logs were rolled on a carriage, feet up, to a drag saw, which cut off the sections, or cuts, the proper length for shingles. The butts were then split up into bolts, which were clamped on a carriage which fed them automatically to the saw, the end of the bolt coming to the saw the same as a log which is being sawed into boards. In the improved machine, however, the side of the bolt comes against the saw, making the shingles much smoother than when sawed endwise of the bolt. In former times, when we wanted shingles we found a tree that would split straight and smooth, sawed it into cuts the length of shingles and rived out the shingles about $\frac{5}{16}$ inch thick ; then shaved with a draw shave. Permit me to say right here that such shingles will last from 30 to 35 years, while the best sawed shingles of the same material will last 20 to 25 years, depending on the pitch of the roof. The steeper the roof the longer the shingles will last, for on the steep roof they wear out, while on the flat roof they rot. I omitted to say that the 16-inch shingles are about $\frac{3}{8}$ inch thick at the butt, while the 18-inch shingles are about $\frac{1}{2}$ inch thick at the butt and $\frac{1}{16}$ inch thick at the tip. We formerly made for the market a shaved shingle 26 inches long and $\frac{5}{8}$ inch thick at the butt, although I do not know where they were used. I have heard, however, that they were employed by the Dutch in the southern part of this State. There has been no call for them since the war of the rebellion.

From J. C. W., *Auburn, Cal.*—Answering W. J. McQuillen, in regard to laying shingles, about which he inquires in the February issue of *Carpentry and Building*, I would say that in this section we use redwood, the shingles being 16 inches in length and of various widths, tapered from $\frac{3}{8}$ to $\frac{1}{16}$ inch. These shingles are laid usually on 1 x 6 inch fir or Oregon pine boards, placed 10 inches from centers. The shingles are laid $4\frac{1}{2}$ inches to the weather and nailed with No. 3 wire nails. Usually roofs are not painted until laid and are then treated to one or two coats of metallic paint. Rough buildings are sometimes covered with riven sugar pine shakes, which make a very durable roof.

Laying Off a "Housed" Stair String.

From R. J. M., *Niagara Falls, Ont.*—"L. V. V." of San Francisco, Cal., desires to know how to lay off a "housed" stair string. My way is to joint a board 12 inches wide, or whatever width may be required, and then lay off with a gauge the margin which, in Fig. 1 of the sketches, is 5 inches. I use this for a face line and then place the square on it for the rise and run. In this case the rise is 7 inches and the run 9 inches which, with $1\frac{1}{2}$-inch nosing, makes a tread of $10\frac{1}{2}$ inches. I then place the template shown in Fig. 2 below the tread line with $1\frac{1}{2}$ inch projection and mark around. I use a $1\frac{1}{8}$-inch bit to make the round for the tread. I place the template shown in Fig. 3 at the back of the 7-inch point and mark at the back. The templates are made in accordance with the sketches indicated in Figs. 2 and 3. In this way the one size of wedge answers for both tread and riser. Intersect the string with the base at the top of the stairs ; find the width of the plain part of the base which, in Fig. 1, is 4 inches. Measure up 4 inches on the plumb line of the string and then cut the string level, as at A of Fig. 1. In this way the base and string molds will intersect at the point B. In Fig. 1 are shown two top steps with nosing at the floor line. Fig. 2 represents the template for the tread, and Fig. 3 the template for the riser. I think these diagrams and explanation are sufficiently clear to enable my brother chips to readily understand what I mean. I shall be glad to see any better plan for laying off a "housed" stair string.

From J. C. M., *Oregon, Ill.*—In the February number, "L. V. V." wants to know how to lay off a "housed" stair string. The sketch, Fig. 4, which I send, shows a very good way. First joint the top edge of the string, and then with rule and pencil draw a gauge line down the distance it is desired the string should come above the steps. Next lay off from this line with the square the same as for a horse, as S and R shown in the sketch. The template T is then placed on the step line, with the point P on the gauge line and marked around



Laying Off a "Housed" Stair String.—Methods Employed by Various Correspondents.

The template for the risers is applied in the same way in their places. The templates are made by adding to the thickness of the step and rise $\frac{1}{8}$ inch at the nosing end and $\frac{1}{2}$ inch at the other. It is best to use $1\frac{1}{8}$-inch lumber and rabbet $\frac{1}{2}$ inch deep. It is not necessary for the string to be wider than the dotted lines below. The line L of the sketch shows where the string intersects with the base. If a rabbeted base is employed it is best to rabbet the string on the top edge as nearly as possible in the same way. If it meets at a corner, or, better, against a door, continue the molding upon the string the same as on the base. The sketch which I send shows header and floor, with joints, as they are supposed to run the other way.

From L. J. A., *Atlantic Highlands, N. J.*—In answer to "L. V. V.," San Francisco, Cal., who asks for a method of laying off a "housed" stair string, I submit a method, shown in Fig. 5, which may prove of interest. The way I go to work may be different from that employed by the stairbuilder, though I have usually put up the stairs in the buildings in which I have worked. I take a strip of hardwood $1\frac{1}{4}$ x $1\frac{3}{4}$ inches and about 20 inches long. This I have ripped in two, up to within 2 inches of one end, with a saw, set about the thickness of my framing square. I place a $1\frac{1}{4}$ inch No. 9 screw in the center and another in the open end. I run my square in the slot before driving the screw. I joint the edges of my string and run a line with a thumb gauge $1\frac{1}{8}$ inches from the lower edge. Then lay the square on the board, taking the rise on the tongue and the tread on the blade from the gauge line. I hold the square thus and bring the straight edge against the edge of the string, setting up tight and using as a pitch board while working along the lower edge of the string. For my templates I use a thin strip, cut as indicated in Fig. 6. The drawings I think, will make perfectly plain my method of obtaining the cut to fit the base at the foot and head or landing of the stairs.

The Science of Handrailing.—II.

From MORRIS WILLIAMS, *Scranton, Pa.*—As mentioned in my last article, I will now proceed to develop the section of blocks having obtuse and acute angles. Referring to Fig. 6, let 1 2 3 4 below X Y be the outlines of the base of the block. From 3 draw a line perpendicular to X Y; from 4 draw 4 5 equal in length to 4 3; draw 3 5 from 2 and parallel to 3 5; draw 2 0. All these lines are on the base of the block. To develop the section it is necessary to transfer them all to the elevation, and because they form the outlines of an oblique plan, when in the section they will differ in length and angles. Let 1 5 on the elevation be the pitch of the sectional cut; from 3 on X Y draw 3 3 perpendicular to 1 5; join 3 and 5; from 4 draw 4 4 perpendicular to X Y; from 0 draw 0 0 perpendicular to X Y. Both 4 and 0 cuts the pitch line 1 5. From 0 draw a line parallel to 5 3; mark the point 2 and let it be equal in length from 0 to the length of 0 2 on the base; join 2 3, join 2 1, join 3 4 and the outlines 1 2 3 4 will be the correct form and size of the section. Referring now to Fig. 7, let 1 2 3 4 be the outlines of the base of the block; from 3 draw 3 0 perpendicular to X Y; from 4 draw 4 5 along X Y and equal in length to 4 3; join 5 3 and from 2 draw a line parallel to 3 5 to 0. The point 0 happens to meet in point 4 in this case. On points 1, 3, 4 and 5 raise perpendiculars; make 1 1 equal to the hight of the section; join 1 and 5, and the line will be the pitch of the sectional cut from 3 perpendicular to the pitch line. Draw 3 3 indefinitely and from 5, with the length of 5 3 on the base, cut 3 3 in 3. From 0 or 4 on the pitch line draw a line parallel to 5 3 and with the length of 2 0 on the base cut this line in 2. Join 3 4 and 2 1.

These outlines will form the section. In Fig. 8 I have inscribed a quadrant, and I advise the reader to refer to Fig. 3. There he will have the method of transferring the outlines only of the base to the sectional plane. In Fig. 8 the quadrant also will be transferred; both combined contain the method of finding the tangent and center line of rail in the oblique plane that contains the rail in its travel around the well. Let 1 2 3 4 be the outlines of the base of the block, and in one case they are the tangents of the quadrant 1 6 3, which represent one center line of rail on plan. Make 4 5 on X Y equal to 4 3 on the base; make 1 1 equal to the hight of the section. Join 1 5, which will be the pitch line of section. From 4 perpendicular to X Y draw 4 4, cutting the pitch line in 4, and from 4 to 1 on the pitch line is the upper tangent, and from 4 to 5 is the lower tangent. As in all my previous figures, draw a perpendicular line to the pitch line from point 4 on X Y, and from 4 on the pitch line; with the length of 4 5 the lower tangent will cut 4 3 in 3. Join 3 4. This line is the lower tangent transferred to the section. Now make 1 2 on the section equal 3 4 and 3 2 equal 4 1 and the section is complete. Join 2 4 on the section. Because 2 4 is the diagonal line of the section, it is evident that when the section is in its proper position this line will stand plumb to the diagonal line 2 4 on the base. From 2 on the section with the length 2 6 on the base cut 2 4 in 6. Now, by comparing the section with the base every line is clearly transferred from the base to the section. All that is needed now to find the center line of rail on the section is to transfer the quadrant from the base to the section. Notice the points 1 6 3 of the quadrant on the base, also the points 1 6 3 on the section. In relation to their respective location they correspond: 1 6 3 are points on or near the circumference of the quadrant on the base and 1 6 3 are points corresponding on the periphery of the ellipse on the section. It is evident that the curve of the center line of rail on the section must contain these three points, inasmuch as their corresponding points on the base are contained in the center line of rail on the plan. To draw the curve that will contain these three points it is necessary to find the axis of the ellipse that contains them. The simplest method is exemplified in Fig. 8. Let point 5 on X Y be the point where the pitch line of tangent intersects with the plane or base. Join 5 3. From point 2, and because it is the center from which the quadrant on the base is struck, draw 2 4 parallel to 3 5; now on 4 raise a perpendicular cutting the pitch line in four. Join 4 2 on section. It is clearly observable that this line is the minor axis. It will stand plumb to the line 2 4 on base when the section is in its proper position and the major axis is invariably perpendicular to the minor axis, as shown in diagram. The length of the minor axis will be 2 6. To find the length of major take point 3 as center with the length 2 6, cut the major and extend to the minor, as shown from 3 to 8; now 3 8 will be the length of the major. To find the foci take the point 6 as center with the length 3 8 and cut the major on both sides of minor. These points are the two foci of the ellipse. The center line of rail on section can be drawn, as shown, with a pin fastened in each focus and a string sweeping through the three points previously mentioned as points contained in the periphery of the ellipse.

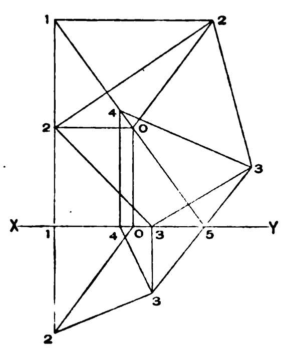


Fig. 6.

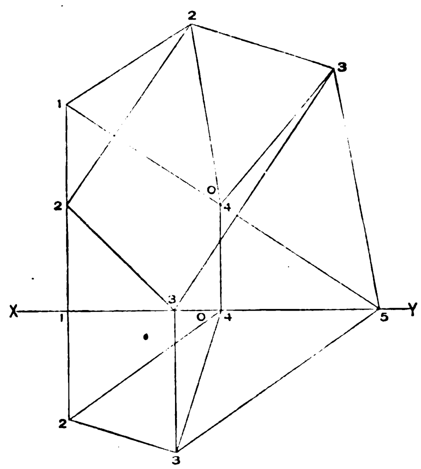


Fig. 7.

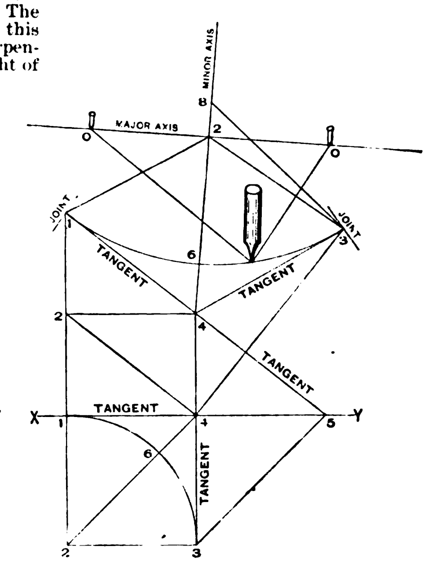


Fig. 8.

The Science of Handrailing.—Diagrams Accompanying Article of Morris Williams.

Designs for Furniture.

From A. W. S., *Camden, N. J.*—Will some of the practical readers of the paper kindly furnish designs of house furniture, as no doubt there are many carpenters who, in the winter time, have leisure which could be devoted to the manufacture of articles of household furniture. They could make such things as bedsteads, bureaus, washstands, bookcases, hall racks and other useful and attractive pieces of furniture, designs for which I have no doubt would be exceedingly interesting to many readers of the paper.

Note.—We have in various issues, in the past, presented designs of book cases, writing desks, tables, hat racks and other articles of household necessity, to which we would respectfully refer our correspondent above. His suggestion, however, is a good one, and we have no doubt that many of our readers will be interested in designs of the character outlined. We shall be glad to have practical readers of experience in this direction submit designs with accompanying descriptive text for the benefit of this and other correspondents.

Plan for Hay Shed.

From J. J., *Victor, Mont.*—I have been an interested reader of *Carpentry and Building* for a short time, and would like very much indeed to have some one submit a plan for a hay shed. The structure should be 30 x 80 feet in size and 18 feet in hight, fitted with fork, pulleys, &c., for unloading hay.

Measuring Plastering.

From R. B. C., *Salem, Ind.*—Will some of my brother readers kindly tell me the proper way to measure plastering? Is it right to measure a flue after the room has already been measured? How much of the wainscotting is a plasterer entitled to?

Designs for Fence Construction.

From G. W., *Galacia, Ohio.*—In answer to the request of "J. C. P.," Bicknell, Ind., I take the liberty of inclosing a number of designs suitable for fence construction. The drawings so clearly indicate the manner in which the fences are made that very little description would appear to be necessary. Fig. 1 represents a picket fence with base 7 inches wide, on which is a 2-inch cap. I employ 38 pickets, 18 inches long, to every 16 feet of length. Fig. 2 is a board fence, with molded top rail and attractive post. Fig. 3 represents a braided wire picket fence, the construction of which is clearly indicated in the drawing. Fig. 4 is another form of picket fence, having three rails and turned pickets. Fig. 5 represents a board fence made of 1 x 6 inch fencing or panels, being 16 feet in length. The number of feet in the first panel, including posts, is 72, board measure. Fig. 6 shows a picket fence with two 2 x 4 rails, mortised for pickets, there being 26 to one panel. Figs. 7 and 8 represent designs for board fences, the construction of which is clearly indicated.

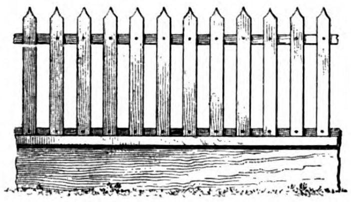


Fig. 1.

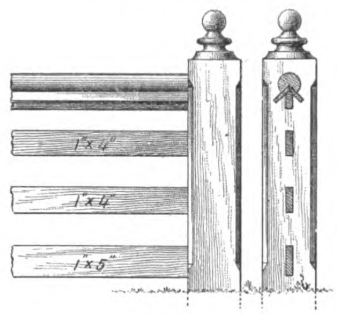


Fig. 2.

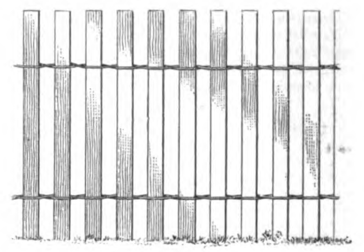


Fig. 3.

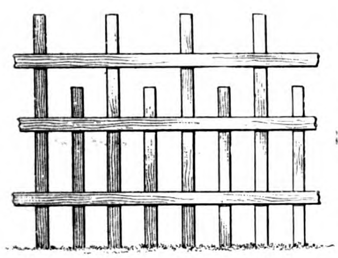


Fig. 4.

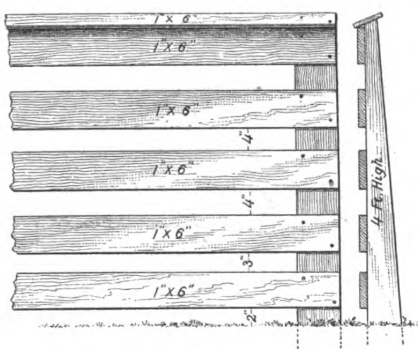


Fig. 5.

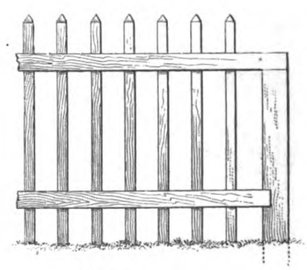


Fig. 6.

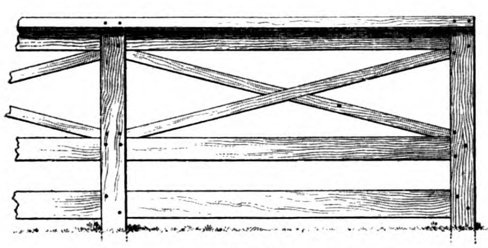


Fig. 7.

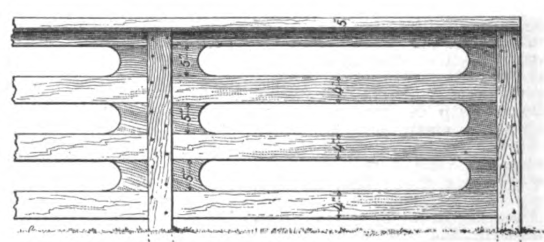


Fig. 8.

Designs for Fence Construction.—Submitted by "G. W."

Making Window Frames.

From L. M., *New York City.*—I should like to ask a few questions through the columns of *Carpentry and Building*, which are likely to interest others as well as myself. I very much desire to see published plans and details of window frames, with a few particulars as to the manner in which they are made for a city and frame building, with and without inside blinds. I would also like to know what is a sub-sill, as well as information regarding circular-headed frames and sash-mullion windows, &c.

Workingmen's Houses.

From F. G., *Fort Gratiot, Mich.*—I have been a subscriber to *Carpentry and Building* for more than a year, and find in it much that is instructive and interesting, especially in the Correspondence Department. In the January number I saw a paragraph inviting more correspondence, and so I take the opportunity of making a request. I should like very much to have some of my brother chips send to the editor for publication plans for a comfortable workingman's house, either one story or more. The majority of house plans published are rather too elaborate and high priced for the average workman to build for himself; hence my request.

Recipe for Fire-Proof Paint.

From W. C. R., *Chicago, Ill.*—Will some of the many readers of the paper kindly give me a recipe for a fire-proof paint for inside work? I have a small room in a barn which I desire to make fire proof. I would also like to know how much paint is required to the square yard.

WHAT BUILDERS ARE DOING.

UNDER the form of arbitration advocated by the National Association of Builders, the Mason Builders' Association and the Bricklayers' and Stonemasons' unions of Boston have signed an agreement to the effect that nine hours shall constitute a day's work five days in the week, and eight hours on Saturday; the rate of wages to be 42 cents per hour; work done between 5 p m. and 7 a.m. to be paid for as time and one half; work done on Sundays, Fourth of July, Labor Day and Christmas to be double time; work subject to interference of tide water, so that full time cannot be made, shall be paid for at 75 cents per hour. During the months of November and December, 1892, eight hours shall constitute a day's work.

Preference shall be given to union men for employment by members of the Mason Builders' Association. In case the committee cannot agree on any question, the umpire is to be Hon. John D. Long, ex-Governor of Massachusetts.

The Joint Committee of Arbitration between the Mason Builders' Association and the union have had several subjects brought before them for consideration, and the working of this plan for adjusting the differences between the employers and workmen has proved very satisfactory.

In the circular issued by the Mason Builders' Association to its members, announcing the working rules, &c., for the ensuing year, the following statement by the Joint Committee is included: "The Joint Committee are of the opinion that the time has arrived for the adoption of an eight-hour day, and recommend that the Mason Builders' Association and the Bricklayers' Union have the matter under careful consideration during the year, with the view of adopting it 1893.

"In the opinion of the Joint Committee, the best interests of the employing masons demand that all journeymen bricklayers should belong to the Bricklayers' Union, in order that the agreements between the two bodies may be more representative and effective; for that reason, the committee recommend all journeymen bricklayers to join the union and that preference for employment should be given to union men by the members of the Mason Builders' Association, and that all members of the association should be urged to carry out these recommendations.

"If any workman does not thoroughly understand the value or benefit which the committee believes will follow from all workmen belonging to the union, the committee will be glad to give a private or public hearing, and will endeavor to show them that it is for their advantage and for the advantage of their employers that they unite with their fellow-workmen in their respective organizations, and that such membership will tend to create better feeling, make such action as may be taken more effective, and assist in the harmonious solution of the labor problem."

The building interests are less active at present than they have been for some time past at this season of the year, although there is considerable work being done. The Master Builders' Association has again shown its interest in the affairs of the city by requesting the Associated Board of Trade, of which it is a member, to consider the question of rapid transit, which has agitated the city for so long.

The building law as formulated and submitted by the commission appointed by the Mayor in 1890, and of which the secretary of the National Association of Builders was a member, is now before the State Legislature for passage.

Buffalo, N. Y.

The clause in the new city charter of Buffalo making eight hours constitute a full day's work on all city work, has been the source of much discussion and consideration on the part of the members of the Builders' Association Exchange. An effort was made by the exchange to either make eight hours a day's work in all branches of the buiding trades or to secure an amendment to the charter making nine hours a full day for city work. The question was made the subject of a special meeting, but after thoroughly discussing the matter it was decided to take no action as a body as to the number of hours. Nine hours is the time worked in the majority of the trades, although both ten and eight hours are in vogue in some cases.

Radical changes in the building laws of the city are proposed. An entirely new draft has been prepared, but has not yet been passed upon by the Ordinance Committee. Among the most important provisions are those concerning theaters. They provide for strictly fire-proof construction and enter into a mass of details as to how it shall be done.

Provisions in regard to fire escapes are very stringent, going so far as to require that all buildings more than two stories high, to be occupied by more than one family, shall be provided with fire escapes.

Metallic stand pipes, to which fire department hose may be coupled, are required on all buildings more than 56 feet high having an area of 5000 superficial feet, and on all buildings exceeding 80 feet in hight. These stand pipes must extend above the roof. At least one stand pipe must be placed on all public halls and theaters, no matter what the hight.

There are also provisions for the thickness of brick walls as follows:

No walls shall be thinner than 12 inches, even in one-story buildings.

Two-story buildings must have foundations 18 inches thick, and the walls 12 inches thick.

Three-story buildings shall have 20-inch foundations, first floor 16 inches, second and third 12 inches.

Four-story buildings shall have 20-inch foundations, first and second floors 16 inches, third and fourth floors 12 inches.

Five-story buildings shall have 24-inch foundations, first floor 20 inches, second, third and fourth 16 inches, fifth floor 12 inches.

Six stories, 24-inch foundations, first and second floors 20 inches, third, fourth and fifth 16 inches, sixth 12 inches.

Seven stories, 28-inch foundations, first, second and third 20 inches, fourth, fifth and sixth 16 inches, seventh, 12 inches.

These regulations are practically those adopted about three years ago at a conference in which the fire underwriters took a leading part.

May 2 will be moving day for the Builders' Association exchange. Only the first floor of the new building will be ready at that time, and part of this will be used temporarily by the exchange until the upper floors are finished. Desk room will be provided free in the banking offices to tenants until their offices above are ready for them. It is expected that the whole building will be finished by July 1. There has been a great demand for the offices, and all would have been rented on May 1 if they had been ready.

An informal opening of the new building will take place on the morning of Monday, May 2, and the formal opening and dedication will take place some time in July.

Applications for membership in the exchange are coming in at a rapid rate.

For a long time the builders have desired that bids for important work should be opened by the architects at the exchange rooms. Some days ago Green & Wicks opened bids at the exchange rooms for the new Market arcade to be built on Main street above Chippewa. Mr Green expressed himself as greatly pleased with the new idea, and now that a start has been made it is likely to become a permanent feature.

The 'change hour is fast becoming a successful feature of the exchange.

Chicago, Ill.

Secretary James John of the Builders' and Traders' Exchange of Chicago writes that from present indications the amount of building to be done in that city this year will be very large. The question of building law, which has been agitating the building interests of the city for some time past, has at last assumed definite shape, and a special committee has been appointed by the Common Council to revise the ordinance, as it now stands, consisting of three members of the Council, the Commissioner of Buildings and one member from the Chicago Underwriters' Association, Real Estate Board, Illinois Chapter of the American Institute of Architects, the Builders' and Traders' Exchange and one from the Building Trades Council. The Builders' Exchange will be represented by Joseph Downey. The committee has held but one meeting as yet, and that for the purposes of organization, at which meeting the city clerk was instructed to procure for its guidance the building laws of the principal cities of this country and Europe. M. B. Madden, one of the members of the committee from the Common Council, and who is also a member of the Builders' and Traders' Exchange, proposes to introduce a resolution at the next meeting of the committee that will greatly facilitate the consideration of the various requirements of a building law, if adopted, which will permit the calling in of some practical man representing the several branches of building as they come up for consideration.

Cincinnati, Ohio.

The builders of Cincinnati have been expecting a strike of carpenters on May 1, and at the time of going to press the Congress of Master Builders intends to order a general suspension of all work in the building trades pending the adjustment of the differences existing between the carpenters and their employers. The carpenters made a demand of 37½ cents per hour from May 1, 1892, and in a conference held with the employers, the committee from the Carpenters' Union agreed to accept 30 cents per hour for 1892, and 33⅓ cents per hour for 1893, working nine hours on all days except Saturday, when eight hours should be considered a day's work. The union failed to ratify the action of the committee, and maintained their demand of 37½ cents per hour from May 1. The Congress of Builders then took the matter up, with the result above stated. It is expected that, if the suspension takes place, the cessation of work will be short, as there are a large number of carpenters in the city who are idle and who are strongly opposed to the action of the union.

Word has just been received that the difference between the carpenters has been settled and no strike or lockout will occur.

Detroit, Mich.

The Builders' and Traders' Exchange of Detroit has been steadily increasing in numbers and importance since the return of the delegates to the sixth convention of the National Association of Builders. About 50 members have been added since that time, and Mr. B. F. Guiney has been appointed permanent acting secretary and superintendent. Matters of importance to the building fraternity are constantly under consideration, the adoption of the Uniform Contract being discussed at present. A committee has been appointed to lay the contract before the architects previous to final action.

Kansas City.

The Builders' and Traders' Exchange held an important meeting March 25. It elected an excellent board of officers, raised its membership fee to $200 and read the riot act to a little afternoon poster that had maligned one of its members, a candidate for a municipal office on the Democratic ticket. The exchange has been doing good work in the city, and under the rule adopted expects to add greatly to its strength and stability.

The officers elected were as follows: President, W. A. Kelly; vice-president, A. Sutermeister; secretary, C. L. McDonald: treasurer, Thomas Eadie.

Louisville, Ky.

The Builders' and Traders' Exchange of Louisville, after considering various plans for securing a building of its own in the most advantageous manner, settled upon a plan of issuing bonds bearing 4 per cent. interest, and to sell these bonds to members of the exchange only. At the last regular meeting a large number of bonds were pledged and the Board of Directors will resolve itself into a committee for the disposition of the balance.

About a year since the journeymen stone cutters and the contractors engaged in a hot fight, which lasted until a few weeks ago. Every stone cutter went out and demanded higher wages, which the contractors refused. A great many new men were brought in, so that now the matter has been settled many of them are still out of employment. The terms of settlement are given in full as follows, a noticeable feature being that hereafter all disputes are to be settled by arbitration:

At a joint meeting of the Louisville Cut Stone Contractors and Journeymen Stone Cutters' Association the following rules were adopted, upon the condition that the Journeymen Stone Cutters' Association withdraws from the Stone Cutters' Association of North America and organize a local union.

1. The Louisville Cut Stone Contractors will recognize the Journeyman Stone Cutters' Association, and will employ only stone cutters that belong to said association, provided the Journeymen Stone Cutters' Association will, as a body, agree to the conditions herein stated.

2. The rate of wages to be jointly agreed upon by the two associations as soon as possible after February 1, 1892, and January 1 of each year thereafter, and to be in force for a year from March 1.

Violations of the rate of wages must be jointly acted upon, and violators punished by their respective associations.

There shall be a classification of wages as follows: First and second class, to be agreed upon by each local body.

There will be a difference of 60 cents between the maximum and minimum prices of wages.

3. All disputes or misunderstandings of any

kind that may arise shall be submitted to a standing Arbitration Committee, to be elected for one year, and consist of equal numbers from each association, whose decision, if carried by a majority, shall be accepted by both associations as final.

4. Journeymen to recognize only such employers as belong to the Ohio Valley Cut Stone Contractors' and Quarrymen's Association, and to only work for owners direct, if joint permission of both associations is granted.

5 Apprentices to be governed by the following rules :

Boys wishing to learn the cut-stone trade must serve an apprenticeship of four years in full, all time lost during said four years, except holidays, to be made good at the end of the term, with wages at the rate of the last year.

No firm will be allowed more than three apprentice boys, except in such yards where more are at present employed, and when the terms of such boys expire then the first rule to apply to such yards.

Any firm employing boys must pay them their wages for ten months of the year, except for time voluntarily lost, and must keep them employed every day the weather permits.

Complaints between the employer and apprentice shall be settled by the Arbitration Committee.

Any apprentice who may quit his employer without proper permission will not be allowed to work in any yard within the jurisdiction of this association.

Apprentices making application for membership in the Journeymen Stone Cutters' Association must produce a certificate from his employer that he has served his apprenticeship according to these rules.

Apprentice boys will not receive pay for time lost of their own accord or on account of unfavorable weather, and they will not be allowed an extension of time after they have served four years in full.

Employers discharging a boy without just cause will not be allowed to take another in his place until the term of said boy's apprenticeship shall have expired.

6. The Ohio Valley Cut Stone Contractors' and Quarrymen's Association will not concede to the Journeymen Stone Cutters' Association the right to fine or assess any of its members, but all grievances must be settled according to Article 3.

7. Setters shall not receive more than 75 cents over the wages of the first-class stone cutters.

8. Journeymen stone cutters who are not members of the local union of the Stone Cutters' Association shall only be required to pay an initiation fee of $10 for admission.

9. Nine hours shall constitute a day's work.

Contractors : Blats & Krebs Stone Company, Peter & Melcher Stone Works, John Diebold & Sons, Peter & Burghard Stone Company.

Journeymen Committee: John Siebold, John Hanlon, James Boyle.

Milwaukee, Wis.

The employers in several branches of the building trades in Milwaukee are taking steps to provide against a repitition of the experience of last year, and are holding conferences with the workmen for the purpose of establishing wages, hours, working rules, &c., for the coming season which will be satisfactory to both sides. A committee from the Builders' and Traders' Exchange has been in consultation with the Bricklayers' Union with the end in view of establishing conditions which will prevent any possibility of strikes or labor disturbances this year. There may possibly be trouble among the carpenters and painters as both are dissatisfied with the present conditions under which they are working.

Minneapolis, Minn.

The painters of Minneapolis have demanded an increase from 27½ cents to 30 cents per hour, and notified the employers that unless their demand was conceded they would strike on April 15, but up to the present time no notice has been received that they have done so.

The question of the number of hours to constitute a day's work recently came before the aldermen of the city, and after considerable discussion in which both the eight and the nine hour day were advocated, it was decided that ten hours should still be considered a full day's work.

New York City.

The strike referred to in the last issue of *Carpentry and Building* as affecting the building interests of New York City because of the opposition to the employment of non-union engineers by the Pelham Hod Hoisting Company was ordered again by the Board of Walking Delegates, who claimed that the elevator engineers who attempted to distinguish themselves from those who are employed in apartment houses, freight handling and other pursuits not identified with building were "rebels." Strikes were ordered on all buildings where the Pelham hod elevators were used, not only of engineers but on all classes of work. Strikes were ordered against all persons who supplied material to a contractor who was using a Pelham elevator, and the pressure was so great that the Pelham elevators were ordered removed by the contractors, and the new union of elevator engineers went to pieces for lack of employment of its members, as the Pelham Company could not supply the engineers with work unless their elevators were in use. The Pelham Company were forced to yield, and the men are again at work.

The bill providing for a new and separate Building Department, which was recently signed by Governor Flower, makes considerable change in the organization of several departments. The department will include the Building Department as now constituted, the Bureau of Plumbing and Ventilation, now controlled by the Department of Health, and the Bureau of Vault Construction and Inspection, now a part of the Department of Public Works.

Under the law the erection and repairs of all buildings and the inspection of them will be under control of the new department. The head of the new department will be known as Building Commissioner.

This change was very largely effected through the instrumentality of the Mechanics' and Traders' Exchange, the Building Trades Club and allied organizations of contracting builders, and is one that has long been needed.

It is the opinion of architects and builders generally throughout the city that no bill has passed the Legislature of late years of more substantial benefit than the new Building bill which was signed by the Governor about the middle of April. For a good many years there has been urgent need of a building law adapted to existing conditions, but for one reason or another it seemed impossible to bring together the minds of those interested and to secure the approval of the Legislature to such a measure.

The Building law now ordered to the statute books represents labor more or less formal covering a period of about 12 years. It represents the organized efforts of associations interested in this subject for nearly nine years. It is the culmination of attempts to provide legislative remedies for existing defects for nearly seven years. Now that the law is at last to become operative in a form substantially approved by these various interests, and combining the best thought of experts upon this subject, builders and architects feel that something has been accomplished of which the city may well be proud.

The provision of the bill creating a Department of Buildings has been widely favored for a long time. It appears in the present law, however, as a result in part of a happy accident. Those who were concerned in framing a building law, while favoring the creation of a Building Department, had hardly dared to hope that such a provision could be included in the law itself. It was thought that possibly some time afterward a separate measure might be passed embodying this provision, or perhaps entirely devoted to it. The accident that brought the provision within the bill now passed is, therefore, regarded by builders and architects as a matter for special congratulation.

Three years ago the following associations combined by each appointing a representative to what became the Committee on Revision of the Building Laws. This is the committee that framed the present law, its members for the last year consisting of John W. Murray for the New York Board of Fire Underwriters, William J. Fryer for the Association of Architectural Iron Manufacturers, Warren A. Conover and Edwin Dobbs for the Mechanics' and Traders' Exchange, Napoleon Le Brun for the New York Chapter of the American Institute of Architects, and Cornelius O'Reilly for the Real Estate Owners' and Builders' Association.

The new law is particularly stringent in regard to protection against fire, and among its new features includes a provision relating to the strength of floors, which must be submitted to test.

An organization of employers has been recently formed in New York City under the name of the United Building Trades for the purpose of promoting harmony and justice between employers and employees, and to further the best interests of the building trades. The constitution states that these objects are to be obtained "by securing settlements of differences and difficulties by a Board of Arbitration consisting of an executive committee to which all differences may be referred. By rendering aid and comfort to the different branches of the building trades in times of difficulty when united effort may be deemed advisable and beneficial to the building trades."

Omaha, Neb.

The last regular meeting of the Builders' and Traders' Exchange of Omaha was well attended. N. B. Hussey, president, occupied the chair, and commented favorably upon the address of Arthur McAllister, president of the National Association of Builders, which was delivered at the builders' convention held at Cleveland last January. Mr. Hussey, in effect, said that the local builders should have a better appreciation of the advantage of proper organization to place the building business upon a plane as high as that of any business practiced in the country. He urged the fraternity in the direction of higher and better business methods, to insist upon the correction of some of the abuses from which he said the builders are suffering. Mr. Hussey was of the opinion that it was the universal sentiment of the builders to take some action in the movement of separate organization.

At present the plumbers, carpenters and bricklayers have separate and distinct organizations and are auxiliaries to the Builders' and Traders' Exchange. No other trades have separate organizations. The reports on these were favorable, and it appeared to be the general opinion that even the architects should be organized in order that they could affiliate with the contractors. It was also thought that all contractors' bids on buildings should be opened in architects' offices at a specified time and in the presence of the competing bidders.

The City Council's ordinance regulating the size and shape of common brick used in the construction of buildings in the city was adopted. The size of the brick, in accordance with the ordnance, is a uniform make and of a national size, 8¼ inches in length, 4 inches wide and 2¼ inches thick.

Several communications from the secretary of the National Association of Builders were read, and the committee appointed to visit the architects and request that in future they open bids in the presence of the bidders, reported that they met with some opposition, although several architects present at the meeting expressed their willingness to comply with the request of the exchange in this particular. The plumbers, steam and gas fitters, the carpenters, the brick manufacturers and the contracting bricklayers reported that they had effected the establishment of subsidiary organizations for the better execution of the recommendations of the exchange and greater unity of action.

After the meeting an excellent lunch was served by the exchange.

Philadelphia, Pa.

The exhibit of architectural drawings held under the auspices of the Master Builders' Exchange of Philadelphia proved a most pronounced success. Seventy-five of the city's best architects contributed in all about 400 designs, which excited the greatest interest among the builders and others interested in building. The exhibition was visited by over 3000 persons during the week it was open.

To all practical intents and purposes the attitude of the journeymen bricklayers toward the pupils of the Builders' Trade Schools has been settled in favor of the boys. A special meeting of the committee has been held, composed of representatives from the schools, the Bricklayers' Company and the Journeymen Bricklayers' Protective Association, when the two latter organizations agreed to report back to their respective bodies : 1, that in hiring apprentices preference would be given to the pupils of the Trade School holding certificates of graduation ; 2, boys holding such certificates will be entitled to have one year deducted from their period of apprenticeship.

This question has been under discussion for a long time and was raised about a year since, when journeymen refused to work with the boys on the grounds that they were not registered apprentices. This caused a diminution in the bricklaying classes, as the prospective pupils refused to spend the cost of tuition with the prospect of being unable to secure work in union shops after finishing their course. The action of the committee settles this point, as there is no doubt that both the Bricklayers' Company and the Journeyman Bricklayers' Protective Association will indorse the action of their representatives which they have favorably recommended.

During a recent visit to Philadelphia of some of Buffalo's prominent business men for the purpose of looking over the industrial facilities of the city, the party visited the Master Builders' Exchange where they were given a royal welcome. President Dobbins made an address in which he went into detail about the exchange, its merits and advantages. O. P. Letchworth of the Buffalo delegation made a few remarks, as did Joel Cook, who as a political economist recommended methods for increasing of population in cities. Chairman

Woelpper of the Exchange Entertainment Committee said Philadelphia was always ready to welcome bodies of representative men, and there was no city that could do it better. A lunch was served at the exchange, which was thoroughly enjoyed by visitors and members

The Philadelphia Exchange has done a handsome thing in printing the address made by President McAllister at the sixth convention of the National Association of Builders, for distribution among the architects and builders of that city.

Providence, R. I.

The workmen of Providence, particularly the painters, are making strenuous efforts to secure the general adoption of nine hours as a full day's work. The workmen want $2.50 per day of nine hours, and the master painters are divided on the question. At a recent meeting of the Master Painters' Association it was voted to concede the request for nine hours, but no action was taken in regard to the wages to be paid. The journeyman are making a strong effort to secure the wages which they demand.

Portland, Maine.

The builders of Portland have begun a new method of securing attendance at the meetings of the Builders' Exchange The call for the last regular meeting was accompanied by an announcement that a dinner would be served at 6.30 o'clock, after which the business of the meeting would be transacted and the remainder of the evening devoted to an entertainment which had been provided by the officers of the exchange. The result was a complete success.

The building business in Portland is about as usual at this time of the year, the summer work having not all been opened up yet. The prospect for the season is good.

St. Louis, Mo.

In their handsome new hall on the second floor of the Bell Telephone Building, Tenth and Olive streets, the members of the St Louis Builders' Exchange held their first quarterly meeting at noon April 12. About 100 members were present. President Charles B. McCormack presided The report of the treasurer showed that there was $7073 in the treasury, nearly all of which was out at interest. A report from the Committee on Resolutions expressing regrets over the loss of the late James S. Dowling was read. President McCormack, as Chairman of the Building Committee, pleased the members exceedingly by reporting that the entire second floor of the Telephone Building had been leased for five years at $3000 a year, and that part had been sublet for $1920 a year, leaving the exchange to pay only $1080 a year, or only $180 a year more than in the old quarters of the old Masonic Building. The exchange now has quarters as handsome as any Builders' Exchange in the country and as convenient as the former place. Secretary Walsh said he had applications for 28 new members since the change was made.

The new quarters were formally opened on April 19, but up to the time of going to press a full description of the event has not been received.

San Francisco, Cal.

The Builders' Exchange has requested the directors to bring about, if possible, consolidation with the Builders' Association, as the Mason and Builders' Exchange has already united. The exchange would like to have a building of their own.

St. Paul, Minn.

At the last meeting of the Board of Directors of the Builders' Exchange the following officers were elected: J. W. Mackinson, president; William Rhodes, first vice-president; John Bazille, treasurer, and William Porten, secretary.

The stonemasons are thinking of reorganizing their union. Scarcity of work last year and the removal of a large number of the members from the city rather tended to weaken the union. The matter of wages also has been materially reduced; in some instances as low as $1.50 per day, when the old schedule called for $3.50. The reorganization will probably be effected in a few days. Some of the members have stated that all the other unions, especially those of the building trades, were organized on a strong basis and they hope soon to have their union equally as strong as the others.

Syracuse, N. Y.

The Builders' Exchange of Syracuse held a special meeting a short time ago, to consider an amendment to the Mechanics' Lien law, which has been drawn up by the Buffalo Exchange and which is being sent to the various builders' associations of the State for their approval. The purpose of the act is to further protect builders from the scheming of dishonest property owners, but particularly does it shield those persons who are sub-contractors or who furnish materials to the contractor, but who have no direct dealing with the owner. It provides that a notice to the owner that work has been done or is about to be done, or that materials have been furnished or are about to be, shall act as a lien and oblige the owner to reserve out of the price to be paid the contractor enough to secure the persons procuring the lien. In case the owner pays a contractor after such notice has been served, the owner becomes personally liable to all who have served notice on him.

The Builders' Exchange recommended the passage of the bill.

The association has been following out the plan which was alluded to last month of having the meetings addressed by persons familiar with topics that are of interest to builders. The Skillful Builder, The Eight Hour Day, What Shall We Do to Make the Exchange Useful? and The Benefits of a Builders' Exchange are some of the subjects that have been presented and discussed.

The painters of Syracuse have been on a strike for higher wages for some time past, but it is hoped that some settlement of the difficulty will be reached soon.

Worcester, Mass.

The Builders' Exchange of Worcester held a most enjoyable banquet on the night of March 31 A large number of guests were invited, and the affair passed off with the felicity with which the builders of that city usually accomplish their desires.

The building interests of the city are in about a normal condition and the prospects good.

Notes.

Business as affecting the interests of builders in Indianapolis seems to be in a prosperous condition. The Builders' Exchange is steadily increasing in membership, and is in excellent shape generally. The members seem to be growing more and more impressed with the advantages of the organization.

The Builders' Exchange of Scranton, Pa., has applied for a charter from the State under a declaration of principles almost identical with those of the National Association of Builders.

The new rooms of the Builders' Exchange in the Eagle Block, Spokane, Wash., were opened March 22 to the public. This new organization of the business men in Spokane starts into life with a large membership, composed of the contractors and builders, and also those engaged in the several building trades in the city.

The new exchange of Stockton, Cal., is having difficulty in convincing the public of the character of its intentions. The report has been spread that the exchange was formed for the purpose of forcing owners to pay for bids submitted by every contractor invited to estimate, whether awarded the contract or not. The exchange denies *in toto* any such intentions.

Building interests are very quiet in Pueblo, Col., and the Master Builders' Association finds great difficulty in bringing its members together, there being so little interest manifested in its affairs. It has been impossible to secure a quorum at the last two meetings.

The Master Builders Exchange of Philadelphia, Pa., has decided to have important portions of the reports of the conventions of the National Association of Builders read aloud for the benefit of all members at the regular meetings.

The gift of $500,000 by J. Pierpont Morgan, as an endowment for the New York Trade Schools, created considerable discussion among the members of the Master Builders' Exchange of Philadelphia. The exchange supports a trades school of its own, and it is quite a burden. Colonel Auchmuty has donated $3000 yearly to it It is now proposed to try and get some of the wealthy men of this city interested and have them to subscribe to an endowment fund.

The bricklayers and masons of Fall River, Mass., will ask for an increase in wages from $3 to $3.25 per day of nine hours.

The Carpenters' and Joiners' Union of Macon has taken a new departure, and one which they think is likely to result in great good. They propose holding sessions each month for the purpose of discussing everything of a nature interesting to themselves. They will take up their trade, for instance, and discuss every featnre that would be of benefit to the members of the union. They will also discuss political matters, and it is probable that the carpenters and joiners will make some very much-needed reforms.

Some time ago the Bricklayers' and Masons' Union of New Bedford Mass., asked for an advance of wages from 33 to 36 cents an hour, or 24 cents advance per day. The advance was asked to be made by June 1. The Master Builders' Exchange has now communicated with the Bricklayers' and Masons' Union asking for a committee of conference. The latter body has agreed to this, although as yet no date has been fixed for the conference.

The carpenters of Newport, R. I., have been on a strike for $3 per day of nine hours for about two months. The employers do not feel warranted in granting the demand and as there is comparatively little work on hand at present, they expect the workmen will soon return to work. The objection of the employers seems to be to paying a level price of $3 to all carpenters irrespective of their ability.

The new Builders' Exchange of Toledo, Ohio, is already at work upon the problem of securing a building of its own in the most advantageous manner. The plan at present under consideration is to raise the money by assessment on the membership. A committee will be appointed soon with power to formulate the plan and select a site for the building. The members are very proud of their new organization. One of the subjects up for consideration is an arrangement on time jobs with forfeit, to secure from the owner an amount equal to the forfeit for every day that is gained by the completion of the contract before the time specified. The exchange is considering the question of joining the National Association of Builders.

Charles G. Riehl of New York City has recently published a very handsome photo-engraving of the present officers of the National Association of Builders suitable for framing, and has very kindly presented each of the filial bodies with a supply. The work is excellent and the likenesses are all exceedingly good.

The State Convention of the Master Painters' Association of New York will be held in Saratoga, July 26 and 27. A practical programme, embracing a wide range of important subjects, is now being prepared.

Preliminary steps were taken April 12 to organize a Master Builders' Exchange at Springfield, Ohio. O. N. Bartholomew presided and E. M. Crumley acted as secretary. A committee was appointed to secure a charter and draft by-laws and a constitution to be presented at the next meeting for adoption.

The new Building Exchange of Los Angeles, Cal., has become an incorporated body, and its permanency and usefulness seem to be firmly established.

The master carpenters of Jackson, Tenn., have formed an association for mutual protection and benefit. The following officers were elected: U. R. Heavner, president; D. A. Janes, treasurer, and J. F. Still, secretary.

The carpenters of La Crosse, Wis., are on a strike for increased pay. They ask for a scale of 25 and 30 cents per hour.

The workmen in the building trades of Lowell, Mass., are making a strong effort to secure the general adoption of nine hours as a day's work. The Lynn, Mass., workmen are after eight hours.

The builders of Wheeling are having trouble with their carpenters and plasterers, the former asking that no workman shall be employed who does not hold a union card, and the plasterers asking for an increase from $3 to $3.50 per day.

The Builders' Exchange of Wilmington is gradually establishing the custom among the architects of submitting plans for estimate directly to the exchange. At the last regular meeting of the Board of Directors A. L. Johnson, who has been so long the efficient secretary of the exchange, tendered his resignation, which was accepted, and William H. Foulk elected in his stead.

Movements are on foot to establish builders' exchanges in Duluth, Minn., Brunswick, Md., and Nashville, Tenn., and an effort is being made to revive the old Builders' Exchange of Dayton, Ohio.

The Builders' and Traders' Exchange of Detroit has issued a hand book for 1892 containing a list of members, directory of Detroit contractors, lien law of Michigan, building laws of the city and much other valuable information. The book is neatly bound in black and well printed.

The new Builders' Exchange at Los Angeles, Cal., is now thoroughly organized, and is in running order.

CARE AND USE OF SAWS.

By JAMES FRANCIS.

PROCURE a hand saw from the kit of the advance "wood butcher" and the line forming the ends of the saw teeth will show a curve something like A B in Fig. 1. This is evidence of a lack of skill on the part of the workman. The teeth should show a perfectly straight line, as in Fig. 2, or better yet, the teeth at extreme front and back ends of the saw blade should be cut down, as shown in Fig. 3, so that the line of the teeth is curved in the opposite direction from that shown in Fig. 1. When a saw like Fig. 1 is to be put in order the first thing is to join it down until the ends of the teeth form a straight line. This will leave the ends of the teeth with a surface of $\frac{1}{16}$ to $\frac{1}{8}$ inch, as shown in Fig. 4. If the saw be very rounding, it requires considerable time and about half a file to put the saw in a condition to be of use.

We will assume that a cutting-off saw is to be sharpened. The proper shape of the teeth for wood of medium hardness is shown in Fig. 5. For very soft wood the angle formed by the teeth is to be lessened. This style of filing is shown in Fig. 6. Where the wood is very hard the teeth may be given a greater angle equal to 60°, but no saw should have a tooth more stunt than this will make. Fig. 7 shows the shape of the teeth.

In all these examples of filing one side of two teeth is sharpened at the same time, the manner of doing this being shown in Fig. 8. Here a section of the file is illustrated, and it will be seen that one side of tooth A is filed "against the grain," so to speak. The tooth B, shown in dotted lines and represented out of sight, is filed with the grain—that is, the file does not cut against the spring of the saw blade. The spring is partly compensated for by the tooth A being set before it is filed and projecting toward the operator, as shown by the dotted lines at the top of the tooth. The file C is held at the required angle to give both teeth the taper and cut desired.

Following out this method of filing, we find that a tooth for soft wood becomes filed more fleaming than one designed for hard wood. This is caused automatically by the angle made by the file, which is nearer parallel with the saw blade when filing for soft wood than it is when filing for hard wood. Fig. 9 shows a bit of saw blade after the jointing down process has been gone through with. The square-toed teeth are shown at A. After being prepared for setting, the teeth are as represented at B. It will be noticed that they are almost sharp, but not quite. A sectional view of the saw at this stage, cut through the center of a tooth, is shown in Fig. 10 by A. After being set the saw takes the position shown by B, the tooth being bent to the left near the top. The filed part does not now show a straight bevel, but is curved. This is removed after the second filing which gives the tooth shown at C, making the bevel straight from the heel of the tooth to the toe and removing the awkward curve, which looks bad when it occurs at the top of the tooth.

A good many users file their saws in a different manner, sharpening only one side of one tooth at a time. A saw tooth sharpened in this way is more apt to have the shape shown by Fig. 11. It is not desirable and no first-class carpenter will use such a saw. It is formed by shifting the position of the file so as to touch both teeth alternately, thus cutting away the bottom of the tooth already finished in order to get at the one that is being filed. This method of filing applies equally well to coarse saws for framing and to fine saws for finishing. Indeed, the same file may be used for both purposes, but it is well to use a short, slim file having a fine cut for finish work and leave the large, coarse files for saws having five to eight teeth per inch.

In selecting files quite a number will be found having only one or two sides fit for filing fine saws. Open a package of a dozen new files and probably not one, or more than one, will be found which is perfectly straight on all sides, and which has three angles of 60° each. In forging and grinding files it is very hard to keep them perfect as to shape. Even in cutting, the file maker is liable to raise a longer tooth on one edge of a file face than he is on the other edge of the face. Sometimes the files are ground to resemble the shape of the section shown in Fig. 12. Quite an acute angle exists at A, while at B and C angles may be found considerably more obtuse. Sometimes angles B and C are equal, but it is the exception rather than the rule.

The carpenter will do well to look over a new package of files when he opens it and reserve for filing saws for soft wood those files which have acute angles, as shown at A in Fig. 12. The files having angles like B and C will do the best work on saws for hard wood. For splitting saws the writer prefers those having teeth like those shown in Fig. 13. The same method of forming one side each of two teeth is to be used in filing a splitting saw as was used for the cutting off saw. For hard wood the saw may be filed straight across, giving teeth alike on both sides, as shown in Fig. 14. For cutting wood "slashing," as carpenters style it—that is, for cutting rafters, stair brackets, &c.—the tooth should be filed very fleaming on the front edge and square on the back, as shown in Fig. 15. This gives a chisel-like tooth, which cuts very fast and is easily driven through the wood. The methods of holding a file for filing square and for filing a splitting saw fleaming are illustrated in Figs. 16 and 17.

There are several methods of setting a saw. The simplest consists of screwing the saw in an iron vise, then bending the tooth outward by means of a punch and a hammer. This is a very crude method, but is capable of excellent results when done by a skillful mechanic. It is seldom used, however, nowadays except for very small saws. Still another method of using the punch is to lay the saw flat on a piece of wood, using hard or soft according to the fineness of the saw. The old-fashioned sawset that screws in the vise, and having a hinged die driven down upon the saw with a hammer, needs no description. It should be placed upon the shelf with the punch and hammer methods. One of the perfected sawsets now in the market should be used in all cases. At least one of the so-called perfected sets should be avoided. It invariably sets a tooth in the manner shown in Fig. 18 at A. It will be seen that the bending of the tooth is entirely at the top; therefore, after a few hours' use, wearing off the points of the teeth, the set is almost entirely gone and another call upon the saw dentist is necessary. The form of set shown at B is preferable in all cases. Here a large

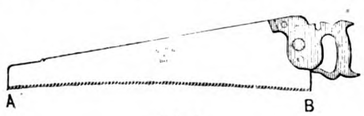


Fig. 1.


Fig. 2.

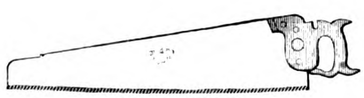


Fig. 3.


Fig. 4.

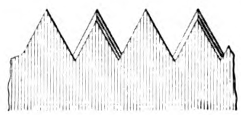


Fig. 5.

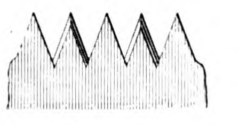


Fig. 6.

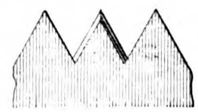


Fig. 7.

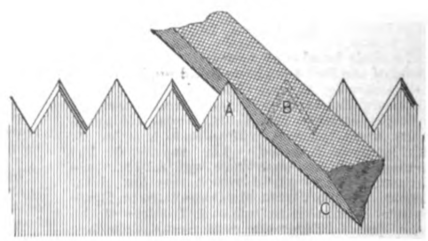


Fig. 8.

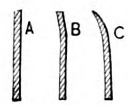


Fig. 10.

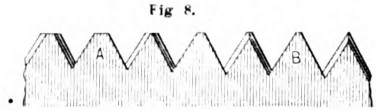


Fig. 9.

Care and Use of Saws.—By James Francis.

body of metal is bent out so that the tooth will wear a long time before setting is again necessary. Care should be taken not to set a saw too much, no matter what kind of wood is to be operated upon. The saw should only be wide enough to barely clear itself in the kerf. The bent saws made nowadays have their backs ground very thin, so that in dry wood hardly any set is necessary to do good work.

For jointing or trueing up a saw some carpenters use a flat file, held in the left hand. It is almost impossible to thus hold a file and pass it over the entire length of the saw without deviating from a horizontal position. To avoid getting one side of the saw teeth too low some of the mechanics use a square piece of board, resting one side against the saw and laying the edge of the file flat upon the top of the board. The two pieces are clamped together by the fingers and then passed over the saw until the required amount of metal is removed. This is a pretty good way of jointing a saw, but it does not come up to the device shown in Fig. 19. This consists of a block of wood with a hole bored through the center thereof, and a saw kerf cut in as shown. A three-cornered file is driven into the hole and so arranged that the lower surface stands perpendicular to the saw kerf. This ring can be slipped upon a saw and there is no danger of its getting out of true and cutting one side of the teeth too low. It will joint the saw true every time, no matter how carelessly it may be used.

Saws are continually becoming kinked either by hard usage or by falling into the hands of inexperienced workmen. A saw should never be used while kinked. It will not do good work and it requires more power to do a given amount of sawing. There are three kinds of kinks. The first and simplest is a simple bend, which extends wholly or part way across the saw. Such a bend can usually be removed from a hand saw by bending in the opposite direction between one's fingers. The next and very worst kind of kink that is ever encountered consists of a bend as above described, complicated with a bend in the lower half of the saw blade, but in the opposite direction. Virtually such a kink forms a twist. In most cases both edges of the saw have been stretched while the middle of the blade retains its original length. In straightening such a kink the first step is to bend the saw all one way if possible. When this is done, if it be found that the blade has not been stretched, the second part of the kink can be removed in the manner already described. When, however, the edges of the blade have been stretched it is necessary to take out one-half of the kink by judicious bending between the fingers, then hammer the middle of the saw until it becomes stretched equally with the edges. After this has been done it is possible to remove the rest of the kink in the usual manner.

The third form of kink is exactly the opposite of the one last described. It consists of a spot in the middle of the saw blade which has been stretched either by heating or by a heavy blow. The method of curing it is to hammer the edges of the saw until they become elongated and equal to the stretch in the middle of the saw. This relieves the strain of the kink, which usually disappears of its own accord as the stretching process is completed.

The care of saws goes a good way toward having a good tool or a poor one. No good workman will use a saw when it needs filing. The best of workmen file their saws almost before they need it—that is, before they would need it were they in the hands of ordinary workmen. When a saw is only slightly dull it does not require much filing; therefore, the work of keeping it in order is diminished, and the capacity of the saw and its owner increased. Saws that are wet when on a job should be wiped off as soon as possible either by sprinkling sawdust on them or by rubbing them dry on a piece of waste. Vaseline is one of the best substances known for using upon saws to prevent their rusting or sticking when used in wet or pitchy wood. It may be stated here that vaseline is even better than glycerine upon an oil stone. The workman who is doing an out-of-doors job will, upon the first drop of rain that falls, rub his saws with oil or vaseline, and he will take care to have a small box of this substance always handy in his tool chest for the purpose of dressing down his saws and other bright tools.

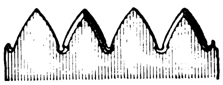


Fig. 11.

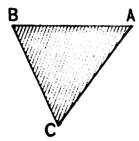


Fig. 12.

Fig. 13.

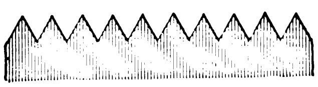


Fig 14.

Fig. 15.

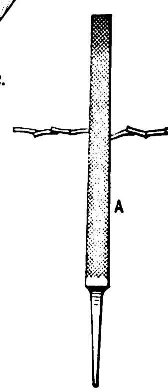


Fig. 16.

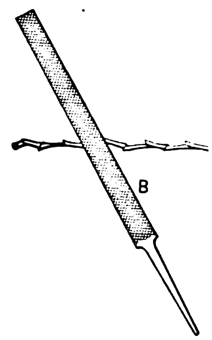


Fig. 17.

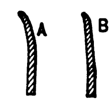


Fig. 18.

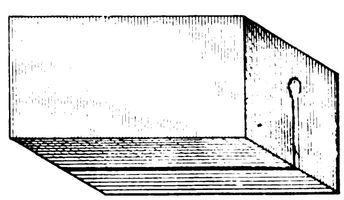


Fig. 19.

Diagrams Illustrating the Care and Use of Saws.

The Rights of Workmen.

In disposing of the case of Emil Suvers, a member of the Cabinetmakers' Union, in Philadelphia, 8th inst., charged with breach of the peace, Judge Finletter made some remarks anent the rights of workingmen. In November last the workmen belonging to the union and employed at Hale & Kilburn's furniture establishment, among them being Suvers, went out on strike, and it was claimed that the defendant lingered about the place and interfered with those who filled the vacant positions, by hooting at them and calling them "names."

Suvers denied that he had done anything to create a breach of the peace. He said he was appointed by the association to watch its members and inform them of the strike and that was why he hung about the place. He was paid $15 a week for so doing—the same as his salary when employed by the firm.

Judge Finletter, in deciding the matter, says:

I recognize the right of the workingman to try and better his condition. I recognize the right of strikers to abstain from working until they get the wages which they think are due them, but I also recognize the right of every other American citizen to work for just as much as he pleases and no association of workmen has a right to interfere with those who do not believe as their union does.

It seems to me that all unions are governed entirely by foreigners who bring to this country none of the spirit that should actuate the American citizen. They persist in maintaining all their individual rights and exclude the natural rights of every other citizen. The result has been that in all labor that requires skill the American citizen has been driven out and there are in this community large establishments, in which many workmen are employed, none of whom can speak English, and if this thing continues it will not be very long before there will not be an American citizen who understands skilled labor.

I cannot exactly understand why such a system of conduct is persisted in by these people. Every interference on the part of the defendant or any other member of the society with workmen which is likely to breed disturbance is a violation of the law. Therefore, it is an offense which can be punished and will be punished. These people must recognize the fact that every man has a right to work as much as he pleases and when and where and how he pleases. It appears from the evidence that this man has adopted the business of a spy and has been well paid for it, and it is a fact that all these men find it much more profitable for them to act as spies than to labor themselves.

In this case I will put a stop to this man's interferences because I will hold him to such bail that if he violates the law again it will be made very expensive to his friends. I will require him to enter security in $1000 to be of good behavior for one year, and understand, being of good behavior means no interference with other people.

THE BUILDERS' GUIDE.*

By I. P. HICKS.

Estimating Labor for Carpentry Work.

IT IS GENERALLY CLAIMED that the question of labor is the most difficult and uncertain the carpenter is called upon to solve. Material can often be figured very closely, but just how long it will take to work up a lot of material and place it in position in a building can not be so easily determined. The cost of labor depends upon the time required to perform a certain amount of it. All men do not work alike; some will do easily one-third more than others—hence the time required to perform a certain amount of labor depends largely upon the ability of the men employed, the advantages they take in doing work and the skill of the foreman in the management as it progresses day by day. It is an easy matter to find four men who will do as much in a day as five others, and to illustrate the surprising result of the difference in the ability of men to perform labor, I will give a practical example.

Suppose two contractors, A and B, each have a job of work exactly the same. A takes his job for $900. B takes his for $800. Each pays wages at the rate of $2.50 per day, and each employs five men; but four of B's men are equal to five of A's and it takes 60 days to complete his job. Which will make the most money, and how much? The solution of this problem is as follows: If A employs five men at $2.50 per day for 60 days, the labor will cost him $750; as he took his job for $900, his profit is $150. Now if four of B's men are equal to five of A's, B will complete his job in one-fifth less time than A, which will be 48 days. Now, if B employs five men at $2.50 per day for 48 days, the labor will cost him $600, and, as he took his job for $800, his profit is $200. Thus we can see how one man can underbid his competitor $100 on $900 worth of work and still make the most money. Again, suppose it required B 52 days to complete his job; even then he could bid $100 lower than A and still make as much money. The above example shows at least one chance for the surprising difference in builder's estimates on the same work. It also shows how the difference in the ability of the workmen employed and the management of the work can make a vast difference in the cost of a building. Under such circumstances how can a contractor make estimates upon which he can rely?

In all kinds of work there must be an average, and this average is what is wanted as a standard in estimating. If labor cannot be estimated from what is known to be an average day's work, then we naturally conclude it must be estimated by comparison or guessed at. The best way for a contractor to obtain facts and figures that he can rely upon in estimating is to keep a record of all the work he does. It will not do to trust to memory, for in a few months or a year he will not know whether such and such work cost $42 or $54, or what it cost. If he would profit by experience he will keep a record of the cost of his work, so that he can refer to it at a moment's notice. To keep a record that will give the best and most reliable facts and figures prepare a list of all kinds of work, having two sets of money columns, one for estimated cost and one for actual cost. When estimating a job put down the estimated cost, and when the actual cost is found from experience in doing the work put it down, and keep each particular kind of work or portions of a job separate from the entire job. By so doing one will soon be able to see where he has estimated too high or too low, and will have facts and figures which will enable him to make a proper average. Some parts of a building are easily estimated by the "square," which contains 100 square feet. Some parts are easily estimated by the lineal foot, while other portions are best estimated by the piece. Keep a record of the time required by different men in doing work by the "square," lineal foot or piece. In this way one will find the average day's work from actual experience, which is the only plan that can be followed with success.

When it is known what it is worth to do work by the square, lineal foot or piece, any person of ordinary skill in figuring ought to be capable of making an estimate reasonably accurate. As I have said before, the average day's work of all kinds is what is wanted as a standard in estimating. Accordingly I have prepared a table with the average day's work of each kind and the average rates to figure on. The table is made on a basis of ten hours for a day's work and as near as practical to average $3.50 per day. If an estimate is wanted for nine hours add one-tenth to the price; and if for eight hours add one-fifth. The prices can easily be made for any rate per hour or any number of hours per day. To those who want to test the advantage of a table of this kind I would say, do not take it for granted that my rates and averages are the best in the world, or that they are just the thing for a guide, but prepare a similar list and begin entering rates and averages as they are found from actual experience. Then one will have something that will suit the locality in which he lives, and there can be no doubt that in a short time he will have something that will be much to his advantage in estimating. Let me say, however, that the average day's work as found in the table is a reasonable average, as I have found from

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experience, and considerable dependence can be placed on estimates made from it.

POINTS ON ESTIMATING LABOR.

While the tables show the average day's work with the average rate per square, per lineal foot, and per piece for nearly all kinds of carpentry work, yet I think it proper to show how and why variations should sometimes be made, and that it is necessary to use some discriminating judgment in connection with the tables as regard the average day's work. Undoubtedly, many will think the rates in the table too high, and the averages too low, but right here let me say that no contractor should make an estimate based on these so-called big day's work. If he does he is almost sure to find he is mistaken. An estimate should always be made from a reasonable average, and then if the contractor is able to average as well as he estimates, and perhaps a little better, he feels that he is making a success of his business and is satisfied. On the other hand, if the estimate is made from too large an average, the big day's work which was counted on may not be accomplished and many a time, what seemed like time enough, would prove insufficient. Then there would be dissatisfaction and disappointment. I will now return to the tables and show how to make some short cuts by combinations. In the tables every item is given separately for convenience in estimating any particular portion of a job, but to facilitate the work of estimating an entire job, many of the different items may be combined and regarded as one. For example, it is worth—

TABLE OF PRICES FOR ESTIMATING LABOR BY THE LINEAL FOOT.

Different kinds of work per lineal foot.	Average day's work. No. of feet.	Rate per foot.
Putting down base and garter round	90	$0.04
Putting on base molding	180	.02
Cap and molding for wainscoting	140	.02½
Putting up cornice	24	.15
Making gutters in cornices	50	.07
Putting up corner casings	70	.05
Putting on belt casings	90	.04

TABLE OF PRICES FOR ESTIMATING LABOR BY THE SQUARE.

Different kinds of work per square.	Average day's work. No. of squares.	Rate per square.
Framing floors in houses	5	$0.70
Framing floors in barns	4	.90
Framing outside walls of houses	6	.60
Framing outside walls of barns	4	.90
Framing and setting partitions	6	.60
Framing ceilings	7	.50
Framing plain roofs	6	.60
Framing hip and valley roofs	3	1.20
Sheeting sides with common sheeting	8	.45
Sheeting sides with 8-inch shiplap	7	.50
Sheeting sides with 6-inch flooring	6	.60
Sheeting roofs with common sheeting	8	.45
Sheeting roofs with 8-inch shiplap	6	.60
Shingling with common shingles	2½	1.40
Shingling with dimension shingles	2	1.75
Siding with 6-inch beveled siding	3	1.20
If papered before siding	2½	1.40
Siding with 6-inch cove siding	2½	1.40
If papered before siding	2	1.75
Siding with 12-inch barn boards	6	.60
Siding with 12-inch boards and battened	4	.90
Laying floor with 6-inch pine flooring	6	.60
Laying floor with 4-inch pine flooring	4½	.80
Laying floor with 6-inch hardwood	5	.70
Laying floor with 4-inch hardwood	4	.90
Laying floor which has to be surfaced	2	1.75
Ceiling with 6-inch pine ceiling	4	.90
Ceiling with 4-inch pine ceiling	3	1.20
Plain wainscoting without cap	4	.90

TABLE OF PRICES FOR ESTIMATING LABOR BY THE PIECE.

Different kinds of work per piece.	Average day's work. No. of pieces.	Rate per piece.
Making plain window frames	3	$1.20
Making plain door frames	4	.90
Making transom frames	3	1.20
Setting frames in position in building	14	.25
Hanging blinds before frames are set	15	.24
Hanging blinds after frames are set	10	.35
Hanging inside blinds	5	.70
Fitting sash in frames	18	.20
Hanging sash with weights	14	.25
Hanging transoms	10	.35
Casing windows	12	.30
Casing doors, one side	16	22
Casing doors, both sides	8	.44
Casing transom frames, one side	12	.30
Casing transom frames, both sides	6	.60
Cutting in window stops	35	.10
Cutting in door stops	30	.12
Band molding frames, one side	24	.15
Band molding frames, two sides	12	.30
Putting down thresholds	24	.15
Fitting common doors	20	.18
Hanging common doors	20	.18
Putting on rim knob locks	35	.10
Putting on mortice knob locks	14	.25

For framing and placing joists in position per square	$0.70 to $0.90
Laying floor per square	.60 to 1.75
Total	$1.30 to $2.65

Thus the framing and laying of floors may be estimated at once if desired. The bridging of joists should be estimated at 3 to 5 cents per joist for each row of bridging.

DOUBLE FLOORS.

Where one floor is laid over another it is worth one-fourth more to lay the second floor than the first. Thus if it is worth 60 cents per square to lay the first floor, it is worth 75 cents per square to lay the second, or $1.35 per square for both. Framing floors for brick buildings may be estimated at the same rate as for frame, for, while there is usually less framing, more time is required to place joists in position and level up, thus making the labor about equal. As a building progresses in hight more time is required to place joists in position, hence 10 per cent. should be added to each succeeding story after the first. The outside walls of a house may be estimated as follows:

To frame and raise, per square	$0.60 to $0.90
Sheeting the same, per square	.45 to .60
Siding the same, per square	1.20 to 1.75
Total	$2.25 to $3.25

Thus the outside walls of a house may be estimated at $2.25 to $3.25 per square.

(To be continued.)

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

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Marc Eidlitz.

Among those who answered the first call which resulted in the organization of the National Association of Builders was Marc Eidlitz of New York, and of the little group of builders who gathered together in preliminary consultation on that occasion, he is the first one to answer that great call which cannot be denied, and which sooner or later comes to all.

What can be said of him that can convey to those who did not know him the conviction that a man of rare worth has passed away, or fittingly express the sense of loss which his associates in the National Association feel so keenly?

There is but one answer to the query. No one who did not know him can be made to understand that peculiar kindliness of his nature which was so constantly manifested to those with whom he had any relations, either of a business or social charactor. Neither is it possible to describe the feelings of those who have for so many years enjoyed his friendship and confidence, and who now know that they can never again feel the grasp of his friendly hand, or hear the sound of his cheerful voice.

Life will seem strange without him, and no matter how the wheels may insist upon turning round, slowly grinding down the gaps which sorrow makes in the heart, until the pain is less intense and the mind more calmly accepts the inevitable, his companions in the National Association will never cease to be conscious of the vacancy which can never be filled, and of a sense of loneliness which will never be obliterated till they too pass out beyond the reach of loss and pain.

The National Association suffers much in the death of Marc Eidlitz. The association had no more faithful adherent, no more enthusiastic believer in the need of the united counsel and concerted action which it provides for, and from the first meeting in Boston in 1887 to the last one which his health permitted him to attend, his counsel and support were unstintedly given. No measure was placed by him upon his service. It was with him only a question of his capacity to render assistance in any undertakings which the association brought forward, and though his modesty led him to underestimate the worth of his service, his fellow members well knew its value, and placed the highest gauge upon his opinions and advice. His conservatism was a needed element, and though the outward semblance of the man may be denied to us, his advice and counsels still live, and will be applied in future work for the good of the building fraternity.

His associates in the city where his life work was accomplished well knew his worth as a builder and as a citizen, and they render to his memory the tribute of their esteem and appreciation; but the National Association of Builders knew him in a broader sense, and his frequent testimony was that the association had broadened him. If this be so, then the association may well feel glad in the midst of its sorrow in contemplation of the fact that it brought fresh life to the maturer years of our dear brother, opened new avenues of thought, widened the field of his usefulness, gave added pleasures and satisfaction and multiplied his friendships.

Peace be with you, brother! Yes, peace is with you; truly a peace that passeth understanding, and though we may still be journeying along the path which you have ceased to tread, and though we may be oppressed with many doubts and many fears, we still are glad that we have known you, glad to believe that you enjoyed companionship with us, and sure that our work was better, and will be better alway, because you were a part of it. W. H. SAYWARD.

Character of the National Association of Builders.

The following portion of a letter recently received by the secretary of the National Association of Builders from the secretary of a newly formed organization of master builders, shows the misapprehension as to the character of the National Association of Builders which prevails to a considerable extent in localities where there is no affiliated exchange. The impression seems to be more or less general that the National body assumes the right to sanction the existence of local exchanges by granting a charter, &c. Such is not the case, for the National Association exists as a means for placing every one of its filial bodies in possession of such plans for the welfare of the builder and his business as are considered best, after mature deliberation, by the whole, and acts as an adviser and director instead of an executor, as appears in the secretary's reply, which is subjoined.

The letter above referred to, after citing certain local conditions and asking advice thereupon, goes on to say: "We would also like to know if we can be recognized by the National Association of Builders; if we can get a charter for the same, and if so what the charges will be and where shall we send for it?"

The secretary's reply was as follows: "I may not be correct, but I infer from your letter that you are under the impression that the National Association of Builders issues charters to local bodies of builders. If this is your idea it is an erroneous one. The National Association does not issue charters. It is simply a central body, the object of which is to bring together, for purposes of mutual counsel and support, builders of all localities, with the end in view of securing the establishment of uniform customs among builders, which will carry weight and be of value because of their uniformity and because they are the product of the deliberate judgment of many people in the same general line of business all over the United States. Each exchange contributes its ideas and experiences, out of which a general policy is formulated as the safest and best for all builders' associations to secure in the communities in which they exist. The National Association then promulgates and recommends these general policies and practices, but does not assume to dictate their establishment. Charters for local organizations should be obtained from the State authorities."

Official Report.

The official report of the proceedings of the sixth annual convention has been distributed to all filial bodies and their members, and in accordance with suggestion made by the Board of Directors at their last meeting, all filial bodies are requested to have the more important portions of this report read aloud from time

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED

The Builders' Exchange.

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166 DEVONSHIRE ST., BOSTON, MASS.

JUNE, 1892.

Public Buildings.

The bill now pending before Congress, designed to make a change in the planning and construction of the public buildings of the United States, is proving of no little interest to the building trades generally. At present the designing of the various public buildings devolves on the supervising architect, who by reason of the widely scattered nature of the work can necessarily give but little attention to any particular building, and is therefore compelled to intrust the work of supervision to subordinates. The new bill provides for throwing open the designing and supervision of the construction of all public buildings to the competition of the architects of the country. Not less than five architects are to be invited to compete for the plans, while the general supervision of the work is to continue in the office of the supervising architect. Among the benefits likely to result from the adoption of such a law would be a better class of buildings constructed of better materials in much shorter time than is usual under the present law, combined with a large saving in cost.

Arbitration.

It has been stated by one of the carpenters' unions which is a member of the national carpenters' organization that it was impossible for it to adopt the form of arbitration advocated by the National Association of Builders, as such action would conflict with the ones of the general organization. Such a conclusion, as the reader will perceive, assumes that the laws of the general organization in question are the only ones which should be recognized as just and proper. Such an assumption as this is not tenable, for the laws referred to have been framed without recognition of the rights of others, but solely with the purpose of maintaining the assumed rights of the makers of the laws. It seems hardly possible that any organization of workmen which seeks to improve the condition under which its members are working would refuse to accept so manifestly fair a means of settlement of the differences which arise between those members and their employers as the form of arbitration suggested by the National Association. This form provides for the establishment of a joint committee, to be composed of equal numbers from each side, which shall have the power to decide all matters of mutual concern which may be referred to it by either party. In case no decision can be reached by the joint committee, it shall select an umpire, whose decision shall be final and binding upon each side, all work to continue without interruption or cessation pending a decision. Such an arrangement presents a means for adjusting differences which would appear perfectly just to both sides. Each has an equal opportunity to be heard and each an equal number of votes upon any question. A refusal to accept this, or some other form of arbitration equally just, would likely be construed by the community at large as an unwillingness, upon the part of the side refusing, to assist at a fair and equitable settlement of points at issue. Neither side to a controversy can ever expect to effect a satisfactory settlement by itself, for while the adjustment might be perfectly satisfactory to one side, it is more than likely it would not be to the other, and the "settlement" therefore would only be a temporary affair which the dissatisfied would attempt to overthrow at the first opportunity. What is needed is some plan whereby a permanent means may be established through which these differences may not only be satisfactorily settled, but prevented. The form of arbitration suggested by the National Association presents this plan, and either party declining to accept it, and refusing all other plans equally just, puts itself in the position of admitting that it is not justice that is wanted, but its own way.

The Chicago Building Collapse.

Chicago coroners' juries are making themselves a record in holding men responsible when through their negligence or carelessness the lives of others have been lost. Recently a jury preferred criminal charges against the City Building Commissioner, two of his inspectors, an architect and the owner of an unfinished building which collapsed during a heavy storm on April 1. It was a seven-story brick structure, belonging to Samuel E. Young, and intended for the use of Street, Young & Kent, manufacturers of plumbers' specialties. When it collapsed it crushed some adjoining buildings, killing no less than seven of the inmates. The catastrophe was at first attributed to the force of the wind, as a heavy gale was blowing at the time, and the building was not inclosed. On subsequent investigation, made the more searching by the great loss of life, it was found that proper care had not been taken in the erection of the building, and that its collapse was due to structural weakness, for which all the parties above named were held responsible. The laxity of city building inspection has been shown up very strongly, and it is probable that another result of the investigation may be the licensing of architects. The coroner's jury recommended that measures should be taken to control the erection of buildings by compelling architects to take out licenses after proving their qualifications, the same as physicians, plumbers and a few other branches of professional men and mechanics whose occupations have relation to the health or safety of their fellow men.

Academy of Ship Carpentry.

An imposing structure which, when completed, will take rank among the valuable additions to the already large number of benevolent and educational institutions for which the nation is noted is Webb's Academy and Home for Shipbuilders, now in process of erection at Fordham Heights, N. Y. As indicated by its name, the building will constitute a home for indigent and aged shipbuilders, architects and engineers, as well as a complete and well-equipped institute of marine technology. The idea is "to furnish any worthy young man, a native or a citizen of the United States, who, after a careful examination by the trustees shall have proved himself competent and of good character, with a free and gratuitous education in the art and science of marine architecture and engineering, both theoretical and practical, and also teach him the craft of ship carpentry, marine engine building and the allied trades, with free board and lodging, tools, engineering implements and materials, while acquiring that education." The building, which is now completed to the roof, is of buff brick with terra cotta trimmings, and covers an area of 150 x 50 feet. The main portion of the structure is four stories in hight, the northern end six stories, while a tower ten stories high is located at the western corner. This tower is 160 feet high, and while designed to harmonize with the remainder of the building, represents the shaft and lantern of a coast lighthouse. At the southwest corner is to be a tower six stories in hight with a conical roof of tile. The second floor will be utilized as a museum for marine naval architecture, also dormitories, laboratories, hospital ward and dispensary. The third floor will be devoted exclusively to dormitory purposes, while the fourth floor, with its high trussed roof, will be used as an assembly, lecture, and laying-out room. The upper four stories will be devoted altogether to school purposes, and will be used as drafting rooms. The founder of the academy, William H. Webb, has set aside $1,000,000 to build and equip the institution, which will probably cost about $400,000, leaving $600,000 as an endowment fund.

The Uniform Contract.

It is a fact to be regretted that builders who are members of exchanges affiliated with the National Association of Builders do not in all cases familiarize themselves with the nature and purpose of the various improvements over old methods of doing business recommended by the National body. A case in point recently occurred in one of the local exchanges, the secretary of which, in referring to a strike in a certain branch of the trade, stated that one of the contractors, who had a time-limit contract on hand, would not be injured, as he "had a clause inserted in his contract to cover just such an occasion." The Uniform Contract, which has been so persistently urged by the National Association of Builders, contains a clause covering just such cases, which was inserted to protect the contractor from injury in the event of a strike and to provide for additional time in which to fulfill the contract when delay was occasioned through no fault of the contractor. It is the attitude of builders as indicated by the case cited which makes the work of correcting the unjust customs prevailing in the building business appear slow in showing results.

House Rents In Chicago in '93.

During the convention of stove manufacturers held in Chicago the first week in May, many of the members visited the prominent buildings and various points of interest. Several of the gentlemen expressed no little surprise at the number of buildings, particularly of dwelling houses and portions of apartment houses, which are at present placarded "for rent." Inquiry of real estate men and citizens of the place revealed the fact that there is at present a larger number of dwelling houses for rent in and about Chicago than ever before. The policy of the landlords, it would seem, has been to raise the rent on dwellings upon the progressive plan, the increase commencing with 1891. The rents demanded during that year, it was stated, were somewhat in advance of what they had been previously. An increase equal to twice the amount demanded for 1891 was put upon the rents for 1892, and for 1893, the statement continued, the landlords had determined to add an amount equal to twice the increase demanded for 1892. This would promise a rent sufficiently high, it would seem, during the fair year to satisfy even the most rapacious landlord, and yet we suppose there will be exceptions to the general rule, and perhaps instances in abundance where a still higher rate of increase will be employed. The effect of all this, it was explained, has been to drive people, in some cases, into more modest quarters in the city than they formerly occupied, and in other instances into the suburban towns. A still further exodus has taken place the present spring and is likely to continue during the year before the exposition opens, by people who wish to avoid the rush and crowds of the city during the fair, and who, accordingly, are retiring to near-by towns. The result is to throw upon the market the houses they formerly occupied. Besides, numerous new houses are also vacant. We are assured that Chicago will be equal to the enormous crowds that are expected to visit the city during the months of the fair, that there will be dwelling places for all who wish to spend the entire period of the exposition in the city, and stopping places in abundance for those who come for shorter periods.

Tall Buildings.

The new tall buildings of Chicago were also a fruitful subject of remark upon the part of delegates attending the convention above mentioned. Said one: "Why, they are all alike, and they are about as handsome as a Quaker meeting house. Swelled fronts and projecting bay windows, I should think, would soon have their day in Chicago from the number that are already in position on the tall buildings of this city. The monotony of the architecture is appalling; story after story, through 12 to 20, from sidewalk to roof, all alike, with nothing in the way of accentuation of lines, and little in the way of embellishment, may suit Chicago, but such architecture would not be tolerated in any other city on the continent."

Strike-Lockout in the Granite Industry.

BY WM. H. SAYWARD.

For several weeks the air has been full of rumors in regard to impending trouble between the employers in the granite quarrying and cutting business and their workmen. These rumors have now culminated in a cessation of work, beginning at the great quarrying centers in New England, and spreading to the cutting yards and shops, not only in that district, but in other sections of the country, threatening to involve substantially all these great interests throughout the Union. It is impossible at the present writing and in the midst of conflicting rumors, reports and statements, most of them unofficial, which are appearing in the daily press, to arrive at such comprehensive conclusions as to the rightfulness of the position taken by either side as would be proper under the circumstances. What appears on the surface is simply this: The workmen in the quarries, pursuing the usual course under present conditions, make a "demand" for a reduction of the number of working hours and a readjustment of wages, which will result in establishing about the same net result of pay as has been secured for the greater number of hours labor which has been in vogue heretofore. This demand is resisted by the quarry owners, and consequent upon this resistance the quarry workmen cease work. The Granite Manufacturers' Association, which includes not only quarrymen *per se*, but granite dealers and contractors for cut granite, issue an ultimatum which is practically a refusal of the whole proposition, and also involves a cessation of attempt upon the part of all these employers to carry on business until the previously existing prices and conditions are renewed. On the one side it is claimed to be a "strike;" on the other a "lockout." At the present writing the situation is so involved that the unprejudiced observer is in doubt as to what descriptive term should be applied to the complex situation. The outlook is not pleasing, and suggests again, as has often before been manifest in labor disturbances, the need of wise councils and serious effort upon both sides to perfect and establish methods of arbitration. Whatever the outcome may be in the adjustment of the special matters that are the points at issue in this controversy, whether the employers force the workmen to retreat from their position, or the workmen secure an acceptance of their immediate demands, either of which results is sure to be influenced, delayed or prejudiced by overt acts and injudicious movements by individuals, the final judgment must be that the future must develop some better way of dealing with the great problem than the arraying of the two divisions of labor in opposing armies with the avowed purpose of assault and defense. It must be evident to all thinking men that the interests of the employers and workmen are so great and necessarily so blended as to demand some permanently existing court of equity conjointly formed and fully recognized and obeyed, by and through which the individuals upon both sides may be saved the terrible loss and disaster which continually impends under the present lack of form and method.

Coal Tar for Waterproofing.

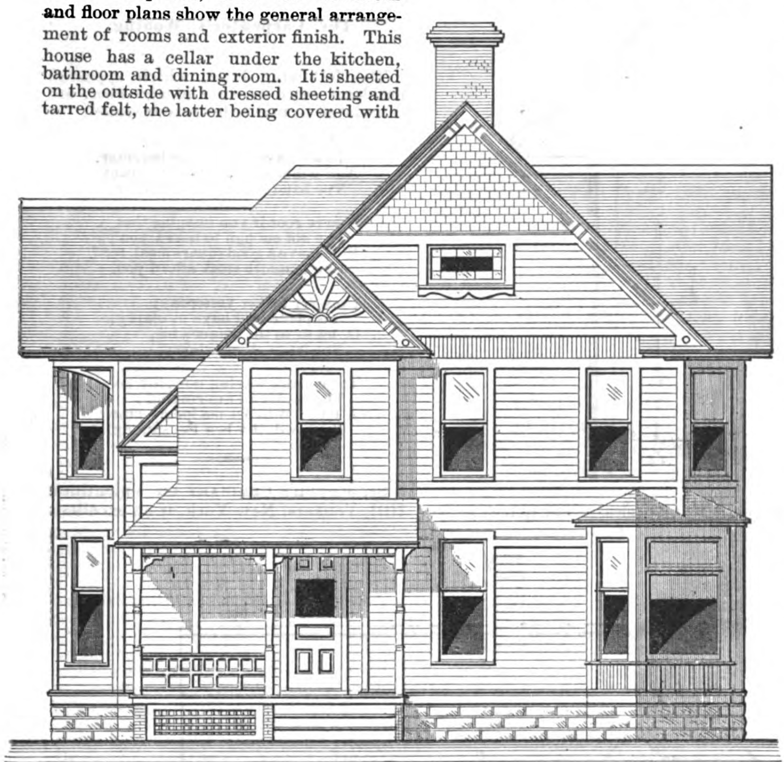
According to the *Revue des Travaux Publics*, the use of coal tar as a means of rendering masonry impervious to water is much favored in France. There are two ways of preparing the tar for this use—boiling and flaring. The former method is suitable for surfaces intended to be exposed to the atmosphere, while the latter is appropriate for surfaces to be covered up by masonry, earth, &c. By adding to the coal tar a paste made by dissolving India rubber clippings in benzine, a coating may be obtained which is still more resistant, elastic and durable. For roofs the heat-absorbing quality of these black varnishes may be overcome by dusting them with any permanent white earth before they are quite dry. For masonry to be covered up the use of flared tar is highly recommended. This is prepared by boiling the tar in a caldron, and filling a bucket two-thirds full from it. The tar is then lighted at the surface and allowed to blaze for 15 or 20 minutes, being constantly stirred the while with an iron rod. When a drop from the blazing bucket upon cold stone has the consistency of thick soup, the flare is extinguished by covering down the bucket with an iron lid. The tar will then be reduced to one-third its original bulk, and it must be spread as rapidly as possible upon the work with a cod-tail brush of vegetable fibre, care being taken to dip often, so as to prevent its cooling and hardening prematurely. If the flaring process is prolonged beyond the proper moment the result is a brittle product like sealing wax. When the flare is stopped at the right time the resultant tar adheres very firmly to any surface, and can be immediately covered up with earth. It has a skin both hard and tough, underneath which is a viscous layer about $\frac{1}{16}$ inch thick, which preserves its integrity for any length of time.

High Chimneys.

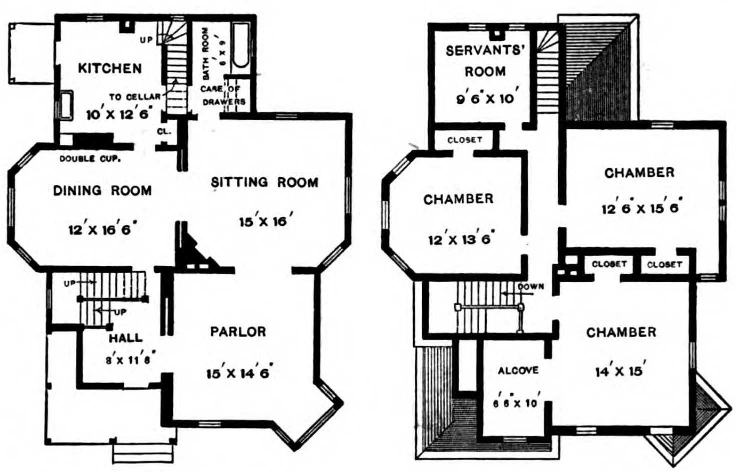
Among the high chimneys of this country may be mentioned one 350 feet in hight, which is being built for the Omaha and Grant Smelting Works, in Denver, Col. It will be an octagonal stack, 55 feet in diameter at the base, placed on a concrete foundation 18 feet deep, imbedding 20 tons of steel rails. There will be two stacks, one within the other, with a ladder-way between. The stack will be banded with 4½-inch wide steel bands every 20 feet, covered by the brickwork. The contract price is about $53,000, and it is to be finished in 130 days. The other high chimneys in the United States, says the *Mechanic and Electrician*, are as follows; At the Fall River Iron Works, 340 feet, and the Clark thread mill stack, in Newark, N. J. The stack at Freiburg is 400 feet high, counting from the ground.

TWO-STORY FRAME COTTAGE.

THE TWO-STORY frame cottage which we illustrate herewith was erected last season in Washington, Iowa, by W. S. Wylie of that place from plans prepared by himself. The picture forming our supplement plate was made from a photograph of the building as it stands completed, while the elevations and floor plans show the general arrangement of rooms and exterior finish. This house has a cellar under the kitchen, bathroom and dining room. It is sheeted on the outside with dressed sheeting and tarred felt, the latter being covered with 4-inch siding exposed 3 inches to the weather. The roof is covered with clear white pine shingles. From an inspection of the plans it will be seen that the rooms on the first floor are so arranged that the three principal ones, together with the hall, may be practically thrown into one. From the hall may be reached both the parlor at the right, and the dining room immediately in the rear. The parlor, sitting room and dining room communicate one with another by means of wide openings, sliding doors being employed in some instances. In the rear of the sitting room is the bathroom, while beyond the dining room is the kitchen, with which it communicates by means of a single door and a double cupboard. The house is provided with both rear and front stairs, thus rendering it possible for the servants to reach the second story without passing through the front of the house. The arrangement indicated provides for three chambers, one of which has opening from it a large alcove. The servants' room is in the rear. The floors throughout the house are laid with selected fence flooring and carpeted. The stairs are finished with red oak, and the remainder of the house with white pine in what is called block finish. The author states that the dwelling completed cost $2900. The design has been much admired by intending builders in the section named, and Mr. Wylie expects to erect two more houses this season from the same general floor plans, the only change being in the rear portion, where a bedroom will take the place of the bathroom on the first floor, and there will be a sleeping room directly above on the second floor.



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



First Floor. Second Floor.

Two-Story Frame Cottage.—W. S. Wylie, Architect, Washington, Iowa.—Floor Plans.—Scale, 1-16 *Inch to the Foot.*

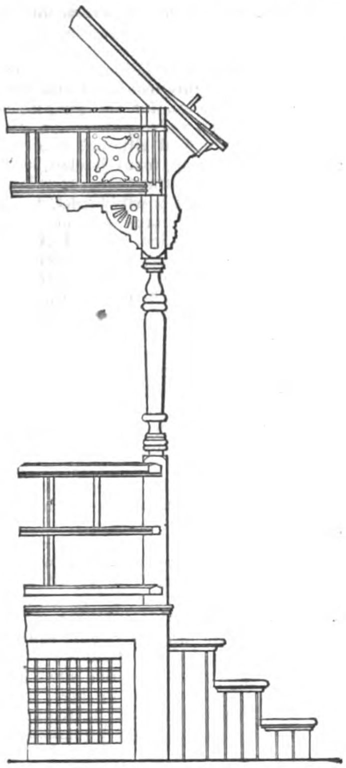
Some Heating Fallacies.

In a recent issue of a local paper of Des Moines, Iowa, was a long and interesting article on Warming and Ventilation by John E. Clarey, from which we reprint some entertaining and instructive paragraphs :

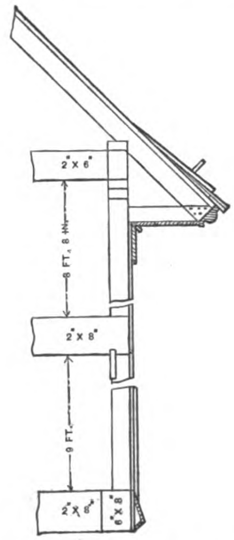
I have frequently met competitors whose mission, like mine, was largely in the line of winning the approval of school boards for a particular system. A genial fellow, now dead, in an interchange of confidence, once said to several of us: "Boys, in the matter of handling school boards, success lies in singing a big song on the subject of ventilation, getting the members thoroughly confused and then socking the price on for the purpose of making 'em think we've got the greatest thing on earth." And although this man was handling a cheap, many-jointed, cast-iron furnace, and making prices to individuals that I couldn't possibly meet, I was amazed to find his figures on school jobs twice as large as mine. He had the "nerve," as we call it, to work on the plan he had outlined. But there are "tricks of the trade" in deals with individuals as well as in those with public officials. I once heard an "engineer" explain, in the most solemn manner, how, as the result of a peregrinating course on the part of the heat on the inside, one foot of the heating surface of his apparatus would give off twice as much heat as the same kind of surface of another apparatus without getting a particle hotter! What was said was being drunk in as though it were gospel truth and common sense. Another furnace man has two boxes of chemicals that he places in the lower corner of his air chamber, and I have seen him, with a countenance that would do credit to a saint, explain in a minutely "scientific" manner how those chemicals converted impure air into pure air, and could keep on doing it forever and ever! I know another who will pray fervently morning and night and then go forth explaining how, by a discovery he made as to the "circulatory motion" of air, impure air is brought into contact with his heating surface, thereby to be immediately made pure.

MOIST AIR.

The great desideratum (of the imagination) with some people, in any heatinn system, is "moist air." It is a delusiog and a humbug—first, no system promising it furnishes it, and second, because it wouldn't be what it is cracked up to be if it was furnished. In saying this I know that I am treading on traditions dear to some people, but I can't help it. Several hot-water heating pamphlets that I have read lay great stress on one page on the moist air feature of their systems and on the next, with beautiful consistency, assert that their systems are so perfectly adjusted as to require but from a quart to three quarts of water per day! Supposing this quart of water actually evaporates into the rooms, what a wonderfully softening effect it must have when diffused through 20,000 cubic feet of air in the course of 24 hours! Hot water heat radiating pipes are not moist but dry; the hotter the water the dryer the pipes. So much for the nonsensical idea that hot water, inside of water-tight pipes, moisten the air outside. How about water in connection with warm air? I make and sell a warm air furnace, and a "vapor" pan or tank goes with each one sold; it goes not because it possesses any virtue but because it is cheaper to furnish it than to argue with a customer that it is useless. A Boston furnace man's directions for using the vapor pan were as follows: "Wash the pan out carefully in the fall; turn bottom side up and keep it that side up until the spring." The vapor pan is useful under two conditions: If in the right place and of ample capacity—almost an impossibility—it will help a little when a furnace is so small as to have to furnish burnt instead of warm air; if impure air is being used, a water pan is useful as an absorbent, but in such a case the water ought to be frequently changed, as otherwise it will become so foul as to itself impart vileness to the air. Neither of these conditions ought to exist; both do frequently exist. A good furnace of sufficient size, properly put in, furnishes a genial wholesome warm air, not a parched air.



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



Detail of Main Cornice.—Scale, ⅜ Inch to the Foot.

The Carpenter's Wooing.

The following lines, which appeared not long since in the Chicago *Post*, are calculated to make the reader smile:

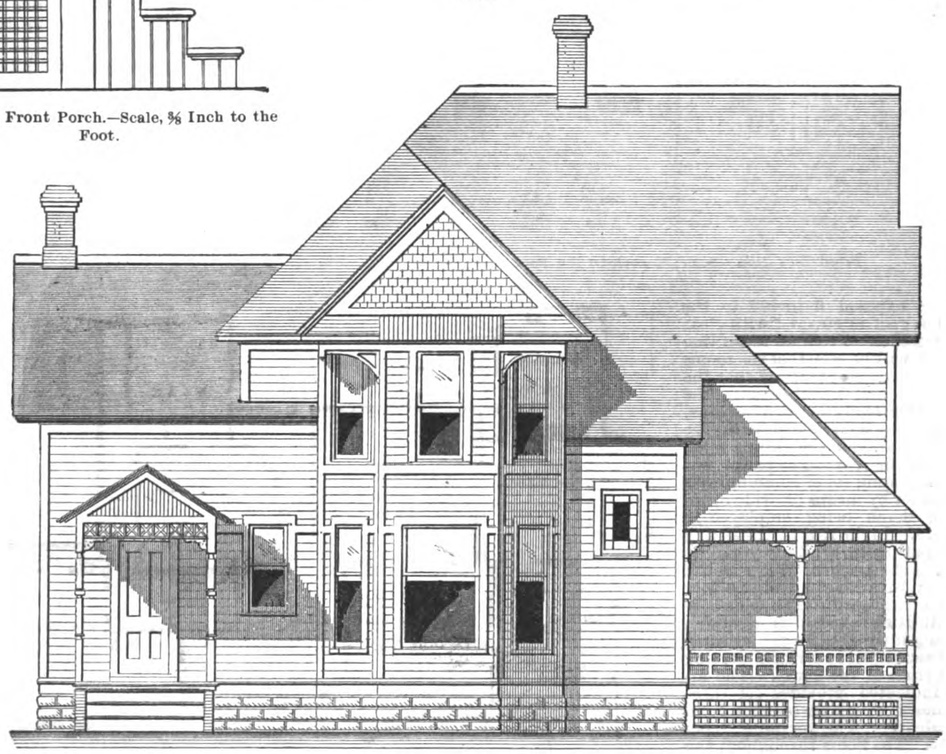
O, I a door you, darling one,
  I hall ways loved your laughter,
And window you intend to grant
  The hand my hopes are rafter?

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 he'd have us marry;
O, let us to the joiner's hie,
  Nor let us shingle tarry.

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

ST. JOSEPH'S SEMINARY on Valentine's Hill, Yonkers, New York, is an excellent example of modern building construction. It will be in the form of a hollow square, with a frontage of 360 feet. The wings project 85 feet, and the chapel in the rear of the main building will be 120 feet long. It will be entirely of granite, and four stories high.



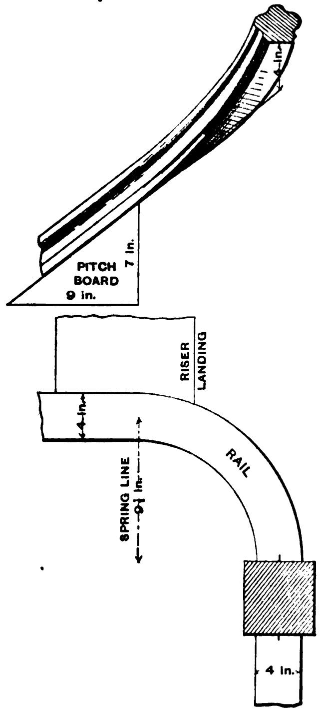
Side (Left) Elevation.

Two-Story Frame Cottage.—Elevation.—Scale, ⅛ Inch to the Foot.

CORRESPONDENCE.

Face Mold for Stair Rail.

From Constant Reader, *Toronto, Canada.*—I have a stair to build with a quarter circle cylinder 9½ inches radius to the center line of rail and 9½ inches



Face Mold for Stair Rail.—Sketch Accompanying Letter of "Constant Reader."

to the top and the wreath 4 inches above the pitch of the straight rail. I have tried to explain what I mean in the accompanying drawing. I would like to have from the practical readers of *Carpentry and Building* the drawing of the face mold for this rail. I also desire a correct explanation of bending stair strings with keys from the back of string.

Window Screens and Outside Blinds.

From H. U., *Talmage, Neb.*—I have been a reader of *Carpentry and Building*, off and on, for nine or ten years, and have found in it a great deal of interest and value to me in my trade. I always turn first to the Correspondence Department, but during all the time I have taken the paper have never seen anything relating to window screens where outside blinds are used. I mean window screens so arranged that a person may conveniently open and close the outside blind from the inside. I have made and put in two kinds of screens, one sliding on the inside of the inner sash and one sliding on the outside between the sash and the blind, moving up and down just the same as a window sash. I do not like either plan, and am desirous of learning from some of the readers of *Carpentry and Building* of a more convenient window screen.

Design for Writing Desk Without Book Case.

From W. C. R., *Chicago, Ill.*—Will some of the readers of the paper kindly furnish drawings, &c., showing the construction of a writing desk and secretary without book case. The principal woods which are available for my use are pine, cherry, oak and maple, and I should be glad to have a design adapted for woods of this kind.

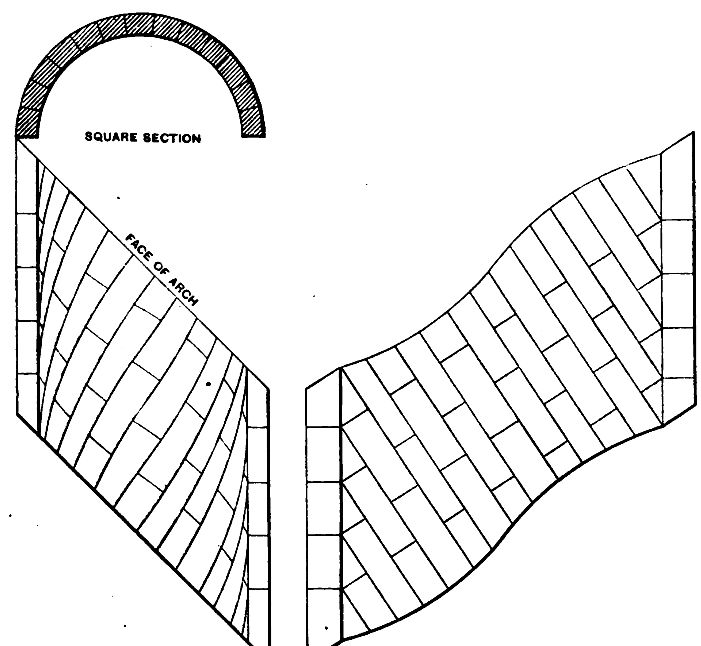
American Shingle Practice.

From W. J. McQuillen, *Port Blair, Andaman Island, E. I.*—There is a slight error in my query, as presented in the February issue of Carpentry and Building, which has just come to hand. In it I am made to say that the shingles are laid on 2 x 4 inch battens. The 4 in this instance is an error, as the battens are 2 x 1 inch, laid flat. I am looking forward to the receipt of the March number of the paper and hope to derive from it much interesting information with regard to the subject of shingle practice. I should be very glad to answer any questions which the readers of the paper may see fit to ask with regard to East Indian building practice.

Note.—We are quite sure that a letter from our correspondent touching the question of building construction in the section of country in which he is located will prove highly interesting to American readers, and we trust he will see his way clear to contribute to the Correspondence Department of the paper.

Striking a Spiral Arch.

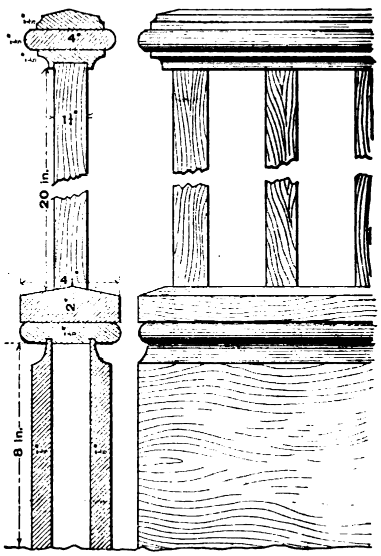
From D. F., *Philadelphia, Pa.*—I send herewith a rough drawing of a spiral arch, and desire to ask the practical readers of *Carpentry and Building* for a method of properly striking it. I desire to know the manner of getting out the arch stones, making the patterns and the method of cutting the face of the arch. I believe there are only two such arches in this country, and they are somewhere in Ohio. I should be glad to have those versed in such problems, especially stone cutters, consider this problem.



Drawing of a Spiral Arch, Sent by "D. F."

Design for Fence Construction.

From J. E., *Shelton, Conn.*—I send a sketch of a fence which I assisted in building some time ago which may prove of interest to the correspondent who recently asked for fence designs. This fence is made of ⅞-inch boards and 2-inch plank. The posts are of stone with iron rods. The



Design for Fence Construction, Submitted by "J. E."

construction is very easy and the results attractive. The construction is so clearly indicated in the drawing that further description would appear to be unnecessary.

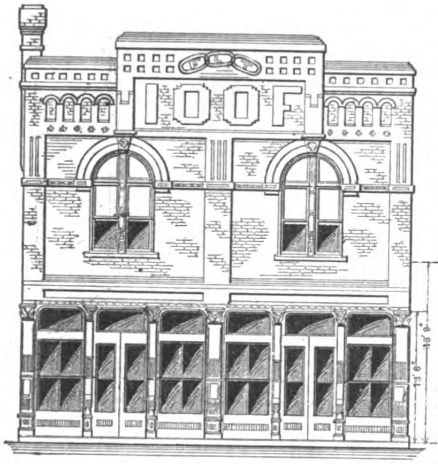
Verandas and Gable Finish.

From Jack, *Ontario, Ohio.*—I would like very much to see in the columns of the paper, from practical carpenters, designs for verandas, and also gable finish.

The subject is one likely to interest a great many readers of the paper.

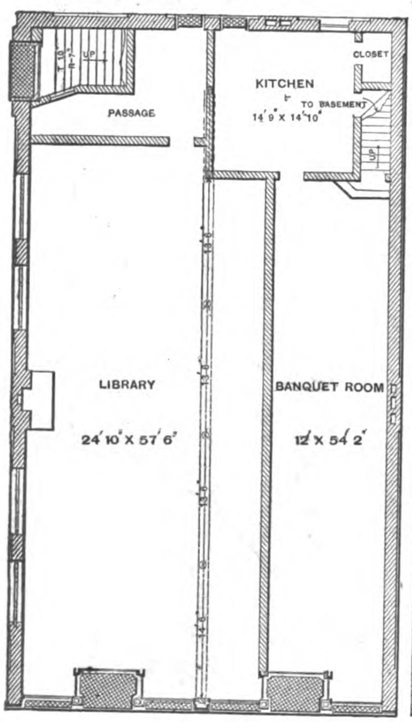
Design for a Business Block.

From E. A. P., *Carthage, Ill.*—In answer to "C. A. W.," who asked in the August issue of *Carpentry and Building*

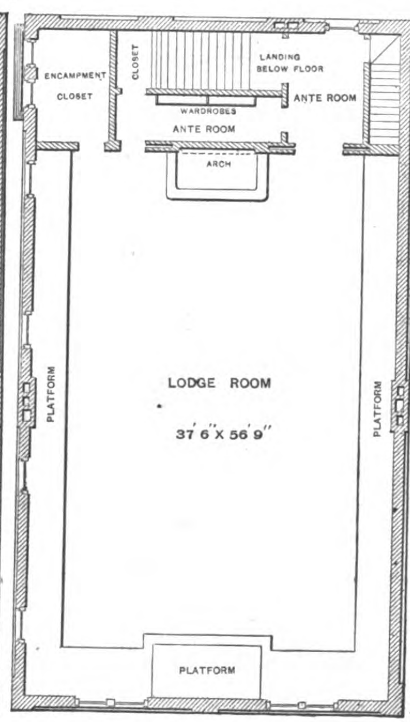


Front Elevation.

for designs for a business block with a hall or theater above, I take pleasure in inclosing blue prints of a building recently erected at Warsaw, Ill., from plans prepared by George W. Payne, architect, of this city. The building was erected by the I. O. O. F. fraternity, and was designed to have a lodge room above, with a banquet room and public library below. From an inspection of the first-floor plan it will be seen that the building could readily be made to answer the requirements of "C. A. W.," by simply moving the partition between the banquet room and library to the center of the structure, as indicated by the dotted lines. This would give two good storerooms on the first floor, each about 18 feet in width. The second floor could then be used as a hall or small theater.



First Floor.



Second Floor.

Design for a Business Block.—George W. Payne, Architect, Carthage, Ill.—Elevation and Floor Plans. Scale, 1-16 Inch to the Foot.

Floor and Roof Truss.

From R. C. B., *Orangeburg, S. C.*—My article in the issue of *Carpentry and Building* for October of last year provoked a criticism I hardly anticipated, and the spirit in which "C. W. W." expressed himself determined me not to reply, but to let him unmolestedly enjoy his opinions; but for two things which have since occurred I should not write now. The first of these is the wish for general information on the subject of correspondence expressed in the January number of the paper by "S. E. D." of Pittsburgh, Pa., and the editor's kind remarks in the note following, wherein it is stated, "the suggestion of our correspondent is a good one, and voices the wishes of the editor in regard to this matter. We trust our readers will heed the advice of our correspondent, and during the long winter evenings send the editor a great deal of interesting matter." The other reason is the courteous expression of opinion by "C. S.," Brunswick, Ohio, who, in an article on the subject, presents his own views, and illustrates them by good drawings and intelligent remarks, wherein he takes occasion to express his disagreement with my proposition. He respectfully says: "I think the plan of 'R. C. B.' is not just what it should be in order to carry the load to be placed upon it. A building 36 x 50 would accommodate a great many people, and I think his plan would not carry the load at all." These thoughts by the correspondent named, in addition to the editorial remarks just mentioned, moved me to give new attention to the matter, and I wish to do it in a single letter and there rest the case. A multitude of cares and a disinclination for controversy, especially demonstrable by figures, will prevent a further pursuit of the question. There has not appeared in the discussion anything like a scientific treatment of the case. In one instance it was an extended sophomoric phillipic against my design, and an unsupported assertion in regard to its next to infinite weakness. In the latter, it is the simple but honest statememt: "I think the plan is not just what it should be, &c., and would not carry the load at all."

I go back to the leading elements in "S.E.D.'s" article, and am impressed with the propriety of his thought and the laudableness of his desires, for there is a lamentable absence of scientific information. I hope to render a service to young carpenters by presenting to them and illustrating rules for calculation, while giving them something reliable to fall back upon, enabling them to express an intelligent opinion relative to the strength of timber and to know for a fact whether or not a design is just what it should be to carry a given load. As "C.W.W." is entitled to thanks for provoking controversy, I cheerfully give them, but before proceeding to the more immediate matter in hand I will say that when a request was made by "S. M. J." for a design of roof and floor framing in the balloon style I made such as I then thought and now consider economical and adapted to the purpose. I would italicise the word "balloon," for it implies and carries with it the suggestion of a cheap building, and not one to be used as a heavy warehouse, nor, in fact, for any purpose out of the ordinary. However much or little I have pleased "C. M. J." of Ontario, Ohio, I have evidently entertained "C. W. W." of Allentown, Pa., and have given him an opportunity to display his knowledge of the strength of the materials, statics, &c. He has also taken advantage of the door opened, and passing through has presented to the public, and more especially to our balloon-style-desiring friend, "C. M. J.," a design which in his own opinion is perfect and exactly meets the case. Without going much into detail in a criticism of his roof, I simply remark that there are probably a number of persons in this large world and near the close of this nineteenth century who would pronounce his design a fairly good one, provided it was for a building say double the width desired by "C. M. J." There are, however, eyes able to detect the fact that so much lumber is proposed in the design that the voids or spaces left are a respectable approach to the space occupied by the lumber itself, for 6 x 8 truss rafters, and their proportionately large companions as tie beams, &c., for a building 36 feet wide appear, to say the least, suspiciously unballoonish and, to use the expression of "C. W. W.," with a slight change of terms, "I hope 'C. M. J.' has not yet built the roof according to the design of 'C. W. W.'; that is, if he has acted under the delusion that he has produced a cheap and economical 'balloon frame.'" The amusing thing to me is, for the amusement is not entirely on the part of "C. W. W.," that he has made a floor which unballoons the roof. He asked "C. M. J." to employ two girders 8 x 10 inches, supported every 8 feet by two 2½ inch rods. The demand to the least learned seems to approach the ludicrous, and the first impression and suggestion is to rest the case, the game of consideration not being worth the ammunition to be expended. The climax, however, was not reached until he placed three 3 x 16 inch timbers, combined, as cross beams, with heavy cast-iron work beneath as a supporting truss. He appears to act as though conscious of the need of a support for the large beams under them, and all to support what? A floor of but 36 feet span. The entire scheme is so preposterous I with pleasure instead of disgust leave all, and while not over anxious to make a pedantic display as regards my knowledge of strength of materials, their resisting power, &c., but to aid less opinionated readers, I give the formula and rule by which my calculations are made. They are those laid down by the eminent English writer

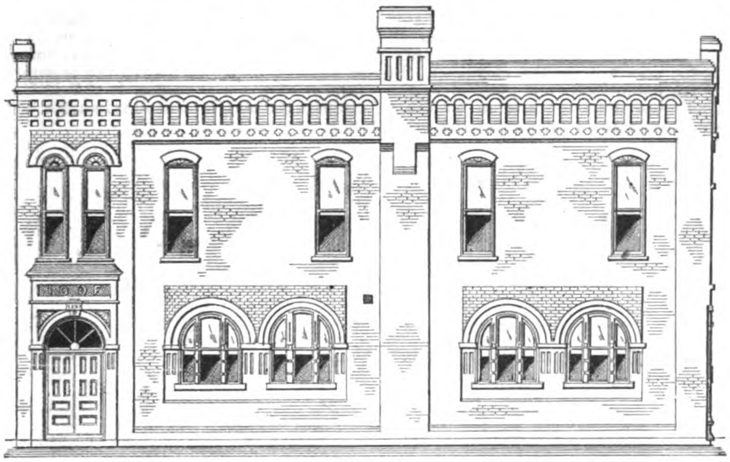
Thomas Tredgold in his well-known work on "Carpentry." I will add that Mr. Tredgold's experiments are sustained by Barlow and Rondelett, as well as by our American author Haupt in his treatise on bridge building.

Mr. Tredgold's rule is as follows: "To determine the cross strength of timber, multiply the thickness of the stick in inches by the square of the depth in inches and divide the product by the length of the piece in feet. With the quotient multiply the sum that is set against the wood—the table—and the product is the breaking weight as applied to the center of the stick; but it will sustain double the amount when equally distributed over its entire length." I will state that the coefficient for Southern pine or "the sum set against the wood—the table" is not given by Tredgold, but that 684 pounds is the result of experiments by both the United States Government and the English at the Woolwich Navy Yard, and is accepted as correct by engineers of both countries for use by the rule of Mr. Tredgold. According to the rule named, the formula for my floor joist is:

$8 \times 8 \times 2 = 128 \div 18 = 7\ 1\text{-}9 \times 684 =$ 4684 pounds as resisting power at the center of the joists. This amount doubled for equal distribution of weight gives a strength of 9728 pounds for each of the 36 joists, or an aggregate strength of 350,208, and as this comprises but one-half of the floor, we have an entire resistance of 700,146 pounds. Next, the formula for girders is:

$8 \times 8 \times 6 = 384 \div 8 = 48 \times 684 =$ 32,832 pounds as center breaking weight, and for equal distribution 65,664 for each of the six girders, or an aggregate of 393,984 pounds.

Now, as regards the weight of wood in the floor and joist, I would say there are 1800 square feet of floor, double, 2 inches thich, 300 cubic feet. In the floor joists there are 144 cubic feet, or an aggregate of 444 feet, weighing 48 pounds per foot, which gives an aggregate of 21,312 pounds. Now, as regards a possible load on the floor, it may be stated that the available space inside the walls is 35 x 49 feet = 1715 square feet. That loaded with people closely packed is 120 pounds per foot, or an aggregate of 205,800 pounds, to which we add the 21,312 pounds for wood work, giving an extreme weight of 227,112 pounds. As one-half of the weight is supported by the outside walls we subject the girder to 113,556 pounds, which is less than one-third of the breaking strain, or in other words, should a second tier of people stand above those on the floor it would support all, and there would still be a surplus resistance of 177,528 pounds. This is enough for a third tier of people and yet leave a surplus of 74,628 pounds; for it is to be remembered in each instance the outside walls take off just one-half of the weight. As no floor, in any instance, would be packed solid, nor much more than one-half, we practically have four times as much resisting power as would be required. As regards the joists themselves, they have a resisting power of 700,146 pounds, and our weight of people being 205,800, we have in strength more than three times as much as required. As the floor would not be more than one-half solidly packed we have a full strength of six times that which is required.



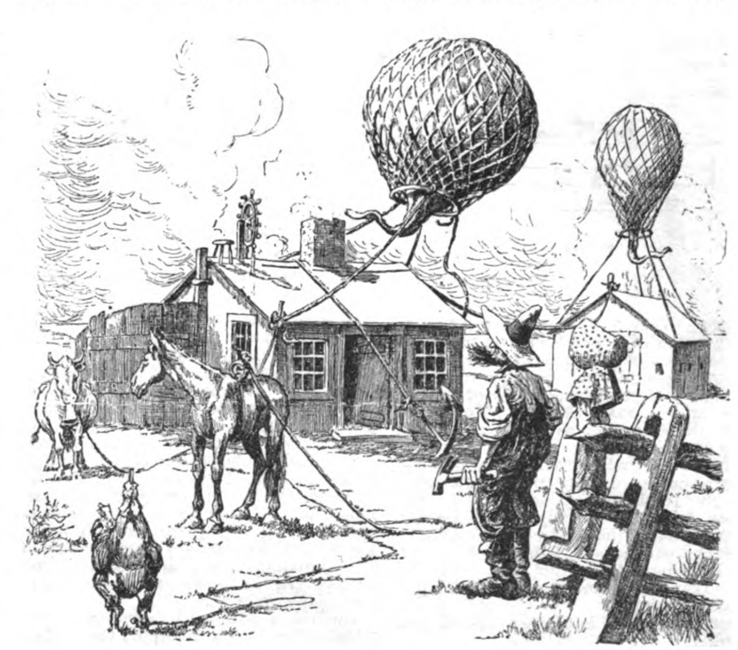
Design for a Business Block.—Side (Left) Elevation.—Scale, 1-16 Inch to the Foot.

Now, a few words with regard to the iron rods. All engineers and intelligent architects are aware that experimenters disagree as to the absolute tensile strength of wrought iron; but an average of the results as given by Barlow, Rankine, Hodginson and Unwin, and I may add well ratified experiments by the Woolwich Navy Yard, is that an iron rod 1 inch in diameter in the position stated has a tensile resistance of 30 tons, thus giving 60,000 pounds as a resisting power for each of the five rods, or a total of 300,000 pounds. The weight of the people and floor, as above stated, is 227,112 pounds, and the added weight of the girder itself 768 pounds, making an aggregate of 227,880 pounds. As one-half of each of the two end ones are supported by the end walls we reduce the aggregate one-sixth, which is 37,900 pounds, leaving only 187,920 pounds for the rods to support. Here again we have a surplus resisting power in good relative proportion, for 112,080 remains, and this for a solidly packed floor.

I have thus given what I consider to be reliable figures of both resistance and weight, as calculated by tables of eminent engineers and writers. I next, in closing, will state that in the *Engineers' Magazine* for November, 1891, pages 139 to 144, this question of strength of material is considered in detail and reliable tables presented. For a 2 x 8 inch joist, 18 feet long and 1 inch thick, or wide, as they term it, the author gives the one-sixth breaking weight when equally distributed to be 47 pounds to each foot in length. From the tables presented the formula is $18 \times 47 \times 2 \times 6 = 10,152$, thus giving a resisting strength or power of 424 pounds more than by the other tables. The formula for my girder is: $240 \times 8 \times 6 = 69,120$ for each of the six girders, or an aggregate of 414,720 as resisting power, against the 393,984 by the tables I have used. In each instance is given more strength than required and here, so far at least as I am concerned, the controversy ends.

Cyclone Architecture.

From Harman.—I was much interested by a perusal of the article on "Cyclone Architecture" by a correspondent in May issue of *Carpentry and Building*, and particularly as I have given the subject considerable thought myself and conceive that I have approached very near to a satisfactory solution of the difficulty experienced by settlers who locate with a desire to confine their residence within one township. I note the peculiarity of construction referred to by "W. S. C.," but out here (and I am extremely "out West," by the way), a ton or two of sand more or less, packed among the "innards" of a house, don't amount to much in the way of anchorage, especially if the storm be a regular cyclone—that is, one of the kind that boasts a royal lineage—the blue-blood of a straight breed.



Cyclone Architecture.—Picture Contributed by "Harman."

If one of our thoroughbred cyclo-tornadoes comes along on a business trip you may just make up your mind that you've got to "git aboard" and go to! I came to this decision in a very short space of time after arrival here.

In less than six months I found myself and most of my farm buildings, together with a certain contingent in the form of livestock (some of which wasn't mine!) exactly 37½ miles from Blanktown, where I first located. At this juncture I called a halt, so to speak, and got up on the chicken-coop to ruminate. I argued thus: In this matter, as in all others, we must endeavor to conform to nature rather than to oppose her, and when nature taps you on the shoulder and says "Git your things together, sonny, and come along of me," why, the wisest thing is to do it; and a wiser thing yet is to always be prepared to do it, see?

I have had ocular and other demonstrations that this is a progressive part of the hemisphere, and we have got to keep moving. Very well, then, the solution of the question of preparation gives the secret of comfort and contentment. The picture shows a general view of my premises immediately after the appearance of a cloud "as big as a man's hand." We do not wait till it is as big as a man's foot—as they say in Chicago.

If you ask where this unique outfit may be inspected I reply in "the picture," for the truth of the matter is I have never felt able to buy the necessary paraphernalia, though I am beginning to make preparations. I have not ordered my balloons yet; in fact, about all I've got so far is the steering wheel and a pot of green paint.

But the scheme is all right—don't you think so?

The Science of Handrailing.—III.

From MORRIS WILLIAMS, *Scranton, Pa.*

In the explanation of Fig. 7 in last month's issue two errors occurred which I hereby correct. Instead of "From 3 draw 3 0 perpendicular to X Y" it should be, "From 3 draw 3 3 perpendicular to X Y." The words "On points 1, 3, 4 and 5 raise perpendiculars," are to be omitted.

My wish and endeavor is to make these articles as clear as possible, and I am taking this opportunity to inform the readers thereof of my willingness to answer any questions they may ask.

In my previous letter I endeavored to explain the principles upon which the sections and tangents are founded. If the young reader will trouble himself to understand thoroughly all that was said he will know all that is needed of the sections and tangents to enable him to get over every difficulty that may meet him in his practical experience.

Before entering on the subject of this paper I wish the reader to examine all the previous diagrams and note particularly the line 2 3 in the elevation. In right angle blocks it runs parallel to the pitch line of tangents, and in all other shaped blocks it deviates from the pitch of tangents.

The isometrical view given in Fig. 10 will show clearly the place it occupies in the development of the section. The lowest point in the section is 3, next comes 2 and the highest is 1. The highest side of the section is 1 3; the lowest 2 3. Point 2 of the line is the elevation of point 2 on plan; point 3, the elevation of point 3 on plan. Compare the figuring of Figs. 9 and 10, each line in both figures corresponding one with the other. In Fig. 9 they are located geometrically, in Fig. 10 isometrically. It is essential to understand the relation these lines bear to each other and the place they occupy in the section, because they form the plan of the section, and they are also the lines that govern the bevels that are needed to square the wreaths.

I will now leave the tangents and sections and proceed to exemplify the method of drawing the face mold. This mold is a template, by the use of which the top and bottom faces of the wreaths are cut from the plank intended for the purpose. When the curve on plan is a part of a circle the curve of the face mold invariably becomes a part of an ellipse. There are various ways of drawing the curve of an ellipse in use by handrailers, viz.: by the use of a string, trammel, straightedge and ordinates. With the first three methods it is necessary to find the length of semi-minor and semi-major axes, also the foci for both inside and outside of the wreath or the face mold. In Figs. 9, 11 and 12 is shown how these are found. Figs. 11 and 12 are exactly similar to the section of Fig. 9. The circle in the middle of Fig. 11 represents the width of rail; the two semicircles at the ends represent the width of the mold at the ends. They are larger than the circle, their radius being the length of 1 0 in Fig. 9. These two semis and the circle together give the width of the face mold in both ends and in the center; consequently it is evident that they must be contained in the curve of the mold. From point 2 in the intersection of the axis in Fig. 11 to 3 in the circle is the length of semi-minor for the inside of the curve. From the same point to 1 in the circle is the length of the semi-major for outside of the curve.

To find the length of semi-major take point 3 on the semi as center, with the length of 3 2, and cut the major in point 5; extend till it cuts the minor in 4. This line 3 4 is the exact length of the semi-major axis for inside of the mold. Take point 1 on the semi for center, with the length of 1 2 (which is the length of semi-minor), and cut the major 6; extend to the minor, cutting it in point 2. This line 1 2 will be the exact length of semi-major for outside of the mold.

To find the foci take point 3 on circumference of the circle in the center of the mold as center, with the length of semi-minor 3 4 as radius and cut the major in points 7 7. These points will be the foci for inside of the mold. Take point 1 in the circle as center, and the length of the semi-major 1 2 as radius; cut the major in 8 8. These points are the foci for outside of the mold.

Fig. 9 will explain the method of striking the curve with a string. Fig. 12 explains the method of the use of the straightedge. Mark on a straightedge the length of semi-minor axis 1 6, also the length of semi-major 1 2. Keep point

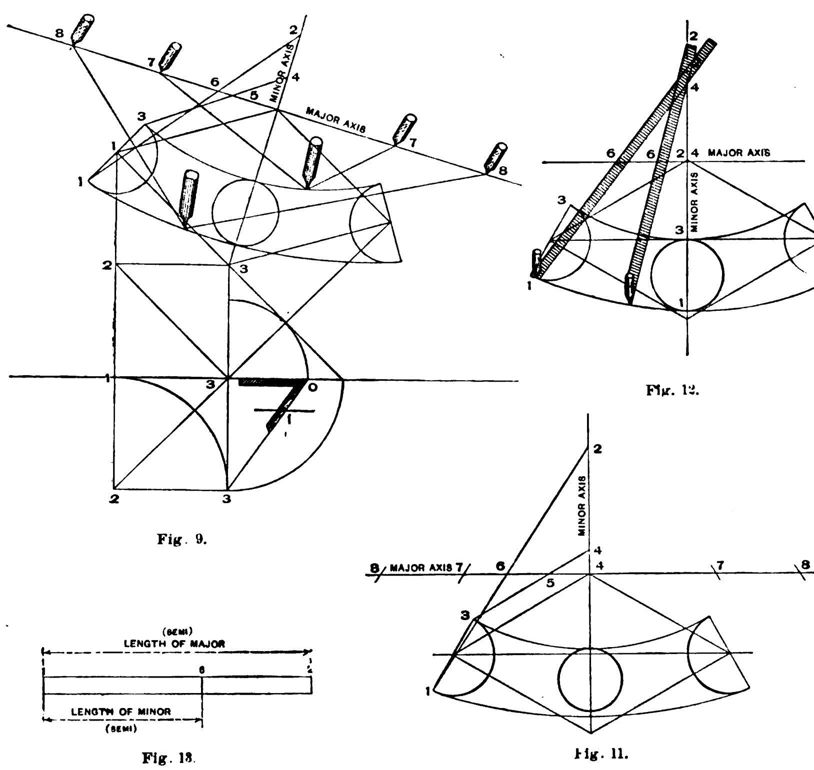


Fig. 9. Fig. 12. Fig. 13. Fig. 11.

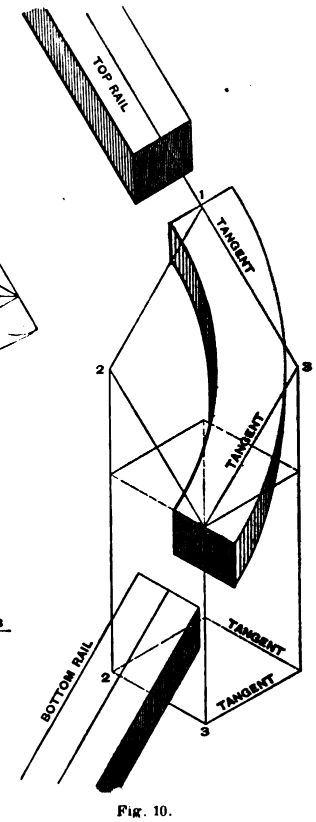


Fig. 10.

The Science of Handrailing.—Diagrams Accompanying Article of Morris Williams.

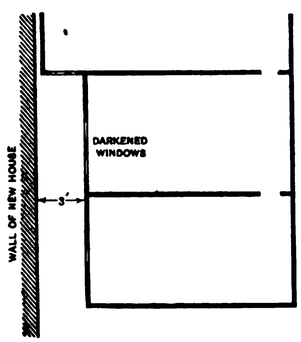
6 on major and point 2 on minor, and rotate the straightedge, marking dots at each rotation. These dots will be contained in the curve of the outside of the mold. Similar process is necessary for the inside of the mold. The trammel is worked on the same principle as the straightedge.

Joist Required for a Building.

From L. J. A., *Atlantic Highlands, N. J.*—I will try and answer what appears to be a somewhat difficult question from "L. J. N.," Lincoln, Neb., who asks for a short rule for finding the number of joists required in a building. If placed 16 inches from centers I take one-quarter of the length of the building and add one. If the remainder contains a fraction I add one more. Suppose, for example, the length of the building is 60 feet. Then $60 \div 4 = 15 + 1 = 16$; or suppose the length of the building to be 55 feet; then $55 \div 4 = 13\frac{3}{4} + 1 = 14\frac{3}{4}$, and, adding one for the fraction $\frac{3}{4}$, gives 15 as the result, which is the number of joists required.

Making Dark Rooms Light.

From J. K. W., JR., *San Francisco, Cal.*—Will some of the practical readers kindly tell me through the Correspondence columns if there is any artificial means to give light in dark rooms. A house has been put up next to mine, which so darkens the rooms as to render them unpleasant. My house has a 3-foot break or L, as indicated in the accompanying sketch. This shows the rooms which



Making Dark Rooms Light.—Sketch from "J. K. W., Jr."

are darkened and the position of the wall of the new house.

Note.—Without attempting to anticipate the answers of correspondents to the above question, we would suggest that whitewashing the wall of the new house, or painting it white, would afford some relief. Another plan would be to make use of some of the reflectors at present on the market for purposes of this kind. These are adjusted at an angle outside the windows of the darkened rooms, and are so placed as to throw the light from above into the apartments. We trust those of our readers who have had experience in cases of this kind will write us fully, accompanying their letters with sketches as may seem desirable.

Adjustable Trestle for Plasterers.

From T W., *Aylmer, Ont.*—I would like to obtain through the columns of the Correspondence Department some ideas for an adjustable trestle for plasterers' use. I want a light, stiff trestle, which can be easily and quickly raised or lowered to suit various hights of ceiling. If some of the practical readers of the paper who have had experience in this direction can give me some information touching this matter, I shall be greatly obliged.

Design for an Open Staircase.

From D. A. B., *Franklin, N. Y.*—I desire to ask through *Carpentry and Building* if some of the readers will furnish a design for an open staircase. It is intended to rise from a sitting room which is 16 x 16 feet and the ceiling is 9 feet. I inclose a sketch of the room, which I think

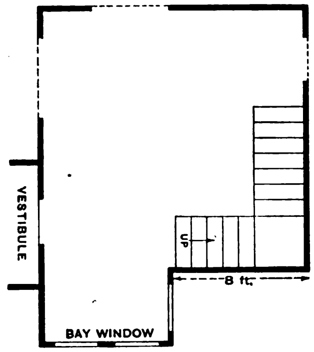
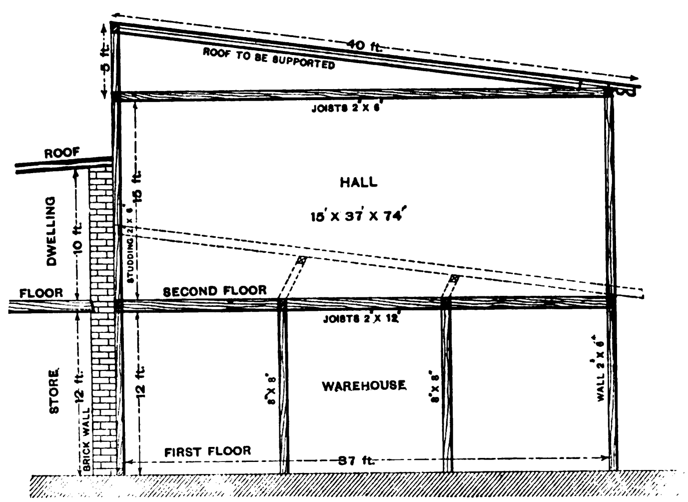


Diagram Submitted by "D. A. B."

will be readily understood. If some one will kindly furnish what I require it will be highly appreciated by the writer, while of undoubted interest to many other readers of the paper.

Roof Truss.

From J. C. W., *Pine Hill, Pa.*—I notice in some recent issues of *Carpentry and Building* diagrams of roof trusses which interest me very much. I send herewith sketch of a roof and would be glad to have practical readers give their methods of supporting it. Not long since I was asked by a merchant to make out a bill for him for a hall which is to be built on



Sketch Accompanying Letter from "J. C. W."

top of his warehouse. By referring to the drawing which I send, it will be seen that the first floor of the store to the left of the warehouse is of brick, and that the second floor is used for dwelling purposes, making the structure two stories in hight. Now, the warehouse is but one story high, and the owner desires the hall to be above the warehouse. It will be noticed that the roofs on both buildings are very flat. The hall portion will have only 5 feet in 37, which will make the rafters about 40 feet long. The merchant does not wish any posts in the hall. The question arises, How can this one-sided roof and top ceiling be supported? The hall is to be 37 x 74 feet in size. If I dared set one row of posts through the space it would be a very easy matter, but not having anything of this kind on which to depend renders the problem difficult. The roof is to be tin and the other material wood. The dotted lines in the main portion of the diagram show how the roof of the warehouse is at present framed. I should like very much to have this problem solved.

Cabinet for Laboratory.

From W. C. R., *Chicago, Ill.*—I should be very glad, indeed, to have some of the readers of *Carpentry and Building* submit drawings, accompanied by an explanation, of the method of making a cabinet or case suitable for laboratory, chemical and workshop purposes. The case should have convenient drawers and shelves to hold tools, chemicals, sheet brass, &c. The case should not be over 3 feet 9 inches wide and about 4 feet in hight, although the latter dimension may vary according to taste. I should like the drawers to be of varying size, in order to hold tools, bottles of chemicals and loose materials.

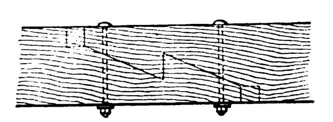
Composition of "Staff."

From J. J. C., *Lexington, Ky.*—Will some of the well-informed readers of the paper tell me how the material called "staff," of which the Columbian buildings at Chicago are to be erected, is made?

Note.—If our correspondent will refer to the issue of *Carpentry and Building* for June, 1891, he will find on page 149 an article entitled "What Staff Is." While this does not give the proportions and various ingredients employed, our correspondent may find much that is of interest to him in this connection.

Splicing Timber.

From T. B., *Headingly, Canada.*—I have seen a great many ways of splicing timber for framing, but must confess that I prefer the method shown in the accompanying sketch. Most people believe that their way is the best—and that is



Method of Splicing Timber, Suggested by "T. B."

just my case. Some of the readers, however, may not admire my plan of splicing and those who do not I would ask to criticise it and tell me what they think of it.

CONCRETE—ITS COMPOSITION AND USES.

CONCRETE may be defined as an artificial stone, says a writer in an English exchange, composed of a mixture of hard materials, such as ballast gravel, flints, stone chippings from stoneyards, burnt clay, broken bricks, cinders, clean breeze from gas works, pottery or iron slag, called the "aggregate," and a cementitious material, either of lime or cement, called the "matrix," thoroughly combined with water. Where sandstone or any flat stone can be obtained in large quantities, concrete can be made much cheaper than with gravel. The stone should be broken up by a suitable machine, such as Blake's patent. It is to be noticed that angular fragments of stone will make better work than those of a round nature, which do not give so good a hold for the "matrix." Stones having an average porosity are better than very hard or polished ones. For instance, Kentish rag or Portland roach are far better than flints or pebbles. Bricks should not form the whole substance of the "aggregate," neither should the pieces used be too large. In the use of ballast, it is important that it be clean and free from loam or earthy matter. The size of the "aggregate" depends upon the nature of the work; for thin layers, as in floors, it may be gauged to a 1 or 1¼ inch ring, but for ordinary purposes it may be gauged to a 2 or 2½ inch ring, and should contain about one-third its bulk of fine stuff and sand or its equivalent. The sand used should be clean and sharp, free from clay and loam.

Concrete is always stronger for an addition of sharp sand by filling up all interstices and making a more solid mass, but the value of the concrete depends almost entirely upon the quality of the cementitious material, whether lime or cement.

CLASSIFICATION.

No doubt most of our readers are aware that lime is produced by burning limestones, and upon the constituents of the limestone depends the quality of the lime. The following classification has been adopted to distinguish the several descriptions.

1. Rich or fat limes, from the upper or middle chalk formations, are nearly pure carbonates of lime. This lime when mixed with water commences to slake at once, with great ebullition of heat and vapor, falling to a fine powder, and if mixed with water will remain of the same consistency and never harden.

2. Poor limes, from clayey limestones, contain, besides 70 per cent. of carbonate of lime, about 30 per cent. of sand or inert matter.

3. Feebly hydraulic limes, from the gray or lower chalk, are called stone limes, such as Dorking, Halling and Mertsham. These limes contain about 90 per cent. of carbonate of lime and magnesia and about 10 per cent. of clay. These limes slake in a few minutes, breaking into a powdery mass, with heat and vapor. Sets firm in about 15 to 20 days, and as hard as soap in 12 months.

4. Moderately hydraulic limes, such as the Sussex gray lime chalk, Roach Abbey and Bolsover Dolomites, contain 15 per cent. to 20 per cent. of clay. These limes begin to slake in about an hour, finally cracking all over, with slight heat and vapor, but not powdery. Will resist the pressure of the finger in about eight or ten days, and in 12 months will be as hard as soft stone.

5. Eminently hydraulic limes, from Barrow, Whitby, Lyme Regis, from the blue lias formation, contain from 20 per cent. to 30 per cent. of clay, slakes with difficulty, often without cracking, and takes considerable time, with very little heat, only sensible to touch. It is often covered with sand to hasten the slaking. Firm within about 24 hours, and will set hard under water in from two to six days, in six months as hard as limestone. It is better to have the lime ground before using for concrete. It will be observed that, generally speaking, the constituent which confers hydraulicity is clay, although, in a few cases, a portion of the carbonate of lime is replaced by carbonate of magnesia, which also increases the rapidity of setting.

NATURAL AND ARTIFICIAL CEMENTS.

Passing on, we come to the cements, both natural and artificial. Natural cements—such as Roman and Medina—are frequently employed in the preparation of concrete, because of their rapid-setting properties. For works to be executed between tides, and where running waters in foundations prevent lime or Portland cement from setting quick enough for the work, Roman or Medina should be used. They cannot be used with so large a proportion of "aggregate"—not more than four parts should be used.

Roman cement concrete should never be rammed on any account, as the action of the ramming would disturb the indurating action which speedily sets in.

PORTLAND CEMENT.

Portland cement is an artificial cement, and consists generally of 70 per cent. chalk and 20 per cent of alluvial clay, although it will vary according to the nature of the chalk. It is mixed in a mill, run off to settle, dried and burnt in kilns, and ground for use. It may be composed of limestone, clay, or shale roughly burnt, gound together, mixed as a powder in pug mills, then slightly moistened, pressed, dried, burnt and ground for use. The following is a good specification for Portland cement: "The Portland cement to be of the best quality, finely ground and free from all coarse, inert particles, 90 per cent. to pass a sieve of 2500 meshes to the square inch; to weigh not less than 110 pounds per striked bushel, filled into a bushel measure lightly. When made into molds it should be capable of maintaining—after seven days' immersion in water—a tensile strength of 400 pounds per square inch; the immersion to commence within 24 hours of the molds being made." If the latter test be impossible, another can be substituted, viz.: Small pats about 3 inches diameter, ½ inch thick, should be gauged wet and kept in the air. It should set well, without any shrinking, change of color or shape; the color should be of dark gray. Another pat should, after setting, be immersed in water for 24 hours; no cracks or swelling should be seen. The color should be as before; if of a yellow or ochery color, the cement contains too much clay, and would probably be deficient in tensile strength.

The cement, before using, should be emptied on to a dry wooden floor of a covered shed, to a depth of not more than 4 feet, and turned over occasionally to cool. When fit for use it should be comfortably warm to the bare arm, about blood heat; if hot it is not fit for use, or if too cold it is dead.

The essential difference between limes and cements is that limes slake with the addition of water, but will not set if mixed up with water unless sand is added. Cement, on the other hand, will set at once and just as well in water as in air. These properties render Portland cement of great value, and its use for concrete is now universal. Without doubt cement concrete is the best. With care in mixing, if the materials are good, you can rely upon it setting quickly and forming a perfectly solid mass. If necessary to use lime, reject that which is obtained from limestones containing less than 8 per cent. to 10 per cent. of silica and alumina.

PROCESS OF MIXING.

Having described the material of which concrete is composed, I pass on to the process of mixing. I have often noticed how carelessly builders' laborers will mix up concrete. It seems as if no trouble need be taken so long as a heap of "aggregate" is piled up, whether in proportion or not, turned over, watered, shot into its intended position, and there left. If examination is made, a number of nodules of unslaked lime are often to be seen. This is a most improper way of preparing concrete, and is much to be condemned. The great point is that the whole of the lime shall be perfectly slaked during the mixing of the mass, and before it is deposited. Exact proportions should, it is needless to say, be also maintained. It should not be left to laborers, but be controlled by an agency possessed of the requisite scientific or technical knowledge. In concrete, for whatever purpose, the first consideration should be excellence. The proper way is to mix the concrete upon a clean stone or wooden floor, about 10 x 15 feet. A box of 1¼-inch stuff, with handles, bound with hoop iron, and open both top and bottom, 5 feet 6 inches by 5 feet 6 inches by 1 foot 4 inches deep is a good size for measuring, and for a proportion of one to eight the following may be adopted: Fill the box 1 foot deep of broken stone, then 4 inches of sand. If the "aggregate" does not require sand, then a depth of 1 foot only is necessary. Then add two 2-bushel sacks of cement. These quantities give 1¼ yards cube of concrete. Lift off the box, turn the material over twice in a dry state, and again a third time, about a barrow load at a time, and while turning add water from the rose of a watering pot in sufficient quantity only to make the ingredients cling together; about ¾ gallon of water to one hundredweight of ballast is considered sufficient.

(To be continued.)

Fire-Proof Flooring.

A building inspector in Hamburg recently made a series of experiments to test the comparative fire-resisting qualities of different sorts of flooring. He constructed 11 pieces of flooring, all of pine and unplaned. The floor, says the London *Carpenter*, was double in every case, save the first, and the boards ranged from 1½ to 2¼ inches in thickness. The first floor, of single boards, burned through in 30 seconds. Then for the second and third experiments the floor was doubled, the joists running the same way; two layers of asbestos paper were placed between the second piece of floor, and "superator" (probably thick asbestos felt) between sample three. The second burned through in one hour and four minutes, and the third in one hour and thirteen minutes. The fourth and fifth samples were double floors, which resisted well. The sixth floor was like the fifth, save that the joints crossed each other at right angles. This floor required an hour and twenty-two minutes to burn through, the crossing of the joints being more effective than the asbestos or superator between the boards, and the resistance in each case was prolonged somewhat. Ordinary roofing felt was placed between the boards in the tenth piece, and it resisted an hour and twelve minutes. In the last piece the upper floor was of matched inch boards, and the under planks 2½ inches thick, with square joints running at right angles with those of the upper flooring. Nothing was put between the floors, but the resistance was two hours and twenty-four minutes.

DESIGN FOR A GREENHOUSE.

IN RESPONSE TO inquiries which have been received from correspondents and also for the benefit of a large class among our readers, we have pleasure in presenting in this issue a design for a greenhouse, the elevations, plans and some of the details of which are shown in the accompanying illustrations. Fig. 1 represents a perspective view, Fig. 2 the plan and Fig. 3 an end elevation. From the plan it will be seen that the building is divided into a number of sections known respectively as the Propagating House, Plant House, Conservatory, Orchid House and Fern House. In designing this building the idea has been carried in mind that as each class of work is assumed to require different conditions of temperature, as well as a different arrangement of the interior, each section has been kept separate and distinct, while combining the whole under one roof, and heating by means of one apparatus. From an inspection of the plan shown in Fig. 2, it will be seen that tions. The stands are arranged in a manner similar to the preceding section but with a better finish. These stands extend entirely around the conservatory and also through the center. To the left of this section is the Orchid House, which is designed for purposes similar to that where plants are raised. The arrangement is practically the same, except that it contains all the rarer and more costly plants, appropriately crowned by the orchid, from which it takes its name. Still further to the left, and at the extreme end of the building is the Fern House which demands a still different interior arrangement. A feature of the apartment, and one which adds much to its beauty, is the rockery, there being many species of ferns requiring this kind of cultivation. The attractiveness of this section of the greenhouse might be still further enhanced by the introduction of a fountain placed in the center of the rockery.

Probably the most important points in connection with structures of this kind ered from an inspection of the sectional view shown in Fig. 4 of the engravings. For the flat roof sash on other sections of the house the arrangement made is similar to that described, except that single V-shaped arms are keyed on to the continuous rod. This arrangement is also employed for working the ventilating apparatus at the bottom when it is desired to open or shut all the sash at the same time. The worm and pinion wheel principle is sometimes employed for working the ventilating apparatus instead of the lever principle. The arrangement of the former is the same as that of the latter, consisting in merely putting a pinion on the continuous rod with a worm on the end of it and operating by means of a wheel instead of a lever at the bottom. The construction of the lantern top and also of the frame-work of the greenhouse may be understood from an inspection of Figs. 5 and 6 of the engravings. Referring now to the plan shown in Fig. 2, it will be seen, as already stated, that the boiler is

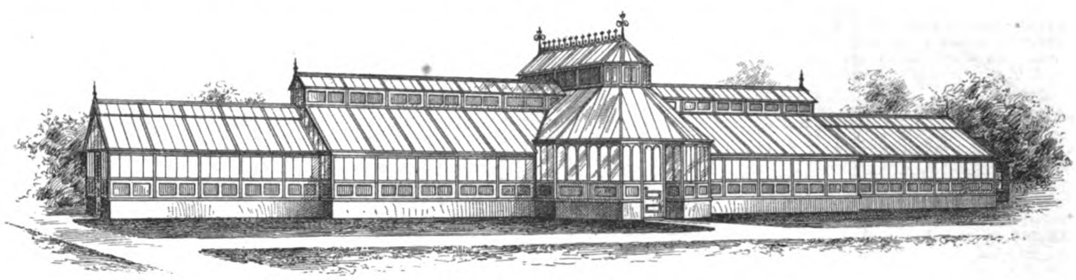


Fig. 1.—Perspective View.

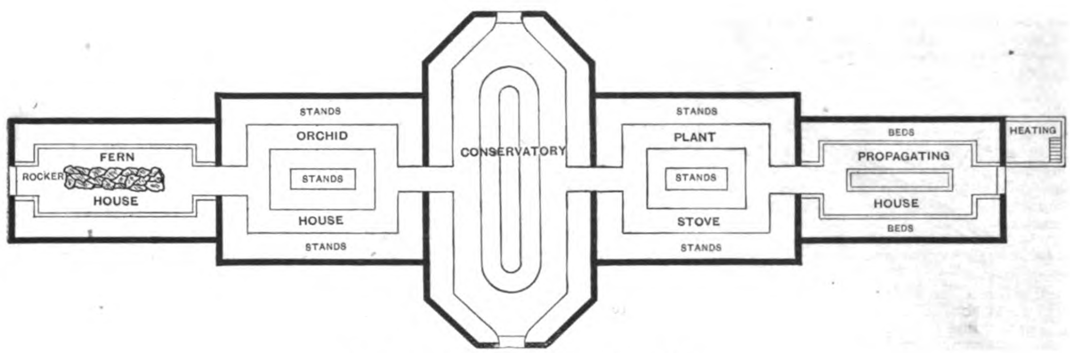


Fig. 2.—Plan View.—Scale, 1-16 Inch to the Foot.

Design for a Greenhouse.

the boiler is placed in an extension at the extreme right, while next to it at the left is the Propagating House, considered the most important of all by experienced gardeners. This section, fitted with stands containing earth, is divided into compartments and covered with glass frames. These compartments are employed for cultivating combinations of flowers, plants, &c., and as this frequently requires the greatest range of heat the section is properly placed nearest to the boiler. The second section from the extreme right is designed for plants, and it is here are raised from seeds and cuttings the various kinds of flowering plants, which are almost wholly contained in pots. This section is, therefore, provided with tables or stands consisting of cross pieces at intervals of 4 feet resting on turned supports. Along these laths are placed longitudinally with a space of ½ inch between them.

The central section of the house, marked on the plan as the Conservatory, is intended for displaying flowers and is more artistically furnished than the other sec- are the heating and ventilation, a vitiated atmosphere being injurious to plants, especially to the more delicate ones. For this purpose the greenhouse illustrated herewith is ventilated at the lowest point for the admission of pure air, and at the ridge for the escape of vitiated air, thus maintaining a constant current of fresh air. The bottom sash are opened separately by means of lifting rods constructed to the radius of the hight of the sash. These are of flat iron, punched with holes, into which a pin is inserted when the sash are opened. For the ventilation of the lantern top a continuous rod is passed through a rafter and made to work in brass bushings. On this rod and between each rafter double S-shaped arms are keyed, the ends of which are attached to the hinged sash on each side of the lantern. A connecting rod and arm are fixed at one end of the sections for working the sash, while a lever is fixed at a distance of about 3 feet from the ground for opening and closing them, as required. An idea of this arrangement may be gath- placed in an extension at the extreme right. The various sections of which the greenhouse is composed are intended to be heated by hot water on what is known as the "low-pressure" principle. A boiler of special design is placed in the extension, and sunk low enough to prevent any "dip" in the flow pipes. It is fed from a tank placed at a slight elevation, by means of a pipe running from a tank to the return pipe, where it enters the boiler. A flow pipe of 4-inch cast iron is carried from the top of the boiler through the entire length of the greenhouse just below the floor level, and having a rise of about ⅛ inch to the foot. A return pipe is carried back with a corresponding fall, and enters the boiler at its lowest point, thus insuring a constant circulation of the water.

The base of the greenhouse here illustrated consists of brick work carried up 12 inches above the ground. On this rests the upright framing, the bottom member or sill of which is formed of teak, in order to render the construction durable. The bottom member projects about 2 inches over the brick work in order to shed the water. The roof is composed of rafters placed at intervals of 5 feet, and fastened together by means of iron tie rods extending across the house at a sufficient hight for head room. In the center is an iron king rod, the relative position being indicated in Fig. 4 of the engravings. This gives the necessary strength without interfering with the light, which is a very important consideration. The house may be painted any warm color outside, but for the inside white is preferable.

Care of Hand Saws.

James H. Miner contributes the following suggestions as to the care of hand saws to a recent issue of the *Mechanical News:*

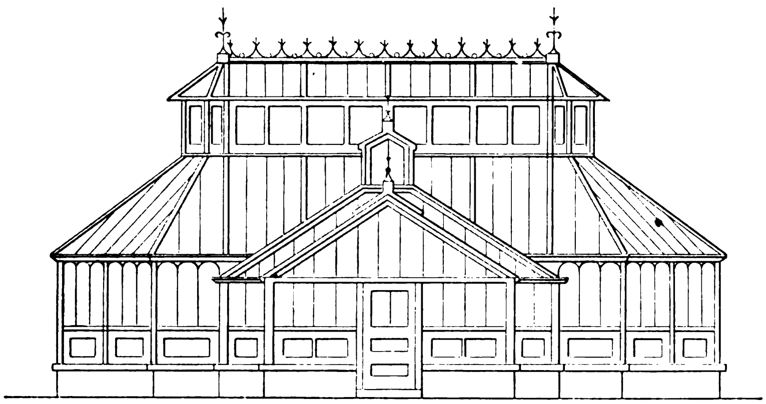


Fig. 3.—End Elevation.—Scale, ⅛ Inch to the Foot.

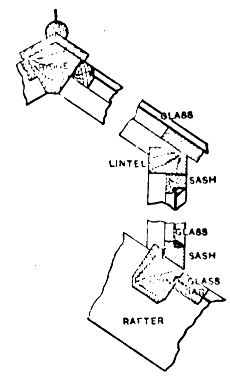


Fig. 5.—Details of Lantern.—Scale, 1¼ Inches to the Foot.

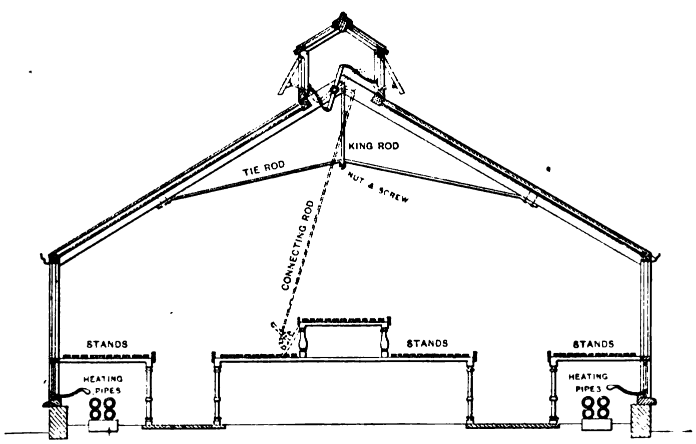


Fig. 4.—Cross Section Through Building.—Scale, 3-16 Inch to the Foot.

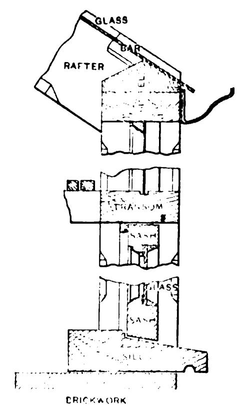


Fig. 6.—Details of Frame Work.—Scale. 1¼ Inches to the Foot.

Design for a Greenhouse.

The hand saw, though a common tool, is seldom found in good order. The art of filing and straightening is known by few. Every mechanic should know how to keep his saw in perfect order, inasmuch as the tools to do so are in his possession, viz.: a try-square and a straight-paned light hammer. Take the average filed saw and it will not cut angling across the grain, even at a short angle. What is wanted is a fast, smooth, easy cutting saw, that will take a miter or angle in the grain without gouging or pinching itself, as an ordinary rip saw would do. This is accomplished by filing the teeth with considerable pitch and a good bevel, using the file with the stroke outward on the front of the teeth. This puts the wire or rough edge on the outside and allows a saw to run with much less set and cut more freely. The gain in cutting is principally in plenty of pitch and a good bevel, using Stubbs' files. They are cheaper at five times the cost of the common file. Use a good set, setting only the points of the teeth, otherwise the blade will be sprung. The saw will run lighter set as near the point as possible. This, of course, takes a good set.

In straightening hand saws use only a light, straight-paned hammer. Hold the saw up, looking down the tooth edge, and where a kink is found, locate it with the try square. The blows ought to be applied directed on the edge, as here is where the saw is sprung the most. Use very light blows and don't expect much result from one blow on a kinked place; better use a dozen light taps than to drive the twist through and make it more abrupt. The idea is, not to indent the blade, but to get the edge straight without sinks from the hammer. A saw that is kinked assumes a curved condition more or less, and may appear full under the straightedge near the center of the saw. Pay no attention to this, get the edges straight and ninety-nine times out of a hundred your saw will be straight throughout.

In case a saw falls and gets bent, it will be necessary to extend the blows a little further in from the edge, as in this case the saw is bent clear across, but in no case strike the center of your saw. The edges get bent or kink and there is where the work is to be done. Don't use a round pane hammer unless a round spot is found in the center of the saw. A saw with a gradual curve wants a uniformed space of light blows always on the convex or high side. The tooth edge sometimes appears crooked while the back is straight or nearly so. In such cases proceed as directed—viz., apply the blows where the kinks are found. All this must be done on a firm, smooth wooden block, never on the anvil, or your saw will soon be ruined by the edges getting longer and will not then come straight, unless an expert is called in who understands tension.

NEW PUBLICATIONS.

A Guide to Electric Lighting. By S. R. Bottone. Published by Macmillan & Co.; illustrated; 12mo; 189 pages; price, 75 cents.

The author first deals with the various kinds of primary batteries, which is followed by a description of the mode in which the battery works, so as to enable the reader "to form an idea of the relative adaptability of the different forms for the particular purposes to which they may be applied." Now follows a description of different forms of dynamos and the best known arc and incandescent lamps and the methods of wiring. The chapter on accumulators contains a description of a very effective one that can easily be made by any amateur. The fifth chapter considers the smaller appliances which are necessary in any electric lighting system. The final pages are devoted to the electric motor and a discussion of the cost of power obtained from the motor. The book is well written, free from technicalities, and deals with the subject in an original and instructive way.

WHAT BUILDERS ARE DOING.

THE FIRST OF MAY this year was almost uneventful in the building trades of the country, comparatively few disturbances having occurred. Such strikes as have taken place were of an unimportant nature, and, with one or two exceptions, have occurred in the smaller communities, where neither the workmen nor the employers have been in the habit of treating collectively with each other. In a majority of cases the workmen have been endeavoring to secure a reduction of working hours without reducing the wages, and but little opposition has been found where the change could be effected without serious injury to the business of the employer. In many instances the employers were entirely willing to change to a shorter-hour day, but objected to the payment of the former wages, claiming that their business would be injured thereby, it being impossible to secure united action, which would enable all contractors to figure the cost of labor alike. There was no general demonstration May 1 this year among the workmen, and advices from various parts of the country show that affairs generally in the building business are in a tranquil condition. The building season seems to have been backward in many cities, for which no particular reason is assigned, but the prospect in most localities is fairly satisfactory.

Baltimore, Md.

The building interests of Baltimore have been greatly disturbed during the past month by a strike among the carpenters for an eight-hour day at the old scale of wages. The carpenters have been working nine hours per day and receiving $2 50, and on May 2 demanded that the hours of labor be reduced to eight and the wages remain the same. The mill-workers also demanded a reduction of their hours from ten to nine, the pay to remain the same. Early in the month the bricklayers determined to assist the carpenters, and refused to work on any building where carpenters working nine hours a day were employed.

The Master Builders Association held a meeting in the rooms of the Builders' Exchange on January, 5 1892, and adopted a set of resolutions advocating the establishment of a joint committee of arbitration as recommended by the National Association of Builders between their association and the Carpenters' Union. The union refused to entertain the proposition, alleging that it would conflict with the general law of the union, and at the same time announced that from July 5, 1892, journeyman carpenters should receive 35 cents per hour and eight hours should constitute a day's work. At the next succeeding meeting of the Master Builders Association it was voted to reaffirm the wages and hours established with the union in 1886, viz., $2.50 for nine hours. The following correspondence then took place, and on May 2 the carpenters struck as above stated:

LOCAL UNION NO. 29,
April 9, 1892

To the Master Builders' Association:

GENTLEMEN: Union 29, United Brotherhood of Carpenters and Joiners of America, wishes to inform your body that on and after May 2, 1892, eight hours shall constitute a day's work and $2.50 shall be the minimum rate of wages per day.

GEORGE ROLLMAN,
Recording Secretary Union 29.

MASTER BUILDERS' ASSOCIATION,
19 West Saratoga street,
Baltimore, Md., April 21, 1892.

To Union 29, United Brotherhood of Carpenters and Joiners of America:

GENTLEMEN: Your communication, dated April 9, received April 18, demanding that on and after May 2, 1892, eight hours shall constitute a day's work, and $2.50 shall be the minimum rate of wages per day, was laid before the meeting of the Master Builders' Association held on April 19, and the following resolution was adopted and the secretary ordered to notify your association:

Resolved, by the Master Builders' Association, That we decline to accede to the demands of Union 29, U. B. C. & J. of A., and respectfully refer them to the action taken by the Master Builders' Association on February 9, 1892—namely, that we reaffirm our settlement made with the journeyman carpenters, 1886, that $2.50 shall be the rate of wages, and nine hours shall constitute a day's work.

E. BRADY, President.
B. FRANKLIN, Secretary.

Some talk has been indulged in regarding a possible strike among the granite quarrymen in the vicinity of Baltimore which was unwarranted. The nine-hour demand, with eight hours on Saturdays, was granted some time ago. The men demanded an advance in wages and all the quarry owners but one have granted it. The one holding out employs only about 15 men, and no serious consequences would arise if the men strike, which is hardly likely. Laborers have been advanced in wages from $1.25 to $1 30. Men who before received $1.50 a day will now get $1 75, and those who were getting $1.87 will receive $2.

The exchange is considering the advisability of establishing a building exhibit in their new building, using the one in connection with the Philadelphia Exchange as a model.

At the meeting of the Builder's Exchange, held on May 6, a resolution was unanimously passed to the effect that the exchange is bitterly opposed to the general card system that is trying to be forced upon those connected with the building and other trades. In explaining the breadth and scope of this card system, it is stated that the majority of the journeymen associations are under the control of the Federation of Labor, which claims the right to refuse to allow any one to work on a building or elsewhere who has not a card from the local union recognized by the Federation.

Boston, Mass.

Building in Boston is much more quiet this spring than it has been for several years. While there is a very considerable amount of work being done, it is of less magnitude in character than that carried on during the past two years. There have been no serious disturbances among workmen in the building trades this spring, although the plasterers are talking about an eight-hour day. There has been no trouble of any kind in the bricklaying, the stonemasons' and the building laborers' trades since the adoption of the form of arbitration advocated by the National Association of Builders between their unions and the Mason Builders' Association.

The granite quarrymen of Quincy, Mass. and Barre, Vt., are on a strike, and are more or less disturbed in all the quarries in New England. The workmen are after a new set of working rules and a new scale for cutting granite. They also want more pay.

The plumbers are out on a strike for more pay.

On the evening of May 11 the Master Builders' Association of Boston held the first of a series of "smoke talks" upon subjects of interest to the members and the association. A most excellent lunch was served at six o'clock, and afterward the balance of the evening was devoted to the consideration of subjects of general interest, the revision of the by-laws being the principal topic.

Buffalo, N. Y.

May 1 produced no complications among the workmen in Buffalo, and building interests are moving along about as usual, with no present prospect of disturbance. The Builders' Association Exchange moved into its new building on Monday, May 2, and a very enjoyable opening of an informal character took place on that occasion. The exchange, which has been in existence since 1867 under various names, is one of the best examples in the country of the progress of such organizations, and of the beneficial influence of the National Association of Builders upon local bodies of builders. Immediately after the national convention, held in New York City in February, 1891, which included in its programme a visit to the exchange in Philadelphia, the Buffalo Exchange determined to have a building of its own. The membership, which had been steadily increasing since 1888, the year after the exchange joined the National Association, led to the formation of the Builders' Exchange Association, with members drawn entirely from the Association Exchange. The new association was organized for the purpose of erecting a building, which the exchange now deemed necessary. The act of incorporation was secured on March 24, 1891. The capital stock of the company was $75,000, which was divided into 750 shares at $100 each.

Plans were immediately made for the new building, and the work begun as soon as possible. To day there is a handsome seven-story fire-proof building on the corner of Pearl and Court streets as the result of the efforts of this organization.

The following are the present officers of the association: Alfred A. Berrick, president; George Duchscherer, vice-president; Charles A. Rupp, treasurer; John C. Almendinger, secretary. The new home of the organization has a frontage on Pearl street of 86 feet and 3 inches, and on Court street of 51 feet 4 inches. From the bottom of the basement to the top of the cornice is 120 feet, 110 feet being above the ground. The material used in the construction of this building is nearly all brick, stone and iron, the only wood used being in the window and door casings.

The structure is an office building in the strictest sense of the word. No stores will occupy any part of the building, the first floor being designed specially for banking or brokers' offices. No pains have been spared to make this one of the best constructed and finest structures in the city.

The officers of the Builders' Exchange Association, which is the organization formed for the purpose of erecting the building, are: President, Charles A. Rupp; vice-president, H. C. Harrower; treasurer, Alfred Lyth; secretary, J. C. Almendinger; building Committee, J. H. Tilden, E. L. Cook, George Duchscherer, Henry Schaefer, Jacob Riemann.

A lunch was served at the opening of the new building, and speeches, music and a general good time were indulged in.

A pleasant feature was the presentation by C. A. Rupp, president of the Builders' Exchange Association, of a 12 x 24 flag to the Builders' Exchange Association, and a streamer to the Builders' Association Exchange. The latter is the parent organization. Mr. Rupp made a very happy little speech, and responses were gracefully made by Vice-President Harrower of the B. E. A. and President A. A. Berrick of the B. A. E.

The cost of the entire property will be $165,000 in round numbers, every dollar is paid up to date, enough stock has been taken to pay everything and when completed there will not be a cent of debt on the property.

Pending the completion of the upper stories, which are as yet unfinished, the exchange will occupy the first and second floors.

Chicago, Ill.

The painters of Chicago struck on May 2 for 32½ cents per hour, as a minimum rate of wages, and eight hours as a full day's work. The demand of the workmen was conceded after they had been out a short time. There have been several unimportant strikes in individual shops in the fair grounds, all of which have been settled by compromise, with slight advance in pay. There has been some dissatisfaction among the iron setters, but nothing of the nature of a concerted strike has yet occurred. The journeymen stone cutters recently demanded Saturday as a pay day, and the matter was submitted to arbitration. Chas. W. Gindele, director of the National Association for the Chicago Exchange, was chosen by the employers and Judge McConnell by the men. In the hearing the men failed to establish any valid reason why the pay day should be changed to Saturday from any other day, and no change was made.

The Builders' and Traders' Exchange at a special meeting called for the purpose passed resolutions of regret at the death of Marc Eidlitz of New York.

It is rumored that there may possibly be a strike of all the workmen engaged upon the World's Fair buildings, it being claimed by the local unions that workmen are being imported, by the contractors, from outside and employed in favor of the members of the local unions. The unions claim that while the contractors have adhered to the agreement made with the men early in the year, regarding eight hours, they have broken other agreements and are discriminating against them.

Cincinnati, Ohio.

The settlement of the difference between the employers and the journeymen carpenters which occurred late in April reached us too late to appear in the May issue of *Carpentry and Building.*

The differences were adjusted by a committee of equal numbers from the Builders' Congress and the Carpenters' Union, P. J. McGuire, secretary of the United Brotherhood of Carpenters, being one of the latter.

The situation was fully discussed and an agreement was finally reached.

This agreement sets forth that the minimum rate of wages shall be at the same rate as at present until August 15, 1892, and from then until May 1, 1894, the minimum rate shall be 33⅓ cents an hour.

Nine hours shall constitute a day's work, from 7 a.m. to 12 m., and 1 p.m. to 5 p.m., save on Saturdays, when it shall cease at 4 p.m., making eight hours for that day.

For work overtime, one and one-half hours shall be counted for every hour, and double time on Sunday.

Both committees signed the agreement.

The settlement was generally considered as very satisfactory to all concerned.

There was a strike of mill workers early in May, and a general lockout was determined upon by the Congress of Builders in case the men did not return to work or declare the strike off before the 16th of the month.

The stairbuilders are somewhat disaffected, but it is expected that no trouble will occur, and that the contract offered by advice of the Congress of Builders will be accepted, which is nine hours and $3 per day for the first class, and $2.75 for second-class men. Employers to pay car fare where it exceeds 5 cents, and the employers to employ as many apprentices as they desire.

The plasterers are out on account of an inability to adjust the apprenticeship question, the workmen refusing to allow more than one apprentice for three years and two for four years.

A later communication has been received which states that the mill owners and their employees have come to a satisfactory understanding, which will be adopted if ratified by the Builders' Congress and the union, and there is no doubt of its ratification.

This amicable settlement of what promised to be a very serious labor difficulty will be hailed with much satisfaction by all interested in the building and real estate business. It removes the last element of doubt and uncertainty, and builders can take contracts and commence to work with confidence.

The official text of the agreement is as follows:

An agreement made this 12th day of May, 1892, by and between the Hamilton County Planing Mill Association and the Carpenters' District Council of Hamilton County.

Witnessed—That the subscribers in behalf of their respective associations do agree:

1. That the hours and rate of wages remain the same as at present existing until August 15, 1892.

From August 15, 1892, until June 1, 1894, nine hours shall constitute a day's work at the same rate of wages as now prevailing for ten hours.

2. In case of necessity requiring the working of overtime, the same shall be counted a time and a half, but it is understood that necessary repairs required in the factory shall not be counted at overtime rates.

3. The arrangement of the hours will be left to be adjusted between each employer and his employees.

4. It is agreed that notice of any future demands shall be given prior to January 1, 1894, and that in case no agreement is arrived at by February 1, 1894, the matter in dispute shall be referred to an arbitration committee for settlement.

5. This agreement is made subject to the ratification and approval of the Hamilton County Carpenters' District Council and the Congress of Master Builders of Hamilton County.

Cleveland, Ohio.

Nothing has been done this spring either by the employers or workmen in the building trades in Cleveland to indicate dissatisfaction with the relations as existing at present between the two. The Builders' Exchange is in a fairly prosperous condition and is steadily gaining ground.

Grand Rapids, Mich.

The painters and decorators of Grand Rapids are out on strike because of the employment of non-union men by the contractors. The employers and workmen in the painting trade have been for some time on the verge of an open disagreement. Early in 1891 a meeting of the two was held for the purpose of securing the adoption of working rules which should govern both the workmen and the employers, but nothing definite had ever been formally adopted between them. The workmen were granted nine hours, with the wages that had formerly been paid for ten hours, and the question of wages was satisfactorily settled, but the men refused to work with non union workmen.

The other building trades are undisturbed and there is no immediate prospect of any trouble. The amount of building projected for the season is about up to the usual volume and the summer's work promises fairly well.

The painters and decorators have formed a stock company, to be known as the Grand Rapids Union Paint Company. It is said that enough stock has been subscribed to give the company a fair start. The contractors appear to be entirely undisturbed over the matter, and seem to be perfectly willing to have the men strike or resort to any plans which they may deem best for their own good, as there is so little work in the market just now that there is not enough to keep everybody busy.

Indianapolis, Ind.

The builders of Indianapolis have had nothing to disturb the harmony of their relations with their workmen this spring and there is little probability that anything will occur during the season.

The Builders' Exchange made a renewed effort on April 1 to establish in the minds of its members a recognition of the value and importance of coming together at a fixed 'change hour for the purpose of transacting business, and the move promises to be successful. The attendance has been greater than was anticipated and the members express themselves most favorably upon the advantages that such a custom presents. Secretary George W. Stanley, in a letter referring to this subject, says: "We are just beginning to learn that the exchange is not simply a resort for the unemployed, but is a place where the builders can come together in perfect equality to transact their legitimate business, receive and answer calls, meet in social and friendly intercourse and help to make the exchange a practical business institution. We have already learned, notwithstanding the short time we have met daily, that the custom economizes time and it is a great accommodation to the public to know just when and where the best builders of the city may be found with certainty every day." The annual election will occur early in June, for which the following candidates for the various offices have been nominated:

President—William P. Youngclaus, George W. Stanley, T. J. Vater.

First Vice-President—J. McGauley and J. E. Shover.

Second Vice-President—M. M. Cotton and W. R. Fall.

Directors—J. Martin, George Kirkhoff, T. J. Moore, L. S. Pierson, William Koss, J. A. Dunlap, William Newman, Val. Heintz, J. A. Miller, Charles Humphrey. Nine of the ten nominated are to be elected.

Committee on Arbitration—James McGauley, T. J. Vater, C. Bender, G. H. McClure, John Martin.

Louisville, Ky.

The Builders' Exchange of Louisville, which is composed of carpenter contractors and made up almost wholly of members of the Builders' and Traders' Exchange, passed a resolution, taking effect May 1, making a day's work for carpenters nine hours at the old rate of wages. The carpenters had some time previously signified their desire for a nine-hour day, but the action of the contractors was entirely voluntary, it having been considered best to secure as much uniformity in the hours worked in the different trades as possible. The following are the officers of the Builders' Exchange: John Greiner, president; A. S. Hughes, vice-president; John Mitchell, treasurer; Leo P. Kaufman, secretary. The Executive Board for the coming year is composed of J. H. Murphy, J. N. Struck and George Rommel.

The project for securing a building of its own by the Builders' and Traders' Exchange is progressing favorably and the amount necessary to insure the success of the undertaking is practically in hand.

Lowell, Mass.

The Lowell Master Builders' Association has elected the following officers: President, E. S. Foss; vice-president, C. H. Nelson; secretary, John H. Coggeshall; treasurer, George H. Watson.

A committee from the Central Labor Union, representing the building trades, recently appeared before the City Council and asked that in awarding contracts for city work, if possible, the contracts be not awarded to contractors opposed to union labor, or to those who were not local contractors. If this could be done the union men would regard it as a favor to the contractors, with whom they were working in harmony. In response it was guaranteed that no contract would be given to parties outside of the city.

Local building interests are usually active and there is no open disagreement between the employers and workmen.

Milwaukee, Wis.

All the lathers in Milwaukee belonging to the union went on strike May 2, for an increase in wages of 5 cents an hour. They number about 150. The bosses have combined and decline to grant the increase demanded on the ground that they cannot afford it.

The other trades are quiet and possibilities of a disturbance among the carpenters and painters seems to be growing less.

The work on the new building being erected by the Builders' and Traders' Exchange is going forward rapidly and promises, when completed, to be one of the handsomest office buildings in the city.

Minneapolis, Minn.

The proposed strike of the painters of Minneapolis for 30 cents per hour did not occur, on account of a lack of unity among the workmen. The majority are dissatisfied with the present wages, however, and a strike may occur at any time.

The Builders' Exchange is constantly increasing its influence and is gradually growing more firmly established as one of the prominent business institutions of the city. The members are growing into the custom of being in the exchange rooms during the 'change hour, and the benefits derived from such a practice are making themselves apparent.

The demands of the striking steam fitters are:

1. The same pay for eight hours as they were formerly paid for nine.

2. Payment for board and all other expenses when sent out of the city.

3. Employers shall not hire men at any time of year for less than $3 per day.

4. Employers shall hire union men only.

The employers offered to grant the first demand, but refused to entertain the others. The strike has apparently had no effect on the building business, and it is generally believed that the strikers will fail to carry all their points.

New York, N. Y.

The Employing Plasterers' Association held a banquet recently in honor of the opening of their new rooms in the Jarger Building, on the corner of Fifty-ninth street and Madison avenue. The occasion was a most enjoyable one, the toasts being well chosen and the responses being particularly interesting.

The secretary, George M. Reed, read letters of regret from Mayor Grant, Judge Dugro, Geo. C. Prussing of Chicago, J. M. Blair of Cincinnati, W. H. Sayward of Boston and numerous others. He also gave an account of the work accomplished by the association, particularly in the direction of arbitration with the workmen. James Gaynor of the Arbitration Committee of the Journeymen Plasterers, who was present by invitation, was then called upon, and said a few words, in which he favored friendly relations between masters and men. Music, singing and recitations followed, and the guests departed in the "wee sma' hours."

The Mechanics' and Traders' Exchange, at a special meeting called for the purpose, passed a set of resolutions expressing the gratification of the members at the passage of the law providing for the establishment of the Department of Building as separate from the Fire or other department of the city government. Thanks were also expressed to Mayor Grant for the selection of Thomas J. Brady as the new Superintendent of Buildings.

The Building Trades' Club passed at a special meeting resolutions expressing the utmost regret and sorrow at the death of Marc Eidlitz, late president of the club. The sincere sympathy of the entire membership was tendered to the family, and the club house was ordered draped in mourning for 30 days as a mark of respect to the memory of the deceased.

Gen. Horace Porter, president of the Grant Monument Association, has appealed to the citizens of New York to raise the balance of the amount necessary to complete the monument prior to the seventieth anniversary of General Grant's birth, which will be April 27, 1893. Each particular business interest has organized an auxiliary committee, and the builders have gone earnestly to work to do their share. The General Committee of the building industry is as follows: Chairman, Geo. Moore Smith, president Mechanics' and Traders' Exchange; vice-chairman, John J. Tucker, ex-president of the National Association of Builders; secretary, Stephen M. Wright, treasurer of the Building Trades Club, and Cornelius O'Reilly, treasurer.

Omaha, Neb.

A committee has been appointed by President Hussey of the Builders' and Traders' Exchange of Omaha to revise the building laws, and when the revision is completed an effort will be made to pass the new laws in place of the present ordinance. The following gentlemen compose the committee: John Hart and George C. Bassett to represent the carpenters; A. J. Vierling, the iron work; D Shane and George Deverem, brick; F. Reum ping, galvanized iron; H. P. Drexel, stone, and Messrs. Lowrie and Kimball, architects.

In connection with this committee, the chair also appointed an advisory board, consisting of President Hussey, E. P. Davis and J. F. Tilly.

The secretary of the exchange received a letter recently from the Department of the Interior containing a request for bids on a schoolhouse to be erected for the use of the Indian pupils at Flandreau, S. D. This is the first time since the organization of the exchange that the Government authorities have officially recognized it, and naturally the members feel quite elated.

The letter requests the secretary to display the plans of the proposed buildings and to endeavor to get as many of the Omaha builders and contractors as possible to submit proposals for the work.

There has been no trouble of any kind in the building trades this year, and the only possible complication is that, owing to the lateness of the opening of the building season, bricklayers may be scarce enough to warrant their demanding an increase in wages. In such an event the matter will be referred to the Arbitration Committee of the exchange for settlement. Other than this no trouble is expected. The exchange is constantly growing in numbers and influence. The lunch feature has proved a marked success.

Peoria, Ill.

The Peoria Builders' Exchange is at present acting somewhat conservatively, though making a gradual gain in membership. Since February 1, 1892, the exchange has accepted four firms of the city of Peoria, and has prospects of other applications for membership. The number at present who are in good standing in the exchange is about 70.

A meeting of the Board of Directors was held May 2, at which the more important action and discussion was to make the exchange of more power, and to that end to create greater activity and interest on behalf of the membership, by having a monthly meeting of the full membership, at which time a lunch will be served and a discussion take place to insist on the use of the uniform contract, and also on general uniform specifications for builders.

The building trade is in a good state of prosperity in Peoria. A few of the contracts are as follows: H. G. Anderson, store on South Adams street, 160 x 38 feet, three stories and basement, mason work contracted to Wall & Lewis of the Builders' Exchange, who also have a contract for a building at Gridley, Ill., a summer resort, the plans of which are furnished by Armine & Sietz; J. L. Flinn, contractor and builder, past delegate to the National Association of Builders, has a contract for a building for J. B. Green, also the Women's Club; R. W. Kempshall, general manager of Ætna Life Insurance Company, is building a residence to cost about $30,000; brick work contracted to F. B. Hasbrouck, iron work to Lucas & Son, carpentry to Fred Habers, stone work Frank Binlet, metal and heat to Hunter & Streblow, all respectively members of exchange; Wm. Schroeder & Co., builders, with Richardson & Salter, architects, have the contract for the residence of Gus Schimpff of Martin Kingman & Co, for $12,000. All work to be done by members of the exchange.

The Builders' Exchange is steadily growing into a condition of increasing usefulness to the members, as is indicated by the foregoing, and the practice of keeping work as much as possible among the members is strengthening the organization.

Philadelphia, Pa.

May 1 passed in Philadelphia without any strikes or lockouts having occurred, and save an agitation among the carpenters for shorter hours, everything is harmonious in the building trades.

The Stone Cutters' Association has settled all differences with its journeymen, and an agreement has been made that nine hours shall constitute a day until after January 1, 1893, when eight hours will be the schedule on which they will work.

The schedule adopted between the bricklaying contractors and the workmen early in the season is proving satisfactory, and will probably not be altered.

The Master Builders' Exchange has recently been considering the best means for securing a permanent and assured income for the trade schools under its patronage and supervision. The school is in a prosperous and flourishing condition, and the advisability of establishing it in an independent building near the exchange is considered desirable and increasing its facilities advocated, as it would cost but little more to conduct a school of twice the size, and the income would be much larger. The question of calling on outside aid was discussed at length, but the opinion that the exchange should support its own project was the sentiment of the majority of the members.

The exchange, in conjunction with the Brickmakers' Association and the Carpenters' Association, is moving in the direction of securing better protection from loss of life by fire in theaters and public buildings than has heretofore been afforded by law. So important has the question of saving human life become, and so lax are the laws at present in force governing the construction of theaters and other public places, that an ordinance will shortly be introduced into councils regulating the arrangements of the building and the method of conducting it, so far as the safety of the public is concerned.

The ordinance suggested would require the Building Inspectors to withhold any permits until the specifications in the ordinance were complied with. The ordinance, it is suggested, would also probably direct the Mayor to withhold a license from any theater failing to comply with the ordinance.

The builders and the lumbermen played a game of base ball at Forepaugh's Park, on May 19, a nine having been picked from each exchange. Considerable preparation had been made by both sides and a large crowd turned out to watch the game. The affair afforded considerable sport and was the source of much amusement and fun for all concerned. The proceeds were devoted to the trade schools.

On the evening of May 3, after the adjournment of a directors' meeting, the directors, as has been their custom with former ex-presidents, presented to George Watson, the retiring head of the board and of the exchange, a handsome testimonial, it taking the form in this case of an elaborately carved and finished hall clock.

Having had an inkling of what was coming, Mr. Watson provided an excellent collation for the board, at which the new president of the exchange, Murrell Dobbins, presided. Speeches were made by ex-Presidents Stevens, Woelpper, Reeves and Messrs. Harris, Gillingham and others, and at midnight the meeting adjourned.

Providence, R. I.

The demand of the painters of Providence for nine hours and $2.50 per day was granted by the employers, and everything is quiet in that branch of the trade at present. The plumbers are asking $3.50 for a day of nine hours, with eight hours on Saturday, and have made a formal demand to that effect to the Master Plumbers' Association It is the general expression that the journeymen have overreached themselves in asking for $3.50 for a nine-hour day, and the master plumbers are determined not to yield. As it looks at present the fight is likely to be a protracted one.

The granite quarrymen of Westerly, R. I., and Northbridge, Mass, are out on strike, and the stone cutters are idle for lack of stock.

The disagreement seems to be over the date when the annual bills shall go into effect. The employers will not sign any bill unless the same takes effect hereafter on January 1. The paving cutters insist on having the bills take effect on May 1, as heretofore. The reason for this is apparent to any one acquainted with the granite industry. In the winter there is little work, and the employer would be more than willing to close for a month or more. On the contrary, the granite worker does not care to make his demands then, as he knows that they would be refused. In May, however, all the quarries have plenty of work, and then is the time the workman desires to fix his prices for the coming year.

Rochester, N. Y.

Everything is quiet among the builders of Rochester, the workmen being apparently satisfied with wages and hours. The masons are at present working for 35 cents per hour, which, under an agreement made early in the year, will continue until July 1, when they will be paid 36 cents. The workmen asked for eight hours with 40 cents per hour, but were induced by the employers to withdraw such a request, and it is expected that the present wages and hours will govern during the entire season. The other trades are all quiet.

Saginaw, Mich.

The building trades of Saginaw are all quiet, with the exception of the bricklayers, who are striking for an increase in wages from 39 cents to 45 cents per hour. The bricklayers made a demand in the winter for the increase, to take effect May 1, and the contractors were opposed to the advancement at that time, and are still of the opinion that they cannot afford to pay $4.05 for nine hours' work. There is comparatively little building going on in the city at present, and the employers do not anticipate any serious injury to their business because of the strike.

St. Louis, Mo.

The opening of the Builders' Exchange in their handsome new quarters in the Telephone Building, Tenth and Olive streets, took place April 19. About 400 builders and contractors were present and an address of welcome was delivered by President Charles B. McCormack, who, on behalf of the Builders' Exchange, welcomed the members and invited guests to their new quarters, after which they were all invited to the sixth floor of the building to partake of an elegant spread, gotten up for the occasion by George Milford the caterer.

President McCormack was the toastmaster, and after Secretary Walsh read communications and telegrams from the Builders' and Traders' Exchange of Chicago, W. H. Sayward of Boston, secretary of the National Association of Builders, and the Contracting Plasterers' Association of New York sending congratulations, President McCormack introduced E. E. Scribner of Chicago, ex president of the National Association of Builders, who spoke on the advantages of local bodies belonging to the National Association.

Anthony Ittner, president of the National Association, complimented the officers and members of the exchange on their elegant quarters, and hoped to see the exchange double its membership the coming year. Seneca N. Taylor spoke of the builder's as being one of the grandest of professions. Wm. A. Rutter spoke of the advantage and importance of every builder and contractor belonging to the exchange, and Henry Feurbach told the experience of a Chicago builder who visited St. Louis and found that in place of the builders here being dead, they were a live and enterprising class of men.

Secretary Walsh read the address of President McAllister of Cleveland, Ohio, delivered by him at the annual convention held in that city last January. This closed the programme.

The building season in St. Louis has been somewhat backward in opening up this spring, and nothing of a serious nature has occurred to disturb the existing relations between the employers and workmen. The lathers were out on a short strike just prior to May 1 for an increase in pay to $2.50 per day for second and $3 for first class men. The increase was granted by the employers, although they refused to sign such a scale for the entire season. The men employed in the stair factories demanded eight hours, but the employers refused to accede, and the men are working on the old terms.

St. Paul, Minn.

The plumbers of St. Paul are striking for eight hours and at the old rate of wages paid for nine hours. The contractors are willing to concede eight hours, but only on a basis of payment by the hour. The employers are not much alarmed, as there is but little work on hand at present. At the last meeting of the Builders' Exchange, a resolution in favor of nine hours as a day's work, with payment by the hour, was unanimously passed.

Syracuse, N. Y.

At the meeting of the Master Builders' Association of Syracuse held April 29, Thomas B. White, one of the prominent attorneys of the city, delivered an address on "The Builder, the Builded and the Lien Law." The address was particularly interesting and instructive. The speaker's practical and exhaustive treatment of the lien laws was thoroughly appreciated.

At the meeting next month a stereopticon exhibition of views of American and European scenery will be given, to which the friends and families of members are invited.

The painters' strike, which is against working with non-union men, is still in force, but there is no demonstration against the shops where only non-union labor is employed. The other trades are quiet.

Wilmington, Del.

The workmen in the building trades in Wilmington are apparently satisfied with the condition of affairs as existing in that city, as they have made no effort to change them this spring. Many of the workmen, particularly bricklayers, are out of employment, the building season being slow in opening up.

Everything is running along smoothly in the Builders' Exchange. The membership is constantly increasing, and the members are taking more interest in its affairs. The exchange has made a strong effort to secure the appointment of a practical man as building inspector for the city, and submitted three names to the council, but the political element was too strong, and another selection was made. The following reasons were set forth by the president of the exchange why the organization should be interested in the appointment of a proper person:

The object and aim of the Builders' Exchange is to better the conditions of the building business; to have good work done by competent mechanics; to induce builders to use good business methods, and to put them in the position which they should occupy in the community. They certainly have as much at stake as any other set of business men.

It is the custom in Philadelphia for the examiners of applicants for inspector to be taken from the Builders' Exchange. Our Board of Trade names the candidates for port wardens. The Builders' Exchange offer three candidates to our council to select from, and we do not think it can be successfully contradicted that they are as good men as are in our city. And we think much better than any of the other names mentioned for the position. They are men who served an apprenticeship and educated themselves for their business. They have spent a lifetime in practical work, and we do not think they need any better monument than the works which they have produced. Can as much be said of any of the other candidates? The building inspector is a member of the Board of Revision, and the builders as taxpayers are certainly interested as much as any other class of our citizens.

A. S. REED, president.

WILMINGTON, May 4, 1892.

Worcester, Mass.

The hod carriers of Worcester are out on a strike, which is the only ripple in the building trades that has occurred in that city during May. The contractors seem to be having but little difficulty in securing men. and the workmen claim that they have all the work they want, so every one seems satisfied.

Notes.

The builders of Americus, Ga., the home of Speaker Crisp, are at work forming an exchange.

An effort is being made by the builders of Cairo, Ill., to form an organization for the purpose of securing greater harmony among the members of the trade.

The carpenters of Asbury Park, N. J, have returned to work after a brief strike upon the promise that nine instead of ten hours shall be a day's work, and the wages, $2.50, remain the same.

The carpenters of Covington, Ky., will probably accept the same terms as were accepted by the Cincinnati journeymen, which appears in another column of this issue, and the threatened strike will probably not occur.

The Building Trades Council of Chicago has been at work for a long time upon a plan to establish a library for its members and workmen generally. The scheme is to include a building, in which will be included a hall for debates, a free employment bureau and other beneficial features.

The carpenters of Danbury, Conn., are on a strike for nine hours with the same pay they formerly received for ten hours' work.

An unsatisfactory feature of too hasty action on the part of trade unions recently occurred at Decatur, Ill. The Carpenters' Union ordered a strike of all members irrespective of any conditions and upon investigation no cause for strike could be found, and the men were obliged to apply for work again after having disturbed the building community all to no purpose.

The journeymen bricklayers of Easton, Pa., have been granted nine hours at the old rate of wages, after a short strike.

The carpenters of Holyoke, Mass., struck on May 2 for nine hours and a uniform rate of $2.25 per day. The employers have formed an association, and the feeling between the two has become very bitter. The workmen are determined to hold out until their demand is conceded, and the contractors are equally determined not to yield.

The carpenters of Ithaca, N. Y., have been given nine hours by the contractors after a short strike.

The plasterers of Lima, Ohio, have asked for nine hours, with eight on Saturday, to take effect June 1, and $2.50 per day, the price paid for ten hours' work.

The carpenters of La Crosse, Wis., have returned to work at the old hours and wages, and everything is satisfactory in this branch of the trade. The painters are out because of the employment of non-union men by one of the contractors.

The painters' strike at McKeesport, Pa., for a uniform price of $3 per day has ended, as the employers agreed to pay the wages asked. The employers wanted the men to accept a reduction to $2.50 per day, which was refused.

Two hundred and fifty carpenters of Marion went out on strike May 11 because of a failure of the contractors to meet a demand for higher wages and fewer hours. The journeymen demand a day of nine hours at 25 cents an hour. The prevailing wages for some time have been from 17½ cents to 22½ cents per hour for ten hours.

The strike of carpenters at Newport, R. I., is still in force, although the contractors claim that they have all the men they want.

A Builders' Exchange has been established at Portsmouth, Va., with Samuel W. Hodges president and W. N. Stroud secretary.

The Newark, N. J., carpenters object to the contractors' plan to pay by the hour hereafter. The stone cutters are still out for an increase of wages.

The carpenters of Norwalk, Conn., made a demand for nine hours without any reduction of wages. Of 28 boss carpenters in the town 18 have acceded to the demands of the men. The other ten have not, and 100 men are still on strike.

The total receipts for the year of the International Association of Bricklayers, says the *News* of Sacramento, Cal., were $115,641; expenditures, $88,014, leaving a balance of $27,627. Charters were granted to 62 new unions. Total number of unions, 305. The number of men initiated during the year was 2997; number rejected, 113; expelled, 643; reinstated, 251. Total membership, 42,268. Amount of money paid out for strikes, $26,288.10; to maintain local strikes, $16,239.52. Amount of money in treasury of subordinate unions, $59,211.82.

The building trades of Scranton, Pa., are considerably disturbed. The carpenters are on a strike for shorter hours and the plasterers and bricklayers are both in a dissatisfied condition.

EMPLOYERS AND WORKMEN.

WILLIAM H. SAYWARD.

IN CONSIDERING the present relationship between employers and workmen in the building trades of the country, it is necessary that some of the larger centers, especially New York City and Chicago, should not be taken into account, owing to the peculiar conditions existing in these cities. In New York City there is probably the most complete organization of workmen in the country, if not in the world, with comparatively little organization on the part of the employers. This results in conditions that are purely arbitrary, and which while being an aspect of the relationship between the two, it would be unfair to consider as indicative of the general conditions existing throughout the country. In New York it is a combination of workmen against an individual employer, and so thorough is the organization of the former that the latter is almost inevitably compelled to yield, in order to be able to continue his business, for in the event of the employer refusing to concede the demands of any particular class of workmen those of every other class are ordered to strike until the boycott has become so complete that the employer must yield in order to carry on business. Cases have been cited in these columns where it has seemed, from a point of justice, as if the workmen had taken a most unfair advantage of their power. In Chicago another phase of the relationship appears. The enormous amount of work in connection with the World's Fair, and the added impulse, in consequence, given to the usually large amount of building carried on in that city, has literally flooded the labor market with workmen, many of whom are anxious to obtain work at any wages. The organizations among the employers and among the workmen are more nearly balanced in Chicago than they are in New York, but under the existing circumstances it is almost impossible to maintain perfect acquiescence with the rules of the organization of either and the result is a constant condition of minor upheavals, which in turn cannot be considered as indicating the general relationship between employers and workmen throughout the country. Cincinnati is passing through a season of experiment. The employers in the building trades have formed a central organization composed of all specific trade organizations and called the Congress of Builders, with the general object in view of preventing protracted strikes, lockouts or labor disturbances on the homœopathic plan. The most equitable methods are employed by the congress, the executive power for which is vested in a committee chosen from the different trades, for the settlement of questions at issue, arbitration as prescribed by the National Association of Builders being one of the leading features. In case it is impossible to effect a settlement of differences between the workmen and their employers in any one particular branch of trade, the Congress of Builders has the power to stop all work in every branch of trade until the difference is adjusted. This organization has been in existence for several months, and it has not been found necessary to use the general lockout yet, all questions thus far having been settled without the need of testing the efficiency of the plan. Pittsburgh builders are still in an anomalous condition, the strike of bricklayers which was inaugurated on May 1, 1891, being considered by the workmen as still in force, although the employers claim to have all the men they need to carry on the work in hand. Outside of the large cities the workmen seem to be, in a large majority of cases, satisfied with the conditions under which they are working. The relations between employers and workmen are unmistakably showing signs of improvement. The bitterness which was formerly an almost invariable feature of difference between the two is gradually decreasing, as the adoption of arbitration becomes more general, and although specific cases seem occasionally to point to the fact that there is no change for the better, there is no question but that the building trades generally are in a much more satisfactory condition than they were five years ago. Employers are beginning to look at the demands of the workmen in a broader light, and are less inclined than in the past to judge the position of the workmen by the utterances of the more hot-headed of the unionists. The workmen are also learning that employers as a class are not opposed to their desires at all times or from a spirit of unguided opposition, and that under the combined consideration by both sides, clouds vanish and stumbling blocks disappear. The better organization on the part of the employers, which is one of the products of recent years, has provided a means for establishing harmonious relations with the workmen, because it has enabled subjects of mutual importance to be considered mutually instead of entirely from one side or the other as was the case heretofore. The example of one trade effecting satisfactory adjustment and arrangement with the employers in a given community affects all the other trades in that community and benefits the whole by showing conclusively the advantages of arbitrating a difference, each side having equal voice, over the compulsory settlement of a difference, to end a strike or lockout. Reports from all over the country show that such differences as have caused strikes are of a purely local or individual character, and in a large majority of cases have occurred in places where the possibilities of proper organization are but imperfectly understood.

POLE-PLATE ROOFING.

AMONG THE MANY varieties of timber roofs, from the complicated hammer beam, or the massive truss, to the unpretentious leanto, none are more entitled to a little consideration than pole-plate roofing, says one of our English contemporaries, especially in so far as simplicity of construction is concerned. Being usually constructed of 6½ x 2½ inch battens, and not required to be put together before being raised, it is light and easily handled, and, if there are plenty of struts and collars to the rafters and joists. In setting up a pole-plate roof, the first thing done is to lay the joists; then the pole plates are notched in as shown in Fig. 3, running in straight lines parallel to one another from end to end of the building. The rafters, struts and collars may all be previously prepared, either by hand or steam power, if the latter can be conveniently applied. After the joists and pole plates are fixed in position the former may be covered loosely with sarking, and a scaffold set up convenient to joists to be very short. This is, however, considered by some to be the strongest and most economical method. The hip rafters in roofs of this class are generally of the same thickness as the ridge plates. The necessary breadth may be determined in various ways by a little geometrical investigation. One way is shown in Fig 7. A cross section of the ridge is set off in elevatson at S, and from any point in it P is drawn at the pitch of the roof. From S and P the plan of a corner is set off, as at M O Y; then an

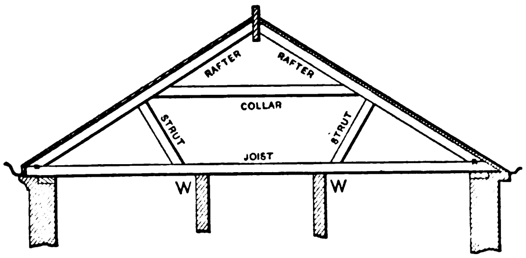


Fig. 1.—Elevation of Pole-Plate Roof, showing Members usually employed.

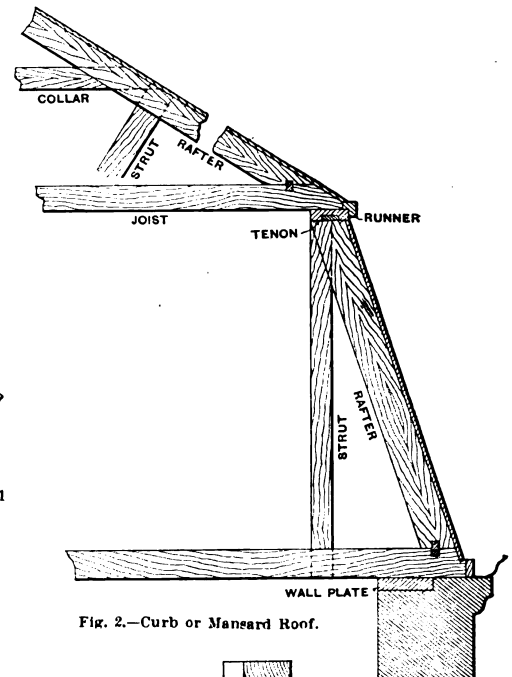


Fig. 2.—Curb or Mansard Roof.

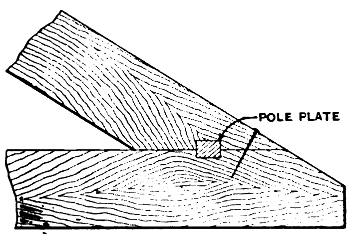


Fig. 3.—Enlargement of Fig. 1 at the Heel.

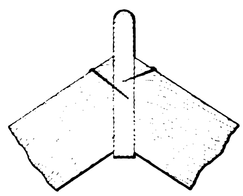


Fig. 4.—Enlargement of Fig. 1 at the Crown.

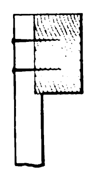


Fig. 5.—Showing the Checking and Fixing of Struts and Collars to Rafters and Joists.

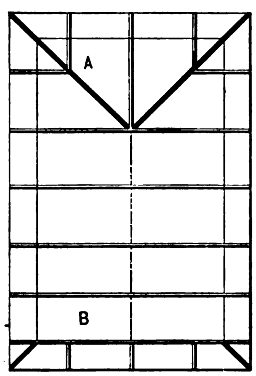


Fig. 6.—One Method of arranging Return Joist.

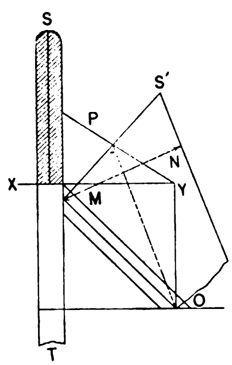


Fig. 7.—Method of determining Breadth of Hip Rafters.

Pole-Plate Roofing.

intermediate supports, it will carry a weight of covering, and resist wind pressure or other stress likely to be put upon it. It needs no bolts or straps to hold its members together, and does not even require to be notched at the crown.

It is largely employed in tenements and other buildings in which inside supports in the shape of brick or timber partitions are abundant. Fig. 1 is an elevation of a pole-plate roof, showing all the members generally used, W W being the bearing partitions; Fig. 2 is a curb or mansard roof on the same principles; Fig. 3 an enlargement of Fig. 1 at the heel; Fig. 4 an enlargement of the same at the crown, and Fig. 5 an enlargement showing the checking and fixing of the the ridge. The rafters and ridge are now placed, and the sarking nailed on, after which the collars and struts are put on, when the whole is complete, unless there are hips or valleys to contend with, which, of course, will cause extra cutting and fitting.

When a hipped end occurs in a pole-plate roof the joist must necessarily be carried round the end to receive the pole plate. There are two ways of arranging the return joists. One of these, in which they are spliced to diagonal joists, is shown in Fig. 6, at A. The other, in which they are simply trimmed to a main joist, is show in the same figure, at B. In the latter case the main joists are continued up close to the wall, causing the return elevation parallel to central line of hip, as at S', gives the required breadth shown between the arrow heads M N.

Prof. Warren P. Laird of the University of Pennsylvania School of Architecture has made public a proposition to found in Philadelphia a traveling scholarship in architecture, the object of which is to give a draftsman every spring the advantages of a year's travel and study in European countries. We understand that the amount of subscriptions required is $20,000 to yield an annual income of $1000. It is stated that any draftsman in Pennsylvania may compete in the examinations, which, it is expected, will be held next spring.

THE BUILDERS' GUIDE.*

By I. P. HICKS.

FRAMING should include raising and sheeting; and siding should be estimated sufficiently high to cover the cost of building scaffolds. It is worth one-third more to sheet a building inside than outside, and twice as much to sheet it diagonally. The siding of a house is subject to large variations, as a man can often side three or four times faster on some buildings than he can on others. The amount an average workman will put on in a day depends upon the number, size and shape of the openings around which he has to side, the hight of the building and the amount of scaffolding he has to do. Difficult places to side can be readily seen on a building or even from a plan, and the siding should be estimated sufficiently high to cover the cost. I have known men to put on siding for 60 cents per square, but not one man in ten can make anything like respectable wages at this price, even on the plainest kind of work and under the most favorable circumstances. Some men may be able to put on four squares a day and perhaps a little more than that, but the large majority will fall short of four, and some will not put on more than two squares a day. The average is therefore not more than three squares per day, which would amount to $1.80 per day, with chances of not doing so well. In estimating siding or sheeting by the square no deduction is made for openings. Roofs may be estimated as follows:

For framing, per square	$0.60 to $1.20
For sheeting, per square	.45 to .70
For shingling, per square	1.25 to 1.75
Total	$2.30 to $3.65

Thus to frame, sheet and shingle a roof it is worth from $2.30 to $3.65 per square. Each hip or valley in a roof is worth from 75 cents to $1.50 for sheeting and shingling. Hips and valleys cannot be shingled or sheeted with as much speed as plain roofs, and are seldom estimated high enough. The shingling of belt courses and gables with dimension shingles is worth from $2 to $3.50 per square, according to the windows and difficult places with which the workman has to contend.

CORNICES.

A cornice is composed of several members, the most common kind containing five which are known respectively as planceer, fascia, frieze, crown and bed moldings. It may be estimated at 15 cents per lineal foot. If a cornice has more than five members add 2 to 3 cents per lineal foot for each member. If there are less than five members a similar deduction may be made. If a cornice has brackets it will be necessary to add a sufficient amount to cover the cost of putting them up.

GUTTERS.

These are variously formed on roofs and in cornices and are worth from 4 to 10 cents per lineal foot. A standing gutter on a roof is worth from 4 to 6 cents per foot. A flush gutter or one sunk in a roof or cornice is worth from 6 to 10 cents per foot. Fig. 46 shows a cornice with a standing gutter on the roof. The gutter is usually placed on the second or third course of shingles, and consists of one piece standing square with the roof, as shown by the dotted lines, and is usually supported by small brackets on the under side with end pieces as shown. G is the gutter, C the crown molding, F*a* the fascia, P the planceer, B the bed molding, F the frieze and S the sheeting. Fig. 47 shows a gutter formed in the cornice with four pieces—namely, a bottom, two sides and a fillet, all as shown by the dotted lines. G is the gutter, FL the fillet, C the crown mold, F*a* the fascia, P the planceer, B the bed molding, F the frieze and S the sheeting. To make this kind of a gutter is worth 10 cents per lineal foot.

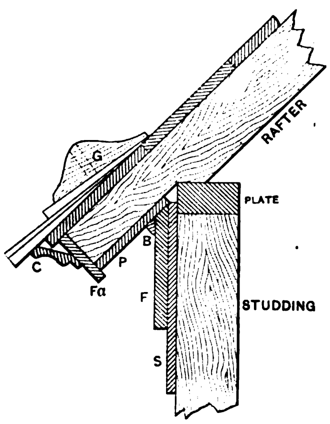


Fig. 46.—Cornice with Standing Gutter.

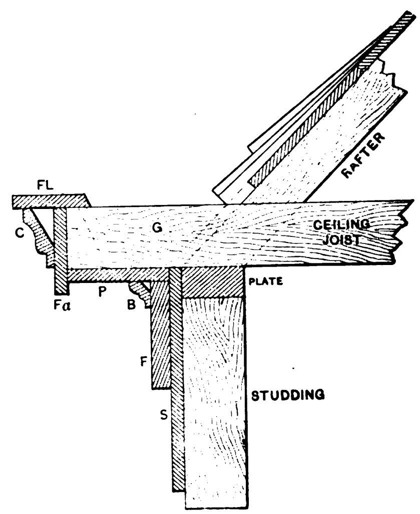


Fig. 47.—Gutter Formed in the Cornice.

The Builders' Guide.—Illustrating Two Forms of Gutter.

PORCHES.

Sometimes porches may be estimated by the lineal foot, at from $2 to $4 per foot. This, however, is not the best method, its principal advantage being its

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simplicity and ease. The most common kind of porches, with which almost every one becomes familiar, may be estimated as above with generally satisfactory results. The best and most accurate way, however, is to estimate the framework, flooring, ceiling and roofing by the square; the cornice, gutters and latticework by the foot, and the steps, columns, brackets and ornamental work by the piece. After summing up the various parts the result may be taken as the most reliable estimate.

ESTIMATING WINDOW FRAMES.

The various parts of the work necessary to complete a window frame in a building may be put down as follows:

Making frame	$1.25
Hanging blinds	.25
Setting frame in building	.25
Fitting sash	.20
Hanging sash with weights	.20
Casing window	.30
Band molding frame	.12
Cutting in stops	.09
Total	$2.66

Thus we see that plain window frames complete in a building, may be estimated at $2.66 each. It should be remembered that a fine hardwood finish is often worth twice or three times as much as a common soft wood finish, and that large transom frames, twin windows, &c., finished in hardwood may be worth as high as $20.

DOOR FRAMES.

The different parts of work required to complete a door frame may be estimated as follows:

Making frame	$0.90
Setting frame in building	.25
Casing frame	.44
Band molding frame	.24
Fitting and hanging door	.86
Putting on mortice lock	.25
Cutting in thresholds	.15
Cutting in stops	.12
Total	$2.71

Thus it is worth $2.71 per frame to make and finish common door frames complete in a building. By looking over the above estimate it will be seen that there is a great deal of work about a door frame besides fitting and hanging the door and putting on the lock—hence many are apt to estimate too low. To fit, hang and put a lock on a common door, using one pair of loose pin butts and a common mortice lock, is worth 60 cents. The average day's work is about six doors per day. If the doors are large and require three butts each, it is worth 75 cents per door. Front doors having complicated locks with night keys, &c., are worth $1.50 to $2 per door.

SLIDING DOORS.

The different parts of work required to put up sliding doors are worth as follows:

Lining partitions and putting up track	$7.00
Setting jambs	1.00
Casing door frame	1.00
Band molding frame	.30
Hanging doors and putting on lock	3.50
Cutting in stops	.20
Total	$13.00

Thus sliding doors are worth $13 per set, and may vary according to size and style of finish up to $30. A single sliding door is worth very nearly as much as double doors. The difference in the labor of putting them up in most cases would not be over $2.

FOLDING DOORS.

The cost of labor for putting in folding doors complete is from $3.75 to $5.50 per set. To fit, hang and put on lock and flush bolts is worth from $1.75 to $3.50 per set.

WAINSCOTING.

Plain wainscoting is worth about 90 cents per square. The cap should be estimated by the foot extra, according to style of finish. Paneled wainscoating is often worth twice or three times as much as plain work.

SINKS.

To finish a kitchen sink in the plainest style is worth $2, and some styles finished in hardwood are worth as much as $10.

BATHROOMS.

A bathroom having in connection a wash bowl and a water closet, finished in the plainest style, will take a good workman two days, and is worth $7. An inexperienced hand in this kind of work will require about three days to complete the job. Some styles of hardwood finish will require from four to six days' work and are worth from $14 to $21.

PANTRIES.

The shelving and finishing of a pantry in the plainest style is worth from $3 to $5. Pantries with flour chests, spice drawers and numerous other things, shelves inclosed with doors, all elegantly fitted up, are worth from $25 to $40.

STAIRS.

The cheapest kind of cellar stairs are worth from $3 to $5, and the plainest kind of box stairs from $8 to $12 per flight. Plain open stairs with hand rail, newel post and balusters are worth from $20 to $35. Stairs and staircases finished in hardwood may vary from $50 to $150. It is frequently worth from $10 to $20 to set the newel posts and put up the rail of some of the most elaborate designs.

RECAPITULATION.

In looking over the items which have been variously combined and bringing them to a minimum, it will be seen on what the carpenter has to figure and the easiest way of estimating it.

Framing and laying floors, per square	$1.30 @	$2.65
Framing, sheeting and siding, per square	2.25 @	3.25
Framing and setting partitions, per square	.60 @	.90
Framing, sheeting and shingling roofs, per square	2.30 @	3.65
Hips and valleys, each	.75 @	1.50
Shingling belt courses and gables, per square	2.00 @	3.50
Cornice, per lineal foot	.10 @	.15
Corner casings, per lineal foot	.04 @	.06
Gutters, per lineal foot	.06 @	.10
Porches, per lineal foot	2.00 @	4.00
Window frames, complete, in building, each	2.66 @	20.00
Door frames, complete, in building, each	2.70 @	20.00
Sliding doors, complete, in building	13.00 @	30.00
Folding doors, complete, in building	3.75 @	5.50
Wainscoting, per square	.90 @	2.70
Wainscoting cap, per lineal foot	.02 @	.05
Sinks, each	2.00 @	10.00
Bathrooms, finished complete	7.00 @	21.00
Putting down base in houses, per lineal foot	.03 @	.05
Finishing pantries	3.00 @	40.00
Cellar stairs, very common	3.00 @	5.00
Plain stairs	20.00 @	35.00
Front stairs	30.00 @	150.00

A LONG ISLAND DWELLING.

THE HOUSE which we illustrate on the following pages has recently been erected for George Wigle at East Williston, L. I., from plans prepared by Schweitzer & Diemer, architects, of No. 84 West Broadway, New York City. The house is of frame construction, having a cellar under the entire area, with foundation walls of brick. The framing is of spruce timber, sheeted and papered. The siding from sill to gables, except the tower, is of narrow-lap white pine. The tower and gables are covered with cedar shingles, while the roof is covered with slate. From an inspection of the floor plans it will be seen that in the first story there are three large rooms and a hall from which all are easily accessible. The parlor and dining room are connected by means of folding doors, while the kitchen, which is in the rear, opens directly into the dining room and also into the hall. The arrangement is such that the front door may be reached from the kitchen without passing through any other rooms on the first floor. The kitchen is fitted with portable range provided with a hood for carrying off odors arising from cooking. The boiler in the kitchen furnishes hot water for the sink and washtubs, as well as to the bathroom fixtures. Upon the second floor are four sleeping rooms and a bathroom. One of the chambers is of comparatively small size and may be used for a sewing room if so desired. The attic is finished in such a way as to provide two good-sized rooms, as well as large storage and drying space. It will also be observed that each room is provided with ample closets. All trim, base, architraves and jambs are of white pine, finished in the natural wood. The rail, newels and balusters of the main stairs are of white oak while the stairs themselves are of good white pine with platform landing. The kitchen and bathroom are wainscoted with North Carolina pine. The house is heated by means of a hot-air furnace. The bathroom and hall are fitted with stained and crackled glass of neat design.

Fire-Clay Roofing Tile.

At the recent meeting of the Ohio Brick and Tile Makers' Association, held at Columbus, John R. Elder of Indianapolis presented a paper on fire-clay roofing tile which contains much that is of interest to our readers. We quote from his address as follows:

Although the subject of roofing tile may be new to many of you, still it is not a new industry. History places tile for roofing next to brick and pottery in point of age, and the use of these three articles, manufactured of clay, can be traced back many thousand years. It is not my purpose to go back to the heathen ages to tell about tile and its use; but it may be proper to say here that tile roofs are now on old churches, in good condition that have been there for over a thousand years; and it is not uncommon to see, and some of you may know from family traditions, roofs that have been in use and are now in good condition that have been there for five, six and seven hundred years. The only benefit to be gained from these facts is to show the lasting qualities of burnt clay—that it will exist in good condition as a building material when iron, wood and stone have all gone back to their original elements.

In some countries in the Old World tile is almost the only roofing material used. They know and have tested its value, and have faith in it. This is not the case in this country. Our people have not been building houses, as a rule, for their great grandchildren to occupy; our structures are more temporary, cheaper and less durable materials have been used, and the consequence is our roofs and out buildings are short lived, and there are very few buildings standing in any of our cities to-day that are 100 years old. Fire, the elements, fashion and continual changes cause buildings to be torn down before they are mellowed by age, and our cities are built and rebuilt over and over again, at an enormous expenditure of time and money.

I am glad to note that a change is going on in this country in this respect. More attention is paid now to the character of the materials used in building than ever before, and the consequence is the products of clay, in every department of construction, are taking the front place for beautiful and durable buildings.

ROOFING TILE MANUFACTURERS.

After the census reports are published we will know more about the number of factories engaged in the manufacture of roofing tile in the United States, but so far as I know, there are not more than seven, and I am not certain there are that many. There are three in Baltimore, one in Akron, Ohio, and one at Montezuma, Ind. Unfortunately, however, the factory of the last named burned down in December last. The company are now preparing to build larger works at Indianapolis, as being a

A Long Island Dwelling.—Perspective View.—Schweitzer & Diemer, Architects, New York City.

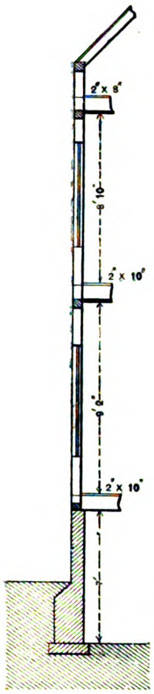
more accessible point for the business. I have heard there is a new factory started in Eastern Ohio, and that there is a factory in New Jersey, but of the last two I have no positive information. I can now announce for a certainty that the Trenton Terra Cotta Company, at Trenton, N. J., will be manufacturing fire-clay roofing tile on a large scale within 60 days. It is a wonder to many that there are so few roofing tile factories in this country; and this wonder is increased when it is known that no factory is able to supply the demand within a reasonable time; and no factory can keep a stock on hand to fill orders on demand. It takes weeks and months after the order is received before the tile are delivered; and buildings are often exposed to the weather waiting for them.

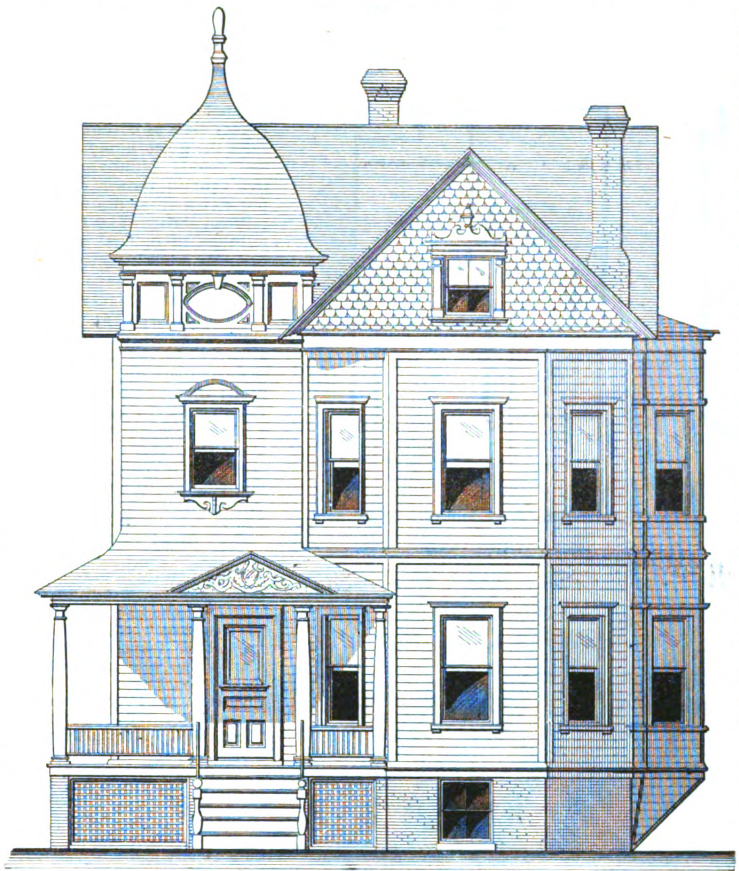
It is now four years since my attention was directed to the manufacture of roofing tile. In that time I have read nearly everything that has been printed on the subject, given the question a great deal of thought and attention, and in the last two years have been in a position to know something of the demand for tile. The more I study the subject the larger the business grows; and the more I am impressed with what an important industry is ready for the clay workers of the country. If you will think that about one twentieth of the entire cost of the buildings of the United States is for the roofs, and that at least one in 50 of the roofs built each year would be tile if they could be had, and weight of tile and cost were brought down to where it can be, you can see where this will run to in dollars in the whole country. In Chicago alone the buildings in 1891 amounted to over $54,000,000. This is only one city in one State.

LITERATURE ON THE SUBJECT.

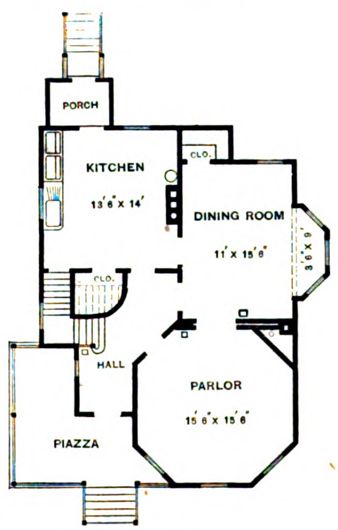
By far the most instructive and interest reading I have found on the subject of tile roofs are a series of letters written in France by Louis H. Gibson, an architect of Indianapolis, and published in the *Clay Worker* during the last year. Mr. Gibson is practical; he understands his business, and his letters describe the different kinds of tile used, where and how long they have been used, and their value for covering houses. I could not interest you more than by reading some of Mr. Gibson's letters. I will not take your time to do that, but will read two short extracts, in order that you may have a better idea of the true value of clay roofing tile.

He says: "The arguments in favor of a tile roof are too old and too numerous to need anything more than mere mention. If we stop to think about it we know that the roofing material in general use is far from satisfactory. Slate, at best, is a temporary roofing; it is readily affected by heat, so much so, indeed, that a little heat will expose all the wood work of an ordinary roof to the action of fire. Shingles are as inflammable as it is possible to arrange the same amount of wood. Slate and shingles, as we know, are the general roofing materials. Tiles, being a clay product, afford protection to all wood work under them in a perfectly satisfactory way. The heat does not affect the tiles in the least. Frost affects them much less than slate. The covering of a roof with tile practically means not only the protection from the elements, but, as well, protection from conflagrations or any unusual or dangerous degree of heat. Heat, as we know, cannot affect burned clay products. This quality, together with its ability to resist other elements of nature, renders it the ideal building material. Its qualities of this character are quite as apparent for roof covering as for other use. For some reason, not easily understood, tile roofs have not been generally manufactured in America. While the field is open, and while there is a general demand for the material, it is not satisfied. There is a difficulty in securing a satisfactory tile roof at a moderate price."

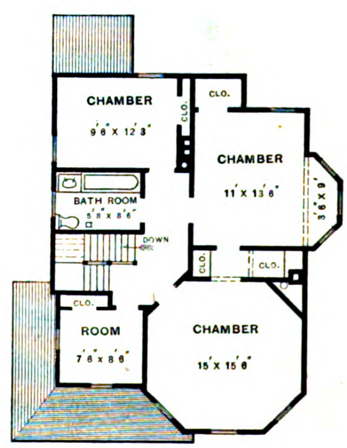




Section and Front Elevation.—Scale, 1/8 Inch to the Foot.



First Floor.



Second Floor.

Scale, 1-16 Inch to the Foot.

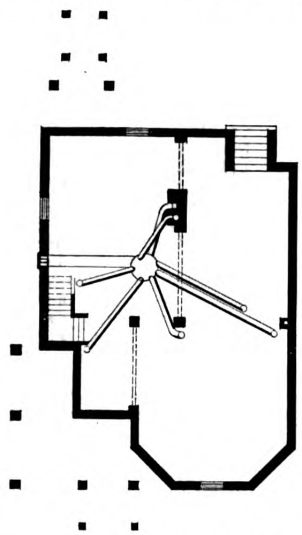
A Long Island Dwelling.

THE TILE ROOF.

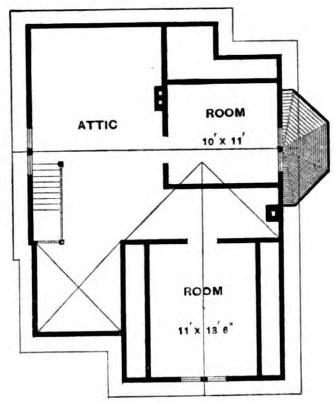
Again he says: "A tile roof is one covering which will stand for years without expense or attention. No one has a right to dispute this. There are not two sides to this question. A tile roof is permanent; other roofs are temporary. History sustains any statement which may be made as to the permanent quality of such a covering. History confirms the temporary character of other roof coverings. A covering which is superior to tile remains to be devised. When we can look back and see a roof which has been in use for five or six hundred years, why concern ourselves? Why look for something better? . . . So much for tile covering. . . . The natural color of a tile roof is red. This color is imitated in our metal and wood roofs. Red always makes a good line against the sky, and makes an agreeable complement against the green of a landscape. It is a natural, proper combination, never offensive—always harmonious. Here we have four or five hundred years of history, proper decorative qualities, good color, harmony with nature and everything to commend it."

Mr. Gibson has illustrated many of the forms of tile used in Europe. There are many patterns, but as a rule they are heavy and expensive, and are generally laid in cement. The same general style has been followed in this country. This is one reason tile has not been adopted more extensively here. Another is that shingles, slate, tin and iron roofs, although temporary, and lasting but a few years at most, are cheaper, and can be obtained without delay.

As we grow in wealth, we want something better, more permanent and enduring, and there is nothing that will meet these wants so well as tile. Of course tile are not intended for the cheap and temporary class of buildings, but if you consider the great number of national, State and county buildings erected each year that contain records of value, and where protection from fire is so important; the railroad stations and freight depots where millions of dollars' worth of goods and property are constantly stored; the schools and colleges of the country; the churches; the State and county benevolent institutions and hospitals; the hotels, where so many disasters in late years have called attention to better protection from fire; the manufacturing establishments of every kind; the large business blocks so full of valuable goods in cities, and the large number of elegant private residences built every year, you will see that a market is open for tile roofs, as soon as they can certainly be had at a price within reach.



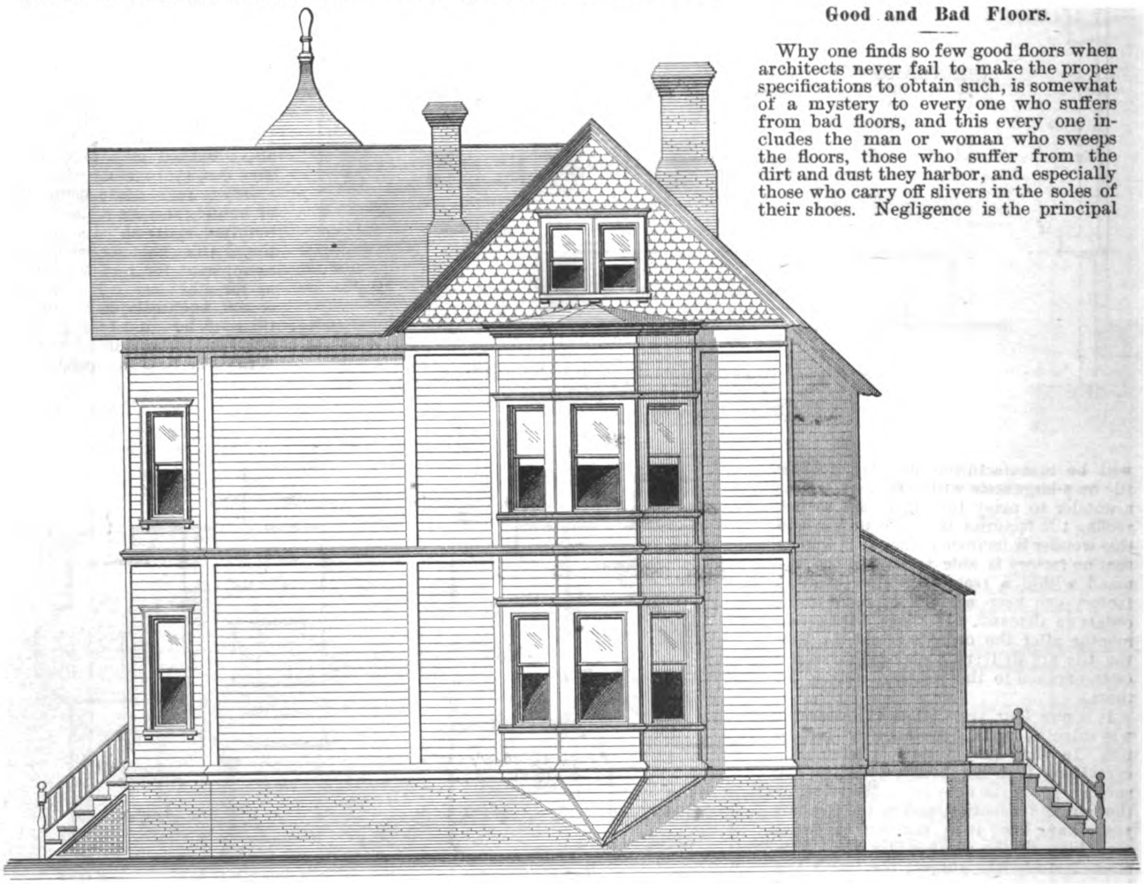
Foundation.—Scale, 1-16 Inch to the Foot.



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

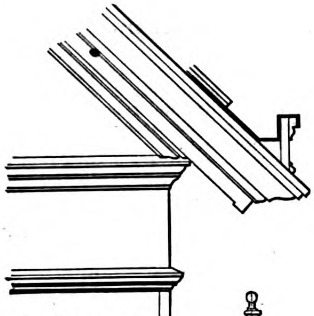
Good and Bad Floors.

Why one finds so few good floors when architects never fail to make the proper specifications to obtain such, is somewhat of a mystery to every one who suffers from bad floors, and this every one includes the man or woman who sweeps the floors, those who suffer from the dirt and dust they harbor, and especially those who carry off slivers in the soles of their shoes. Negligence is the principal reason for this state of facts, says a recent issue of *The Northwestern Builder and Decorator*, and both architect and carpenter are open to the charge. As perhaps three-fourths of all floors laid are of yellow pine, a material that gives better satisfaction than even the higher-priced hard woods, and as every architect and every carpenter knows how to obtain an almost perfect floor with this material,

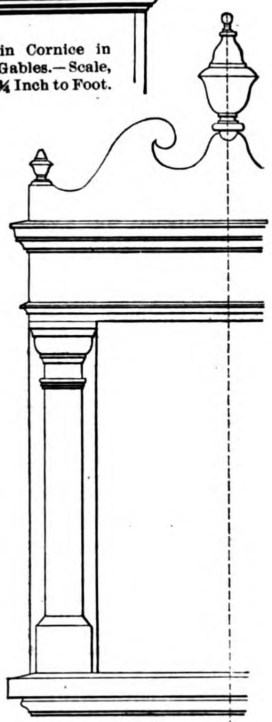


A Long Island Dwelling.—Side (Right) Elevation.—Scale, 1/8 Inch to the Foot.

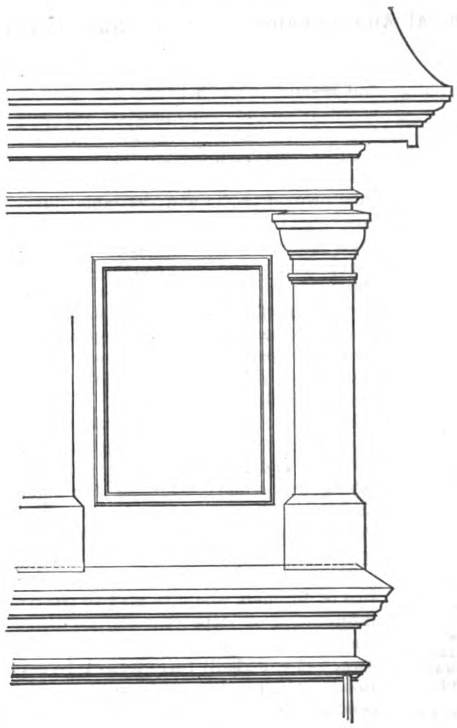
where does the negligence manifest itself? In the selection or acceptance of the material. Every board should have a straight or "comb" grain, and if the log is properly sawed, every board will have they are usually nailed through instead of being nailed through the tongue. Some of the nails are almost certain to work up, and a hole in the carpet is the result. Such things may seem to be small matters, but a multitude of them creep into a designs for the New Jersey State Building at Chicago, that submitted by Architect Charles Allen Gifford of Newark. His plan is for a reproduction of the famous Washington headquarters at Morristown. This is a mansion in the



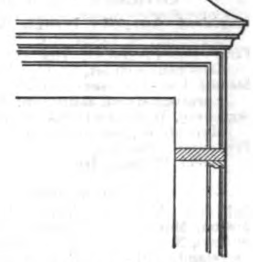
Main Cornice in Gables.—Scale, ¾ Inch to Foot.



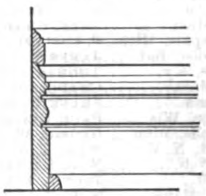
Window in Gable.—Scale, ¾ Inch to the Foot.



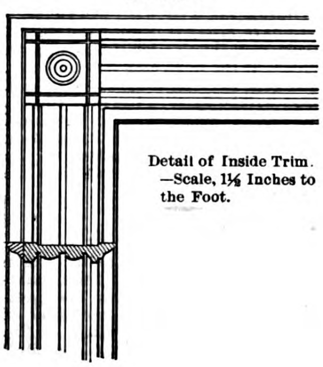
Detail of Trim of Tower.—Scale, ¾ Inch to the Foot.



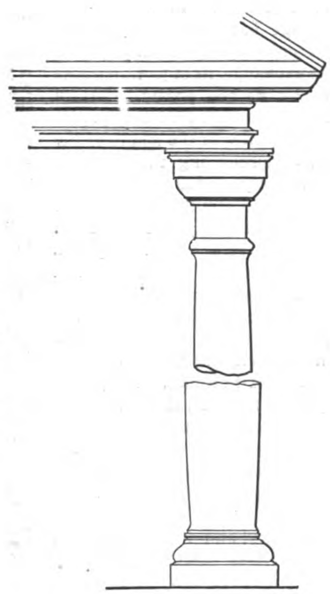
Detail of Tower Window.—Scale, ¾ Inch to the Foot.



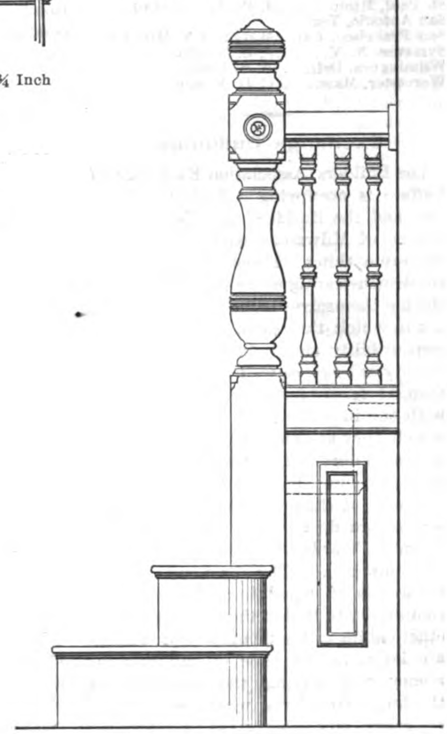
Detail of Base Board.—Scale, 1½ Inches to the Foot.



Detail of Inside Trim.—Scale, 1½ Inches to the Foot.



Detail of Piazza Trim.—Scale, ¾ Inch to the Foot.



Detail of Main Stairs.—Scale, ¾ Inch to the Foot.

Miscellaneous Details of a Long Island Dwelling.

such a grain, just as quarter sawing produces a grain of peculiar kind and beauty, but very few mills care to take the trouble to saw in this manner, and they will not as long as they can sell any kind of stuff for high-grade flooring.

Floors to be carpeted are usually made of white pine, and to save a little labor building, and its occupant can never know the comforts of a well-built house.

THE New Jersey commissioners of the World's Fair, who met at Trenton recently, chose from a large number of colonial style of architecture, with roomy apartments, and surrounded by a spacious veranda. The commissioners may cause a few alterations in the plan of the structure, but Secretary Lennox says that money will not be spared for its beautification. The erection of the building will begin in June.

The Builders' Exchange

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Worcester, Mass......C. D. MORSE.

Exchange Buildings.

The Builders' Association Exchange of Buffalo is occupying a building of its own and the Builders' and Traders' Exchange of Milwaukee will soon be doing the same thing. These two exchanges are demonstrating every day the value of placing themselves before the communities in which they exist in a position of responsibility and influence. The community at large, as well as the members themselves, are more favorably impressed with the importance of the industry in which they are engaged, and, with the increased dignity resulting from its members assuming the position which the character of their work commands, they are accorded the deference which is given to boards of trade and chambers of commerce. The business of the builder is of equal importance in any community to that of the members of any other callings; his financial transactions are large, in the sense of handling the money and buying the material for the huge structures which are a part of every city; he gives employment to many more workmen than the majority of employers, and yet heretofore his position has been one of secondary importance and his influence in the community little felt. The establishment of builders' exchanges has been of immense benefit when such exchanges have been conducted with vigor and their possibilities and benefits understood. The ownership of a building carries with it more weight than is generally conceded, and besides, it also increases the value of membership and consequently increases the interest in the organization. The interest and membership in such exchanges as have secured buildings of their own, or proper and desirable quarters equal to those occupied by boards of trade, has increased from the date of such acquisition. The membership in the Builders' Association Exchange of Buffalo has greatly increased since its plan to erect a home for itself was adopted, and the same experience has been had in Milwaukee and other cities that have undertaken a similar enterprise.

Baltimore, Louisville and other cities have plans to secure buildings of their own well under way, and other cities are taking preliminary steps in the same direction. The ownership of a building by every builders' exchange in the country cannot be too strongly advocated.

The secretary of the National Association of Builders would be glad to receive information of steps that any exchange may be taking to secure a home of its own, and will gladly furnish any information relative to plans that have been successfully used by other exchanges for the same purpose.

A Feature for Exchanges.

A feature of exchange work of which little advantage has been taken is the facilities presented by the local press for bringing the exchange, its objects, purpose and nature before the public. Certain exchanges have interested the n wspapers of their various cities in the affairs of the exchange, as representing the building industry of the city, and as a place where news that would be of interest to a large constituency could always be obtained. Prominence in the press would help to a very great extent to give business men a knowledge of the existence and character of an exchange, and would tend to assist at making the exchange a place for the transaction of such business as comes within the scope of building. The public would very soon find out, if it was made public, that the various builders in the different branches of the business could be found together at one place and one time—that is, during 'change hours. The building industry is too important to be ignored in any city, and it only has been in the past because there has been no central place where the daily press could find authentic news at all times.

Every exchange should have a Committee on Press, or publicity, for the purpose of seeing that the representatives of the daily press were afforded every opportunity for obtaining news, and to whom matter that would be of local and general interest could be referred in order that it might be made public. The Master Builders' Exchange of Philadelphia, for instance, is the recognized headquarters for all information pertaining to the building trades in that city, and reporters are always sure of a welcome and of obtaining correct information.

The National Secretary desires that in this connection the secretaries of the filial bodies should send him all clippings that relate to the affairs of the local exchanges or that would be of general interest to the building fraternity.

Notice to Secretaries.

Secretaries of filial bodies are requested to send copies of the report of the last convention of the National Association of Builders to the architects of their various cities, and if sufficient number of copies are not on hand for the purpose they will be supplied upon application to the National Secretary.

The Uniform Contract.

The Committee on Uniform Contract requests that all filial exchanges secure and keep on hand a supply of uniform contract blanks, and urge their use upon the members. Specimen copies should also be sent to each architect in the various cities with the request that the form be used in preference to any other. Supplies of the form can be had of the Inland Publishing Company, Tribune Building, Chicago, Ill., at $4.55 for 500 and $8 per 1000.

Suggestions for the Uniform Contract.

A meeting of the Joint Committee on Uniform Contract of the American Institute of Architects and the National Association of Builders will be held some time in the fall, the exact date of which is yet to be fixed. The committee of the National Association requests that any suggestions for amendment to the form be forwarded to the National Secretary, to be transmitted by him to the committee.

The Mid-Year Meeting.

All filial bodies are requested to bring under consideration such subjects as they desire to have brought before the Board of Directors of the National Association of Builders at the next mid-year meeting, which will be held in Indianapolis, on a date that will be fixed in the near future. All subjects of importance to the local exchanges and to the National Association should be prepared and submitted to the secretary, to be by him presented to the board for action.

Foreign Interest.

The importance attached to the action of the National Association by the building fraternity of Australia is best indicated by the very generous treatment of our last convention by the editor of the *Building and Engineering Journal* of Melbourne. The review of the convention by the National Secretary, the president's address and the summary of the secretary's report, as presented in the columns of *Carpentry and Building*, are reprinted in full. An editorial commenting upon the convention, and particularly upon the withdrawal of the Pittsburgh Exchange, in a correct and comprehensive manner, is a most flattering indication that our Australian brother builders consider the National Association, its action and its example of great importance.

THE HOUSE THAT JONATHAN BUILDS.

THE FOLLOWING EXTRACTS are taken from a paper on the above subject, read by Horace Townsend before a recent meeting of the British Architectural Associations:

I am going to enter into no elaborate defence of American architects, as some of you may have imagined, and, so imagining, have perchance made ready and whetted the keen-edged knives of reprobation and satire, nor am I going to bombard with the heavy artillery of adverse criticism architecture as she is spoke in the United States.

AMERICAN ARCHITECTURE.

The architectural history of North America will not require an extensive array of book shelves to contain it. When the early colonists, the stolid Dutch burghers of New Amsterdam (for New York, as you will doubtless remember, was originally settled by emigrants from Holland), the sedate Puritans of the New England States (who have left their descendants of to-day, among other legacies, that Puritan conscience and hatred of frivolity which has impressed itself in a measure upon New England architecture), or the gentlemen adventurers of Virginia and Maryland, had advanced beyond the initial stage of providing for themselves mere shelters from the inclemency of the climate, they looked to the mother country, naturally enough, for their architectural style; but for materials to those forests which stretched around them for so many thousand square miles, and wood remains to-day, as it was in the seventeenth and eighteenth centuries, the main reliance of the American architect and builder. Of the early works to which I refer but few examples remain to us; but those few examples have been so well taken advantage of by the native architect, have so impressed him as being the representative of the only mitigated antiquity to which his country can lay claim, that they have modeled to no inappreciable extent American architecture of to-day. You would be surprised if you could see what good eighteenth-century work there is to be found in America. The city halls of New York and Philadelphia, and certain churches in Maryland and Pennsylvania, are models which could afford valuable hints to the most devoted and learned student of Wren and the Queen Anne architects of our own country. Nor is the old domestic work which is to be found everywhere throughout the more early settled States, such as the old manor houses along the valley of the James or the Hudson rivers, and a few of the older city houses of Boston, New York and Philadelphia, to be despised. A quaintly free classicism, an ingenious use of wood where stone or brick in this country would naturally have been used, a refinement and grace of detail, carving and molding, mark the work of this period, which, for want of a better name, the American architects have dubbed Colonial, a term which, at least, is more comprehensive and founded more on actual fact than our terrible mismomer of "Queen Anne." About the beginning of the present century, however, architecture became practically a lost art on the other side of the Atlantic, and it was in fact not until toward the close of the sixties that any real and healthy regeneration took place. The last score of years, however, may fairly be termed a period of Renaissance as regards domestic architecture in America. The casual tourist may not at once be impressed with this fact when he rattles through Broadway, in New York, or the broad avenues of Chicago: he sees public buildings of a deadly monotony of ugliness and inartistic brutality on every side, and, naturally enough, says to himself that "all is barren," from the Dan of the Atlantic to the Beersheba of the Pacific.

FIRST IMPRESSIONS.

When I first made up my mind to become an emigrant my ideas as to America and American life were of the vagnest. If I thought of an American house at all, I have no doubt I had a hazy notion of a mud-beplastered log cabin standing in the midst of a rude clearing, as representative of the country dwelling; and of a wooden shanty, with four square windows and a door, as the typical town house. You in England to-day have doubtless learned more of America and the Americans than we knew of them ten years ago, but I assure you that my ideas were then shared by the vast majority of my fellow Englishmen. Since I have returned, the most extraordinary questions have been put to me as to the tenor of domestic life in America. The fact of the matter is—and it is a fact that, I am glad to say, is becoming more appreciated over here—that no one in the world knows how to live better than the average American. I mean the Americans of the Eastern States, be it understood most distinctly, for I will not deny that in the far-off West, the South and the Northwest there are certain crudities and roughnesses which are apt to set cultured teeth on edge. The New Yorker and Bostonian, and, to a less marked degree, the Chicagoan also, are cosmopolites in the truest and most admirable sense of the term. They have taken something of the best from every nation of the world; a hint here, an idea there, a suggestion from somewhere else, and the result is that they are better housed, better fed, better amused, better warmed in the winter and cooled in summer than any European or any Asiatic.

THE AVERAGE AMERICAN DWELLING.

Take the ordinary house of the middle-class American and compare it with the building of the same class on this side, and I think the odds will be found to be very largely in favor of the former. It is, in the first place, if a city house, better and more conveniently planned. Domestic service is an expensive luxury in New York, the result being that everything which will reduce household work to a minimum and render friction as nonexistent as possible is a distinct pecuniary advantage and worth taking a great deal of trouble to attain. My experience has therefore been that in most American houses of the class to which I refer the relation of the domestic offices to the living and reception rooms is much more carefully studied, with the result of a vastly greater convenience both to servants and their employers. Such little labor-saving devices as lifts or dumb waiters for the carrying up of dishes from the kitchen to the dining room, or for the sending down of soiled linen, &c., from the top of the house to the basement, are much more universal there than here. The interior arrangements of the kitchen also compare most favorably with the domain of the London cook. The comparative advantages of English and American kitchen ranges are not for me to discuss, but there is certainly less trouble and less work connected with the latter than with the former. There is one point, at least, in which the American house compares absolutely favorably with the English, and this is as regards the heating systems employed. Americans are exposed all over their vast country to extreme variations of temperature. They have accordingly been forced in self-preservation to so construct their houses that they shall be habitable when the thermometer is in the neighborhood of zero, and at the same time shall not be too stifling when the temperature is semi-tropical. We in England, though we may not be exposed to quite the same variation, have something of the same nature to contend with. But we do not set about it (at least, have not for a great many hundred years) with the same reasonableness as the American. To all intents and purposes it is practically as cold when the glass is at 32° as when it is from 10° or 12° or even 20° below that point, and yet it seems to me the average English house is built for summer alone, and as though no such thing as winter existed. Since I returned home, at the beginning of this winter, I have hardly known what it was to be warm within four walls, whether of a house, a theater, or any other public building, unless I were standing or sitting within 2 feet of a blazing coal fire.

METHOD OF HEATING.

Now, the American goes to work to warm his house on a very different plan. It has required no very peculiar Yankee ingenuity on his part, no very serious scientific study of the question; he has simply said to himself that in order to be warm in his house he must warm the house itself, and not the separate rooms thereof only. It is this fundamental principle which makes so great a difference between one's winter comfort in the two countries. I need not dilate upon the various methods employed by the American to attain the desired end, but I should like to momentarily take up the cudgels in defense of the much-abused system of hot-air heating. The stories one hears of oppressive floods of baked, scorching air, which are supposed to form one of the horrors of Yankee life, if the tales of some returned travelers may be believed, are, in my humble opinion, sheer and undiluted nonsense. The average American house is heated, not by baked air, but by warm air. Pure, fresh, cold air is drawn into the basements, heated to any degree which may be desired, by an ingeniously constructed furnace, and discharged through tin-lined ducts into every room and every passage of the house. The cost is trifling, the system is easily regulated, is absolutely safe, requires but little attention and results in a degree of comfort of which you can form no idea until you have become habituated to it. This thorough and universal heating of a house disposes to a certain extent of another problem, which seems to me as unsolved to-day in this country as it was a decade ago, though it has been one on which a vast amount of talk has been expended, and about which volumes have been written. This is the problem of effective ventilation, and, as I say, it disappears almost entirely when one has to deal with a house the air of which is throughout of one universal temperature, and which does not practically consist, as does the English house, of a series of more or less efficiently heated rooms, separated from each other by halls and passages of semi-arctic temperature.

NO USE FOR DOORS.

Something more of material comfort, too, is the result of these thoroughly heated houses. One can practically abolish doors, save for the purposes of securing privacy, and the whole ground floor of a house may, therefore, be thrown into one, and much valuable space gained for living purposes, which in this country would be wasted on passages and hall. Most charming effects are gained in the smaller city houses of America by this means, rooms being thrown into one by the raising of a *portière* or curtain, and charmingly artistic vistas being thus gained. It has also led to the practice, which is an admirably one in a country where the average building lot is never more, and frequently less, than 25 feet in width, of placing the staircase hall in the center of the house, with the rooms rear and front opening into it and connected by it.

THE APARTMENT HOUSE.

But the average American of moderate income does not live in a house at all. I don't mean that he camps out in a tent, or that he is altogether homeless; he lives in a flat; and I can quite understand the shudder of disgust with which this announcement will be heard by those whose notions of flat life are gathered from that system as developed in London. A Londoner said to me the other day that in London a flat was looked upon as a luxury. If this is so, all I can say is that London ideas of luxury and my own notions of the same article are several miles apart. The London flat is a creation of the last ten years, and among the many sins for which that decade has to answer at the Dast Day, it will, I am sure, be held the chief. The better class of New York flat has its disadvantages, it is true. What is there in this decidedly second rate world of ours which has not? Take it all in all, however, it is as convenient, comfortable and economical an abode as intelligent man has yet devised for himself. By its means the New Yorker is enabled to live in a fashionable or convenient neighborhood in a house, or, all events, in a portion of a house, built in a style comparable only to those of the richest of his fellow citizens, and he pays for it the rent which he would have to pay for a small house in an inconvenient and distant suburb. Architecturally, the apartment houses, as they are termed in New York and the larger cities of America, are among their most admirable features. They are run up to a somewhat alarming hight, it is true, for though land in New York is dear, dearer even than in London, the atmosphere is free, and of this fact the American has taken advantage. But he has not thought it necessary to build a jaundiced-looking barrack with oblong holes punched into it in place of windows, as one wicked individual, at all events, has done in London, and this abnormal hight is from a practical point of view a matter of little moment; for when one ascends to one's apartment in a lift or elevator, as in Yankeedom it is termed, it matters little whether one stops at the third story or the thirteenth. The average number of stories, however, does not exceed nine or ten, and it is a significant fact that the rents are very often in direct proportion to the hight of the story. The same principle is carried into the apartment house as prevails in the ordinary dwelling house. The staircases and passages leading to the various floors are not, as seems to be the fashion in London, cold, cheerless, and wind swept, but are warm, carpeted and decorated, as are the halls and staircases of a private house.

THE TYPICAL FLAT.

The typical flat, when one enters it after stepping out of the elevator, consists of an inner hallway, or passage, from which open out the various rooms; some of these derive light and air from a central shaft, but as many as possible have direct communication with sun and air. Everything is done to economize room, and I think many valuable hints would be gained by English architects from a study of the plans and specifications of these American flats. The servants, as a rule, sleep on the top floor, access to which is gained from each flat by a private staircase in the rear; the entire flat is heated either by steam or hot water, as the case may be, and in addition to this, there are open fire places in all the principal rooms. From the kitchen a dumb waiter or small lift runs to the basement, and is used by tradesmen for sending up their goods, and by servants for sending down the ashes, &c. Coal and wood are kept in the cellar, and sent up every day as required by the janitor or caretaker attached to the premises. A large refrigerator, carefully drained, is as a rule built into the butler's pantry. The wood work is generally hard wood, and exceedingly elaborate mantels and overmantels with mirrors and *bric-à-brac* shelves, &c., are among the permanent fixtures. Cherry and ash are the predominant varieties of wood used, though mahogany is by no means uncommon. In the newer flats the lighting is effected by means of the incandescent electric system, and this, as well as the heating, is included in the rent.

EXTERIOR FINISH.

Some quarter of a century ago the ordinary house in New York was what is termed a brown-stone front, and was quite as hideous and unarchitectural as anything we can offer in this country. The exteriors were all cast in one mold, and the plan was always more or less on the same plan. They have changed all that now, and nowhere can a more interesting variety of elevation be found than in the more newly-built districts of New York. Even the so-called speculative builder's house is pleasing to the eye, and I have in my mind a couple of short streets in the upper part of New York which I used to pass every day, and which were entirely built by one man, an ordinary building speculator. Instead of going (as I think the same man here would) to an architect, even if he went to an architect at all, and getting from him the plans of one house, to be afterward reduplicated as often as necessary, the American got half a dozen architects, all of acknowledged position, to design for him a number of houses of somewhat similar plan, but of absolutely varying elevation. The result is a street which in its variety of gabling and fortuitous contrast of color and material is as picturesque as anything one can find in the oldest quarter of one of the oldest Dutch towns.

THE AMERICAN THEATER.

The American theater, both before and behind the curtain, is better arranged on the average than any playhouse in the world. They have thrown overboard all the hampering conventionalities which are still in force here, and render the English theater, with all its arrangements, but a servile copy of that which was good enough for our grandfathers and great-grandfathers. As regards its plan, the American theater is so arranged that the line of sight from every seat therein to the stage is, as a rule, perfect. The fact that the entire ground floor is taken up with what we should call here the stalls renders the task of planning and of securing adequate entrances and exits somewhat easier, it is true, than that set before the English architect; but, at the same time, no such dangerous death traps as one finds in London would be permitted in America. The building law of New York is in most of its provisions most admirable, but no sections are more commendable than those which expressly concern the erection of theaters or other buildings intended to be used for the purposes of public entertainment. It is provided that every theater shall have at least one front on a public highway, and that on either side of such building shall be left a clear space of not less than 8 feet in its narrowest part, and that this space shall begin from the line of the proscenium wall and extend the whole length of the auditorium. No portion of any theater can be used for any other purpose, while as far as possible the entire building and all it contains must be of non-combustible material, and all stage wood work, scenery &c., must be rendered non-combustible by approved means.

CHURCH ARCHITECTURE.

I hardly think I should be doing you any service by dwelling at too great length upon the purely artistic side of American architecture or of the value of the work of American architects. Do not, though, be too ready to sneer at what I may euphemistically term their eccentricities. They may be vulgar at times, their straining for novelty so called may occasionally be offensive to the judicious, but at least they are reaching out, blindly, it may be, but still honestly, toward a style of their own. Nothing quite so shocking or so harrowing as the American vernacular church work would be permitted here by the public authorities. Detail is the weak point of the average American architect, but his Gothic detail amounts to a crime. Of course, they have had Richardson, whom most of you, I am sure, know by name at least, and in Richardson they can claim the greatest architectural genius the English-speaking world has seen since Wren's days. "The King can do no wrong"—and Richardson's church work was almost on a level with his secular performances, which says everything. But Richardson is dead, and, like all men of the highest genius, he was a snare and a delusion to his followers. A big man intellectually, physically and artistically, he was of such strong and marked an individuality that his colleagues had perforce to be his imitators, and the greatest menace offered to American architecture is the influence of this departed Titan, which is responsible for the presence of swarms of little tin Richardsons on wheels, who are flooding the country with weak imitations of the Richardsonian Romanesque marked by all devices, and but pale reflections of the virtues of the original. Turn, on the other hand, to their country and town houses, and in the work of such men as Stanford White, of the firm of McKim, Mead & White, of Richard Hunt and others whom I could name, though doubtless with but little benefit to English hearers, and one finds a restrained originality, a freshness of *motif* growing to a thoroughly trained cultured perception and trained knowledge which you would not find it easy to parallel on this side of the Atlantic. As to their public buildings, they are hampered regarding Government and municipal edifices, but of their offices and corporation buildings I may say that though not so prominent as their domestic work, they are at least not quite so immoral as their churches. Without entering into any detailed criticism of the modern American architectural styles, I may say that so far as I am aware its followers are the first architects in any nation who have journeyed with the sister arts of painting, music and literature into the realms of eclecticism.

Ruins of Javanese Architecture.

The architectural ruins of Java surpass those of Central America, says a recent issue of the *Home Journal*. At Chandi-Sewa are found the remains of what was once an assemblage of 296 temples, arranged in five parallelograms, one inside of the other. In the center of all is a large temple in the shape of a cross, surrounded by 40 flights of steps, richly ornamented with sculptures and containing many apartments. Eighty miles to the eastward is the temple of Borobods, consisting of a central dome 50 feet in diameter, around which is a triple circle of 72 towers, the whole building being 620 feet square and 100 feet high. In the walls are niches containing 400 cross-legged figures larger than life. The amount of human labor and skill expended upon the pyramids of Egypt sink into insignificance when compared with that which was required to complete this sculptured temple in the interior of Java. Forty miles southwest of Samarang, on the same island, is an extensive plateau covered with the ruins of temples, to reach which four stone stairways were constructed, each containing more than a thousand steps. Traces of more than 400 temples are found there, all of them decorated with rich and delicate sculptures. In Eastern Java the ruins of forts, palaces, baths, temples and aqueducts are to be seen everywhere.

MASONRY AND STONE CUTTING.*

GEOMETRICAL STAIRS.

A MAN'S STEP is about 25 inches on the level and 12½ inches going up a ladder. By combining these two facts we get the formula $T + 2R = 25$ inches, in which T = tread, R = riser, as the basis for finding the proper proportions of tread to riser. If $T = 12$, then $R = 6\frac{1}{2}$; if $T = 9$, then $R = 8$, &c. But R can only vary between the limits of 4½ and 8 inches.

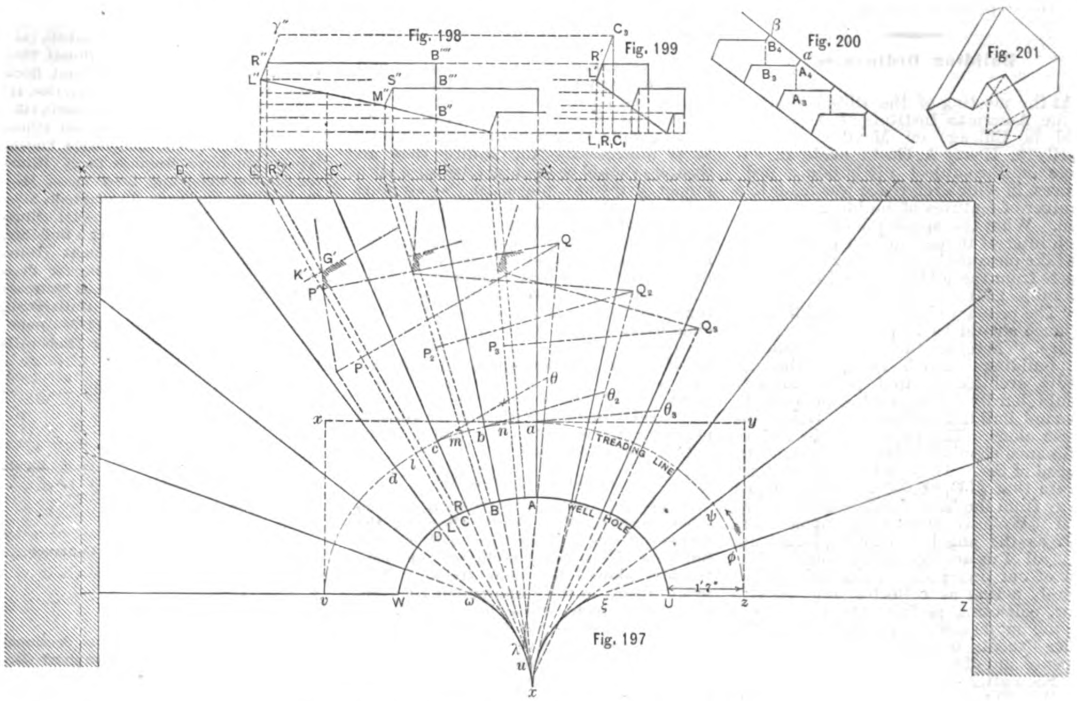
Stairs may be formed of straight flights, the steps supported by a wall at both ends, or the steps supported by a vault, or the steps may be housed in the wall at one end and left free at the other end, leaving the center of the staircase an open well hole. In that case the steps are made to rest upon one another by joggled themselves may be made shorter so as to extend the treading line.

Then draw normals to the curve $v\ a\ z$ through the points of division found, and their mid-points $l, m, n, \ldots$ The intersections of these normals will form a polygon, the enveloping curve ($\omega\ \lambda\ \mu\ a\ \zeta$) of which is the involute of the treading-line. On every one of these normals carry 1 foot 7 inches and you can get the curve U A B C D W as well hole. The normals A A′, B B′, C C′ . . . are the projection of the arrises of the steps.

Now, if on the vertical cylinder $z\ a\ b\ c\ d \ldots$ we draw a helix—that is, a curve on which the co-ordinates of every point counted on the base line, have the constant proportion of tread and riser, z will be at a level = R and every other point of division at the same hight, R, above fore let the joint be a plane taken through the arris L L′ of the joint and the normal to the surface in P, mid-point of L L′.

To construct that normal, we must find the plane tangent in P, which is done by substituting a connecting paraboloid to the surface of the soffit. To draw the connecting paraboloid, produce $l\,\theta$ tangent to the helix, and let it meet a horizontal plane at the level of three steps below, in which case $l\,\theta$ = three treads. As the joint line l L touches a vertical in λ, if a horizontal line be made to move in contact with $l\,\theta$ and the vertical λ, it will produce the connecting paraboloid required.

Now, to find the plane tangent to the soffit in P, draw $\lambda\ \theta$ generator of the connecting paraboloid, and cut $\lambda\ \theta$ and $\lambda\ l$ by a vertical plane, P Q. The



Masonry and Stone Cutting.—Figs. 197 to 201 Inclusive.

joints, such as M″ S″ B‴, Fig. 198. The joint on the lower step is called a back rebate, and in the upper step a bird's mouth. If the well hole be curvilinear, as in Fig. 197, the stairs are called geometrical.

In geometrical stairs the widths of the steps vary from one end to the other, but the proportions of treads to risers are fixed on a line parallel to the well hole at a distance of 1 foot 7 inches from it. This is called the treading line, on which all the treads must be equal.

To draw the plan, Fig, 197, take z U = length of the shortest step; deduct therefrom U z = 1 foot 7 inches, and draw the rectangle $z\ y\ x\ v$, of which the sides are equidistant from the walls; inscribe in this rectangle a semi-ellipse, and this will be the treading line of the stairs. If the outside walls formed an irregular polygon, the treading line might be drawn with centers so as to form a continuous curve. Divide the treading line in n equal parts = to the widths of the treads, $z\,\phi = \phi\,\psi = \ldots = a\,b = b\,c = c\,d = \ldots$, which gives $n + 1$ risers from z to v. If the number of steps be not sufficient, the proportions of the treads and risers may be made stiffer, or the steps

* Continued from page 13, December issue.

the former. If a horizontal lines moves along that helix, remaining at the same time tangent to a vertical cylinder on the involute $\omega\ \lambda\ a\ \zeta$, then it will describe a surface which will touch the arrises of all the steps; this is the extrados of the stairs, and it is a skew surface.

The soffit of the stairs is a surface identical with the former, but lowered uniformly of a certain distance, δ, which we shall determine later on. The joint lines of the soffit are projected on the normals to the treading line drawn through the mid-points $l, m, n, \ldots$; one of the steps, for instance, will stretch between the lines B B′ and L L′. So that the surface of the joint be everywhere normal to the soffit, the correct way is to erect normals in two points of the joint, then divide these normals in equal parts, and work the surface by means of a straightedge placed on these points of division. The surface is then a hyperbolic-paraboloid. Nothwithstanding this terrible name, it is a very easy operation to accomplish when the well hole and the walls are circular. In our present case it would involve making two separate bevels for each step; besides which the construction of the normals is more difficult than in circular stairs. We there-

line which joins in space the points P and Q is another generator of the paraboloid; the plane tangent to the soffit in P contains that line P Q, and the joint line L L′. Turn down the plane P Q round its trace; P′ is at the level of three risers above P, draw P′ Q and produce P′ G′ at right angles with it; that is the normal required through which the plane of the joint must be taken. At about 2 inches above the point P draw K′ G′, the upper level of the step. Now we can settle the hight B″ B‴′, Fig. 198, which we called δ. The arc $l\ m\ b = \frac{3}{4}$ of width of tread, therefore, the point l is $\frac{3}{4}$ riser above the point b. Adding this difference of level to the hight P′ K′ we have δ = P′ K′ + $\frac{3}{4}$ riser. Therefore, it follows that the hight P′ K′ is constant for all the steps. The construction of the normal at the mid-point has to be made for every step independently, for its angle varies with each step.

Face Molds.—The face, which is housed in the wall, is the intersection of the vertical plane X′ Y′, with the surfaces of the steps as shown in Fig. 198. The soffit is a curve, of which several points are found by the intersection of generators of the soffit. If a nosing is put to the steps it must be added on the mold. The face which forms the well hole, Fig. 199, is a cylindrical surface, and must be developed. Mind the joint line is curved. To find a third point of that curve draw a horizontal generator of the plane of the joint, say $\iota \gamma'$ on plan, find its level, γ'', by which get C_2 above C_1, Fig. 199; then draw the curve.

Cutting of the Steps.—Select a stone which will contain the step; work the tread; draw thereon the outline B B' R' R; then with a square work the riser, the wall face and the well hole. Draw the face molds in their respective positions and work the joints, both rebate at the back and bird's mouth in front. Through guiding marks work the soffit of the stone with a straightedge.

Sometimes (Figs. 200, 201) a piece, β B_4 B_2 A_4 α, is left on along the well hole to form a string about 4 or 5 inches wide, upon which to fix the balustrade. In Fig. 201 is rather an exaggerated view of a step finished in this way. When the offset β B_4 is less than 2 inches it need not entail any sensible waste of stone, but sometimes the string is built separately and the steps are housed in it.

Building Ordinances.

At the meeting of the Illinois Chapter of the American Institute of Architects, held in Chicago on Monday evening, April 18, Henry A. Goetz made an address on the subject of building ordinances, in which reference was made to a number of features of building construction. What the speaker had to say is of such interest to many of our readers that we take pleasure in presenting copious extracts from the address. In introducing his subject Mr. Goetz said:

"The primary object of a building ordinance should be to prevent the spread of fire. There are such a small number of buildings which collapse through faulty architecture that public interest would hardly be aroused sufficiently to demand building ordinances from this cause alone. The primary object of an ordinance should be, first, to prevent the spread of fire. Those who are posted are aware that $130,000,000 are being wiped away from the face of this country every year. We have been looking upon insurance as the angel of charity, forgetting that all of us are paying for this fire loss out of our own pockets, the underwriter merely acting as collector and distributor, collecting $1 from the masses and paying out 60 cents to the individual, the other 40 cents being needed for salaries, expense and dividends.

"Soon after some great fire or calamity a call is sent and issued for a committee, which, with much energy, goes to work. But no one is held responsible, and the work is done in a careless manner. Your great city of Chicago has now adopted such a plan," said the speaker, "and, while I have due respect for each member of the committee, still I cannot refrain from believing that none of you will be satisfied with the work after it is done. I believe that one man, who must devote his entire time thereto, can get up or edit a better building ordinance than a dozen men, no two of whom can agree."

WHAT A BUILDING ORDINANCE SHOULD COVER.

As a suggestion, Mr Goetz thought it best to do away with fire limits and "make the ordinance cover the size, hight and kind of building, no matter where located." The present plan is to restrict and prohibit frame buildings within a certain fire district and allow all kinds outside of the district until it is so idly built up, and then comes into the fire district after much damage has been done.

"Instead of this," the speaker said, "the ordinance should cover the whole city or even the whole State, for is it not just as important to erect a safe building outside as inside the business district?

"Make the walls of certain thicknesses for each class and permit no system of building which might have a tendency of pulling down the walls during fire," said Mr. Goetz.

"Party walls are usually built of a less thickness than the exterior walls. All party walls should be securely anchored to each tier of joists, but so that deflection or breaking of the joist would not injure the wall. Mr. Moore, President of the Continental, insists that his company would make money at one-third the present rates if brick buildings were constructed in such manner that the interior might be cremated and leave intact the walls. All companies admit that 40 per cent. of the money loss is by exposure; that is, where fires spread to adjoining property."

VALUABLE SUGGESTIONS.

The speaker made the following statements in the course of his address:

"Prevent loss of life in manufactories by limiting their hight, and by requiring stairways at opposite ends of the building, of a width in proportion to the hight of the building and the number of people employed therein, this simple provision making an exterior fire escape unnecessary.

"Prevent loss of life in theaters and public halls by limiting their hight from the ground level, and provide proper and convenient exits in proportion to the number of people they are to accommodate. It is unnecessary to require that all theaters should be fire proof, because with proper exits any place can be emptied before the fire can reach the inmates.

"Buildings exceeding 85 feet in hight should be constructed of incombustible material, and should not be allowed to have a party wall, but should be able to stand alone even if the buildings adjoining should fall. Buildings used for merchandising should be limited in hight, for the reason that a tall building filled with merchandise will develop, in case of fire, such a high degree of heat as to be a menace to all others in the neighborhood.

"No elevator shaft should be allowed near any stairway if such stairway is the only means of escape."

ENFORCEMENT OF LAWS.

In regard to the enforcement of laws when passed, Mr. Goetz thought the owner of the building as well as the building inspector, architect or contractor, should be held liable. This would result in the employment of competent architects, while the owner would come to the inspector for advice, while under the present plan the owner tries in every way to evade him.

In conclusion, Mr. Goetz said great improvement would result from combining the fire and building departments under one head. He would raise the standard of excellence of firemen by impressing upon them the advantage of preventing fires as well as extinguishing them. He would have them become familiar with all the details of construction, the location of stairs and elevators, the general surroundings, and such knowledge as during a fire would be of inestimable value. He would require them to report to each other the faults they find in the districts, and in special cases they should be given power to order improvements. General discussion of Mr. Goetz's paper followed its reading. The members of the chapter were favorably impressed by the discourse as a whole, while unstinted commendation was accorded several of the speaker's propositions.

THE DESIGN chosen for the Connecticut Building at the World's Fair is in striking contrast with the edifice at the Philadelphia Exposition. This was in the general style of an ancient farmhouse, with the roof sloping nearly to the ground. The Chicago building is modeled after the mansion houses of the wealthy men of the colonial days—the magnates and rulers of that period. Half a dozen designs were submitted, W. R. Briggs, a Bridgeport architect, winning the prize. The structure will be two stories high, with colonial pitch roof, surmounted by a small balcony or "deck," such as was commonly built on the houses of merchants at the seaports, and from which they watched the movements of their vessels. Such roofs yet exist in New Haven and New London; at Nantucket, on the Massachusetts coast, there are dozens of them. Broad verandas stretch around the building on three sides, and the massive porch has four fluted columns.

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CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED

The Builders' Exchange.

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JULY, 1892.

Employer and Workman.

The average employer in the building trades has, at some time or other during his business experience, felt the pressure of the action of the labor unions in their efforts to improve the conditions under which their members perform their work. The average employer has also been in the habit of allowing such matters as do not directly affect his relationship with an owner to take care of themselves, and has made no effort to prevent customs which he knows must ultimately be changed from becoming fixed. He has conducted his business entirely upon the assumption that when he is pushed into a corner or when conditions detrimental to his business become fixed, he would make a grand overthrowing of things generally and start afresh. In the meantime the workmen have been steadily and systematically pushing ahead, gaining ground here and there, a little at a time, firmly establishing their organization and continually progressing toward their desired goal. Until recently they have met with so little rational opposition and have found so little desire on the part of employers to seek out and maintain right and justice for both sides, that they have come to look upon every point gained as an evidence of the justice of their position. They have undoubtedly encroached upon the prerogatives of the employer in some cases, which is not unnatural, considering their strength in numbers and in unity of purpose. They have had no one to point out to them wherein they have assumed too much as their own right, for the action of the employer has generally been one of resistance rather than assistance or direction. No equitable conditions can be established between two parties when one of the parties is less attentive to existing conditions than the other. A satisfactory adjustment of the labor problem will not be secured until the employers are sufficiently well organized to treat with the organizations of workmen upon some other basis than that of opposition. Until the use of force is abandoned and the two interests meet on equal terms, no reasonable or just solution of the question can be expected.

Conditions in the Field of Labor.

It appears from the reports of the commercial agencies that the number of strikes and of workmen involved during the first week in May was nearly two thirds less than the figures quoted for the same week in 1891, which in turn were much smaller than the figures for the corresponding week of 1890. It is fair to assume that these figures are approximately accurate and may be accepted as an evidence that the differences between employers and workmen as a whole are being adjusted with less friction than heretofore. The first week in May can be taken as fairly representative of the year, as at that time the unions have been in the habit of making their demands. The condition of labor, too, is then fairly indicative of the attitude in which the workmen stand to the employers. The figures quoted show that 18,500 employees were concerned in strikes in the first week of May, 1892, while in 1891 there were 49,000, and in 1890 there were about 54,000. In New England the labor troubles seemed, proportionally, to involve the greatest number of workmen, it being stated that there were 28 strikes, which involved over 8000 men, including strikes on ten stone quarries, which affected about 4500 men. There were doubtless more strikes than those quoted by the agencies, and it is not unlikely that some of those reported were unimportant, but the showing goes far toward establishing the fact that the workmen generally are better satisfied with the conditions under which they labor than formerly, or that they have found peaceable means of adjusting such differences between themselves and their employers as may have arisen. One of the principal causes of this desirable effect is the better organization of the employers, which has resulted in their becoming better able to treat with the workmen in a broad and effectual manner, and with such unity as to secure the settlement of differences with greater facility and justice than was possible where each employer attempted to settle upon a separate basis

Building on the Pacific Coast.

According to advices from the Pacific Coast, the building season in California opened with bright prospects. A large number of buildings have been placed under contract, and dwellings of a superior class are being erected far into the suburbs of the larger cities, owing, no doubt, to the fact that some of the most desirable locations, especially in the neighborhood of San Francisco, are now accessible by cable or electric railway systems. Buildings for business purposes are said to show an advanced taste in design, and in place of cheaper material heretofore employed, stone and marble are being extensively used. This increase in the demand and use of stone has stimulated the development of new quarries in localities where the material can be economically shipped to market.

A Remarkable Building.

One of the greatest novelties in the building line probably ever designed for erection in this city is the structure which is about to be put up on Broadway near Murray street. This building is intended to be 12 stories in hight, surmounted with a high gable roof, the finial terminating at a distance of about 187 feet above the sidewalk. The building has a frontage of 30¼ feet on Broadway and a depth of 107½ feet. The first story will have a ceiling hight of 18 feet 6 inches and will be arranged for counting room or banking purposes. The second story, which will be used as general offices of the Home Life Insurance Company, who are putting up the structure, will be 28 feet 3 inches in hight on the Broadway front and have main and mezzanine floors in the rear. The style of the building will be of the severest kind of early Italian renaissance and absolutely fire proof. The material for the front will be of light brick and the structure will be thoroughly equipped with all the modern appliances. With the possible exception of the Tower Building on lower Broadway, this will probably be the narrowest high building in the country.

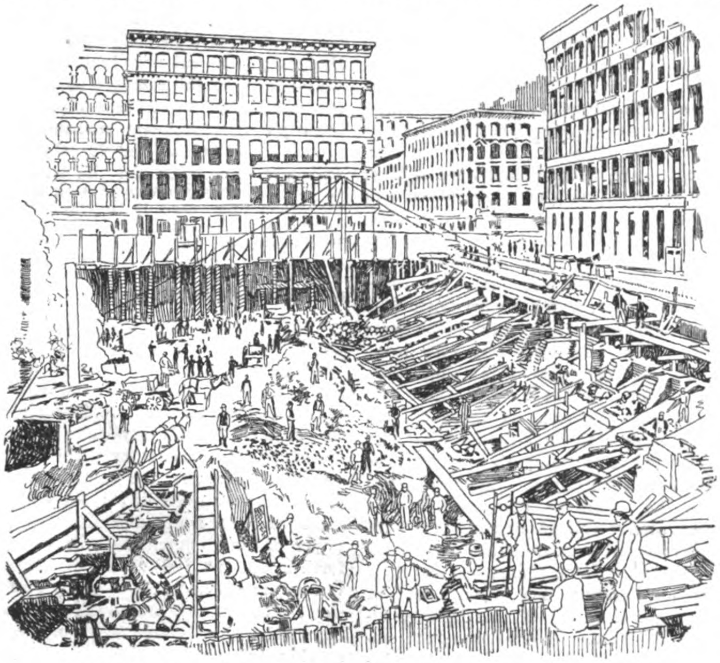
Contractor and Supply Dealer.

The subject of securing special prices on building material for contracting builders, which was brought up at the last convention of the National Association of Builders, is one that is worthy of the consideration of every dealer in builders' supplies in the country. The present custom of charging the contractor who buys unlimited quantities every year the same price that is asked of the occasional buyer of small quantities was well set forth by one of the delegates to the convention mentioned. He was by profession a plumber, and stated that he could buy one barrel of lime in the open market as cheaply as the mason or plasterer could buy 1000 barrels. This condition of affairs exists practically the same all over the country, but it is in the building business only that such a condition does exist, for in every other line of business the regular buyer of large quantities of merchandise, who buys to sell again, receives an appreciable discount from the price at which the same commodity is sold at retail and in small lots. The builder stands in the same position to the material dealer that the retailer does to the wholesaler in any other business, for he buys to sell to the consumer. The owner is the consumer in the building business, and if the dealer sells direct to him the builder is deprived of a legitimate profit and the dealer receives no more for his wares than he would if he had sold to the builder. It is sometimes the case that a dealer will sell to an owner cheaper than he would to a contractor. Cases of this kind have been known where the dealer, in order to be sure of a particular sale, has given a less price to an owner than he would to the contractor for the work. A certain amount of building supplies must be sold in every city, and it is not unfair to maintain that the dealer should give the builder preference over any one else in prices and should help to keep the business in the proper channels. The owner would pay no more for his building than he does now, the same amount of material would be sold, the business would become fixed upon a recognized basis, and the builder would receive an equitable margin upon the material which passed through his hands.

CABLE ROAD POWER STATION.

A STRUCTURE which will embody, when completed, a number of unique features of no little interest to builders generally is the power station of the Broadway Cable Road, now being put up at the corner of Broadway and Houston street, this city, by the Broadway and Seventh Avenue Railroad Company. At the present time the foundations are being put in, an idea of the appearance of the excavation being indicated in Fig. 1 of the accompanying illustrations. As the site selected for this building is a very valuable one, the question which confronted the engineers at the outset was, how to utilize the ground to the fullest extent. If it could be used for nothing more than a power station, much of its value would be lost, but, as the necessary machinery to operate the cable was to be below the street level, the company desired to erect a large building above it, which might be rented for commercial purposes. The obstacle, however, in the way was the vibration which would result from the operation of the machinery, and which would render a building designed for commercial purposes practically untenantable. The engineers, however, have outlined a scheme, which is being pursued in the work now in progress, and which is expected to bring about the desired results.

The floors of the building proper are to be supported on peculiarly constructed piers, of which there are to be 45 interior ones and 28 piers on a line with the exterior walls, which will be self-supporting. The exterior piers will consist of steel columns, fixed on a grillage of iron piers, the latter resting upon stone walls. The interior piers are to be constructed after the manner indicated in Fig. 2 of the illustrations, for the use of both of which we are indebted to the courtesy of the *Sun* of this city. Large cylinders of wrought iron or steel are to be sunk into the earth and filled with sand below and concrete above. On the top of these is to be a grillage of iron beams, to be level with the tops of the cylinders, which are but 6 feet in length. Resting on the grillage will be massive iron bases weighing in the neighborhood of 3000 pounds each, and surmounting these will be steel columns. The cylinders, with the exception of a few for supporting the court of the building, vary in their diameter from 8 feet 6 inches to 12 feet. The object of this is not only to prevent the sand foundation from spreading laterally, but also to divide the sand on which the building is to be supported from the sand foundation of the floor on which the machinery to operate the cable is to rest. This is in conformity with the main theory of the engineers' plan, which is to have the foundations of the building entirely independent of the foundation of the machinery, so that the operation of the latter will not cause the building to vibrate. All the iron and steel used in the construction of the building is subjected to the severest tests so as to stand the strain to be put upon them.



Cable Road Power Station.—Fig. 1.—Present Appearance of Foundations.

For the purpose of providing room for the driving wheels on the machinery floor, it has been necessary to excavate to a depth of 42 feet below the level of the street. Bridges of iron beams resting on brick walls are to be constructed around the columns supporting the building, the object being to prevent any portion of the machinery floor, which will rest partly on the bridges and partly on the sand foundation, from touching the main columns. The driving wheels will be 32 feet in diameter and weigh about 100 tons each. Cotton rope drives will be employed in order to still further reduce the liability to noise and vibration. Each of the driving wheels will have 32 deep grooves for 32 lengths of 2-inch rope. Attached to the engine shaft will be 9-foot wheels, while 32-foot wheels will be attached to the shaft connecting with the cable drums. At the present writing it is expected to have the building, including the machinery floor, completed early in the fall of this year. It is stated that this building will be stronger and will contain more iron and steel than any other structure of its size in the city, while the machinery floor will probably be unlike any other in the country.

IT IS SAID to be a common practice in France to coat the beams, the joists and the under side of the flooring of buildings with a thick coating of limewash as a safeguard againt fire. It is a preventive of prime ignition, although it will not check a fire when once under headway.

AN INGENIOUS INSTRUMENT is now used in Italy for the cutting of stone cornices, moldings, balustrades, &c. The general features of the machine are very similar to those of the ordinary metal-planing machine. The stone to be operated upon is firmly clamped on the bed, to which a reciprocating motion is imparted by suitable mechanism. The cutting tools are carried on a saddle plate capable of horizontal movement upon a slide by means of a screw and handle. The slide is, in turn, capable of vertical adjustment on slide pillars by means of bevel gearing and screws. The machine turns out 16 feet of cornice, well finished, in 20 minutes.

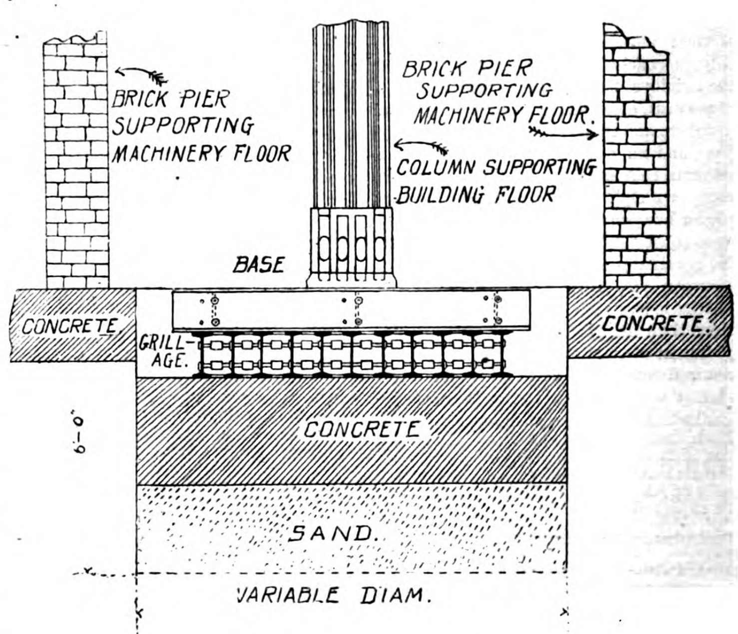


Fig. 2.—Sectional View Showing Construction of Interior Piers.

AN ILLINOIS DWELLING.

THE ATTRACTIVE frame dwelling which forms the subject of our supplement plate this month was recently erected in Carthage, Ill., for W. H. Griffith, from designs furnished by architect George W. Payne of that city. The house is built of good, sound pine, the sills being 6 x 8 inches and 8 x 8 inches; the first and second floor joists 2 x 10 inches; the ceiling joists 2 x 6 inches and the studding and rafters 2 x 4 inches. The sheeting is shiplap, covered with building paper and ½-inch siding. The first floor is 2½ feet above the grade line and is approached by broad steps leading to the front veranda, from which the vestibule is reached through double doors. A careful inspection of the floor plans, which are presented in connection with the elevations and details upon this and the following pages, shows the manner in which the space on the two floors has been utilized. It will be noticed that on the first floor there are library, sitting room, dining room, kitchen, sleeping room and bathroom. The hall is of good size and has rising from it a stairway constructed of Wisconsin red oak, finished in natural wood. At the left of the hall is the library with bay window, while directly in the rear and communicating with it by means of folding doors is a cheerful sitting room 15 x 18 feet. Beyond this is the dining room, reached through folding doors and also having an entrance at the side of the house. The means of communication between the dining room and the kitchen, which is at the right, is through a commodious pantry fitted with all the modern appliances. There is also a dumb waiter in the double wall between the kitchen and the dining room. Directly in the rear of he hall and communicating with it by a single door is a sleeping room 15 x 16 feet in size, and beyond this a bathroom of ample size and thoroughly fitted throughout. The sleeping room and sitting room are furnished with drawers under the projecting windows. In the rear of the house is a large woodshed provided with closet, slop sink, &c. On the second floor of the house are three large sleeping rooms, with ample closets. The attic over the main portion of the house is floored and serves the purpose of a large storeroom. The house is well built throughout, carefully finished and is stated to have cost complete $4500.

An Illinois Dwelling.—George W. Payne, Architect, Carthage, Ill.—Front Elevation.—Scale, ⅛ Inch to the Foot.

Fundamental Ideas in Architecture.

A writer in a recent issue of the London *Tablet* presents the following remarks on the fundamental ideas in architecture, which are likely to prove of interest to American readers:

Leaving aside the battle of styles, what is it in architecture that gives the distinctive mark or idea to the leading styles? Compare the Parthenon at Athens to the Cathedral of Cologne, the Alhambra at Granada to St. Peter's at Rome, and we must at once admit some radical difference in the fundamental idea that has produced such divergent results. The result in each case is a growth, but the idea in the elementary notion of construction has in each case been different.

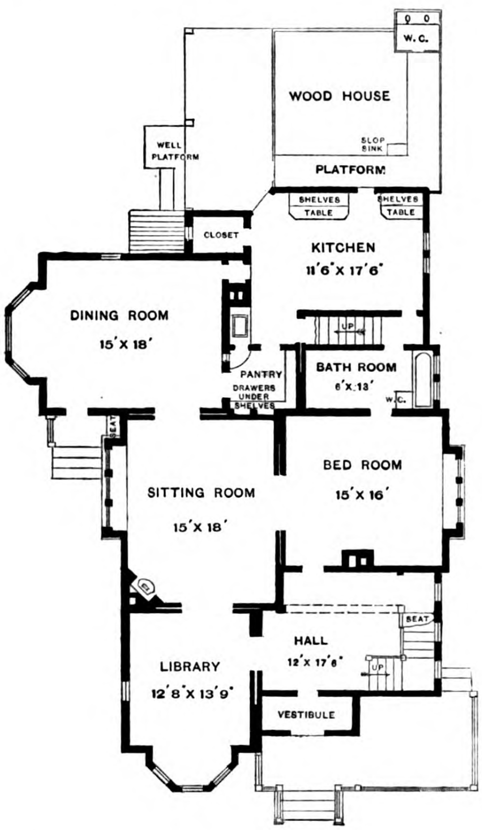
Art in architecture is the ornamentation of the construction; superadded ornament is either bad art or not architecture. In the development of building the treatment of the three elements of weight, support and security assumed different shapes. The employment of ornament, or architecture, came in with the ornamentation of the support, the ornamentation of the weight and the ornamentation of the construction which connected the weight with the support. To arrive at the fundamental idea in the different styles we must examine the relations between the support and the weight.

THE EGYPTIAN.

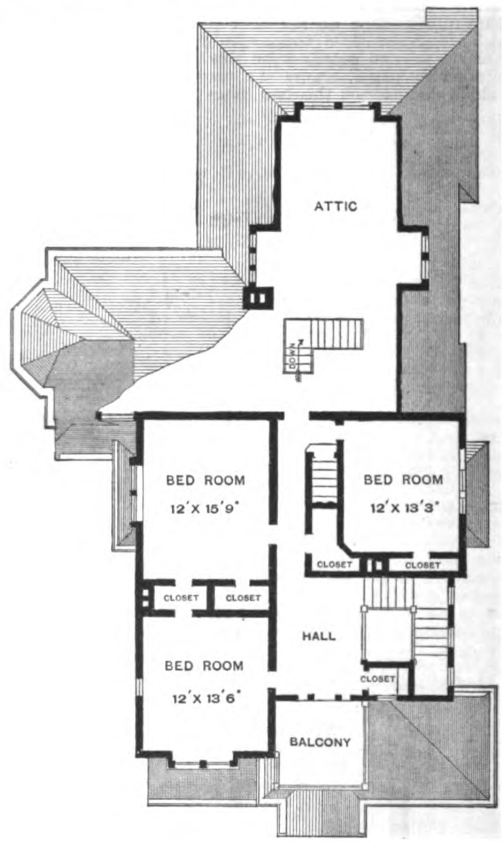
The Egyptian, the oldest of known styles, placed the weight firmly on the ground. In the first stages of building the strength of materials and the art of construction were but imperfectly understood, and to obtain security masses of material were placed on a broad base, narrowing upward in the form of a pyramid. It suggested security and permanence. The earliest extant monument of the work of man, the Pyramids by the Nile, still rest on the sand of the desert in their majestic massiveness. The Egyptian buildings were constructed on the model of the pyramid. Truncated at various hights, the details and ornamention, however varied, left the same impression of security and permanence. The shelving base, from which springs the propylon or porch, the multiplication of short stunted shafts, the shallow reliefs, are all subservient to the one idea. The building rests on the ground, and you know it. The slender obelisk placed in front as a foil brought into prominence the massive solidity of the building. The accessory sphinx, with its front paws placed flat on the pedestal, the body firmly recumbent, and the head solidly draped, was a type of immobility and rest.

THE GRECIAN.

Turn now to the Greek building, with its pediment supported by three lofty columns. The idea here is the expression of power by the easy lifting up of the weight. The Egyptian represents the mass solidly resting on the earth ; the Greek lifted it with ease into the air, and the architectural forms and details were subservient to the idea. The triangular pediment suggests the feeling of pressure downward, the broad architrave and entablature adds mass and solidity, and the moldings and projecting cornice assist the general impression of weight. To resist the downward crush of this mass, the tall graceful pillars rise up to support it, seemingly without effort ; the walls are thrown backward almost out of sight that the eye may more readily rest on the work of the columns. The capital, the point of contact or conflict between the weight and the support, is admirably designed to denote the triumph of support ; the fluting of the columns tell the eye that there is no undue pressure on the material, and the slight tapering of the column toward the capital suggests that there is power to spare. The Greeks, who were born artists, made the minor ornamentation subsidiary to the general idea ; it is neither complex nor elaborate ; the upper intensifies the idea of weight ; the lower that of easy support. Their buildings suggest repose rather than massiveness, confidence rather than security—the confidence of skill in contest with inert weight.



First Floor.



Second Floor.

An Illinois Duelling.—Floor Plans.—Scale, 1-16 *Inch to the Foot.*

THE ROMAN.

The Romans imitated the Greeks, and imitated them without appreciating the simplicity of grandeur. They introduced circles and segments of circles in place of the simple restful lines coursing horizontally round the building. They raised columns which supported nothing, simply for the sake of ornament; the dome behind the pediment took away its significance and removed from it the idea of pressure. They adopted the semicircular arch, which broke the entablature and the idea of solidity, and thus destroyed the fundamental idea of the Greek simplicity without substituting any of their own.

When the Roman style was removed to Constantinople the Byzantines reveled in arch and cupola, but without discerning the real object of the arch. The circular arch distributes the weight of the wall; they refused it the proper office, made it an ornament and concealed the real support of the weight. Consequently, in the Byzantine style we have the domes and cupolas representing the weight with no visible support, and arches multiplied at caprice with nothing to support. The magnificent dome of St. Sophia is poised in the air, traditionally by a miracle, but really by tricks of deceptive material and concealed buttresses.

THE MORESQUE.

The Moresque strove for the negation of the weight altogether ; the Egyptian placed the weight firmly on the ground ; the Greek lifted it up in the air with an assertion of graceful power ; the Roman confused weight and support ; the Byzantine represented weight without support ; the Moor suggested that there was no weight at all. To produce this effect the arch is often elongated, its surface broken up by fretted work, its under surface hollowed out, its span divided into small arches. Above it a molding incloses a rectangular space, leaving to the arch the semblance of leisure or sheer idleness. The shafts are so light as to take away the idea of having any work to do. The roof is divided into a series of honeycombed pendants, which confuse the eye and abstract the feeling of pressure. The result is aerial, fairy like and dreamy.

THE LOMBARD.

The Lombard style, to which our Norman is allied, attended more to truth, and placed the support conspicuously in the wall. Of great thickness, with large blank spaces unpierced and prominent, the walls plainly tell their work and their capacity to do it. The ornamentation is subservient to the idea. Shallow recesses and paneling bring the surface of the wall into prominence ; where they are pierced for window or door the beveling and molding in perspective increase the idea of strength, the arcading points to the depth, the circular arch indicates the solidity of the wall above, the circular windows were adapted to emphasize the notion of power. In the Egyptian the wall is unnoticed, in the Greek it receded from view, in the Byzantine it played no part, in the Moresque it is chopped up and scattered, but in the Lombard, without buttress or pilaster, it asserted itself as the main element of support.

THE GOTHIC.

The Gothic, so familiar to us, leaves the impression of ascendant aspiration. The tendency is upward ; heedless of weight, it breaks through the weight. The nave rushes upward from the aisles, the tower upward from the nave, the spire upward from the tower. The support is lateral to allow of the upward tendency, buttresses support the sides, the aisles support the nave, flying buttresses hold up the roof. The wall is destroyed, being pierced by window and arch ; the arch takes the thrust off from the pillars, and the capitals become mere bands. The windows point upward, the arch points upward, the high-pitched roof points upward. The weight, without being denied, as in the Moresque, is thrust aside, is disturbed over lateral support to allow the upward tendency.

Sufficient has been said to allow of a glimpse of the relations of weight and support in the chief styles, and to indicate how they affected the prominent features.

The treatment of each specimen in each style is distinctive, and the infinite variety in form and ornament clustered around the fundamental idea.

How a Saw is Made.

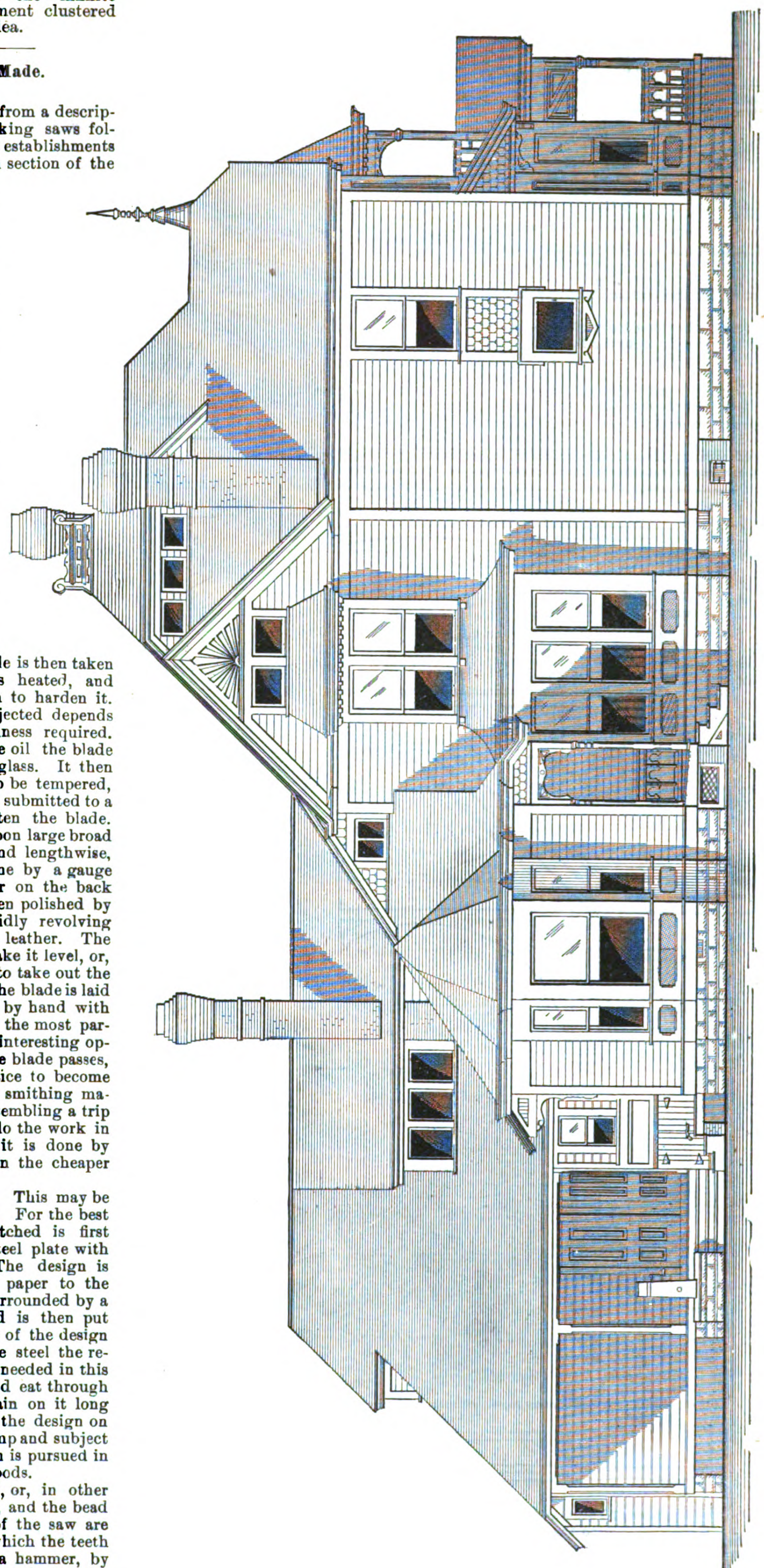
The following is taken from a description of the method of making saws followed in one of the largest establishments of the kind in the eastern section of the country.

As showing the general operation of making saws, it will be interesting to follow the course of the hand saw in the various stages of its manufacture. It will be borne in mind that other Saws are made in a similar manner, with the exception of handling and packing in the case of circulars, cross-cuts, &c.

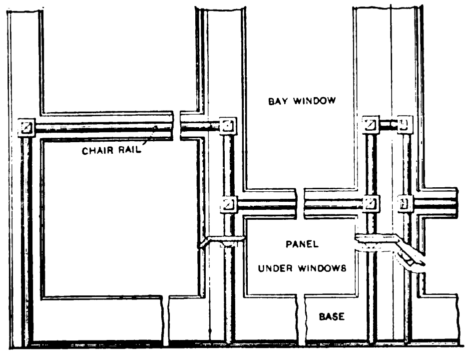
The sheet for a hand saw as received at the factory is large enough for two blades, and is cut diagonally through the center with squaring shears. The blade is then toothed by a machine having a punch-like movement, which is set to punch the desired number of teeth to the inch. Their capacity for toothing hand saw blades is 100 dozen a day. The blade is then taken to a furnace, where it is heated, and plunged into a fish-oil bath to harden it. The heat to which it is subjected depends upon the degree of hardness required. Upon being taken from the oil the blade is warped and as brittle as glass. It then goes into another furnace to be tempered, where at the same time it is submitted to a severe pressure to straighten the blade. The blade is then ground upon large broad stones. The blade is ground lengthwise, being held against the stone by a gauge so set as to grind it thinner on the back than at the teeth. It is then polished by being held against a rapidly revolving wheel covered with sea lion leather. The blade is next smithed, to make it level, or, as it is technically termed, to take out the buckle. In this operation the blade is laid on a large anvil and struck by hand with a hammer. This is one of the most particular as well as the most interesting operations through which the blade passes, and it requires long practice to become proficient as a smither. A smithing machine is in use, somewhat resembling a trip hammer, but it does not do the work in as satisfactory a manner as it is done by hand, and is only used on the cheaper grade of goods.

The blade is then etched. This may be done in either of two ways. For the best goods the design to be etched is first printed on paper from a steel plate with specially prepared ink. The design is then transferred from the paper to the blade, leaving the design surrounded by a wide border of ink. Acid is then put upon the uncovered portion of the design and allowed to eat into the steel the required depth, but care is needed in this operation, as the acid would eat through the blade if allowed to remain on it long The other plan is to print the design on the blade with a rubber stamp and subject it to acid. The former plan is pursued in etching the finest finished goods.

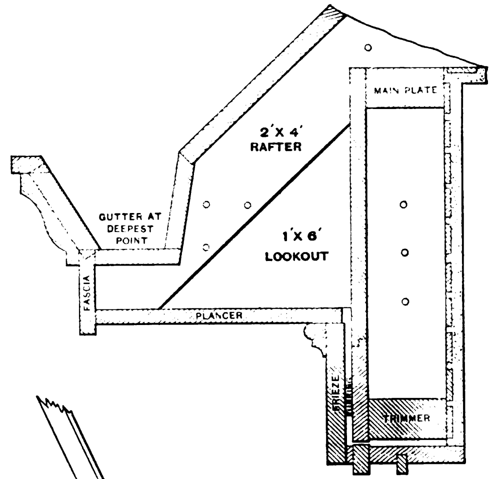
The teeth are now filed, or, in other words, the saw is sharpened, and the bead on the back of the point of the saw are both done by hand, after which the teeth are set on an anvil with a hammer, by hand. The blade is now ready for the



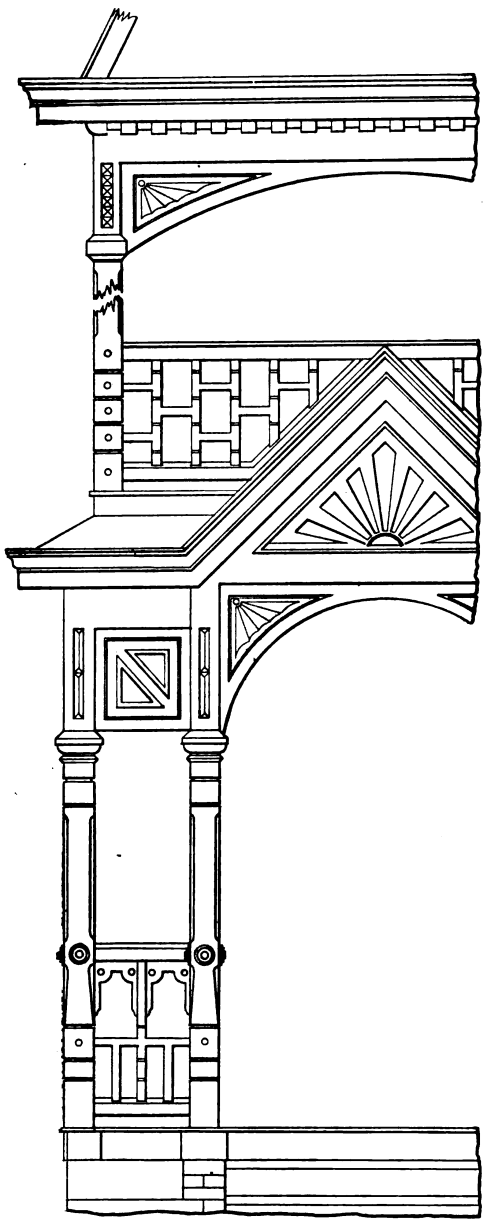
An Illinois Dwelling.—Side (Left) Elevation.—Scale, 1/8 Inch to the Foot.



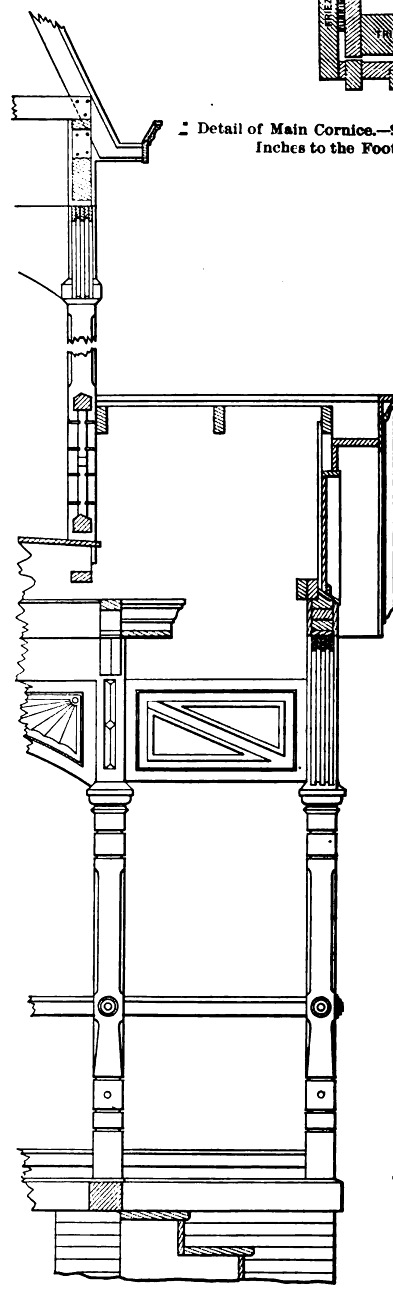
Details of Dining Room Finish—Scale, ½ Inch to the Foot.



Detail of Main Cornice.—Scale, 1½ Inches to the Foot.



Front Elevation of Porch and Balcony.—Scale, ⅜ Inch to the Foot.



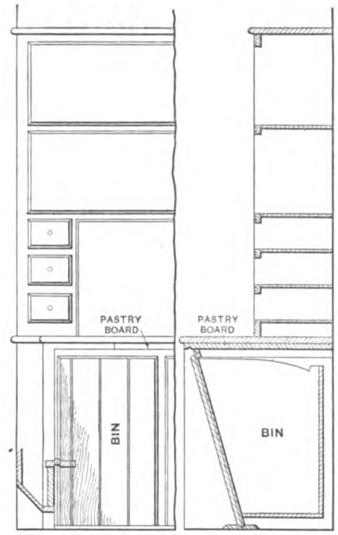
Section Through Front Porch and Balcony.—Scale, ⅜ Inch to the Foot.

Miscellaneous Details of an Illinois Dwelling.

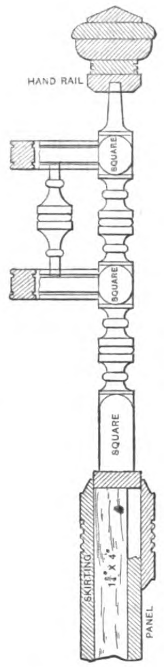
handle. The handles are bought in the white and varnished, French polished and engraved at the factory. With the highest priced goods the saw, after being handled, is subjected to the operation of being blocked, to take out any buckle caused by screwing on the handle. The saw is now ready for packing.

AN INTERESTING COLLECTION of architects' drawings consisting of several hundred designs, principally for a better class of country houses, has been on exhibition in the halls of the Building Material Exhibit in Brooklyn during the greater part of the month just passed. In addition to the architectural drawings there have also been displayed tapestries, hangings, furnishings, stained glass, bric-a-brac, brass, bronze and wrought-iron work, as well as other materials and devices that enter into the construction, finish and decoration of a modern dwelling.

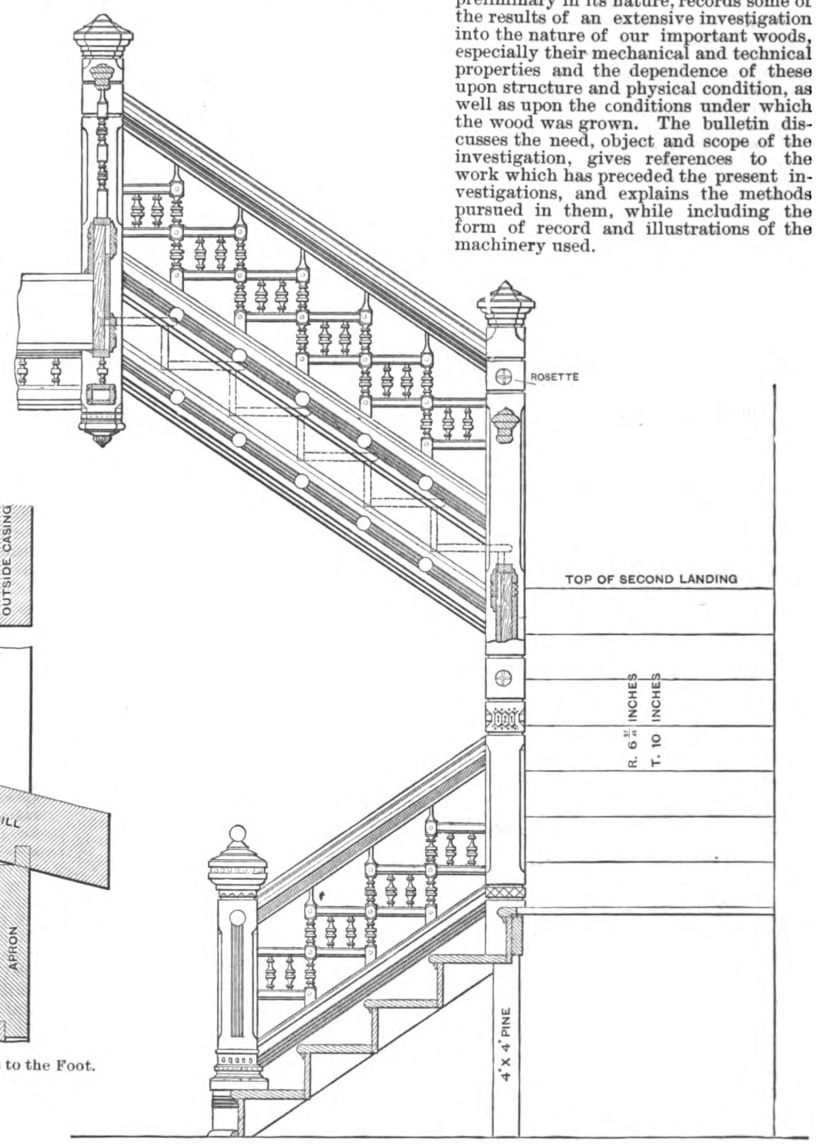
THE DIVISION OF FORESTRY of the United States Department of Agriculture has recently issued the first of a series of bulletins compiled by B. E. Fernow, Chief of the Division, relating to timber physics. This bulletin, which is entirely preliminary in its nature, records some of the results of an extensive investigation into the nature of our important woods, especially their mechanical and technical properties and the dependence of these upon structure and physical condition, as well as upon the conditions under which the wood was grown. The bulletin discusses the need, object and scope of the investigation, gives references to the work which has preceded the present investigations, and explains the methods pursued in them, while including the form of record and illustrations of the machinery used.

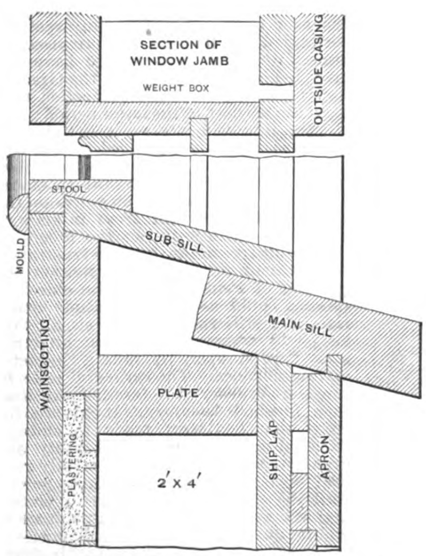


Detail of Pastry Table.—Scale, ½ Inch to the Foot.



Detail of Newel.—Scale, 1½ Inches to the Foot.





Details of Window Sill —Scale 3 Inches to the Foot.

Detail of Main Stairway.—Scale, ¼ Inch to the Foot.

Miscellaneous Details of an Illinois Dwelling.

SITUATION IN THE GRANITE QUARRIES.

AT THE TIME of writing, the situation in the granite industries of New England, as compared with a month ago, is practically unchanged, so far at least as the relationship between the unions and the quarry owners is concerned. The unions maintain what is practically their original position—namely, that no non-union workmen shall be employed and the bill of prices—*i. e.*, the contract between the employer and the workman, shall date from May 1 instead of January 1, as desired by the manufacturers. There is no question between the two of wages or hours of labor, the cause of the entire complication being included in the time for the adoption of the scale of prices under which the unions shall permit members to work, and their objection to the employment of non-union workmen. Under circumstances which seemed to indicate that the differences between the two might be adjusted, a meeting was held in Boston on June 2 and a thorough discussion of the situation was had, both sides being represented; but nothing satisfactory in the nature of a settlement was reached. The workmen firmly maintained their position and the employers also refused to yield. At a meeting of the Executive Committee of the Granite Manufacturers' Association, held on the same date as the meeting above referred to, a resolution was adopted and at a later date incorporated into the following agreement and submitted to the various manufacturers of New England for signature:

GRANITE MANUFACTURERS' ASSOCIATION OF NEW ENGLAND. BOSTON, June 18, 1892.

We, the undersigned, fully indorse and agree to sustain the following resolution, which was unanimously adopted at a meeting of the Executive Committee of the Granite Manufacturers' Association of New England, held in Boston, June 2, 1892:

Resolved, No settlement having been arrived at with the unions, we hereby open our yards to all men with whom we can make individual contracts, and we pledge ourselves to stand by and protect any and all employees who are now at work or may go to work in the future for members of this association.

....

Will you kindly sign the above and return to me immediately to 27 School street, Room 53?

....

Acting secretary.

Up to the present time it is stated that the agreement has been signed by a large majority of the manufacturers, the balance representing those from whom no returns have yet been received. In a statement to the public made by the Granite Manufacturers' Association reviewing the situation, it is alleged that what was apparently the initial movement began at Westerly, R. I., on April 1, with a demand by the local quarrymen's union for a level price for all quarrymen of 23 cents per hour. The manufacturers objected to the demand, as they were already paying capable workmen a fraction over 22 cents per hour, and claim that they were paying extra good workmen more than that amount. A strike was ordered and other allied unions, embracing various branches of the trade, also struck in support of the quarrymen. The situation became so serious that a meeting of the manufacturers was held to consider the matter and an offer was made to the workmen to sign contracts for wages, &c., to end with the calendar year, which offer, under the advice of the National Union, was refused, they preferring May 1 as a date for signing of contracts. The following notice was then issued by the manufacturers to the unions:

GRANITE MANUFACTURERS' ASSOCIATION OF NEW ENGLAND, BOSTON, May 5, 1892.

Members of this association shall stop work in all their departments with all employees on the evening of May 14 next, provided they do not in the meantime make agreements for 1892 in all localities, which shall terminate January 1, 1893.

It has been the custom to make agreements at different times in the year in different localities, and agreements for 1892 had been made in a number of cases, terminating January 1, 1893, and at the instance of the unions these agreements were withdrawn, owing to the refusal of the manufacturers to change the date in the same from January 1, 1893, to May 1, 1892. The employers maintain their preference for January 1 as the date for making agreements with the workmen upon the ground that that date is the time when their fiscal business year ends and is the most suitable time when they should determine the cost of production for the ensuing year. They claim that May 1, being the busy season, is the most inconvenient time for the adjustment of a bill of prices, and refer to their offer to sign an agreement for one, two, three or five years as an earnest of their fair and honorable intention toward the workmen. The statement of the Manufacturers' Association goes on to say that, "The charge of the unions that the association has compelled its members to break existing agreements with their workmen is denied and is untrue. This charge is based upon the claim that in some localities the agreements contained a clause that 60 or 90 days notice should be given of any change in the bill of prices. The employers have not proposed any change in the bill of prices. . . . If it were true that the employers had in any instance made demands for reduction of wages, or for increase in hours of labor, or for a change in the bill of prices under existing agreements, there would have been some grounds for the charge, but as it is there is none. The employers are willing to have the bills extended, not only to January, 1893, but even to January, 1, 1894, 1895 or 1896, if the workmen so desire. . . . The statement is made by the manufacturers that at the present time there are upward of 3000 men at work in the New England quarries, the number usually employed being over 20,000, and that many of the workmen now employed are men who were formerly union men who have voluntarily returned to work under agreements ending January 1, 1893. The workmen, on the other hand, claim that those men who are at work are non-union men, and a few old union men who have left their organizations in order to secure employment. The unions claim that their position is as strong as ever. It is expected that about 500 manufacturers, granite dealers and members of allied trades will sign the agreement cited above.

Since writing the above the Paving Cutters' Union of New York has asked the Granite Manufacturers' Association for a conference, the result of which will probably be known before this issue reaches our readers.

Building Trades Club.

The anniversary entertainment given at the club house of the Building Trades Club, 117 East Twenty-third street, New York City, on the evening of Monday, June 20, was a thoroughly enjoyable affair, in which a large representation of the members participated. On the date named the club house had been open just a year, and it was to celebrate the event that the entertainment was given. Shortly after 8 o'clock the guests assembled in the parlors, which were handsomely decorated for the occasion, and listened to an exceedingly interesting programme, which had been prepared by the enterprising House Committee. The first thing on the list was an address by President John J. Tucker, which, though brief, was directly to the point, and well received by the members present, who fully appreciated its fine points. The following numbers on the programme included a piano solo, singing by the Grammercy Quartet; recitations, by J. W. Macy; "Shadowgraphs," by H. S. Starrett, and a brief period of sleight-of-hand, by the Japanese illusionist and fantasist Loto Suuetaro.

After the literary and musical part of the entertainment had been rendered, Stephen M. Wright, the genial secretary of the club, invited the guests to adjourn to the main floor, where they would find refreshments both liquid and solid. The invitation was accepted with alacrity and full justice done to the good things so liberally provided. The last feature of the entertainment was an exhibition with the ivories in the billiard room by Professor Ericcsson. The entire affair was a success of which the house committee may well be proud. It showed that the club, although established but a very short time, has secured a large following, and is exerting a powerful influence for good in the building and allied trades in the city and vicinity.

Greek and Gothic Masonry.

As masons the Greeks carried the art of building to the highest excellence, says a writer in the London *Architect*. The Grecian architect possessed the means which his mind required. His elements were few. Scarcely any variety of structure was required from his art. He placed a larger number of columns around the more sumptuous edifice and a smaller number around the more humble structure; he raised the temple and the tomb. His career was definite; he saw the end of it. He was required to perfect rather than to invent. Grecian architecture submits itself to the judgment, and the judgment is satisfied. A problem has been proposed to which a perfect solution has been given. The Grecian architect performed all that he had promised to himself; all that he wished to have was given to him; and so soon did the Grecian style attain its wonderful perfection that from the earliest to the latest period a few elegant improvements, scarcely to be discerned even by the practiced eye—a few tasteful variations, rather to be described by the learned than felt by the spectator—are the only tokens which denote the progress of Grecian art from infancy to maturity. Such were not the labors of the Gothic freemason; he stops frustrated, but not in disappointment. Neither the quarries of Pentelicus nor the chisel of Phidias could assist him. Rude materials and still ruder hands were all that he could command. His architecture must depend upon its innate character and significance. The cathedral is to be considered rather as a forethought than as a finished specimen. It exhibits the effort that has been made to embody those abstract ideas of solemnity and grandeur which could not be fully realized or accomplished by human power. Still the effect has not failed; Gothic architecture appeals to the imagination, and fancy half supplies the deficiencies of the material scene. A Gothic building has always the charms of mystery; it always appears to be larger than its actual dimensions. The moldings, the pillars the arches, always create receding shadows, and to the mind the idea of space arises from a succession of shadows, just as the conception of time results from the succession of ideas.

CORRESPONDENCE.

Problems in Roof Construction.

From L. V. V., *San Francisco, Cal.*—Acting on the suggestion of "S. E. D.," in the January issue of the paper, I wish to ask a few questions, which I consider original, with regard to roofs, as I fail to find them treated in any works touching the subject of carpentry. I am often asked "Can you frame a roof?" I answer "Yes, all on the ground, if it does not contain a tower intersecting with the main roof." My plan, referring to the sketch, Fig. 1, is to run the plates A B and C B clear to the corner D, letting the hip E D extend the whole distance. I then sheet the main roof and cut and guess at the tower rafters, fitting them on top of the sheeting. I would do the same with tower K, letting the plate A L run clear through, sheeting the main roof and fitting the tower rafters on the sheeting. In the case of the tower O, where the plate C L and the tower plate are both complete, the tower rafters may be run to the plate before sheeting. Now, I would very much like to know how other practical readers of the paper would do this work, and if there is a way for finding the length of the rafters without any guess work. I notice architects occasionally lay down the seats of tower rafters that come on the main roof, giving it a shape similar to R R in the tower K. If I knew how to find the line of seats, I think I could soon discover a way for obtaining the length and bevel of the tower rafters. I have asked this question of many mechanics and have failed to obtain an answer.

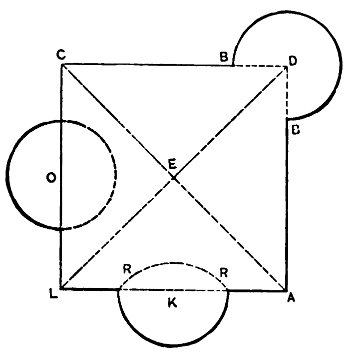


Fig. 1.—Sketch Accompanying Letter from "L. V. V."

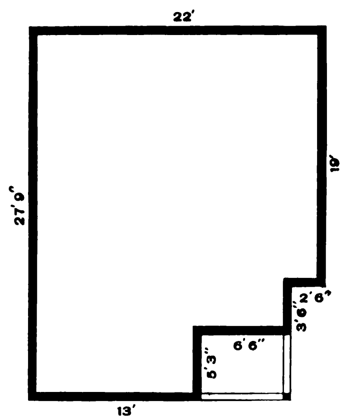


Fig 2.—Plan Submitted by "J. C. B."

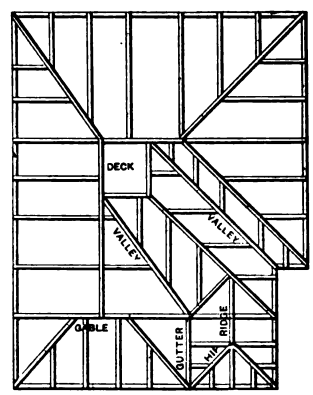


Fig. 3.—One Method of Framing Roof.

Problems in Roof Construction.—Diagrams Submitted by Different Correspondents.

From J. C. B., *Hamilton, Ontario.*—Will some of the readers of *Carpentry and Building* solve for me a problem in the construction of a roof based on the plan Fig. 2, and showing a small gable in the front. My sketch marked Fig. 3 represents the method which I consider the best, but I am not satisfied with it, as it leaves a hollow at the foot of the front valley. This would allow the snow to collect. If some of the readers will help me in this matter I shall be greatly obliged.

Roof Framing.

From J. E. S., *Jacksonville, Ill.*—The rule or method which I send with regard to framing a roof is intended as an answer to the inquiry of "C. D." of Des Moines, Iowa. The method is a simple one and the work quickly done with correct results. It is what is known as the "17" rule, and though I find a number using it, there are a great many who do not understand it. The only thing I employ is a steel square, a bevel and a 10-foot pole. For a square pitch roof take 12 and 12 on the square for the cuts on the main rafters, and to save time in stepping off with the square for the length, take the bridge measure of 12 and 12, which is 17 inches. Multiply by one-half the span of the roof, as, for example, if a 16-foot span, $8 \times 17 = 136$ = 11 feet 4 inches, which is the depth of the main rafter. For the hip or valley, take 12 on the tongue and 17 on the blade. The 12 gives the top or plumb cut and the 17 the bottom or seat. To obtain the length, multiply the bridge measure of 12 and 17, which is $20\frac{13}{16}$ inches by one-half the span, thus: $20\frac{13}{16} \times 8$ = 13 feet $10\frac{1}{2}$ inches. For the jacks, 12 and 12 give the top and bottom cuts. Take the thickness of the stuff square across from plumb cut for side bevel. With regard to the length of jacks, if they are 18 inches between centers, each jack will be $25\frac{1}{2}$ inches shorter than its predecessor. Take the bridge measure of 12 and 12, which is 17, and if 18 inches between centers, multiply $17 \times 1\frac{1}{2} = 25\frac{1}{2}$. If they are 16 inches between centers, then $17 \times 1\frac{1}{3} = 22\frac{2}{3}$ inches, which represents the amount each rafter is shortened. This method may be continued for whatever space may be employed between centers. Now, for any other pitch, the same rule may be used, except if the pitch is 8 and 12, take these figures for the main rafter and 8 and 17 for the hips and valleys. If the pitch is 10 and 12 for the main rafters, take 10 and 17 for the hips and valleys, and always multiply the bridge measures of whatever pitch is employed by one-half the span to find the length.

Concerning Better Workmen.

From R. S., *Strenacum, County Antrim, Ireland.*—Being a reader of *Carpentry and Building,* I would like to make a few remarks concerning the subject of better workmen. For my part, I do not believe they are to be obtained. Look at the old houses and round towers and furniture in England and Ireland, and consider the patience possessed by our fathers 50 years ago—moldings wrought by hand for doors and windows Then look at the furniture, presses, tables, chairs, &c., and consider the time that was spent on them. Now in this country, as well as America, everything seems to be for speed and short cuts. Leave the trade as it is—no man can make a good finish on his work except he have patience and plenty of time. He cannot get the time, as he is under large pay and his employer must push the work as rapidly as possible in order to pay his men and leave a profit for himself. Then look at the planing mills turning out moldings, mortising, &c., and the question arises, Does this improve the workmen in their handicraft, or does it leave them worse? for the mills take away the art of using tools of different kinds. The town carpenter is learned in one branch of trade—that is, house building—while it is very different with the country carpenter. He must know not only house work, but glazing, painting, varnishing, polishing, cart making, wheel manufacture, and how to produce all kinds of furniture. No doubt there are some in the towns who have learned all these crafts, but not many, as they do not get the chance. I think it would be good for them and their employers if they did. I have a small shop and different kinds of work come under my supervision requiring a great many tools to do the work. I would say to all workmen, take an interest in your trade and be a good mechanic. The plan nowadays is big pay and poor workmen. Another grievance is the whisky shop. Workmen should keep away from it and if they have any money to spare put it into tools or books and make their homes happy. I would like very much to see more designs of furniture, picture frames, book-cases, &c., and to know that every one is doing what he can for *Carpentry and Building.* I hope I have not offended any of my brother chips with regard to the subject of better workmen and I trust that others will offer an expression of opinion on this point.

From H. T. B., *Sardis, Ky.*—With regard to the letter from a correspondent which appeared in a recent issue, giving reasons why we do not have better workmen, I would say I will join the union with "J. C. McF.," on his quality-of-work plan, as every four months jag leg who can use a hatchet thinks himself first class, and is dumbfounded when I tell him I have worked at the carpenter's trade 24 years and have reached the conclusion that I do not, as yet, know anything about it.

From G. W. W., *Woodlawn, L. I.*—In *Carpentry and Building* for March, "J. C. McF." of Richmond Centre, Wis., attempts to tell us why we do not have better workmen. I beg to ask him if he thinks he has answered the other correspondent when he tells all he does not know about the system adopted by the Carpenters Union? He asserts that it makes no difference as to the quality of the work, for so long as the workman belongs to the union he gets the same wages as the best of them; accordingly, there is no inducement for him to become an expert at the trade. I submit that such is not the case at all, for the union names the rate of wages below which a member shall not work, but does not say that he shall not go above the rate. In fact, he is allowed to get all he can. Therefore, if a man is worth more he gets it. As to the apprentices, does your correspondent think it better to have six apprentices to one journeyman than one apprentice to six journeymen? Does he think that a superabundance of apprentices is the way to make good workmen? Does he not realize that where there are too many apprentices they are likely to work a single year in a given shop and then go to another and represent themselves as journeymen? It is matters of this kind that the union ought to stop. The union ought to be able to compel all apprentices to serve four years, and that is exactly what it is trying to do. Your correspondent says he is not opposed to organized labor; on the contrary, he is in favor of it. I trust he does not mean convict labor, where men are organized against their will. "Mr. McF." would make quality a requisite for admission to a union. I would like to ask him if he ever made application to a union, else how does he know that quality is not required in a union? He would make quality a requisite and not numbers, for therein lies the danger and the strength. What danger does he mean? Does he think there is danger in being strong? If that is the case it is something new. He says he does not propose to start out as a reformer or inaugurate any movement to break up existing practices. For my part I think he could do a good deal by reforming right around home, and perhaps it would be well for him to break up existing practices in his own neighborhood before he tells the readers of *Carpentry and Building* what he does not know about the Carpenters' Union. In my own judgment the gin mills of the country have more to do with making bad workmen than any other one cause.

From UNION, *New Albany, Ind.*—I like very much to read the correspondence which appears in *Carpentry and Building*. As "J. S. McF." of Richland Center, Wis., occupies a great deal of space to say nothing, I think possibly I can do as well. He says it makes no difference as to the quality of work, so long as the workman belongs to the union he gets the same wages as the best. I would like to ask what union pays that way? Again, the correspondent says he is not opposed to organized labor, but favors it, though not the system in vogue at the present time. My advice to him is to join some union of the brotherhood and study the constitution before writing any more on organizations.

Size and Strength of Truss.

From P. J. K., *Phillipsburg, Mont.*—I notice in the March issue an inquiry from "E. E. C." of Whitesboro, N. Y., for a rule by which to calculate the size of timber in a truss to sustain a given load. In reply I would refer him to a work which I have used and which I consider the best publication on trusses, tensile strength, &c., that I have ever seen. The correspondent named will find the book advertised in *Carpentry and Building*. It is called "Bell's Carpentry Made Easy, or the Science and Art of Framing."

Ventilator for Small Cottage.

From E. F. R., *Tullahoma, Tenn.*—I am a young man in the craft, and therefore do not submit the sketches which I send as perfect examples to be followed by others, but rather in an effort to answer the question proposed by "H. V. M.," which appeared in the September issue of *Carpentry and Building* for 1891. What I have to say relates to my method of making a ventilator for a small cottage. This being the first job under my control, there were many things which were forgotten in making out my bill, and among them was that of ventilators. I therefore went to work to make them. In the first place I found a 10-inch plank, from which I cut a square panel 10 x 18 inches. In it I bored a number of ½ and ⅞ inch holes, as indicated in Fig. 1 of the sketches. I had left over some 2-inch water table, which I returned around the edge of the panel shown in Fig. 1, placing the outside edges as shown in Fig. 2. In the next place I made a raised panel for the center. I cut four pieces of water table in the miter box, sizing to ½ inch, and placing the beveled edges together as shown in Fig. 3. This completed the various parts of a 14-inch ventilator for a 14-foot gable, and when in position it had the appearance indicated in Fig. 4. A proportion which I think will be found to give very satisfactory results is 1 inch for every foot, as in the case of the ventilator I have described. If the readers are interested in the matter, I shall take pleasure in the near future in telling how I ventilated a barn 42 x 52 feet and three stories in hight.

Note.—We are very sure there are many readers of the paper who will be interested in the method employed by our correspondent in ventilating a barn of the size named, and we trust he will see his way clear to send us the sketches with full descriptive particulars at an early date.

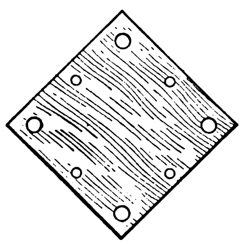


Fig. 1.—Panel with ½ and ⅞ Inch Holes.

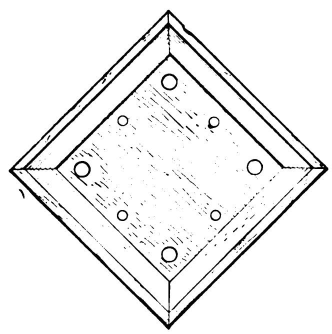


Fig. 2.—Panel with Border in Place.

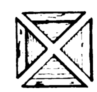


Fig. 3.—Raised Panel for Center.

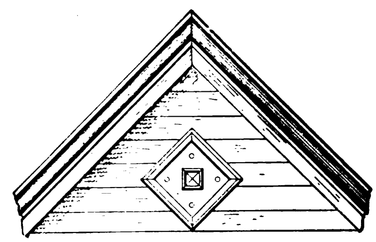


Fig. 4.—Ventilator in Gable.

Ventilator for Small Cottage as Suggested by "E. F. R."

Concrete Walls.

From J. J. C., *Lexington, Ky.*—In the March issue of *Carpentry and Building*, page 77, is an article referring to concrete walls. I would like very much to find out in what proportions the material is mixed, the ingredients employed, how the concrete is put on the wall, and, in fact, all about it, including cost, &c.

Note.—The article in question was reprinted from one of our exchanges, and we have no means of ascertaining just the proportions employed by the writer, but it is possible that among our readers there are those who have had experience in building concrete walls, and can furnish "J. J. C." with special information which will enable him to secure satisfactory results.

A Peculiarity of Pine.

From J. W. S., *Paterson, N. J.*—Will some of the readers of *Carpentry and Building* tell me why white pine wood is so shaky, some of it being so bad that it is useless for almost any purpose? Some say it is because the wood grows too fast. I would like to have those who are familiar with pine wood and its characteristics enlighten me on this subject.

Deadening Floors.

From F. A. L., *Springvale, Maine.*—I desire to ask for information as to the best means of deadening sound in a building, which is 45 x 50 feet in size and three stories in hight. The ground floor is used for stores, the second is occupied as a tenement, while the third is devoted to an Odd Fellows' hall. The claim is made that the noise in the hall can be heard by the tenants below, and also on the ground outside. The structure is thoroughly built and is really a very fine hall, being fitted specially for the Odd Fellows. The owner is a member of the order and has endeavored to have the building first class in every respect. The matter is creating quite a sensation in the lodge, and I desire to ascertain what can be done to remedy the difficulty.

Note.—From the information given by our correspondent, we are inclined to think the most convenient method of remedying his difficulty will be to construct a secondary or double floor and fill in the spaces between the furring strips which are nailed on to the original floor with mineral wool. We would suggest that if this plan be adopted our correspondent place heavy felt under the furring strips before they are nailed down in order to deaden the sound that might be conveyed through them and the floor joists to the rooms below. Mineral wool is a very good non-conductor of sound and owing to the ingredients of which it is composed is not subject to decay, while affording protection against insects and vermin. Another method which might be suggested is to take up the present floor of the hall and place over the floor joists heavy building paper or felt in such a way as to allow it to sag a few inches between the joists. This will serve to cushion the sound and prevent much of it from reaching the floors below. In case mineral wool is employed and the double floor does not serve to keep all the sound within the hall, it will probably be necessary to fill the spaces between the studding with mineral wool, running it from the floor to the ceiling of the room. Our correspondent has a somewhat difficult and expensive job before him, and after completing the work there is the chance of having it rendered unsatisfactory through some slight defect in execution. If our practical readers can assist the correspondent above we shall be glad to publish their letters.

Shingling Hips.

From E. A. M., *Painesville, Ohio.*—In the February number I saw an inquiry for a practical way to shingle a hip roof, and in reply will give my method, which is in general use in this section. We turn a hip with three shingles, cut in the manner indicated in Fig, 1 of the engravings, the dotted lines representing the shingle before cutting. No. 1 is cut on one side, while the opposite edge rests on the hip. After it is laid, the edge is cut down with a chisel, so that a straight edge will lay flat on the other side of the roof. Lay one course on one side, and then lay the next course on the same side of the hip. The following hip shingle will lap over two edges, as indicated in Fig. 2 of the sketches, thus making a lock joint.

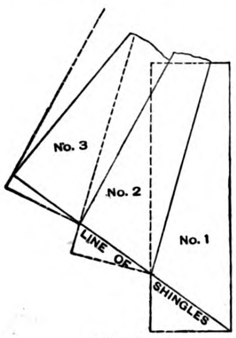


Fig 1.

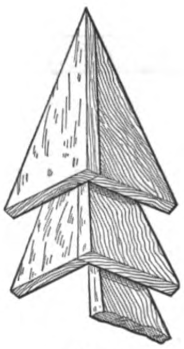


Fig. 2.

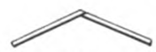


Fig. 5.

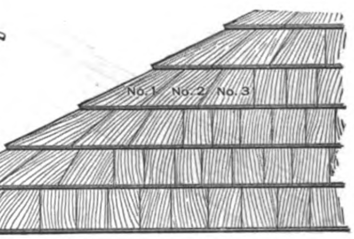


Fig. 6.

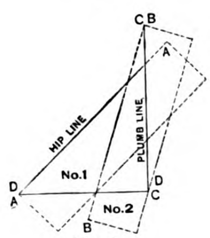


Fig. 3.

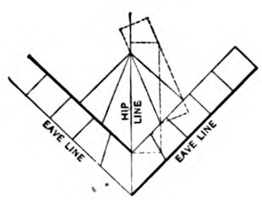


Fig. 4.

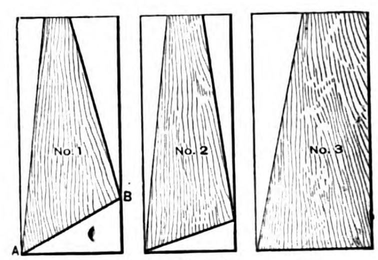


Fig. 7.

Shingling Hip Roofs as Suggested by Various Correspondents.

From E. D. D., *Washington, D. C.*—In answer to the inquiry of "A. W. P." of Buffalo with regard to shingling hip roofs in a neat and satisfactory manner, I submit sketches which show my method of doing the work. I always prepare the shingles before the job is commenced so that they are ready to lay on the roof and the tips are all the right cut for the valleys. By this means no shingles are lost and I kill two birds with one stone (so to speak). Referring to the sketches I placed the top edge of shingle No. 1, indicated in Fig. 3 of the sketch, to correspond with the hip and top edge of No. 2. The dotted lines indicate the shingle before cutting. The hip line is represented by A A. Bisect No. 1 at B and B and No. 2 at C and C. The plumb line cuts both. The level line is D D. I nail the hip 2 inches from the bottom point, and the result is indicated in Fig. 4 of the sketches. In Fig. 5 is represented the bottom end, showing the bevel lap over the hip.

From J. M. B., Jr., *Burlington, Pa.*—In the sketches which I inclose, Fig. 6 represents one side of a hip roof, the shaded parts showing the shingles which are cut, there being three on each side of the hip. No. 1 goes next to the hip and is the first shingle on the hip. No. 2 follows, and then comes No. 3. It will be noticed that the butts of Nos. 1 and 2 of Fig. 7 are cut on a bevel and that No. 1 has a more acute angle than No. 2. The shingles are laid so that the line A B is parallel with the line of the eaves, or to the line by which they are laid. Of course different pitches require different bevels. The way I cut the shingles is to first take five or six at a time, mark the top one by bevel or pattern, and then saw them at one cut. Then when I place them in position I hew off the edges with my hatchet to suit and neatly dress the edge next to the hip with a paring chisel. No. 3, shown in Fig. 7 of the sketches, is cut tapering on one side so that it is narrower at the top than it is at the bottom, for the purpose of bringing the butt parallel with the line. The advantages of this are that there are no small triangular corners to warp and split off. It takes, however, more to shingle in this way than where only one shingle is cut to each course. The shingles are laid according to what is designated by some people as weaving—that is, the hip shingle is laid, the edges next to the hip dressed flush with the plane of the roof as of the other side of the hip, and the one on the opposite side laps over the edge of the first one, each course lapping over the edge of its opposite side. This plan gives a hip which needs no ridge of boards and looks much better without them.

Store Fixtures and Shop Work.

From F. B., *Delavan, Ill.*—I should very much like to see published in an early issue of the paper some expressions of opinion about store fixtures, such as shelving, counters, &c. It requires no little skill to get out work of this kind and arrange it properly, and I think some attention to the subject would prove beneficial to many in the trade. Another point that might prove interesting is in regard to shop work. I do not think it would be much out of the way for some one to give hints about the different work which could be turned out in the shop; such, for example, as making window frames of different styles, kitchen cupboards, fixtures for pantries and open work for porches, &c.

Plans for a Carpenter Shop.

From J. C. H., *Cleveland, Ohio.*—I would like to see plans for carpenter shops, both large and small and with and without power. I think drawings and descriptive matter of this kind would prove of great interest and value to many in the trade, and certainly to myself, as I am about to start in business.

Economy and Strength of Timber.

From H. B., *Justus, Ohio.*—Will some of the readers of the paper who have had experience in heavy frame work kindly give me through the columns of *Carpentry and Building* their idea of making heavy beams out of plank? For example, suppose I want to put a cross beam 10 x 10 inches and 40 feet long in a barn, the beam to be of pine. Now, which makes the stronger and cheaper beam, the solid stick or one made of pine plank 2 x 10 inches and 10 feet long bolted together, or, for that matter, any length of broken joints, counting bolts, washers, labor and everything to prepare both sticks ready for the frame in the barn?

Oil for Tools.

From T. D., *Havelock, Iowa.*—In reply to "E. I. H.," Galva, Ill., whose inquiry appeared in the March number of the paper, I would say that I use 1 part coal oil and 2 parts best lard oil mixed for the purpose named. I have used this mixture several years and it gives entire satisfaction.

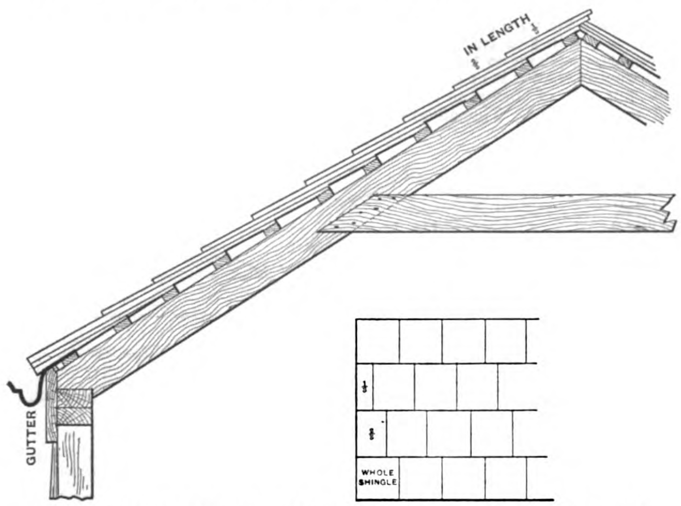
From M. H. T., *Michigan City, Ind.*—In answer to "E. I. H.," Galva, Ill., whose letter of inquiry appeared in the March number of the paper for this year, I would say that I have worked with tools for 20 years and never found anything better for them or oilstones than common lamp oil.

From A. T. S., *New Albany, Ind.*—If "E. I. H.," Galva, Ill., will take a pint of linseed oil, 1 ounce of beeswax, 1 ounce of tallow, and heat until the wax and tallow are melted, which the oil will hold in solution, he will have a good preparation or preventing tools from rusting. It is only necessary to rub the tools well with this preparation in order to secure satisfactory results.

From X. O. O. X., *Hinsdale, Ill.*—In the March issue of *Carpentry and Building* I notice an inquiry from "E. I. H.," Galva, Ill., in regard to oil for tools. I heartily recommend sperm oil, with a very little coal oil to cut it, and well mixed together. I find this best for an oil stone, and also for the purpose of keeping tools bright and clean. The mixture also possesses the advantage of being cheap.

American Shingle Practice.

From J. A. M., *New Brunswick, N. J.*—In answer to W. J. McQuillen of Port Blair, East Indies, I would say that in this locality we use cedar, pine and cypress shingles. The pine and cedar are sawn on a circular saw, while the cypress shingles are split or rived. Pines and cedars are 24 inches long and are laid $7\frac{1}{2}$ inches to the weather. This allows the end to lie on the lath and makes a roof three shingles thick, as shown in the accompanying drawing. The cedar shingles are 5 inches wide and $\frac{5}{8}$ to $\frac{1}{8}$ inch thick. The pine shingles are $\frac{1}{2}$ to $\frac{1}{16}$ inch thick and of a width varying from 2 to 15 inches, 5 inches counting for a shingle. The bundles are 25 inches wide and count five shingles to a row, 40 rows in a bundle of 200. The cypress shingles are 7 inches wide, 20 inches long and are laid 8 inches to the weather. We always start with the points, cutting the shingles into lengths of one-third and two-thirds, and using the points on the eave. The butts are used on the ridge. All shingles are laid on $1\frac{1}{4}$ x 2 inches spruce lath, placed to correspond with the shingles, as, for instance, in the cypress, showing 8 inches, we lay the lath 8 inches on centers. We seldom, if ever, use less than a two-thirds pitch, and very often more. The rafters are usually 2 x 6 or 2 x 8, and are generally set 2 feet on centers. Shingles for roofs are seldom painted or dipped in this locality, but for side inclosure they are frequently dipped in paint, or a shingle stain, of which there are many kinds on the market.

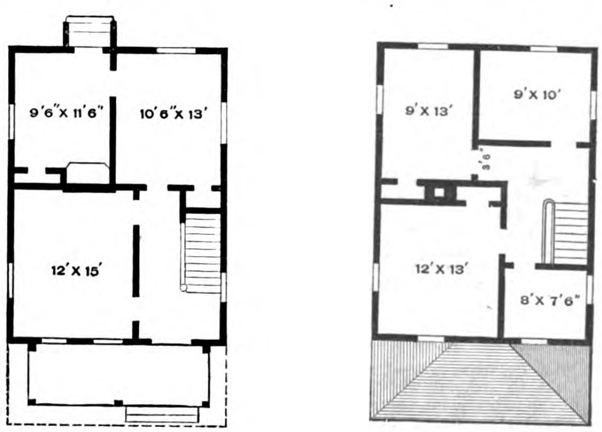


American Shingle Practice.—Sketch Accompanying Letter of "J. A. M."

From J. E. H., *Birmingham, Ala.*—I notice in the paper for February of the present year a letter from W. J. McQuillen of Port Blair, East Indies, asking about American shingle practice. With regard to this part of the country I would say that rafters are generally 2 x 4 inches, placed 24 inches on centers. The sheeting is of 1-inch stuff, running from 3 to 6 inches wide, and sometimes as much as 12 inches wide. The open space between ranges from 2 to 3 inches. Shingles are of hard pine and cypress, 4 or 5 x 18 inches. They are $\frac{1}{2}$ inch thick at the butt end and taper to nothing. They are laid about $5\frac{1}{2}$ inches to the weather and nailed on with 3d cut nails. We seldom, if ever, use a preservative. The shingles last from 20 to 30 years. Our roofs are put on for the most part at an angle of 45°.

Plans for a Small House.

From T. B., *Headingly, Manitoba.*—In a recent issue of *Carpentry and Building* "W. P. R.," Cleveland, Ohio, asked for plans of a small house. I inclose sketches showing floor plans of this kind, which I think will be readily understood. I give only the floor plans, so that the correspondent may employ such elevations and roof construction as may best suit his requirements. The house could have either a hip or pitch roof to advantage.

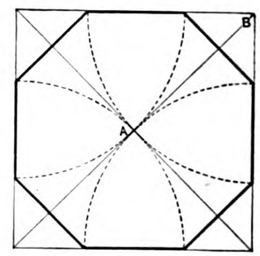


First Floor. Second Floor.

Floor Plans for Small House Submitted by "T. B."—Scale, 1-16 Inch to the Foot.

Laying Out an Octagon.

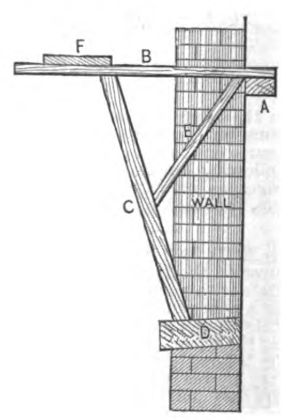
From H. T. B., *Sardis, Ky.*—I have noticed plans for octagons from various correspondents and take the liberty of submitting a simple method which I employ in laying out one of any size when the diameter is given. Suppose, for example, the diameter is 3 feet. First, get the square, then the distance from A to B from each corner and mark across. The sketch which I send so clearly indicates my method that further explanation would appear to be unnecessary.



Method of Laying Out an Octagon Suggested by "H. T. B."

Bracket Scaffold.

From H. M N., *Sandwich, Ill.*—The matter of staging or scaffolding is often an item of no little expense to the builder, both as regards time and money. There are instances where brackets might be used with good results. Some time since I saw a scaffold made with brackets, and send herewith a sketch, thinking it may prove interesting to the readers of *Carpentry and Building*. The bracket here shown was designed to be used on a brick building, the wall being 12 inches thick. Referring to the drawing, A represents a piece of 2 x 4 stuff about 4 feet in length, or long enough to reach across and catch on the wall each side of a

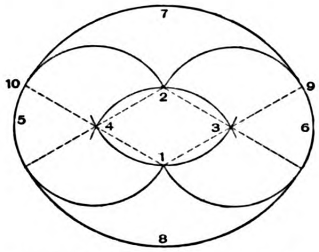


Bracket Scaffold Described by "H. M. N."

window; B is an arm, on which rests a staging plank; C is the principal brace, with foot resting on the stone sill D, while E is a short brace to support the side end of B. The workmen stand on the stage plank represented by F. This bracket in most cases can be made of a piece of 2 x 4 inch stuff 14 feet in length. Eight or ten 20d spikes fasten it together. It is well to put a piece of iron stuff 2 feet long, angling from A to B, to prevent side movement of the latter. The bracket as shown was designed by a prominent builder of Elgin, Ill., the idea being evidently suggested by something similar.

Striking an Ellipse.

From L. S. F., *Beatrice, Neb.*—I learn of a great many useful methods of doing work by being a careful reader of *Car-*



"L. S. F.'s" Method of Striking an Ellipse.

pentry and Building, especially of the correspondence columns. I take the liberty of sending what I think is a new way of making ellipses. I have some valuable books showing nearly every conceivable way to draw an ellipse, but I have seen none like the method which I send, and so far as I know it is original. For any ellipse of given width set the dividers to one-third of its width. Referring to the sketch, set one point of the dividers at 1 and strike the arc 4 2 3. From the point 2 strike the arc 4 1 3. From 3 strike the arc 2 6 1, and with one leg of the dividers at 4, strike the arc 1 5 2. Now place one point of the dividers at 1 and spread them until the other leg touches at a point near 5; then strike that portion of a circle represented by 10 7 9. Now, with 2 as a center, strike the other side of the circle 8. An advantage of this method is that by having the width given, the rest can easily be made, with the result of always having a well-proportioned ellipse.

Squaring Foundations.

From A. L. B., *Nebraska City, Neb.*—Will some of the practical readers of the paper kindly inform me of the usual or best method to square the foundations of a house?

Note.—Without attempting to anticipate the replies which, we have no doubt, the practical readers of the paper will be glad to furnish in response to the request of this correspondent, we would say that there are several methods of accomplishing the end sought. One of the simplest, and, therefore, probably the easiest method which our correspondent can employ, is the 6, 8 and 10 rule, with which the majority of our readers are, doubtless, familiar. We lay the request before the practical mechanics in the trade, and trust they will freely respond.

A Few Thoughts on Estimating.

From O. L. W., *Dallas, Texas.*—I notice most of the writers advise the use of methods of estimating roof surfaces which are more or less complicated and tedious. While they are correct in theory and general in application, it seems to me there are special rules which could be employed to greater advantage. For example, take a roof having the same pitch throughout, and 99 of every 100 are of this class, its surface being at a constant ratio to the horizontal plane which it covers. This ratio being the same as the run to the length of a common rafter, is easily found. To apply it, we take the floor space and add to it the horizontal projection of the roof over the walls, multiply this sum by the length of a rafter for 1 foot run, and we have the roof surface regardless of the number of triangles, trapezoids or other forms which the roof contains. As a further illustration, take a room 16 x 16 feet covered by a roof of half pitch and projecting 18 inches horizontally over the walls. Multiply 16 x 16 and we have 256; to this we add the square feet in the projection all round, which is 105 feet, making a total of 361 feet. Multiply this by $1\frac{5}{12}$ and we have 511 feet for the roof.

Hoops for Water Tanks.

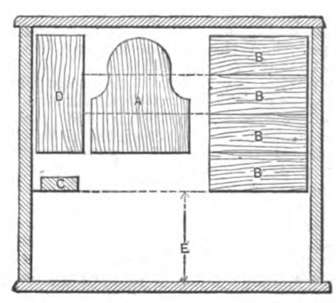
From E. B. G., *Ripley, N.Y.*—I am particularly desirous of ascertaining how to obtain the length of hoops for water tanks. I work for a railroad company and we build tanks. The tubs have 16 feet staves and are 24 feet across the bottom. We put on nine hoops. Now, I want to know how to get the lengths of the hoops, so it will be unnecessary to scaffold outside of the tubs, which are set up on a substructure 24 to 26 feet in hight. I have to build a scaffold from the ground up and get the length of hoops by a traveler wheel. If any of the readers can help me in this matter I should be glad to have them do so, as I have no doubt the matter will be of interest to others as well as myself.

Tinting Plastering.

From G. P. S., *Leavenworth, Kan.*—Will some of the numerous readers of *Carpentry and Building* inform me how the white coat of plastering is tinted, and whether the color affects the durability of the plaster?

Design for a Tool Chest.

From M. H. T., *Michigan City, Ind.*—In answer to "J. E. H.," in a recent issue of the paper, I will try in my humble way to give him a few points in tool-chest construction. The principal feature in my estimation is the tool or work box, as some call it. I will say that my chest is 21 x $34\frac{1}{2}$ inches in size and $19\frac{1}{2}$ inches deep, inside measure. There are four tills running lengthwise; one above; the other at the back of the chest. They are $2\frac{1}{2}$ inches deep by $7\frac{3}{8}$ inches wide, inside measure, with partitions to suit. All are made of $\frac{3}{8}$-inch poplar. There is a saw till in the front, measuring 4 x 8 inches, leaving a space in the center or between the tills of a little more than 8 inches to



Design for a Tool Chest.—Fig. 1.—End View of Chest.

receive the tool box, to which I first referred. This is 8 inches wide over all, and just long enough to go in the chest and rest on the strips on which the third till slides when the work box is out. I think I need not say much about the use of this box, as all workmen are familiar with it. The point I desire to make is in regard to having the box fit in the chest and to keep in it the tools that are mostly used. It will save loss of time and bother packing and unpacking, as when starting for work it is only necessary to lift out the tool box, and when returning from work restore it to its place in the chest. In my estimation it is one of the handiest things in the tool chest, and many others must think the same, as they have patterned their chests after the one described. The sketches which I send will make my meaning clear. Fig. 1 represents an end view of the chest, the tool box A being shown in position. The tills are represented by the letters B B B B, while D is the saw till and C the level and sliding shelf under the saw till. E

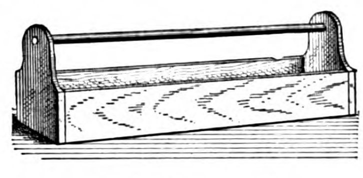


Fig. 2.—The Tool Box.

represents the space below. Fig. 2 of the sketches shows the tool box made of $\frac{5}{8}$-inch poplar, with a turned handle of ash $1\frac{1}{4}$ inches thick. Each piece is set in on a rabbet $\frac{5}{16}$ inch thick, so that all can be lifted out.

Design for a Hennery.

From R. R., *Wheeling, W. Va.*—I would like it if some of my brother carpenters would contribute for publication a good plan for a hennery. I am about to build a first-class hennery not far from this place, and I should be glad to receive suggestions from practical readers of the paper.

Note.—The subject mentioned by our correspondent has already received more or less attention in these columns in the past, and it is possible that he may be able to obtain useful suggestions from an examination of what has already been published. If he will refer to page 72 of the March issue of *Carpentry and Building*, and also to page 194 of the August number for last year, he will find designs of a hen house which may prove of interest in this connection. The subject, however, has not by any means been exhausted, and we shall be glad to have from our practical readers such designs and descriptive matter as they may see fit to furnish.

Joists Required for a Building.

From L. J. A., *Atlantic Highlands, N. J.*—In the June issue of *Carpentry and Building* appeared a letter of mine in reply to a correspondent, and I hasten to correct a grave error, seemingly on my part, before the storm breaks on my unprotected head. I imagine I already hear the thunder. In answer to "L. J. N.," Lincoln, Neb., I intended to say that *from* the length of the building in feet deduct one-fourth and to the remainder add one. The sum will be the number of joists required, and if the remainder should contain a faction, add one more. The only excuse I can offer for the examples which I gave is, that at the time I was busy figuring on a job and trying to read *Carpentry and Building*. As I happened to be working out my joists just at the time my eye caught the request of "L. J. N.," I thought it a good opportunity to dip in my oar. I am sorry, however, to think that I caught a crab at the first stroke. I will only say the building I was working on at the time was 60 feet long and, according to my rule, required 46 joists 16 inches from centers. For example, $60 \div 4 = 15$ and $60 - 15 = 45 + 1 = 46$.

The Science of Handrailing.—IV.

From MORRIS WILLIAMS, *Scranton, Pa.*—My aim in this article will be to explain the method of obtaining the bevels to square the wreaths. The straight plank intended to form the wreath, when the face mold and these bevels are correctly applied, will be transformed into an elliptical twisted form that will, when located in the oblique plane or pitch plane of tangents, follow the curve of the base, while its sides will stand uniformly plumb with the side of the straight rail of the flight. The manipulation of these bevels is called by workmen "squaring the wreath." I think it advisable to use diagrams freely, inasmuch that finding the correct bevels is universally considered to be one if not the most difficult branch of the science of handrailing.

The isometrical diagram, Fig. 19, clearly illustrates the principle and the use of the bevels. It will be seen that they are governed by the tangents. I make use of the figures 1, 2, 3, 4 to mark the outlines of the section, as in all my previous diagrams.

The line 4 3 of the top section, Fig. 19, is clearly shown to be lower than the line 1 2; also the line 3 2 is lower than the line 4 1. The difference in hight between these lines respectively will be the hight of the triangle which constitutes the bevel. The assumed bevels on the section are made use of for illustration to show their relation to the angles and plane of the section. The method of applying the bevels is shown on both ends of the wreath piece. The bevel 5 9 5 is shown applied to a part of the top rail, instead of to one shank, because it can be shown to better advantage. I wish to impress upon the minds of those who follow me the importance of a thorough knowledge of the principles of these bevels, and I would therefore say, study Fig. 19 thoroughly.

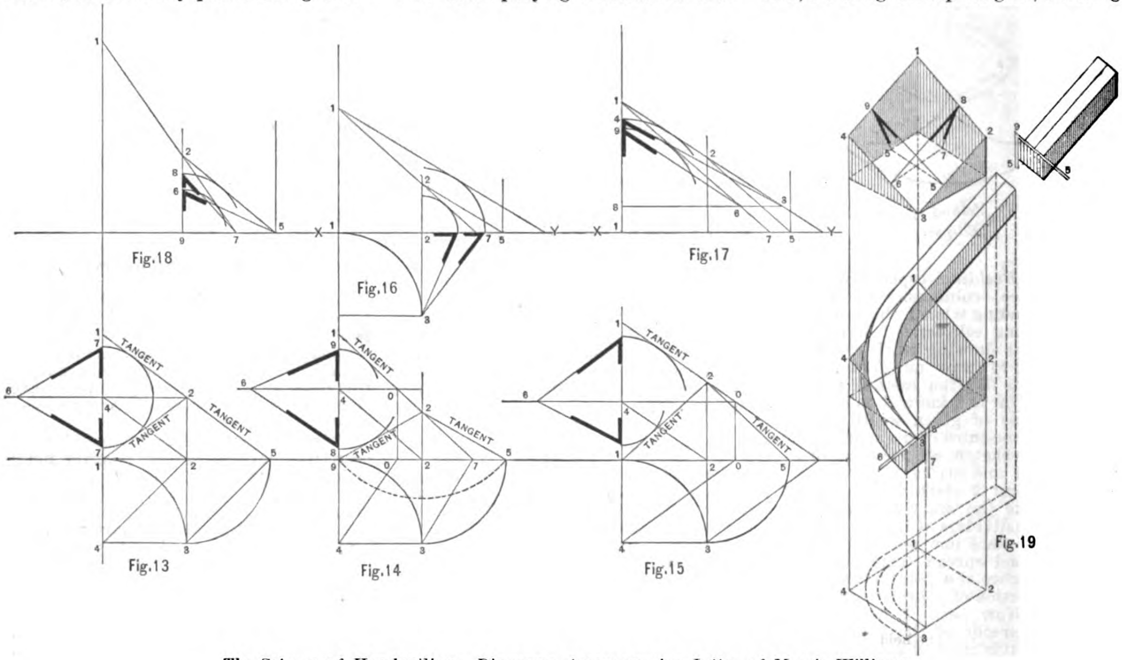
As previously stated, the bevels are governed by the tangents; also the tangents have been shown to constitute the shape of the section. Cut a square block horizontally, and the shape of the section will be similar to the shape of the base. No bevel is therefore necessary. Any deviation from a horizontal cut necessitates a bevel. When the section is oblique to one side of the block only, one bevel only is needed, and the principle of obtaining this one bevel is similar to what is used in obtaining a simple shed-roof rafter. The hight of the section is taken for hight, and one side of the block, or the tangent on plan, is taken for run. The intersection of the hypotenuse with the perpendicular gives the bevel.

When the section is oblique to both sides of the block two bevels are needed, one for each tangent or each end of the wreath piece, and here lies the main difficulty of the bevels. The difficulty is created by the peculiar shape the section assumes, two of its angles being acute and their corresponding angles being obtuse. The base of the level must be the length of a square horizontal line across the section, and the hight, or the perpendicular of the bevels, must be the length of hight from the lowest side of the section to the upper side, which will be a line forming a right angle with the line of the base. As in all right angle triangles, the upper angle formed by the conjunction of these two lines with the hypotenuse will be the bevel. The upper section of Fig. 19 clearly illustrates what I am endeavoring to explain. There are various methods in use by handrailers to obtain these bevels geometrically.

The accompanying illustrations show four different methods. In Figs. 13, 14 and 15 the same method is shown, the only difference being in the pitch and length of the tangent. Fig. 13 has the tangent of the same length and pitch; Fig. 14 has the tangents of different length and pitch, the top tangent being steeper than the bottom tangent, while Fig. 15 is the reverse of Fig. 14.

Referring now to Fig. 13, from the point 4, from which the curve on plan is struck, draw the line 4 2 parallel to 3 5. Raise a perpendicular line cutting the pitch line of tangents in 2, and from 2, perpendicular to 2 2 or 1, 1 draw the line 2 4 6 indefinitely. From point 4 on this line, with the length of tangent on plan, locate point 6. Again from 4 as center, and with radius cutting the pitch line of tangents, turn over to 7. Join 7 and 6, and in the angle is the bevel. I show two bevels in this figure, that it may be seen that one bevel only is needed, the two bevels being equal. In Fig. 14, as in Fig. 13, from point 4 on the plan draw the line 4 0 parallel to 3 7. From 0 raise a perpendicular, 0 0 cutting pitch line in 0. From this point draw the line 0 4 6, and from point 4 on this line, with length of tangent on plan, locate the point 6. From 4 as center, with radius cutting the pitch line of top tangent, turn over to 9. Join 9 and 6, and in the angle is the bevel for the top tangent. To obtain the bevel for bottom tangent take the intersecting point of tangent 2 as center, with radius 2 5, which is the length of the bottom tangent, and revolve it to point 9, as shown by the dotted curved line. Join 9 2 (which is the bottom tangent). Now take point 4 on the line 0 4 6 as center, with the length touching 9 2; turn over to 8, and at 8 is the bevel for the bottom tangent. Fig. 15 can be easily understood, it being similar in construction to Fig. 14, Fig 16 contains a different method, the plan and elevation being the same as Fig 14, 1 2 5 being the tangents. Continue the top tangent 1 2 to 7, and from point 2 on plan as center, with radius cutting the top tangent, turn over to X Y. Join the intersection to point 3 on plan, and in the angle is the bevel for the top tangent. From point 1 in the elevation draw a line parallel to 2 5, the bottom tangent. From 2 on X Y as center, with radius touching this last line, turn over to X Y in 7. Join 7 3 on plan, and in the angle is the bevel for bottom tangent.

Fig. 17 is another method, the figure being similar to Fig. 15 in plan and elevation, 1 2 being the top tangent, 2 5 being the bottom tangent. Now, perpendicular to 1 1 draw the line 8 3, cutting tangent in 3. This line may be located anywhere between 1 and 1. Take point 8 as center, extend to top tangent 1 2, turn over to 1 1 in 4. Join 4 and 3, and in the upper angle will be the bevel for top tangent. To find the bevel for the bottom tangent it is necessary to draw a line from 1, the upper point of top tangent, parallel to the bottom tangent, cutting X Y in 7. Now, take 8 as center and extend to this line 1 7; turn over to 9. Join 9 and 6, and the bevel is at 9. The point 6 is the intersection of the line 8 3 and the line 1 7. In Fig. 18 I have given a steeper pitch to the upper tangent, which is represented by 1 2, while 2 5 is the lower tangent. The upper tangent is extended to 7. Take point 9 as center and extend to the extended part of the upper tangent; turn over to 6. Join 6 and 5, and in the angle at 6 is the bevel for upper tangent. Again, from point 9 as center, extend to the lower tangent 2 5; turn over to 8. Join 8 and 7, and the angle at 8 will be the bevel for bottom tangent. I have now explained the four different methods of obtaining the bevels. The reader will find the variety useful in practical experience, as the correctness of one method can be tested by another and consequently greater satisfaction is obtained regarding the accuracy of the bevels required



The Science of Handrailing.—Diagrams Accompanying Letter of Morris Williams.

CINCINNATI CONGRESS OF MASTER BUILDERS.

THE EMPLOYING CONTRACTORS in the building trades of Cincinnati formed an association, late in 1891, for the purpose of securing complete unity of action on the part of the entire fraternity in matters affecting one or more branches of the business. The organization is called the Congress of Master Builders, and is composed of three delegates from each of the building trades, except the carpenters, who are allowed representation from two associations. The constitution states that "the object of this Congress shall be to foster and protect the interests of the members of the different organizations represented. . . . This association shall have the power to enact such rules and regulations for the government of the various organizations as it shall deem best for the interests of the building trades, which rules and regulations shall be binding and strictly adhered to by all affiliated associations." Besides the usual officers there is a manager, appointed for the purpose of attending to the execution of all matters ordered by the Executive Committee, and to report the final disposition of each branch of work awarded on every building let under competition in the district covered by the limits of the powers of the congress. The following rules and regulations have been adopted for the government of all associations affiliated with the congress:

1. The standard parliamentary rules to govern all business of the meetings of this congress.

2. The president shall be a member ex-officio of all committees, and shall have a voice in all meetings of such committees, but no vote.

3. The chairman or his representative of each delegation shall cast the vote for his organization, and a majority vote of the organizations in attendance shall be binding upon all organizations that are members of this congress. Voting by proxy shall not be valid.

4. When the three delegates of any one organization cannot agree upon a question put to vote, then the vote of two of said delegation shall be binding on the organization represented.

5. It shall be the duty of the chairman of each delegation to see that his organization is represented at each regular or special meeting by at least one delegate, and in the absence of such representation said organization shall pay to the treasurer $5 as a fine imposed.

6. A majority of the organizations represented shall constitute a quorum of congress, and all transactions of business shall be binding upon all organizations.

7. All meetings shall be held at such times as shall be decided upon at the adjournment of the previous meeting or by call from the Executive Committee, notices being given in writing.

8. The organizations represented in this congress shall, before January 20 of each year, report to this congress the hours of work and wages demanded by the workmen in their branch for the year, with the recommendations of the organization on the subject; terms for the year for the workmen can be arranged only when first ratified by congress in session.

9. In the event of any organization being unable to agree with their men or to carry out the instructions of congress, then upon solicitation of said organization for assistance congress, upon a two thirds vote affirming, shall order all branches of the building trades, factories, mills, &c., to cease operations until a satisfactory agreement can be made.

10. The president shall appoint an Arbitration Committee of three the last business day of each month, and to serve the ensuing month, who shall decide all differences and disputes between members represented in this congress.

11. This constitution, by-laws and set of rules to take effect and to be in force on and after their passage.

SPECIAL RULES ADOPTED BY THE CONGRESS THAT MUST BE ENFORCED BY THE ASSOCIATIONS REPRESENTED.

1. On and after January 1, 1892, bids shall not be given or received for work except to parties or firms that are members of an organization that is represented in congress.

2. The standard form of contract, as ratified by congress, shall be used by all members of the different organizations, and said contract shall not be signed or entered into unless the general conditions of the specifications that form a part of said contract are in accordance with the form adopted by congress.

3. General and sub-contractors will not be permitted to change their bids in order to secure a contract; the original bid must stand, and a contract can be signed upon the amount of same, even if not the lowest.

4. General contractors shall under no circumstance submit estimates for work as a whole and separately at the same time, and sub-contractors shall not submit estimates to the owner or his agent, the architect, when the estimate is called for in a lump for the entire work.

Builders shall refuse to give estimates, revised or the second time, on same plans and specifications, unless radical changes have been made involving a justifiable amount, and in case of trivial changes they must be arranged with the acceptable bidder.

5. After a principal contractor has entered into an agreement with any sub-contractor for his branch of work on any building, this subcontractor shall be entitled to the right to make estimates for changes in the work to be performed under said agreement without competition.

6. After any sub-contractor has entered into an agreement with any principal contractor for his branch of work on any building the said principal contractor shall be entitled to the right to receive all estimates for changes in the work of said sub-contractor to be performed under his agreement, and said sub-contractor shall not make any estimates under these conditions to any owner or agent.

7. The different organizations represented in this congress are held to enforce all rules and regulations herein set forth.

The operations of the congress are carried on in conjunction with the Builders' Exchange, and a large number of the members of its various filial bodies are also members of the exchange. This plan for securing universal action among the employers in the building trades as adopted by the congress is a new one, both as to the comprehensiveness of the organization and the compulsory nature of its regulations. Up to the present time such matters of differences with the workmen as have been referred to the congress have been adjusted without entailing the necessity of any action upon the part of the filial associations, all arrangements made by the delegates having proved efficacious. An example of the working of the congress was shown in the settlement of the difference between the employing carpenters and their workmen. Arbitration as a means of adjustment was offered by the congress and was declined by the workmen. The congress then ordered a lockout of all workmen in all branches of the building trades upon a certain date unless the matter was adjusted before that time. Before the date set for the lockout a delegation from the carpenters and one from the union effected a meeting and the difficulty was adjusted satisfactorily to both sides. The result of mandatory action by the congress, involving all branches of the trade, has yet to be tested, as all differences with the workmen have thus far been satisfactorily settled by arbitration.

The various associations which form the congress represent a membership of about 540 firms, and include the cities of Newport and Covington, Ky., which are just across the Ohio River from Cincinnati.

An Equitable Agreement.

The Master and Journeymen Painters' Unions of Lewiston and Auburn, Maine, have settled upon a very important agreement, a part of which went into effect in the month of April and a part May 1. It reads as follows:

It is hereby agreed between the Master and Journeymen Painters' Union of Lewiston and Auburn in their respective sessions assembled as follows: That whereas the best interests of all concerned is an apprentice system: Therefore be it agreed that the rates of wages of journeymen painters shall be $1.75 and $2 per day, and any man or boy working at the trade and not competent to command the minimum wage of $1.75 per day shall be considered as and to be an apprentice.

And be it agreed that the limitation of these apprentices shall be one to each four journeymen and not more than four apprentices in any one shop of the trade.

And it is further agreed that no non-union man except these limited and specified apprentices shall be employed unless necessary and then only on condition that they join the journeymen's union.

And be it agreed that no member of the Journeymen's Union work for an employer of the trade who is not a member of the Master Painters' Union.

And it is agreed that no "black-list" shall be used by the Master Painters' Union or its members to discriminate against any members of the Journeymen's Union.

And it is agreed that any journeyman, a member of the union, who shall take work from the public in the busy or dull season, shall turn such work into some shop whose master is affiliated with the Master Painters' Union.

And be it agreed that any demand or grievance, imagined or otherwise, of either of these unions or its members, shall be referred to the other of these unions for adjustment.

And be it further agreed that in consideration of the wages of journeymen remaining at the old rate of $1.75 to $2 per day, the master painters undersigned individually as men and collectively as a union pledge themselves to conform to these prescribed agreements until Monday, September 5, 1892, regardless of the survival or the dissolution of this Master Painters' Union.

And it is further agreed that in consideration of the concession made by the journeymen's union that on and after September 5, 1892, whether the Master Painters' Union shall be in existence or not, these undersigned master painters herewith agree that the wages for journeymen painters shall be $2 and $2.25 per day of nine hours and the basis of rating shall be an advance of 25 cents per day for each and every journeyman who demands it above the scale received for 1891.

And be it agreed that if at any time the members of the journeymen's union shall refuse to work on any so called "scab job" or with non-union men of either of the building trades such action shall not be considered a beach of any part of these agreements.

And be it agreed that any journeyman painter who does not receive his wages on Saturday or on Monday morning shall have the privilege of leaving his employer without being discriminated against, and obtain another position in any union shop.

And be it further agreed that 100 copies of these agreements be printed, and one copy furnished to each of the local trades unions and paint shops of the trade at the expense of Local Union No. 60 of the Brotherhood of Painters and Decorators of America.

Adopted and signed for the journeymen's union this 20th day of April, 1892, and the seal affixed. [Seal] J. F. Stevens, President.
A. E. Coombs, Secretary.

Adopted and signed by the master painters:

I. S. Faunce,	William Baird,
P. A. Tierney,	G. E. Sharpe,
F. R. Jordan,	F. H. Storah & Co.,
W. S. Huse,	M. P. McGillicuddy,
Hartwell & Gammon,	J. F. Larrabee,
F. A. Haskell,	James E. Kelleher,
R. G. Townsend,	A. H. Parent,
Isaiah Merrill,	C. F. Rollins,
J. M. Sherman,	Geo. W. Boardman,
John S. Duncan,	G. & W. Kenyon,
C. C. Allen,	B. A. Ross,
W. D. Crafts,	John Leclaire.

Facts About Glue.

It is important for woodworkers to remember that fresh glue dries much faster than that which has once or twice melted. Dry glue steeped in cold water absorbs different quantities of water according to the quality of the glue, while the proportion of the water so absorbed may be used as a test of the quality of the glue. From careful experiments with dry glue immersed for 24 hours in water at 60° F., and thereby transformed into jelly, it has been found, says an English exchange, that the finest ordinary glue, or that made from white bones, absorbs twelve times its weight of water in 24 hours; from dark bones, the glue absorbs nine times its weight in water; while the ordinary glue made from animal refuse absorbs but three to five times its weight in water.

WHAT BUILDERS ARE DOING.

THE Master Builders' Association of Boston has recently been making an effort to establish some recognized plan under which the submission of bids and the treatment of bids after submitted can be conducted. The following circular, issued to members of the association, indicates the lines upon which action is being taken:

To all Members:

The attention of the Board of Directors has been called quite frequently during the last year, and particularly during the last three months, to the need of definition by the association of what will be recognized as proper and honorable practice in the matter of sub-estimating and the treatment of sub-estimates in the hands of those to whom they are trusted.

It is claimed by some members of the association that sub estimates given in good faith have frequently been used as a basis for "trading," while in other cases sub-estimates have not been guarded with that strict sense of integrity which should prevail, and have become public property, to the detriment of the sub-contractors who have made them. It is further claimed that the whole method of issuing and using sub-estimates at present in vogue is totally wrong and should be reformed.

Provisions exist in the by-laws of the association by and through which members may secure redress in any case where they can prove that they have been dishonorably treated, but it has always been found difficult to induce members to bring cases against each other, owing to the difficulty of proof and a reluctance to make direct and personal charges.

In view of the existing dissatisfaction and believing that it is possible for the association to take action that will tend to correct the abuses referred to, the directors have decided to call a special meeting of the association at an early date to consider the subject.

In the meanwhile the attention of members is called to the inclosed "Code of Practice" which was adopted by the National Association of Builders at the fifth annual convention, based upon a report of a "special committee on reforms in sub-contracting." The discussion upon the recommendations of the committee can be found in the official report of the proceedings of the fifth convention, pages 104 to 127, inclusive. This code covers many point which it will be valuable to consider in anticipation of the special meeting above referred to.

The condition of business is excellent, both as to quality and quantity, and has assumed a much brighter phase during the past month than existed earlier in the season. Labor troubles have been very few, and, aside from the unsettled condition of the granite workers, have caused but little disturbance.

Baltimore, Md.

The condition of the carpenters' strike in Baltimore has remained unchanged during the past month, although strenuous efforts are now being made to secure some kind of a settlement. It is predicted that the differences will probably be adjusted by July 1. The carpenters have had the sympathy of the other trades, some of which have contributed pecuniary aid through their unions. The strike, which affects about 250 men, is mainly an effort to secure the recognition by the employers of the general card system among the workmen. The Builders' Exchange held its annual meeting June 7 in the rooms, on West Saratoga street. James A. Smyser presided. President Hugh Sisson reported a membership of 128, an increase of 25 per cent. over last year. Ten new members were admitted. The exchange elected the following officers to serve until May 31, 1893: Hugh Sisson, president; Noble H. Creager, first vice-president; James A. Smyser, second vice-president; Wm. Ferguson, third vice-president; E. D. Miller, secretary; B. F. Bennett, treasurer. The Board of Directors are E. L. Bartlett, John Hiltz, John F. Adams, George J. Dufur, James L. Gilbert, Herman H. Duker, George Mann, Israel Griffith, J. S. Filbert, Joseph H. Hillen, John Trainor and George W. Starr. A handsome photograph of the president, Hugh Sisson, who is also second vice-president of the National Builders' Association, was presented to the exchange by his sons, Hugh and John Sisson.

A banquet was served prior to the meeting and was thoroughly enjoyed by all who were in attendance.

Buffalo, N. Y.

The building trades of Buffalo are undisturbed at present and the amount of work being done is great enough to keep the builders busy.

The work upon the upper stories of the building being erected by the Builders' Association Exchange is progressing favorably and the structure promises to be an exceedingly handsome one when completed. Several special trade organizations, notably the Master Painters' Association, are already considering the advisability of securing rooms in the new building.

Chicago, Ill.

The gravel roofers of Chicago have been on a strike during the past month against the employment of non-union labor by the contracting roofers. The men are still out, although they have been offered $2.25 per day of eight hours, and say that they will endeavor to protect the principle of unionism by refusing to work with non-union men.

The effect of the granite workers' strike has been felt by the cutters refusing to work on New England stone.

The scale of wages for the next year for carpenters will be 40 cents an hour, and the men say they will accept no compromise. The union has also decided to do away with the making of overtime, even at an increase of wages, and none of this work will be allowed unless human life is in danger or property in imminent risk of being injured. Overtime must then cease when the danger is passed.

Cincinnati, Ohio.

The labor market of Cincinnati seems to have quieted down, and nearly all the trades have adopted working rules, &c., for the remainder of the season. The basis of settlement of the differences between the carpenters and their employees and in the mills was given in these columns last month. The tinners and slate roofers have settled upon a basis of nine hours with the same wages that were paid last year, overtime and other conditions to remain the same. The master bricklayers, acting under the direction of the Congress of Builders, settled with the workmen upon the same terms which existed in 1891, which was satisfactory to the men. The terms were 50 cents per hour for nine hours, five days in the week, and eight hours on Saturday at 55 cents per hour. Overtime $1 per hour. There is no change in the time or wages in the stone-cutting department. The plumbers and stair builders are at work at present with the congress effecting a settlement. The greatest harmony prevails between the employers and workmen.

The Journeymen Iron-workers' Union issued an agreement which they asked the employers to sign, but to no purpose, as the congress instructed the employers' association not to make any agreement which would differ from that of 1892. After a lengthy consideration of the subject the master painters concluded to depart slightly from the instructions of the congress and granted an advance of 1 cent per hour, also making a difference of one month in the duration of the agreement.

The circumstances attending all these demands have caused an increase in the price of building to some extent, and this, together with the agitation of these matters, has had a tendency to drive work in some instances off the market, and to cause postponement in other instances.

The Carpenters' District Council will soon establish an innovation in labor affairs. It has decided to have an office centrally located, where carpenters wanting work will leave word as to how they can be reached.

The headquarters will have telephone connection and the builders will ring up the council and state the number of men they require. This will obviate the necessity of their hunting about buildings for carpenters, and will be a mutual benefit.

Detroit, Mich.

Benj. F. Guiney, superintendent of the Builders' and Traders' Exchange, reports that the building business of Detroit is as active as usual, and that the members of the exchange are securing their share of the work.

The following officers were elected for the ensuing year at the annual meeting of the Contracting Carpenters' and Manufacturers' Association, held in the Builders' and Traders' Exchange: Richard Helson, president; Robert T. Teakle, vice-president; Charles J. George, secretary; John Beyster, treasurer; Henry Spitzley, Henry George and W. G. Vinton, trustees.

Denver, Col.

Reports from Denver indicate that the building business generally is in excellent condition and shows greater activity than last year. There have been few labor disturbances this season, the strike of the plasterers for more wages being one of the most important. The increase was granted after a short period of idleness and the men resumed work.

Matters concerning the Master Builders' Association are moving along about as usual, with the organization in good condition. George F. Harvey has temporarily resigned his position as secretary, owing to his large contracts in the new mining camps about Creede, and John Gregor is acting as secretary during his absence.

Indianapolis, Ind.

The election of officers of the Builders' Exchange of Indianapolis occurred Friday, June 3, and resulted as follows: President, George W. Stanley; vice president, M. M. Cotton; directors, John Martin, J. E. Shover, T. J. Morse, J. A. Dunlap, C. Bender, William R. Tall, J. E. Twiname, George Weaver. The new president was installed and received a handsome bouquet. He made a brief but pertinent speech. The retiring president, Mr. Twiname, made an address, in which he set forth the value of the exchange to its members. He also said: "I am pleased to state that some of the objects of our association are being fulfilled—notably, to provide suitable rooms for the meetings of our members, to establish a more general and better understanding between our members and people dealing with them; to adjust differences that may occur among those engaged in the various pursuits germain to building operations. I am also pleased to note that membership in this exchange is a reasonable assurance to the general public of mechanical skill and honorable dealings, which time will strengthen. . . I look forward to the mid-year meeting of the national association in this city with much pleasure, and feel confident it will be of much profit to our exchange. This is an age of advancement, and it is our manifest duty to co-operate with others in improving our condition."

President-elect Stanley, also the retiring secretary, was then introducted and, after expressing thanks for a handsome bouquet presented by the exchange, said that life in this age of progress called for energetic and persistent effort by builders who expected to keep up with the procession. "Our calling," said the speaker, "is a noble one, and deserves to be placed in the van among leading enterprises. It should be our constant duty to elevate the standard of our business oprations and methods, and we cannot better accomplish this than by effecting and maintaining thorough organization." He then pledged himself to do his utmost to promote the best interests of the organization during his term of office, and asked that he be given the cheerful support of the members in carrying out his official duties.

The exchange occupies an enviable position among the institutions of the city and has been steadily pushing forward to a position of influence and importance. The spirit of the organization is progressive and much of the credit for its present position is due to the excellent management of its officers. The exchange is in better condition to-day than it ever was before.

Louisville, Ky.

The journeymen painters of Louisville all struck on May 24 on account of the refusal of one of the employing painters to comply with the eight-hour rule for Saturday adopted by the union and granted by the Master House Painters' Association. The trouble had been brewing some time. On February 4 last the union passed a resolution to the effect that 25 cents be the minimum price for an hour's work, the working days to consist of nine hours each, except Saturday, which was to consist of eight hours, thus giving one hour for the journeyman painter to leave his job and get his pay. That 35 cents was to be an hour's pay for overtime and 50 cents an hour's pay for Sunday work. This resolution was adopted at the next meeting on February 11.

A copy of the resolution was then submitted to the M. H. P. A. On March 31 the M. H. P. A. appointed a committee to wait upon the union. This committee stated that the resolution was agreeable to the M. H. P. A., with the exception of the clause that eight hours were to constitute Saturday's working time, and asked that the resolution be reconsidered, making it nine hours for week-day work straight, and that they were to be paid at the place of work. The committee stated that the M. H. P. A. objected not so much to the eight-hour clause as to the manner of paying.

The Master House Painters' Association in a communication presented to the union at this meeting stated that they would concede everything except the eight-hour Saturday request and asked that it be rescinded. The union refused to entertain the request and the employers finally yielded the point. One of the employers, however, began shortly after the settlement to infringe the rule and as a result all the union painters in the city were called out on the date mentioned. The strike was maintained until June 3, when the matter was adjusted by the employer who held out consenting to submit to the rule, and the men returned to work.

Lowell, Mass.

The building interests of Lowell are in a favorable condition, and nothing unusual has occurred during the past month to disturb the relations between the employers and workmen.

The Master Building Exchange is in good condition and the members generally are busy.

New York, N. Y.

The following clipping from a New York daily was sent to the secretary of the National Association of Builders as indicating the condition of the labor market in that city on June 1 : Seldom in the history of the labor movement in this city has there been so much restlessness in the building trades as there has been this spring. Hardly a union in the city has escaped implication in one or more of the many strikes which have occurred one after the other, or all together, among the men who build houses. And since the beginning of all the trouble no one week has been more filled with strikes, lock-outs and boycotts than the last week in May, and it promises to be the same during the first week in June, thousands of men idle and millions of capital tied up.

A list of the trades affected in this city alone is startling, especially when it is realized that in the large majority there are several unions involved. Among the larger of these unions are the Granite Cutters' Union, Pavers' Union, Paving Block Cutters' Union, Bluestone Cutters' and Flaggers' Union, Brown Stone Cutters' Union, Marble Cutters' Union and Marble Cutters' Helpers, United Brotherhood of Carpenters and Joiners, 15 affiliated lodges ; Amalgamated Society of Carpenters and Joiners, six branch unions ; United Order of American Carpenters and Joiners, two locals ; Progressive Carpenters, English Speaking and German Framers' Unions, Cabinet Makers' Union No. 7, Progressive Painters' Unions No. 1, 3 and 6 ; Progressive Varnishers' Union No. 1, Tile Layers' and Helpers' Unions, Steam Fitters' and Helpers' Unions, Derrickmen's Union, Tin and Sheet Iron Workers, Electrical Wiremen's Union No 5468, A. F. of L ; Housesmiths' Union, Eccentric Engineers' Unions Nos. 1 and 3, Public Cartmen's Union, two local unions ; Building Material Handlers' Union, Bricklayers' Union No. 7, United Wood Carvers' Association, Machine Wood Workers' Union, Fresco Painters, two unions ; Plasterers, Italian Marble Mosaic Workers' Union, Stair Builders's Union and a score of other unions which have had grievances or whose members have gone on strike in sympathy with other workingmen.

The cabinet makers and varnishers have been on strike since April 4, for a work day of eight hours, and the wood carvers, machine wood workers and a great many carpenters have been on strike in sympathy with them most of the time.

The Tile Layers' and Tile Layers' Helpers' Unions went on strike not only in this city but all over the country, on May 18, for a work day of eight hours and an increase in wages. These eight hours' strikes are still in progress.

The members of Electrical Wireman's Union No. 5468, A. F of L., have been fighting the Edison Electric Illuminating Company since January, and about 100 are still on strike, some of whom have been idle since the strike began, nearly five months ago. The marble cutters began a big fight recently, against a Boston firm employing non union men, and a strike was ordered on the Grand Central Hotel because of the use of stone supplied by this firm, and carpenters, painters, engineers, derrickmen, steam fitters and helpers and others all quit work in sympathy.

A large number of other unions are also supporting members who are on strike for various causes. But last, though not least, the granite cutters and kindred trades are responsible for much stoppage of work on buildings. This strike, in connection with the lockout of quarrymen and the sympathetic strike of paving block cutters and pavers, causes the idleness of a great many thousands of men. Altogether it is safe to say that about 50,000 men are idle in this city and the surrounding country on account of strikes and lockouts

This unsettled state of trade, especially in the building line, as outlined here, is responsible for much stagnation, not only among builders, but also in the real estate field, and rents are high in consequence. Another result of the powerful organization of the forces of labor and their fight for better conditions is the formation of similar organizations of bosses and the adoption of the same tactics in their fight with the unions as the latter have employed against them.

The situation during the past month has seemed to change but little for the better, and is such at present that capital is very reluctant to engage in large building operations for fear of becoming involved in the endless complications of the present labor market. The immediate prospect does not seem to be very bright, though much promise of a better condition is found in the fact that the employers are becoming better organized and future settlements are less likely to be one sided.

Omaha, Neb.

The building business in Omaha seems to be improving, the amount of work on hand this season being greater than that of last year.

The Builders' and Traders' Exchange is at work considering subjects of interest to the building fraternity of the city, and also matters affecting the general welfare of the community. The Nebraska Central proposition is at present being discussed

Philadelphia, Pa.

Nothing of a serious nature has transpired in the building trades of Philadelphia during the past month to disturb the harmonious relations between employers and workmen. The increase in wages asked for by the lathers late in May was granted by the employers.

The City Councils Joint Committee on Building Law has a revision of the present ordinance under consideration. Committees from the Master Builders' Exchange, the Philadelphia Chapter of the American Institute of Architects, the Fire Underwriters, the Building Inspectors and the Citizens' Municipal Association have been acting in concert with the council, and it has been decided to secure the opinions of the various organizations represented before acting further on the subject.

The Master House Painters' Association has reorganized, and the following officers have been re-elected: F. A. Ballinger, president; F. F. Black, vice-president; Lewis A Yerkes, secretary; Charles Fowler, financial secretary; J. B. Scattergood, treasurer; trustees, Alfred Shur, F. A. Nichols and M. Daniel Cohen. The association is open to membership to all employing house painters residing or carrying on business in Philadelphia or the vicinity.

The final examination of the pupils of the Builders' Exchange Trade Schools closed for 1892 on June 2, the graduating class numbering about 65. We shall take occasion to refer to this matter more at length in a subsequent issue.

Portland, Maine.

The Builders' Exchange held a meeting recently for the purpose of electing a vice president to succeed the late Daniel M. Mannix, whose recent death left the office vacant. The selection fell upon W. H. Scott. Suitable resolutions of regret were passed in memory of Mr. Mannix, who was universally respected and beloved by all who knew him.

San Francisco, Cal.

Building interests are usually active in San Francisco at present and such strikes as have occurred have not been of a serious nature. The point upon which the unions are most active is that of the employment of non-union labor, and a strike is now threatened upon the new Powell street theater owing to the employment of non-union painters by the contractors, but generally speaking, the business is in good shape. The Builders' Exchange is in excellent condition and is steadily growing into a position of increased importance and influence in the city.

St. Louis, Mo.

An enthusiastic meeting of the Builders' Exchange of St. Louis was held about June 1, and a large sum of money was raised for the flood sufferers, and pledges for more given.

The meeting was called to order by President Charles B. McCormick and its object stated. It was moved that $100 be appropriated from the funds of the exchange to head the list of donations, and that it be followed up by individual subscriptions. Messrs. Richard Walsh, Patrick Mulcahy and Anthony Ittner were then on motion appointed a committee and authorized to collect and turn over the subscriptions to the committee of the Merchants' Exchange, with whom in such cases the Builders' Exchange always act in harmony. Secretary Walsh was authorized to take the names of subscribers to the fund, and up to a late hour he was kept busy in the good cause.

Worcester, Mass.

The Builders' Exchange of Worcester is coming to be the recognized headquarters for all matters of interest to the building fraternity of the city. The Worcester County Electrical Club, the Plumbers' Association and other similar organizations are using it as a place of meeting.

The building business is about as active as usual, and no labor disturbance has occurred during the past month, except those affected by the strike of granite workers.

Notes.

The establishment of builders' exchanges is being agitated in Springfield, Ohio, Lewiston, Me., Mobile, Ala., Decatur, Ill., Anaconda, Mont , Cairo, Ill., and Austin, Texas.

The Federation of Labor Unions has presented a memorial to Congress asking for the legal establishment of eight hours as a day's work under some form that will be effective.

The master masons of Bloomington, Ill., have formed an association.

A new organization of builders has been formed in Brooklyn, and is established somewhat on the lines of a builders' exchange.

Journeymen in the building trades state that they do not wish to see the Builders' Congress go under. They think it is a good thing for both men and bosses.

The Bricklayers Union of Fall River, Mass., has adopted a rule that no apprentices shall be permitted to work who are not regularly indentured for three years to some recognized mason contractor.

The long strike of carpenters at Holyoke, Mass., is practically over, each side having yielded enough to satisfy the other.

At the annual election of directors of the Exchange Building Association of the Kansas City Builders' and Traders' Exchange, the following board was elected: J. S. Chick, J. K. Cravens, H. M. Holden, F. L. La Force, L. K. Thacher, L. R. Moore, T. B. Bullene, E. H. Allen, E. H. Webster, W. H. Winants, E. D. Fisher, C. W. Whitehead, J. K. Davidson. At the first regular meeting of the directors, to take place next month, officers will be elected.

Work was suspended for some time last month on the Muskegon County Court House, at Muskegon, Mich., owing to the refusal of the masons to work with a non-union foreman.

The master plasterers of Newport, Ky., have organized and became incorporated under the name of the Master Plasterers' Association.

At a recent meeting of the Builders' Exchange of Spokane, Wash., the following officers were elected for the ensuing year : President, Frank Johnson ; vice-president, Robert Russell ; secretary and treasurer, H. C. Ashenfelter; directors, George McKenzie, Edward Riley, E. R. Childs, J. H. Griffith, H. C. Ashenfelter, Robert Russell and Frank Johnson.

The condition of the building interests of Salt Lake City are indicated by the report that work among the carpenters is quiet, with many men out of work; painters in the same condition, and plumbers on a strike.

The carpenters of Sacramento, Cal., are trying to secure an eight-hour day. There will be little opposition on the part of the employers.

A number of the building contractors in Seattle, Wash., have formed an association. The object is to bring contractors into closer alliance.

The carpenters' strike in Scranton, Pa., which was begun on May 1, is still in force.

The lathers of Trenton, N. J., want $1.75 per 1000, which is 50 cents per 1000 over the minimum price now paid. The good men are now being paid $1.50.

The new exchange recently established at Toledo, Ohio, is progressing in excellent condition. One of the members recently presented the organization with a beautiful mail box of antique oak and plate glass.

The Builders' Exchange of Wheeling held an elaborate banquet recently, at which over 100 covers were laid. The affair was an exceedingly pleasant one. This exchange has recently adopted the Code of Practice advocated by the National Association of Builders.

The painters of Halifax, N. S., have recently settled a difference between the employers and workmen upon the basis of the form of arbitration recommended by the National Association of Builders.

At the annual meeting of the Building Trades Club of New York City the following officers were elected for the ensuing year: President, John J. Tucker, 37 West Twelfth street; vice-president, Andrew J. Campbell, 222 West Twenty-third street; second vice-president, Charles A. Cowen, 327 West 122d street; secretary and treasurer, Stephen M. Wright, 117 East Twenty-third street.

The Builders' Exchange of Toronto has recently reorganized upon the lines which have proved so successful among the filial bodies of the National Association of Builders. The exchange has been in correspondence with the national secretary for some time, and has followed as nearly as circumstances would permit the plan of operation in force in one of the most beneficial associations of builders in the United States.

DESIGNS FOR COMBINATION TABLES.

THERE ARE MANY TIMES during the year when the practical mechanic has opportunity for turning his hand to the construction of articles of household use and ornamentation, and to such of our readers the designs presented herewith cannot fail to prove interesting. The illustrations show a variety of single and combination tables, with numerous details, indicating in some measure the manner in which they are put together and constituting excellent examples for the display of artistic skill on the part of members of the craft. The descriptive particulars concerning these tables are taken from a recent issue of one of our English exchanges and will enable the practical carpenter to readily construct the various designs with such modification as may seem best adapted to meet individual requirements. Referring to the illustrations, Fig. 1 represents a combined work and writing table in a closed condition, while Fig. 2 represents the table leaves or projections turned down. The interior of the table is arranged for the storage of letters, pieces of needle-work, &c., there being at one side of the well or box a narrow stationery cabinet and on the three remaining sides a number of small compartments, all as shown in Fig. 7. In order to use this device as a writing table the stationery cabinet referred to is partially drawn out of the well and retained in position by means of two small bolts upon its lower portion. Then the larger part of the projection immediately opposite is folded up over the table top and rested against the stationery cabinet, thus giving to the table top a slight inclination. A sectional view of the stationery cabinet and table top when used for writing purposes is clearly indicated in Figs. 5 and 6 of the illustrations. The four projections, or what might be properly termed leaves of the table, shown in Fig. 1, are each of the same size and each nearly equal to the combined area of the four triangular portions indicated in Fig. 2 of the engravings, which shows the leaves or projections tipped down, exposing the interior. The four top boards are 14 inches long by 10 inches wide, while that portion of each from A to B in Fig. 3 of the engravings is 9 inches and the part from B to C 5 inches. Each, it will be observed, terminates in a point, all the points meeting at a common center. One of the boards is cut through where the heavy line crosses, as shown in Figs. 3 and 4, and both pieces thus separated are hinged to each other so that the outside piece may fold upward. The four boards are then placed exactly over the well or workbox, as shown in Fig. 1, and hinged to the edges of the latter in such a manner that they may he folded over, as shown in Fig. 2. Within the well or box and opposite the divided projection is a board $\frac{1}{4}$ inch thick, joined at a distance of $1\frac{3}{4}$ inches from that side of the well. Up and down the smaller space which this board forms slides a case, shown in Fig. 8. The inside of this is $9\frac{1}{2}$ inches deep, of which, however, only $7\frac{1}{2}$ inches is required for the accommodation of note paper and envelopes. If the front board, therefore, is shaped as indicated in the engraving there will be room in the top of its divisional board for a hole for the insertion of the finger in order to remove it from the case. At a point about half way down the front of the case and at each side is inserted a small bolt, the front of the case being cut away in order to allow the bolts to lay flush. The front board is $\frac{1}{4}$ inch thick, and when the case is drawn upward the bolts will retain it in a firm, upright position by the bolts projecting over the edges of the well. A large portion of the divided projection can be folded over, as in Fig. 6, in order to gain the inclination necessary for writing purposes. A fastening for keeping the four leaves of the table or projections together, as shown in Fig. 1, can be made of a thin metal rod with prongs something after the form of a trident or toasting fork. The rod is secured to the under side of one leaf or projection by fitting flush into a groove and held in place with staples. The remaining projections or leaves are grooved where the prongs come in contact with them and across the grooves fit small staples into which the prongs enter, thus retaining the leaves in a horizontal position, while when the prongs are drawn out the leaves of the table will fall. Fig. 3 shows the prongs drawn out, while Fig. 4 shows them in a position to retain the leaves of the table horizontally.

In Figs. 9 and 10 is shown a combination chess, backgammon and card table, the former illustration representing it as used for chess, while the latter indicates the appearance when used for cards or backgammon. The top of the table consists of two boards, the upper one being divided into three parts, two of them equal in width, and the remaining one—that in the middle—being equal to the combined widths of the other two. The narrower ones are hinged to the long edges of the middle one in such a manner as to permit them to fold upward, as indicated in Fig. 10. On the top surface of the middle piece is painted or inlaid the requisite number of light and dark squares, while on the under surface of each wing are the black and white triangles for backgammon. On each side of the backgammon spaces is an oblong one with holes pierced in it for pegs for keeping tally. On the right and left hand side of the table is a flap, which when opened exposes a space suitable for the accommodation of cards, dominoes, chips and other adjuncts. The flap also answers the purpose of a shelf. Fig. 10 shows the table with the flaps dropped down in position. In Fig. 11 is a general view of the framing of the table top, showing more clearly the construction. Two bottom boards, 8 inches wide, are dovetailed to two upright middle boards 6 inches high. A narrow top framing is mortised into the leg blocks on two sides of the table, while four small boards are mortised and dovetailed between the upright middle boards and the leg blocks. Across each box thus formed is placed two stretchers, which are halved where they came in contact with other parts, in order that they may lie flush and be screwed into position. Both boxes are connected by two cross rails, mortised in the upright boards and still further strengthened by under rails screwed to the latter and the former.

The designs represented in Figs. 12 and 13 of the accompanying illustrations are of fancy tables, Fig. 12 being what might be termed the "Bachelor's Companion." It has a small cupboard, drawer, book shelf, and divisions in the rear for papers, &c. The top is about 27 x 17 inches in size. The design shown in Fig. 13 is for a center table in the modern Chippendale style, and may be made either 2 feet 6 inches, 3 feet, or 3 feet 6 inches, according to requirements.

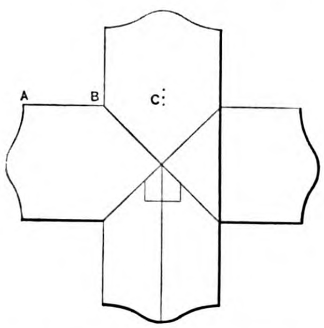


Fig. 3.—Rod drawn out, permitting Projections of Table to Fall.

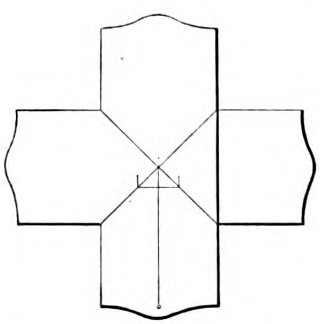
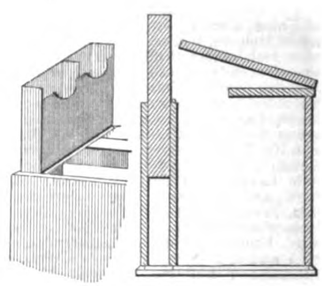


Fig. 4.—Rod in place, for holding Projections in position.



Figs. 5 and 6.—Sections of Table Top when used for Writing Purposes.

Designs for Combination Tables.

Concrete Building.

The members of the Technical Society of the Pacific Coast lately went to Palo Alto on the invitation of E. L. Ransome, who has nearly completed two large concrete buildings for the Leland Stanford, Jr., University. One of these is the girls' dormitory. The larger one is the museum building, and is the finest piece of building concrete work yet done in the vicinity. The structure is absolutely fire proof, and intended also to be earthquake proof. It is built on the system patented by Mr. Ransome, so as to be a homogeneous structure as to walls and partitions, there being no joints. Twisted iron rods, says the *Scientific American*, are used for additional strength where necessary. The cement is mixed in the Ransome patent mixer and elevated to points where used. A large force of men has been at work on this building for some time and it is now almost complete. Even the interior arches and ceilings are of concrete. The stairways are made of concrete, and these will be covered with marble steps. The hallways will be finished in marble over the concrete. There is no wood anywhere in the building, the window frames, &c., being of metal. The exterior is finished with a smooth coat of cement to resemble brownstone. The heavy columns of the entrances are, like the main structure, of concrete, and the statuary to surmount the building is molded of the same material.

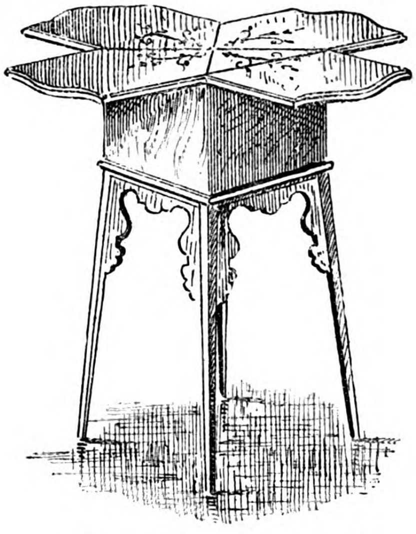


Fig. 1.—Work and Writing Table Closed.

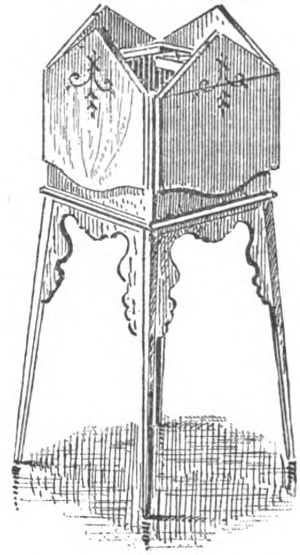


Fig. 2.—Appearance when Open.

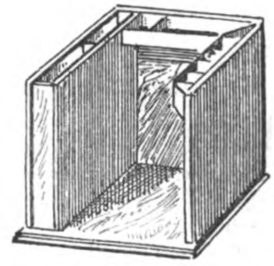


Fig. 7.—View of Interior Arrangement of Table Top.

Fig. 8.—Case Fitting in Space shown at the Left in Fig 7.

Fig. 9.—Chess Table.

Fig. 10.—Card Table.

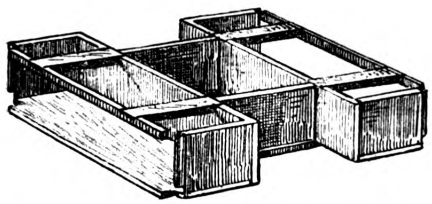


Fig. 11.—Framing of Table Top shown in Figs. 9 and 10.

Fig. 12.—Table with Cupboard, Book Shelf, &c.

Fig. 13.—Fancy Table.

Designs for Combination Tables.

THE BUILDERS' GUIDE.*

By I. P. HICKS.

Short Cut in Estimating.

AS MANY of the principal parts of construction in common buildings are essentially the same, a short cut may be made in figuring the bulk of the rough work, which includes the framing, raising, sheeting, siding, roofing, laying of floors, and setting partitions. Take the number of cubic feet in the building from top of foundation to top of ridge of roof and multiply by the rate per cubic foot, which is usually from two to three cents. After estimating the rough work in this manner add all the parts that are considered of a changeable character, such as the cornice, gable, trimmings, porches, bay windows, inside finish, and all parts not included in the bulk of the estimates. Of course one can see that a change in price will change the amount of the estimate, and that it is as necessary to use discriminating judgment in fixing rates for this method as in any other.

To successfully estimate the labor in a building every one must fix his own rates from personal experience in doing the class of work which he is called on to perform. Tables, prices and methods are good in their way, and many times will give valuable aid in estimating, but actual experience is far better.

The foregoing items include those which come under the head of carpentry. Of course the contractor will have many other items on which to figure if he desires to estimate or contract for the entire job.

The following list, arranged in regular order, will be found to include the principal divisions of estimating an entire job, and also shows a good form for an estimate :

FORM FOR AN ESTIMATE.

	$	¢
Excavating		
Foundation walls		
Brick walls and piers		
Chimneys		
Lumber		
Carpentry work		
Hardware		
Tin work		
Galvanized iron work		
Plastering		
Plumbing		
Gas fitting		
Steam fitting		
Painting		
Incidental expenses		

PRINCIPAL DIVISIONS IN ESTIMATING.

Under each division there will always appear many items on which to figure, but as contractors are supposed to be supplied with specifications, it is useless to enumerate all the items as they may appear under each head. The two principal divisions of lumber and carpentry have been given in full in every detail of the work. Under the other divisions it will only be necessary to mention a few of the essential points to enable any one to estimate them easy and accurately.

EXCAVATIONS.

Excavating for foundation walls, cellars, cisterns, &c., is estimated by the cubic yard, which contains 27 cubic feet. The rate per yard is variable in different localities and according to the location of the grounds and the hardness of the earth to be excavated.

FOUNDATIONS AND CHIMNEYS.

Foundations are generally laid of brick or stone. Brick are laid by the thousand, and stone by the perch. The rates and customs of measuring are variable in different localities. The following, however, is the usual custom of measuring brick and stone work. For a foundation the outside measurement of the wall is the one taken. To find the number of perches of stone in walls, multiply the length in feet by the hight in feet, and that by the thickness in feet, and divide the product by 22. No allowance is made for openings, unless they are numerous or of considerable size.

EXAMPLE AND SOLUTION.

Take the following example : How many perches of stone in a wall 48 feet long, 8 feet high and 1 foot 6 inches thick? The solution to this is : $48 \times 8 \times 1\frac{1}{2} \div 22 = 26.18$ perches. A perch of stone measures usually 24.75 cubic feet, but when built in a wall 2.75 cubic feet are allowed for mortar and filling. To find the perches of masonry divide the cubic feet by 24.75 instead of 22. In estimating the masonry no allowance is made for openings. A thousand brick are about equal to two perches of stone when laid in a wall. Brick are counted as follows :

For a 4-inch wall 7½ bricks to the foot.
For an 8-inch wall 15 bricks to the foot.
For a 12-inch wall 22½ bricks to the foot.
For a 16-inch wall 30 bricks to the foot.

In estimating for the number of brick the openings may be deducted if they are large or numerous. In the measurement of masonry, however, no deduction is made for openings. Seven hundred and fifty brick laid in a wall are equal to 1000 brick wall count. The customary price allowed for the labor of laying brick is $2 per 1000, wall count.

A chimney of 1½ by 2 brick makes a flue 4 x 8 inches inside and requires 25 bricks per foot. A chimney of 2 by 2 brick makes a flue 8 x 8 inches inside and requires 30 bricks per foot, while a chimney of 2 by 2½ brick makes a flue 8 x 12 inside and requires 35 bricks per foot. Chimneys of any size may be estimated by counting the number of brick required for one course and allowing five courses to the foot. A chimney breast for a fire place is usually of 2 x 7 brick and requires 80 to 90 bricks per foot.

LATHING AND PLASTERING.

Lathing is estimated by the square yard and the usual rate is 3 cents per yard. Fifteen lath are counted to the yard, and 6½ pounds of threepenny nails per 1000 lath. Plastering is also estimated by the square yard. The lathing and plastering are usually estimated together at the following rates, including material and labor :

For two-coat work, 18 to 23 cents per yard, and for three-coat work, 23 to 27 cents. In the measurement of plastering no deduction is made for openings.

PAINTING.

When a carpenter has to figure upon painting it is better for him to get some reliable mechanic who is in the business to give figures on the work. Painters figure their work by the square yard. I have inquired of practical painters concerning their methods of calculation and have failed to find any uniform scale or rule by which to measure surfaces. Nearly all master painters have a basis of calculation, but the accuracy of their estimates depends so much upon personal judgment as to the nature and extent of variations, that their methods would be useless to persons of less accurate judgment. The methods also vary according to the nature of the work and the training of the painter. No two would measure in the same way, perhaps, yet they might reach nearly the same results. Although it is true that very much depends upon the painter's judgment, I will try to give a few hints which will be found in some cases entirely trustworthy and in all helpful. One way of measuring is to obtain the number of square feet in the sides and ends of a building as if they are flat surfaces, give a rough guess as to the dimensions of trimming, &c., and let it go at that. This plan may work well for a good guesser, but for general use it is not very satisfactory. Another way in connection with wooden buildings is to measure the length and exposed surface of one strip of siding, then count the siding and multiply the dimensions of one by the whole number on the side or end of the building; the product will be the surface measure. This is a better way, but its accuracy depends upon a pretty thorough acquaintance with compound numbers, as dimensions must be reduced to inches, then back to feet or yards, according to the basis of calculation. Trimmings, &c., are measured separately.

Common siding are put on with one board overlapping another, and the lapping edge of the board is raised from the perpendicular, so that it presents a diagonal instead of a flat surface; and there is also the exposed edge of the board, about ½ inch, which should be included in the estimate. Suppose, now, that the exposed portion of a board of siding is 4 inches—the usual width—and the edge ½ inch. It will give the side of a building just 12½ per cent. more surface than it would possess if it were perfectly flat. Hence one-eighth added to the dimensions, obtained by multiplying hight and length together, will give the actual surface measure of common siding.

In drop siding, which is frequently used, there is an exposed edge of about ½ inch, and about ¼ inch more surface on the molded edge than there would be if it were flat, thus making a total gain over flat surface of ¾ inch on each piece of siding, or 18¾ per cent., which is very nearly equal to one-fifth. Hence one-fifth should be added to the dimensions in square feet of a building to obtain the surface measurement for drop siding.

In measuring the gable ends of ordinary buildings the dimensions should be one-half less than actual square measure. For example, if a building is 20 feet wide, and is 10 feet from the level of the frame plates to the point of the roof, multiply half the width, 10 feet, by the hight, 10 feet, and we have 100 feet surface of the gable end, to which should be added the percentages for the edges of the siding boards, &c. No deduction is usually made for openings. Cornice and trimmings should be measured separately. If there are panels, beads and other projecting and receding features, brackets, &c., carefully measure one of each, count the number on the building and multiply by that number; the product will be the total surface. Open brackets on cornices and scroll and lattice work on verandas should be measured solid, as the edges fully make up for open spaces.

The utter lack of uniformity in house trimmings compels more or less reliance upon the judgment of the painter in measuring them. I can suggest no rule for measuring which can be used with satisfactory results in all cases. What would be admirably suited to one would be wholly unadapted to another, simply because the architectural features are unlike. Here there is no alternative but to exercise judgment in considering these important features.

In calculating the quantity of paint required upon the basis of surface measurement, from 12 to 40 per cent. should be allowed for trimmings, &c., according to their size and shape. For plain work 12 to 20 per cent. will be found a fair average. This depends, however, upon the number of doors and windows, style of frames, &c. On Queen Anne structures, which are painted with two or three body colors and are burdened with numerous and elaborate trimmings, calculations must be made of the portions of the buildings to which the different body colors are to be applied either by divisions of total measurement or by separate measurements and the trimmings considered separately. As outside painting on buildings usually consists of two coats over a previously painted surface, or if on a surface never before, painted preceded by a primary coat, it is customary to estimate the quantity of paint required for two coats. Surfaces are so variable in condition that no rule can be given which will be found applicable to all cases. The quantity of paint required for two-coat work varies from 3½ to 5 gallons per 100 square yards, and I would by all means advise carpenters to obtain figures from experienced painters in this particular line of business.

HARDWARE.

Estimating hardware is as much of a necessity with the carpenter as estimating lumber, but it is not attended with as many variations and difficulties. The number of fixtures for door and window trimmings, &c., may be readily counted from the plans, and it is only through the omission of some items that any serious mistake is likely to happen. A careful study of the plans and a well prepared list of hardware items from which to figure is a guard against mistakes from omissions and a guide to correct estimating.

LIST OF ITEMS FOR ESTIMATING HARDWARE.

Nails, various sizes (see table).

Brads.	Hook and eyes.
Blind hinges.	Drawer pulls.
Window bolts.	Mortise bolts.
Axle pulleys.	Flush bolts.
Sash locks.	Registers.
Sash cord.	Door stops.
Window weights.	Tin window caps.
Mortise locks.	Tin shingles.
Rim locks.	Valley tin.
Butts, various sizes.	Hip shingles.
Parlor door hangers.	Tin roofing.
Wrought butts.	Conductors.
Strap hinges.	Screws.
Transom lifters.	Sandpaper.
Cupboard catches.	Wardrobe hooks.

(To be continued.)

MASONRY AND STONE CUTTING.*

STRING OF GEOMETRICAL STAIRS.

LET the spiral $a\,b\,c\,d\,e\,f$ . . . Fig. 202, be the treading line which best suits the shape of a certain staircase, and let it be divided in equal lengths equal to the widths of the treads; let a A, b B, c C . . . the arrises of the risers, be normal to the treading line, and let A B C D E be the inner line of the string in which the steps are housed, each point of which is taken at an equal distance from the treading line. Now, these two curves, the treading line and the curve of the string, have the same involute, which is formed by the series of points where the normals to the treading line meet one another. In this case, the involute is an ellipse. Taking A A_2, B B_2, C C_2, . . . all equal to the width to be given to the string, the string will then be comprised between two vertical cylinders, which have for base the parallel curves A B C D E . . . and A_2 B_2 C_2 D_2 E_2 . . . As to the upper and lower faces of the string, they are two skew surfaces identical with that of the soffit of the stairs. The directing helixes of these surfaces are drawn on the cylinder, which has for base the treading line, the upper one slightly above the arrises of the steps, and the lower one slightly below the soffit of the steps. The generators of these surfaces will also be projected on A A_2, B B_2, C C_2. . . . The string is divided in a certain number of stones, and the joints are to be planes normal to the center curve supposed to be drawn within the stone. This central curve is the intersection of the cylinder A_3 B_3 C_3 D_3 . . . . . equidistant from the sides of the string, with a skew surface equidistant from the upper and lower faces of the string.

Let P be the horizontal projection of a point on the center curve through which the plane of the joint is to pass. After drawing the generator p P x, select a vertical plane of projection, $p\ t$, perpendicular to the generator p P x. The generator will be projected thereon in one single point, P′, Fig. 203, which place at the level of two risers; then take the distances P′ π' P′ π'', equal to half the hight of the string. In the triangle P′$p\ t$ carry the length of arc $p\ b$ on the base $p\ t$ from the angle t; then produce a vertical until it cuts the side P′t, and carry the length of that vertical from π' to p'. The horizontal $p'\ \beta'$ will be at the level of the generator B B_2 of the upper surface of the string, and therefore it is the elevation of that generator. Then draw at distances equal to the risers other horizontals, $\alpha'\alpha'_2$, $\gamma'\gamma'_2$, $\delta'\delta'_2$; these are the elevations of the generators A A_2, B B_2, C C_2, . . . of the upper surface of the string. On these horizontal generators mark the elevations of the points A_1, A_2, A_3, and B_1, B_2, B_3, where the generators meet the lateral faces of the string and the cylinder on which is placed the center line; this gives the three curves $\alpha'\ \beta'\ \pi'\ \gamma'\ \delta'$, $\alpha_2\ \beta'_2\ \pi'\ \gamma_2$, δ'_2, $\alpha'_3\ \beta'_3\ \pi'\ \gamma'_3\ \delta'_3$, which are placed on the upper face of the string. Those of the lower face, $\alpha''\ \beta''\ \pi''\ \gamma''\ \delta''$, $\alpha''_2\ \pi''\ \delta''_2$, $\alpha''_3\ \pi''\ \delta''_3$, are found by carrying on each vertical a distance $\alpha'\ \alpha'' = \pi'\ \pi''$.

Now we have to find the plane tangent to the skew surface, which follows the center line of the string. Draw first tangent P′ t to the directing helix, and to do this take $p\ t$ = 2 treads; then by sliding the generator (p P x, P) on this tangent and on the vertical x a connecting paraboloid is formed, of which the horizontal $t\ x$ is another generator. If, therefore, the vertical plane P T, Fig. 202, is produced perpendicular to line P x, this plane will cut the paraboloid along the line (P T, P′ T′), which defines the tangent plane P′ T′ T′, and is also the tangent to the center curve of the string. The plane of the joint, which must be normal to the center curve, will have for vertical trace Q′ P′ q' perpendicular to P′ T′; projecting on the bases of the three cylinders A B C, A_2 B_2 C_2, A_3 B_3 C_3, the points where the trace Q′ P′ q' meets the upper and lower curves of the string, the horizontal projection Q Q, Q_2 q_2 q_3 q of the outline of the joint is obtained.

Let R be another point on the center curve through which the plane of the other joint is to pass; after taking, Fig. 204, a vertical projection plane $r\ z$ perpendicular to the generator R y, and projecting thereon the generator on one point R′ at the level of two risers above the ground line, mark the hight $\rho'\rho''$ of the string, equal to that adopted in Fig 203, and construct the upper and lower curves of the string near the point (R R′); then draw the tangent R′ z of the guiding helix, and deduce therefrom the tangent (R′ θ', R θ) of the central curve of the string, and the normal joint plane N′ R′ n'. Lastly, project on the bases of the three cylinders the points where the trace N′ R′ n' meets the curves of the string and the horizontal projection N N, N_2 n_2 n_3 n of the joint is obtained.

By the former projections the shape of the string stone is fully determined; it remains to project the entire stone on one single plane. Draw, Fig. 202, two vertical parallel planes X Y, X_2 Y_2, containing the horizontal projection of the stone; then project the stone on the plane X Y. To do this mark on vertical Z the divisions 0, 1, 2, 3. . . . equal to the hights of the risers, Fig. 205; then, taking through these divisions horizontal lines, and projecting thereon the points B and B_2, C and C_2, D and D_2. . . . draw the curves $\beta''\ \gamma''\ \delta''\ \varepsilon''\ \phi''\ \lambda''$ and β''_2 γ''_2 δ''_2 ε''_2 ϕ_2 λ''_2, which limit the lower face of the string. Those of the upper face will be deducted from the former by prolonging each vertical by a length $\beta''\ \beta'$ equal to the length $\pi'\ \pi''$ in Fig. 203.

The point P′, Fig. 205, is on the vertical erected from P, and it is at a level below $\beta'\ \beta'_2$, equal to P′ p' of Fig. 203. Project the point T in T″ on the horizontal P′ T″ of Fig. 205, take T″ T′, equal to the length of same designation in Fig. 203, the line P′ T′ will be the projection of the tangent to the central curve of the string. Then project in X′, X′$_2$ on the horizontal P′ T″ the points X and X_2 where the medium line of the joint projected in X P X_2 cuts the vertical planes X Y and X_2 Y_2, and draw through these points X′ and X′$_2$, Fig. 205, two perpendiculars to the tangent P′ T′. This will give the intersections of the side faces of the operation stone with the plane of the joint. The operation stone is limited above and below by the parallel planes U′ V′ and u' v' perpendicular to the vertical face X Y, and comprising between them the elevation of the stone. Now, to obtain the curves of intersection of the joint plane with the four faces of the string, project the points Q and Q_2, q and q_2, on the upper and lower curves to which they belong; the midpoint Q_3 must be projected at a level above $\beta'\ \beta'_2$ which is shown in Fig. 203, and it will be the same for q_3; then the midpoints of the lateral curves Qq, Q_2 q_2, will be on the horizontal X′ X′$_2$, and through all these points the curved outlines of the intersection can be drawn.

The same operations will have to be done for the joint passing through the point (R, R′) in taking, Fig. 204, all the differences of level from the horizontal $\phi'\ \phi'_2$; to define the plane of the joint, the perpendiculars to the tangent R′ θ' shall be taken through the points Y′ and Y′$_2$, Fig. 205, deduced from Y and Y_2 on plan, Fig. 202. The operation stone, after the joint planes are worked, is reduced to a prism, the ends of which are oblique planes.

Fig. 206 represents the intersection of the upper face V′ V′ of the stone with the vertical cylinder B C D E F L and B_2 C_2 D_2 E_2 F_2 L_2. To obtain these curves prolong the verticals C γ', C_2 γ'_2, D δ', D_2 δ', D_2 δ_2, . . . until they meet the line U′ V′, and turning down that face round the lines U′ V′, the points will come to C′, C′$_2$, D′, D′$_2$, . . . at the same distance from U′ V′ as C, C_2, D, D_2 from the line U V on plan.

The intersections of the lower face $u'\ v'$ are identical with those of the upper, and therefore the plane $u'\ v'$ is supposed to be raised to the level of the upper plane, and the traces of the cylinders already drawn serve for both planes.

On Fig. 207 is represented the head mold of the operation prism, intersected by the faces of the string; it is a projection with X X_2 as ground line. To produce this take on line P P′ a point, P′; draw through it a parallel to the ground line X′ P′ X′$_2$, from which carry the differences of level of the various points taken from Fig. 203.

On Fig. 208 the head mold of the other joint has been drawn by the same process.

Application of the Lines on the stone, Fig. 209.—Work first the prism, of which dimensions are given, Fig. 202 and Fig. 205; on the upper and lower faces place the molds given in Fig. 206, then work the end joints V V_2 v_2 v and U U_2 u_2 u. After this, work the concave cylinder by means of the curves C, D, E, F, and C′, D′, E′, F′$_2$, laying on these curves a straightedge through the points C_2 and C′$_2$, D_2 and D′$_2$; then work likewise the convex cylinder. Now, on each generator of these cylinders carry the lengths $C_2\ \gamma''$ and $C_2\ \gamma'$, $D_2\ \delta''$, and $D_2\ \delta'$, measured from Fig. 205, and with the help of a flexible straightedge, draw on the concavity of the cylinder the curves $\gamma''\ \delta''\ \varepsilon''\ \phi''$, $\gamma'\ \delta'\ \varepsilon'\ \phi'$; draw likewise the curves of the string on the convex cylinder. Then the upper and lower faces of the string can be worked with a straightedge laid on the level points $\gamma'\ \gamma'_2$, $\delta'\ \delta'_2$, $\gamma''\ \gamma''_2$.

Sometimes the joints of the string have elbows, as in Fig. 210; but it is easier to have a joint in one plane and connect the stones by dowels.

On the convex side of the string the outline of the steps must be drawn, by means of a development, and must be cut in about ½ inch in order to house the ends of the steps in the string.

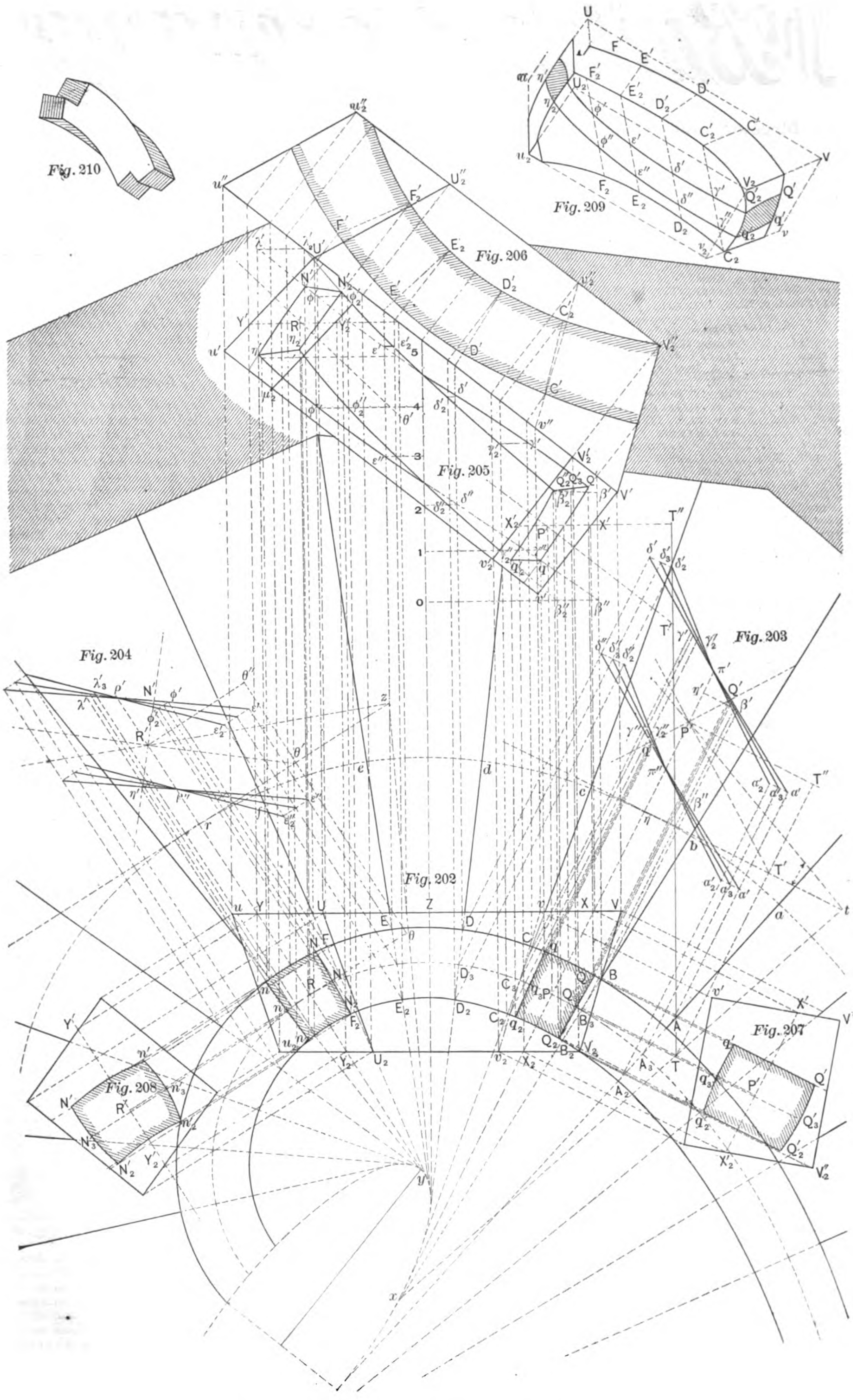
A marble handrail would be worked exactly in the same way as the string; first with a rectangular section, then the moldings would be cut out from this operation helix by means of templets.

* Continued from page 166, May issue.

NEW PUBLICATIONS.

HENDRICKS' ARCHITECTS' AND BUILDERS GUIDE AND CONTRACTORS' DIRECTORY OF AMERICA. 586 pages; 10½ x 7 inches in size. Published annually by Samuel E. Hendricks & Co. Price, $5.

This volume, as its title indicates, is a guide and directory for builders, contractors, manufacturers and dealers in all kinds of building supplies. It contains within its pages over 150,000 names, addresses and business classifications, comprising builders and contractors of material and construction in the building and kindred industries. It also presents full lists of manufacturers of and dealers in everything employed in the manufacture of material and apparatus employed in these industries from the crude material to the finished product. The work covers the years 1892–93 and is well calculated to prove of no little interest and value to the trades addressed. A feature of the work is a very complete index so arranged as to render reference to any particular article or material easy and rapid.



Masonry and Stone Cutting.—Figs. 202 to 210 Inclusive.

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

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H. H. EDGERTON, Rochester, N. Y.
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Committee on Statistics.

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Committee on Building Law.

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C. W. GINDELE, Chicago, Ill.
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C. D. MORSE, Worcester, Mass.

Missionary Work.

The National Secretary, on June 2, in response to an urgent invitation from the Builders' Exchange of New Bedford, Mass., attended the first annual meeting of that organization and made an address upon the benefits of a properly organized exchange, as well as the value of affiliation with the national body. He alluded to his own experience as a builder, and congratulated everybody who was in the business. "It is," he said, "the foundation of all business. We have not educated ourselves to make it looked upon as the leading profession in the country. It is worthy of all the thought that we can put it into it, and the underlying motive in organiznation is to do something to make it more systematic, wholesome and reliable. We should be rid of disorderly methods. We have a duty toward each other, and unless we combine together we cannot find out the essential qualities necessary to build it up. Referring to what had previously been said by another speaker urging an increase of membership, he said the motive is a worthy one, but there are master builders that an association does not want. We must discriminate. We want reliable business men. Let worth, reliability and skillful attributes be the gauge, and don't set a scoop net to bring in every one. It is by no means settled among builders and dealers that any lien law is a good one. There's too much competition in this country, and the desire to branch out before the right is earned is altogether too great. Everybody wants to make haste to be rich and are too ambitious to take risks, thus bringing all builders into the vortex of competition, which makes building the poorest paid business for the risk taken. The opportunity for this sort of competition should not be enlarged." He urged the exchange to become a member of the National Association, and enlarged upon the benefits to be derived from the contact with men in the same calling from all over the country.

The meeting was a large and enthusiastic one, and was accompanied by a banquet, which every one thoroughly enjoyed.

Visitors' Credentials.

To assist in establishing the fullest co-operation between the various filial bodies and for the purpose of increasing friendliness of spirit throughout the whole constituency of the National Association, it is suggested that members when contemplating a visit to other cities where a filial body of the National exists, should apply to the secretary of their local exchange for a letter of introduction to the exchange in the city they propose to visit. This credential will open the doors of that exchange and secure for them a headquarters during their stay. The officers of all filial bodies will extend every courtesy to visiting members, making them feel that they are not strangers in a strange land.

Exchange Benefits.

A properly organized builders' exchange wields a much greater power in a community than is generally accorded to it. The gathering together of many builders and their joint action upon business topics produces an effect upon the building portion of the community much greater than is usually conceded.

Every person engaged in building operations, whether as owner, architect or contractor, is benefited by the improved conditions resulting from the existence of the builders' exchange, whether a member of the organization or not. Building contractors and those engaged in kindred callings are, of course, most benefited, as the reforms that are secured through the medium of the exchange affect the whole fraternity, even though they may not all be contributors to the end gained.

Members of exchanges should for this reason recognize the importance of creating a high standard of excellence for the organization and should also enter fully into all matters of general interest that are for the welfare of the city. A builders' exchange should be identified with every move in the direction of progress quite as much as organizations of a commercial nature.

Extra Work.

The National Secretary has recently been applied to for information in regard to the status of the builders in the matter of "extra work," the reason for the inquiry being that a member of one of the filial bodies has a case on trial where the owner refuses to pay for "extra work" performed under a written order of the architect. The National Secretary would be very glad to receive from the secretaries of filial bodies, or from any individuals, facts touching upon such a condition of things. The point is this ; that if a contractor receives orders from the architect in charge of the work to perform items additional to the contract, is he to be at the mercy of the owner and be in danger of the necessity of proving his claim and collecting his pay by process of law?

Carpentry and Building.

Secretaries of filial bodies are urged to secure as many subscribers as possible among their members to *Carpentry and Building*, in order that the largest possible circulation may be secured to the utterances of the National Association found in its department in the columns of this paper.

Correspondence is being received daily showing that the notices, editorials, &c., are read and valued in all parts of the country, but a still greater interest is desired among the members at large of each filial body. Much good for the fraternity is anticipated through this monthly distribution of news and information, and in return the officers expect valuable hints and suggestions which may be aroused by the matter offered.

Attendance at Exchanges.

The secretary of each filial body is requested to send as soon as possible to the National Secretary the number of members who utilize the exchange as a rendezvous. If a "'change hour" is established, give the limit of the same and the average number of members present, also how freely the rendezvous is utilized by architects and by the general public.

Business Habits.

The National Secretary is desirous of receiving from members of filial bodies suggestions to assist him in preparing a comprehensive article on Business Habits of Contractors.

If the officers or individual members of local bodies will kindly send to the secretary such points as may have occurred to them in their experience showing the need of greater system in the conduct of all parts of the building business, it will be of great benefit, and such correspondence is earnestly solicited.

CONCRETE—ITS COMPOSITION AND USES.*

ALWAYS ascertain the contents of voids in any "aggregate." This can be done by filling a water-tight box of known dimensions with the material, and measuring the quantity of water poured in to fill up the interstices; or, secondly, by weighing a cubic foot of the "aggregate," and comparing its weight with that of a cubic foot of the solid stone from which it is broken; thirdly, take a sieve and put in a known quantity of the "aggregate;" sift it, and ascertain the amount of the gravel there is by measure, then find the proportion, and base your calculation upon it for the quantity to be added, if any. For ordinary foundations, concrete should be laid in horizontal layers 12 inches thick. In extensive works they may be 2–3 feet or 4 feet thick. The concrete should, after mixing, be rapidly wheeled to the site, gently tipped into position, and then evenly and gently rammed, but not so as to make the surface wet, as the cement exudes from it. When depositing fresh concrete upon a previous layer, it must be swept clean and well watered, more especially if the previous layer has already set. If there is not time to allow each layer to set, it is better to ram it as quickly as possible, and follow on before the previous layer has had time to set. No traffic of any kind should be allowed over the concrete. Cement concrete should be deposited as soon as mixed. Lime concrete should be left for a short time to allow the whole of the lime to slake. Concrete, when made with hot lime or cement, swells to from $\frac{1}{8}$ inch to $\frac{3}{8}$ inch per foot of its linear dimension. This is owing to the imperfect slaking or cooling of the lime or cement. This expansion which occurs in concrete has, however, been taken advantage of in underpining walls that have settled in parts; hot concrete, forced tightly into openings made below the faulty portions, expands and sets, filling the opening tightly.

CONCRETE WALLS.

Concrete walls are built by fixing a framing, either of wood or iron sheeting, and filling in and ramming the concrete. The wood apparatus consists of frames 12 feet or 16 feet long, $1\frac{1}{2}$ inches or 2 inches thick; the edges of the timber should be shot, placed face to face, and secured by a double row of $\frac{3}{4}$-inch bolts, provided with tap handles, passing through the wall and kept apart at a distance to suit the required thickness of the wall by collars or plugs of wood or iron, through which the bolts pass, formed slightly tapering to facilitate their removal on completion of the wall. Starting from the top of the footings, the first set of framing is carefully fixed in a horizontal position, with their faces truly plumb. The space between the frames is then filled in with concrete, rammed in layers of from 9 inches to 12 inches deep. After about two days the frames may be moved for the succeeding piece of wall, being attached to the wall already finished by fixing the lower row of bolts through the plugs in which the upper row had previously been. The frames are about 2 feet 3 inches or 2 feet 6 inches wide, and the rows of bolt holes are about 1 foot 6 inches apart. The frames should be strutted at intervals of from 5 feet to 6 feet, and may be nailed to vertical battens about 3 feet or 4 feet apart. If the face of the work is exposed and a fine face required, it can be obtained by having the faces of the casing or framing wrought. The casing should be perfectly plumb, and care taken to keep it so during the process of filling in. The face is formed by filling in at the back of the wrought casing with fine concrete, 2 inches thick, and well worked up to the casing. This process must be executed at the same time as the general mass of concrete. To insure the fine concrete being regular in thickness over the whole face, the following process is usually adopted: A 2-inch batten or deal is placed against the wrought casing and the coarse concrete is filled in at the back; the batten or deal is then removed, and fine concrete is filled into the cavity and well worked up against the casing so as to incorporate it with the coarse concrete. The casing should be struck as soon as possible, and the face finished off by means of a hand float. This process must be executed while the concrete is green, and immediately after the casing is struck. Finished horizontal surfaces of concrete should be kept damp for several days by means of a layer of sand about 6 inches thick and kept watered twice a day.

* Concluded from page 148, June issue.

OTHER USES OF CONCRETE.

When concrete has to be laid under water, care must be taken to protect it during its passage to the site of deposit, so that the water does not reach it until it is laid. This protection is sometimes afforded by "shoots, boxes, or specially contrived iron skips," which can be opened from above when they have reached the spot where the concrete is to be deposited. Sometimes the concrete is filled into bags and deposited without removing the bags. In large engineering works caissons are used. Concrete for this work is also cast in blocks, ranging in size from 2 to 200 tons in weight; they are made on shore and deposited by special contrivances. Cement concrete floors, from 6 inches to 9 inches thick, will stand a good deal of wear. Slabs of concrete can be substituted for stone flagging. They should be from 3 inches to 4 inches thick, faced with fine shingle or granite clippings to a depth of about $\frac{3}{4}$ inch, backed with one of cement to four of "aggregate," broken to a three-quarter gauge. They should be made a few weeks before being laid, and kept damp for three or four days after being cast.

In forming concrete in situ it is best to fill in the concrete, and then work or beat it up until the "fat" appears upon the surface; then finish off to a smooth and even surface with the float. Additional cement should be sprinkled over the surface when being finished with the float. The above process must be done while the concrete is green.

Concrete roofs for small buildings can be made from 3 inches to 6 inches thick, over close sheeting. It should be of finer ingredients than for walls. They should be slightly arched or of sloping planes, not exposed to the sun, or allowed to dry for at least seven days after being laid.

The proportions generally adopted for ordinary work are—for walls of houses, one to seven; sea walls, one to six, seven or eight; foundations, one to eight or ten; arches and piers, one to eight; work under water, one to four or six.

Safe load on piers per foot sup.: Cement concrete, 8 tons; lime concrete, 4 tons.

WEIGHT AND CRUSHING STRENGTH.

I append the two following tables, showing the weight of materials of concrete, and also crushing strength of Portland cement concrete:

Materials.	Weight of 1 bushel.	Weight of 1 cubic foot.
Portland cemet	110.56 lb.	86.35
Sand and ballast	123.30	96.40
Portland stone	98.00	76.50
Broken granite	115.70	90.60
Broken pottery	113.00	88.30
Broken slag	107.00	83.50
Broken flint	126.00	98.50

Crushing strength of Portland cement concrete crushed after being kept one year, half in air, half in water. Materials, ballast; size of blocks 1 foot cube, compressed:

Composition of concrete.	Crushed at tons.	
	Block kept in air.	Blocks kept in water.
1 to 4	103 Tons.	108 Tons.
1 to 5	89	99
1 to 6	80	91
1 to 7	75	80
1 to 8	61	76
1 to 9	54	68
1 to 10	48	48

This table clearly shows that the blocks made with the larger proportions of cement are the strongest.

Design for Stair Finish.

From an interesting little pamphlet which has lately reached our desk, we take the design for stair finish shown in the accompanying illustration. It represents some of the new work which is being turned out by the firm of J. E. Smith & Brother of 199 West Eleventh street, St. Paul, Minn., and gives a very good idea of what they are prepared to do. The carving in connection with this design is not stamped or pressed into the wood, but is cut in the solid material. The firm referred to has recently produced a number of very attractive designs for stair finish which, we understand, have been copyrighted.

Design for Stair Finish.

THE VATICAN, the ancient palace of the Popes of Rome, is said to be the most magnificent building of the kind in the world. It stands on the right bank of the Tiber, on a hill called the Vaticanus, because the Latins formerly worshipped Vaticinium, an ancient oracular deity, at that place. Exactly when the building was commenced no one knows. Charlemagne is known to have inhabited it over 1000 years ago. The present extent of the building is enormous, the number of rooms, at the lowest computation, being 4422. Its treasures of marble statues, ancient gems, paintings, books, manuscripts, &c., are to be compared only with those in the British Museum. The length of the statue museum alone is a fraction over a mile. Conservative writers say that the gold contained in the medals, vessels, chains and other objects preserved in the Vatican would make more gold coins than the whole of the present European circulation.

Manufacture of Roofing Slate.

It may be of interest to those who are not familar with slate quarrying and manufacture of slate, says a writer in the *Slate Trade Journal*, to follow briefly the various processes undergone by the slate rock from its position in the bed until it is placed in rows on the banks of the quarry ready for shipment and for the roof. The first operation is the quarrying of the large blocks from the beds in the quarry. The first step consists of separating such portions of the bed from the main body as may conveniently be hoisted out of the pit to the bank. This is generally done by blasting. The hole is drilled by means of an ordinary drill, which may be used by one man lifting it up and down, or by two men, one holding and turning it in the hole and the other striking it with a hammer. In some quarries where the beds are favorably located the steam drill or compressed air drill is used to very great advantage. The size, shape and position of the hole will depend largely upon the object to be gained, much fine discrimination being used on this point, it being of considerable importance. The explosive generally used is the common rock-blasting powder. The force wanted being sufficient only to heave the rock with as little breakage and shattering as possible, the depth of the hole, quantity of explosive to be used will depend upon the occurrence of such natural helps as joints, floors and slips, of which the skillful quarryman knows how to take the best advantage.

CUTTING AND SPLITTING.

The large blocks having been obtained in as good condition as possible, are hoisted to the top of the quarry by means of derricks, where they are separated into smaller pieces or blocks of convenient sizes for the slate maker. In this operation the skill and judgment of the quarryman are tested, the object being to shape these blocks so that as many slates as possible may be made out of them, with the least amount of waste. These blocks are generally about 2 inches thick, and of such dimensions as will make a given size of slate. The cutting or splitting of the large blocks into smaller ones is done by making a notch at one side, or in the end, and driving a wedge along the line on which the break is to take place; sometimes the notch is cut on one side, and the break produced by striking the block on the opposite side with a heavy wooden mallet, or a hole may be drilled somewhere on the line of the break, and two iron wedges placed in it, and a third one driven between them, forcing the block to split in the direction required. This operation is sometimes called "pillaring," but more generally "block-making," in this country. These reduced blocks are then taken to a hut or shanty, where they are split and dressed into roofing slates. The first operation is performed by a splitter, who is seated on a wooden block, raised slightly above the floor. He is provided with a wooden mallet and three or four splitters, which are thin chisels, with a broad fine edge, from 10 to 15 inches in length, and the broad end from 2 to 3½ inches wide. He takes a block and places it against his left thigh, with the smoothest and straightest end uppermost; then places his chisel in the center, and makes two or three cuts all in a line. The center one of these he drives further into the block, which begins to split. He inserts a second chisel and works the two backward and forward until the split extends down the block and divides it in two along a cleavage plane. This operation is repeated until the desired thickness of the slate is attained, greater care being required as the slabs become thinner. These irregular slates are now ready to be squared or dressed into the required sizes.

HAND DRESSING.

The hand method of dressing, still used to a certain extent in Wales, but entirely out of use in this country, is briefly as follows: The dresser sits with a wooden bench on which is fixed a steel knife or frame, before him. In his right hand is a long knife or dresser. He places the thin slate slab on the carrier, and with one blow trims one straight side, and then one end, at right angles to each other. He is provided with a gauge, with which he is able to mark the length and width of a given size. The slab is squared according to these marks, and the result is a finished slate. The slates are sorted by the dresser according to their several sizes and according to their grade or quality, and stacked in piles ready for shipment. There are several kinds of machines in use for dressing slate, which greatly facilitate the operation and enable the dresser to make a more uniformly square slate.

Polishing Wood with Charcoal.

A method of polishing wood with charcoal, now much employed by French cabinet makers, is described in a Parisian technical journal. In this cosmopolitan city, says a London exchange, may be seen many articles of furniture of a beautiful dead black color, with sharp, clean-cut edges and smooth surfaces, the wood of which appears to have the density of ebony. As against furniture rendered black by paint or varnish, the difference is so sensible that the great margin of price value between the two kinds of work explains itself.

The operations are much longer and more minute in the case of charcoal polishing, which respects every detail of carving, while paint and varnish would clog up the holes and widen the ridges. In the first process only carefully selected woods are employed, of a close and compact grain. They are covered with a coat of camphor dissolved in water and afterward another, composed chiefly of sulphate of iron and nutgall. These two compositions, in blending, penetrate the wood, giving it an indelible tinge, and at the same time rendering it impervious to the attack of insects. When sufficiently dry, the surface of the wood is rubbed at first with a hard brush of couch grass and then with charcoal of substances as light and pliable as possible. Any hard grains remaining in the charcoal scratch the surface instead of rendering it perfectly smooth. The flat parts are then rubbed with natural stick charcoal and the indented portions and crevices with charcoal powder. Alternately with the charcoal the workman also rubs the furniture with flannel soaked in linseed oil and essence of turpentine. Repeated pouncings cause the charcoal powder and oil to penetrate into the wood, giving the furniture a beautiful color and also a perfect polish without any of the flaws of ordinary varnish. A cabinet maker in Paris first hit upon this discovery. He is said to have coined a mint of money at first, and regrets deeply that he has not been able to keep the secret to himself. It will possibly be worth the while of some of our friends to give the process a trial.

CONTENTS.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
The Builders' Exchange.

DAVID WILLIAMS, - - PUBLISHER AND PROPRIETOR.
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AUGUST, 1892.

Mechanical Trade Schools.

The action of the Journeymen Bricklayers' Protective Association of Philadelphia, in regard to its treatment of the graduates of the trade schools, is very satisfactory. The matter has been practically settled for some time, but the action of the Association ratifying the system of apprenticeship recommended by the joint committee from the Association and the Master Bricklayers' Company, which took place while the July issue of *Carpentry and Building* was on the press, is a long step in the direction of better understanding among the workmen of the operations and purpose of these schools. The Bricklayers' Association of Philadelphia is a very influential body of workmen, and their action will do much to remove the prejudice against the schools which has existed in the minds of some of the workmen, and who by that prejudice have been prevented from arriving at a comprehensive knowledge of the work undertaken. The purpose of these schools is not to turn out journeymen, but to give the young man desiring to become a skilled mechanic an opportunity to use one year of his apprenticeship in such a manner as to produce the best possible results; that is, to study one year in the schools under competent instructors and have that year deducted from his term of apprenticeship. By this means he begins his actual apprenticeship in a condition best calculated to make him a valuable workman when the term expires. The value of this year of well-directed study both to the pupil and to his employer is beyond question, and every community of builders should consider it a duty to facilitate in every way the establishment of such schools, and every assistance should be afforded to young men who desire to receive a practical trade education and make themselves skilled mechanics.

Notable Corners.

The noticeable feature of the building business in New York and Brooklyn, the present year, is the number of corner sites which are being occupied by new buildings. With the ground measurably covered by structures, as has been the case in these two cities for many years past, it follows as a matter of course that many of the new buildings put up are erected on the sites of the older buildings torn down; but perhaps never in the history of the cities, and of New York particularly, were there so many corners of the best character being reconstructed as at the present time. All along Broadway signs of this are to be seen, and the same thing is true in various cross streets and in a large number of the avenues. There is less remodeling of old buildings in progress, perhaps, at the present time than usual, and more of putting up first class business structures.

The Rights of Employers and Workmen.

One of the most prominent stumbling blocks standing in the way of peaceful adjustment of differences between employers and workmen is the difficulty of establishing to the satisfaction of both sides just where the rights of each ends and just how far the demands of one side encroaches upon the rights of the other. Each claims that there are certain fundamental principles which are their own inalienable right and which should under no circumstances be assailed or disturbed. This claim is just, and should be conceded without question, but the keynote of the situation is, What are the rights of each? The strong organization of the workmen has made them so powerful that they have presented one demand after another to the employers, who have been compelled to yield to superior strength. The action of the workmen in this regard is not surprising, for it would be strange if with their great strength they did not make requests which would be considered objectionable by the employer. The trouble between the two lies in the fact that the workmen, having secured so many concessions, have come to look upon every point gained as being right because it was gained, while it is undoubtedly the case that many of the points secured have been obtained at the expense of some part of that which the employer considers to be his right. There are many things which are undoubtedly due the workmen from the employer, and there are also certain prerogatives which belong to the employer, and until the two come together and talk over the situation no temporary settlement of points at issue will establish just wherein the rights of each should prevail. Each side owes it to itself and to each other to facilitate in every possible way the establishment of peaceful and harmonious relationships, in order that means may be perfected for the prevention of misunderstandings and differences rather than the temporary settlement in which one side or the other feels that it has been compelled to yield to force and has abrogated certain of its rights.

An Aspect of a Builders' Exchange.

An aspect but little considered of the work of a properly-conducted Builders' Exchange is that which relates to its powers of education—not necessarily the education which pertains to the mechanical portion of the builders' business, but to the ethics of his relationship to his brother builder and to the workmen in his employ. The daily meeting together of builders in an exchange produces a feeling of fellowship among the members thus associated out of which good is bound to come, if only from the natural human desire for approbation. No member of an association of men desires the ill opinion of his fellows, and through constant personal association with men following his own line of business he becomes more and more impressed with the importance of standing well among them. Not that he would not endeavor to conduct his business fairly and honorably even if he were not a member of an exchange; but through his membership he acquires, almost unconsciously perhaps, a better knowledge of the methods of transacting his business, so that he will gain not only the approbation of those with whom it is conducted, but of his competitors as well.

Social Features.

The social features of an exchange are unquestionably beneficial, as they establish and foster a feeling of consideration for members of the same calling which is frequently lost in the keen competition among builders without the personal knowledge and respect of each other that comes from association. In time of trouble the benefits of an exchange, with a carefully selected membership, are beyond question; the existence of the organization has permitted all possible complications in the business to be thoroughly canvassed and wise counsels prevail. When difficulties and misunderstandings arise with the workmen, the influence of the entire building community is felt, for an exchange embraces all branches of the business, and arbitrary or unjust measures taken by employers in one department of building are discountenanced by those with whom such employers are daily thrown in contact, and the powerful lever of desire for approval is brought to bear. It is growing to be more often the case that, through the medium of an exchange, measures of prevention of labor complications are being undertaken, instead of tardy efforts for temporary settlement, and finally an exchange exercises at all times an inherent power for the establishment of better methods for governing business practices.

World's Fair Buildings.

Some of the newspaper correspondents go into ecstacies over the dimensions of the buildings being erected for the World's Fair at Chicago. The Manufactures Building, as it is commonly called, is undoubtedly the largest building ever attempted. That it will be a success in all its features is assured by the character of the men in charge of it. The mere statement that it covers 30 acres fails to convey to the ordinary mind an adequate idea of its magnitude. It is only when it is compared with some of the greatest structures of the world that one comprehends it in a way. A correspondent of the Lancaster *Daily Examiner*, describing the Manufactures Building, puts on paper certain comparisons which cannot fail to be of interest to all who read them. He says:

I spent a long time in wandering about the Manufactures Building. It is the biggest building ever planned, and it will have one roof covering 30 acres. Senator Ingalls came out and looked at it the other day, and as he gazed, astounded at its immensity, he said: "It is an exhalation! Yesterday it was not, to-day it is, and to-morrow it will have passed away. I can see how you can fence it in, but to roof it almost surpasses human conception!" Think of putting a massive glass and iron roof over a 30-acre field! That is what the men are doing here to-day, and I saw them at work putting up the great iron trusses which will support this roof.

You cannot conceive the size of this structure without seeing it. Three hundred thousand people could be seated on the floor and in the galleries, and 80,000 could be seated on the floor alone. The Coliseum at Rome, with all its galleries, could only seat 87,000 people, and it was never roofed except with canvas. You could put four coliseums on that floor and two pyramids as big as Cheops would sit upon it side by side and leave room for the Capitol at Washington. If the great pyramid was taken to pieces and carried here its material could be stored in this building and you could look down upon its masses of stone from the galleries. This building is about a third of a mile long. Thirty great staircases, so wide that two carriages could be driven up them side by side, will lead to wide galleries and there will be a street 50 feet wide running through the center. With its galleries, it will have 40 acres of floor space, and it tires one even to think of its possible contents.

The Boland Trade School.

The building which is now in process of erection on Madison avenue, between Fifty-first and Fifty-second streets, in this city, will be known when completed as the Boland Trade School, and is designed as a new and important annex to the Roman Catholic Orphan Asylum. The new building will have a frontage on Madison avenue of 200 feet, a depth of 54 feet and a hight of four stories. The style of architecture will be mainly Gothic. There will be 16 class rooms for use in the practical teaching of the various trades, which, as at present decided, include carpentry, plumbing, masonry, plastering and painting. The structure complete is estimated to cost about $175,000. It is expected that when the school is fully under way, from 30 to 40 pupils will be graduated each year. The directors of the asylum have given the idea of trade schools no little attention for some time past, and we understand that the new Boland school will be patterned in some degree at least after the New York Trade Schools established by Col. R. T. Auchmuty.

Arbitration.

"An ounce of prevention is better than a pound of cure," is particularly appropriate just at present in the light of the recent complications in the labor world. The value of establishing some means whereby points in dispute between employers and workmen can be settled and the two enabled to adjust their differences without breaking every law of humanity grows more apparent. Arbitration has been advocated, and wherever it has been properly undertaken, the result has been satisfactory. Arbitration as entered into by two parties for the settlement of some long-standing dispute is not arbitration in the true meaning of the word, but is rather a meeting of the two under a forced truce for the purpose of arranging the conditions of a cessation of hostilities that meant ruin to one or both. In such a case justice is likely to be submerged in the desire of each to secure the greatest possible advantage regardless of equity or consideration. Both sides are largely swayed by the feeling of animosity that has been engendered by the struggle, and both are eager to secure advantage over the other. Arbitration as advocated by the National Association of Builders contemplates the establishment of a joint committee of equal numbers from both sides, which by its existence acts as a preventive to hostilities of any kind. The committee has full power to consider all questions of mutual concern, and by its action anticipates a settlement while both sides are in a calm and peaceful frame of mind. So far as it is possible to adjust human differences of this character, the plan is fair and honorable to both, being based upon the principles of equity. In no case where the plan has been adopted in a time when the relations between employers and workmen have been reasonably harmonious has it failed to produce the best possible results. The plan of arbitration advocated by the National Association of Builders is almost identical with that adopted by the United States and the South American countries for the purpose of maintaining harmony and preventing trouble.

Old and New Buildings.

When an old structure is torn down in New York preparatory to erecting a new building several things occur which are very suggestive to the student of the building art. If the old structure was of a pretentious character—was first class, as things were one or two generations ago—the cellar and basement are found to extend pretty well into the earth, but, nevertheless, the excavation of the new building goes far below the bottom lines of the old structure. In preparing for the new building, therefore, there is first the removal of the foundations of the old work, and in this many interesting facts as well as relics are encountered. The character of the masonry, the way the foundations were planned, and in some cases the character of the materials employed, are all instructive. After the line of the lowest depth of the old foundation has been reached the virgin soil is encountered. Very often this is of sand, and in many instances a right good quality of sand it is, too. This is very frequently piled to one side and arranged in a way to give free space for the diggers and masons in connection with the new foundation, and yet to be ready to be used in the mortar necessary for the foundation work as well as the brick work which succeeds. Hard-burned brick is a favorite foundation material in New York, and comparatively little stone is used in the way in which stone foundations are employed in many of the interior cities, and particularly in buildings in the country towns. In watching one of these new buildings, particularly after he has observed the depth to which the old foundations were carried, one is disposed to ask, What will the third or fourth generation to come do with reference to these buildings? Are the first-class well-appointed structures of 1892 ultimately to be superseded by something better, the same as the buildings of a half century ago are now being superseded? Where will the builders' art cease in matters of this kind? The question is particularly pertinent in New York from the fact that in that city, by its environment, territory is limited and there is more and more need to crowd greater facilities into smaller territorial space. Hight and depth are the only dimensions to be manipulated.

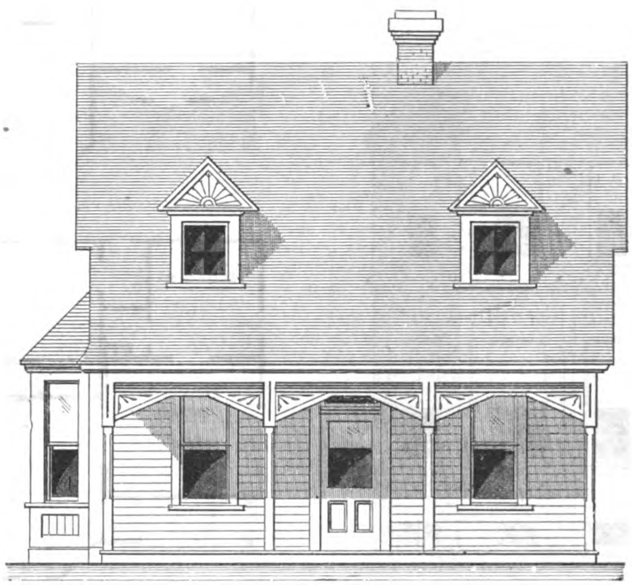
Cleaning Building Fronts.

Whoever goes along the streets of any of the great cities cannot fail to notice in one direction or another the scourers or renovators of buildings at work. Sometimes fronts are being cleaned by the use of acids, and again abrading tools are employed. Whenever they get through with the marble or stone edifice the appearance is greatly changed. From the smoky, dirty appearance that the building formerly presented it has turned to a brand new building. Then with a little paint touching up the wood work or the metal trimmings about the roof a bright piece of new architecture is added to the street. Excesses are possible in this line as well as in any other. The acids employed, particularly on marble, frequently penetrate more deeply than is desirable, leaving the surface in such a condition as to gather the smoke and dirt more rapidly after the cleaning than before. This idea of cleaning by acids is applied not only to buildings, but frequently to statuary as well. For example, the marble statue on the east front of the Capitol building at Washington, representing a desperate struggle between an Indian and a frontiersman, has recently been cleaned. Every year or two the officials in charge of the public buildings and grounds of the Capitol get an idea that these so-called works of art would look better if the signs of age were removed; so they go at them with scrubbing brushes and steel scrapers to restore them to their original color. Very frequently, as already pointed out, the restoration proceeds so far as to be absolutely destructive to the material, to say nothing of spoiling the fine lines which gave the statue character in the first place. The fad for scrubbing public buildings also prevails in Washington. Almost every year all the big structures like the Capitol or Treasury and other public buildings are gone over with the direct purpose in view to remove all signs of age. It is a question if this is not all a mistake. What would some of the ancient piles of the Old World be if cleaned up? Imagine some of the historic structures, to see which pilgrims travel half round the world, scrubbed up to make them look as if they were new. If this were even suggested the art critics of the world would rise to a man and say "No." Ours is a new country as yet. Our buildings are scarcely seasoned, and yet we are having them cleaned up. We treat marble and iron and brick and wood in order to have them look nice. We are in the habit of painting the latter, and sometimes the second material mentioned, and it follows then that stone and brick must be correspondingly treated so as to be kept fresh to the eye.

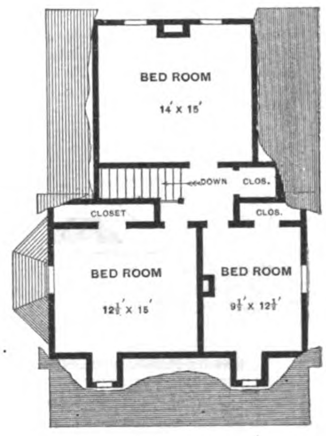
DESIGNS FOR CHEAP COTTAGES.

THE THREE DESIGNS for cheap cottages which are shown upon the following pages were prepared by George W. Payne, architect, of Carthage, Ill., for the consideration of a client in a neighboring village, the gentleman finally accepting the one last illustrated, which, with some slight modification, is now in process of erection. The first design shows upon the ground floor a sitting room, kitchen, bedroom, bathroom and pantry. The kitchen is furnished with sink and drainboard and also a small cupboard, while the pantry has pastry table and bins and is amply provided with shelves. The main stairway is placed in the center of the house and may be reached from the side porch and also from the sitting room. Under the main flight are the cellar stairs, easily accessible from the kitchen. The cellar is excavated under the latter room only. Upon the second floor are three sleeping rooms, all of which are provided with ample closets. The estimated cost of this cottage is said to be $950 in the locality named.

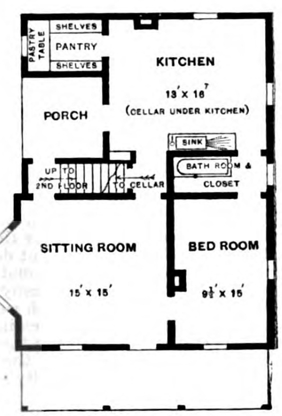
The second design shows a somewhat more pretentious dwelling than the one just considered. The plans call for a parlor, sitting room, bedroom and kitchen upon the first floor, the sitting room being entered from the porch through a small vestibule. The parlor and sitting room are connected by folding doors, while the kitchen is reached through a door and an arched passage. The kitchen is fitted in a manner similar to the one first described. The main stairway leads up from the sitting room and is open to the first landing. Beneath the main flight are the cellar stairs, which are convenient to the kitchen. The second floor has two large sleeping rooms and a bathroom. The estimated cost of this house is placed at $1095.



Front Elevation.



Second Floor

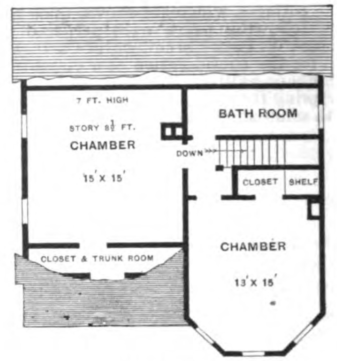


First Floor.

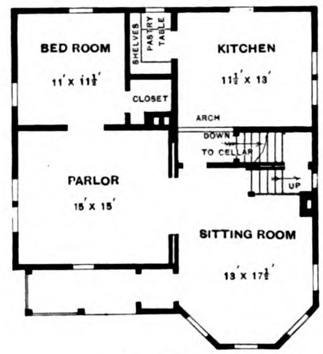
Side (Left) Elevation.

Designs for Cheap Cottages.—George W. Payne, Architect, Carthage, Ill.—Scales: Elevations, ⅛ Inch to the Foot. Floor Plans, 1-16 Inch to the Foot.

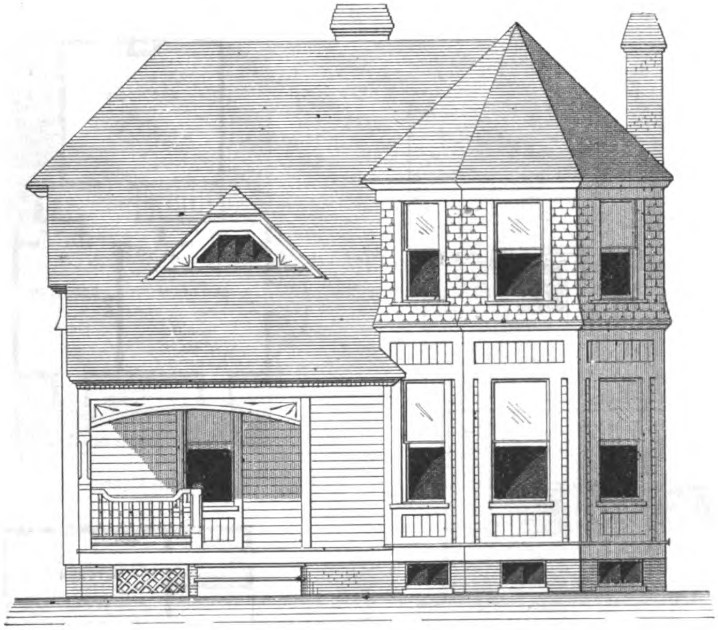
The third design is still more pretentious than the second one, both in exterior appearance and interior arrangement. On the first floor are three large rooms, besides a hall, vestibule and commodious pantry. The parlor, which is at the left of the hall as one enters the house, communicates with the dining room by means of folding doors. In the dining room is a projecting window, furnishing a wide shelf for floors and having drawers underneath. A china closet renders communication easy and convenient between the kitchen and the dining room. The kitchen is furnished with sink and pump, while the pantry is well fitted for the purpose. From this latter apartment descend the cellar stairs. On the second floor are three sleeping rooms, all easily accessible from the main stairs, which rise near the center of the house. The estimated cost of this cottage, exclusive of the fire place, mantel in the parlor and the bathroom outfit, is $1300, in the locality named.



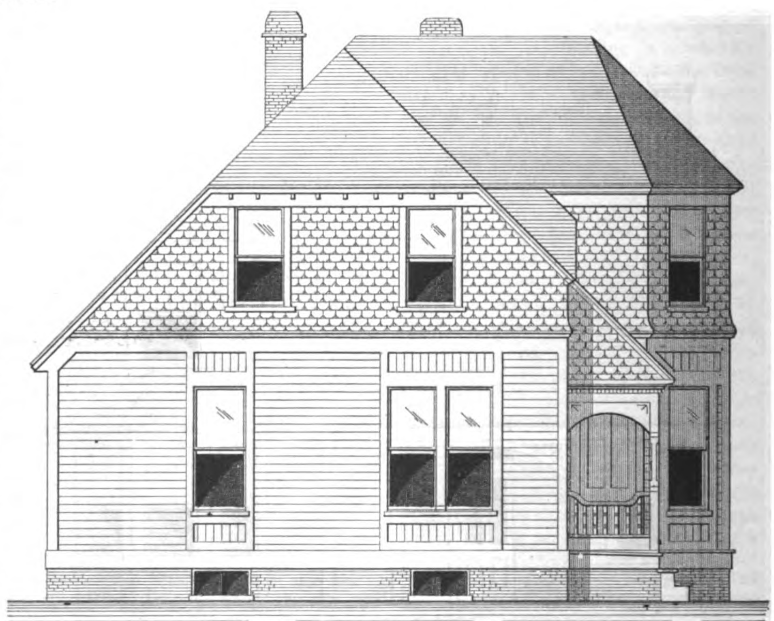
Second Floor.



First Floor.



Front Elevation.



Side (Left) Elevation

Designs for Cheap Cottages.—Scales: Elevations, ⅛ Inch to the Foot. Floor Plans, 1-16 Inch to the Foot.

Rope Moldings.

It is not known probably that new manilla rope will make beautiful and economical spiral moldings for wood work. Rope may be used as spiral moldings in circular and curved work where wooden moldings could not be employed without incurring extraordinary expense. The cash cost of rope will not usually amount to half the price of spiral moldings of the same size, says a writer in a recent issue of *Power and Transmission*. Whatever may be the size selected, the rope should be soaked for a few hours in thin starch and glue, equal parts, throughly mixed together. When the rope is to be nailed in place, take it from the vessels in which it has been placed and wipe off all the adhesive matter; then secure one end with a brad or two and twist the rope until the spiral strands appear more prominent than when a rope is not twisted firmly. After the molding ropes are secured where they are to remain, take a small stick of hard timber, dressed off like a three-square file, and draw the stick firmly in the creases between the strands of the rope, in order to make the strands appear more prominent. Such molding may be finished with wood filler, painted and varnished. Some prefer to soak the ropes in boiled oil instead of thin starch and glue; but oil will be more expensive and no better than the other material. The writer observed recently the columns and pilasters of an elegant suburban villa, all of which were finished with beautiful spiral moldings made of inch rope.

The Congress of Master Builders.

The most that has been accomplished by the Congress of Builders of Cincinnati, Ohio, has been presented in these columns from time to time, under the heading "What Builders are Doing," and in the July number of *Carpentry and Building* a *résumé* was given of the general position taken by the congress in reference to the matters within its jurisdiction. Frank S. Rohan, manager of the congress, has recently issued a letter to its constituent bodies, which contains a summary of the work that has been done, and closes with a restatement of its objects and present condition. The closing portion of the letter is in substance as follows :

The rules and regulations of the various associations and of this congress should be as simple and as liberal as possible, so that everybody engaged in the different lines of trade would become members of this organization, who are willing to live up to honest and straightforward business principles.

The necessity for such an organization no one doubts, not even the most skeptical, and it is this necessity that should impel us to the exercise of greater vigor and enthusiasm and the ardent desire to accomplish the many purposes for which the organization was created, and attain ultimate success.

1. The adoption of principles of fair dealing among ourselves.

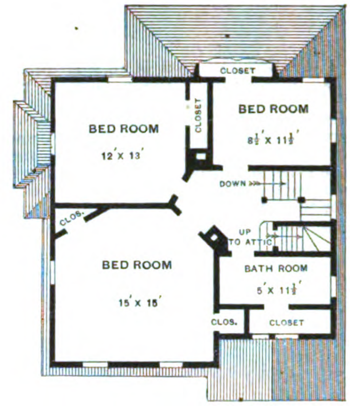
2. The adoption of principles of fair dealing toward the architects and owners.

3. Consistency in our charges. A desire not to take advantage of anybody, and particularly to impress upon the minds of the community at large that this congress is not a pool, nor a combination to take advantage of them, but a protection to all alike, and that only strict business principles and fair dealing are tolerated.

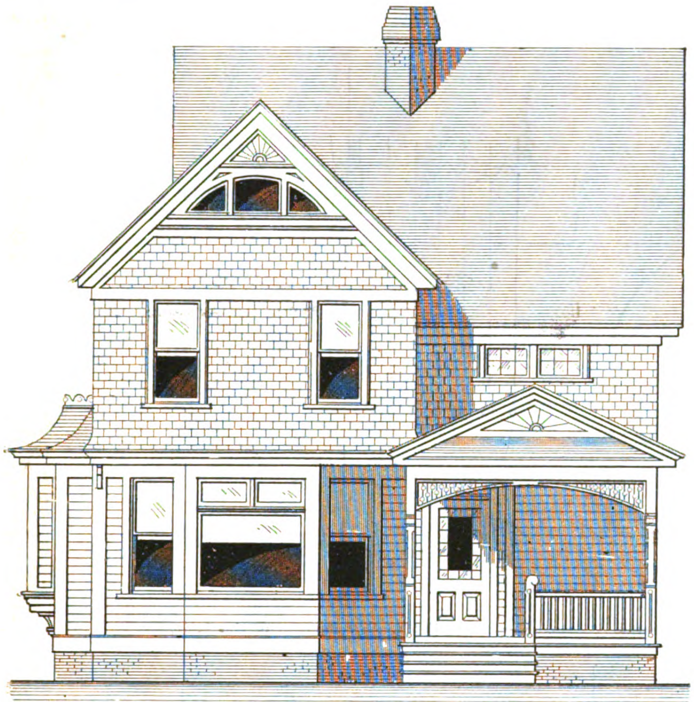
4. A system of dealing with the labor element by which strikes can be averted.

I am aware that competition from those above you and those around you will at times make difficult of execution your own desires to treat honorably and justly those below you. You are intermediaries between higher capital and the journeyman, and the exactions of the former dictate toward the latter a policy which your own hearts do not approve. Still, permit me to say, remember as much as you can the laborer and the journeyman, and use your influence in unison with that of others in permeating the whole community with love for your fellow-men and justice toward the poorest as well as toward the richest. "Justice exalteth a nation, but sin maketh nations miserable." More than all our palaces and railroad and factories, will justice bring to the land peace and plenty and happiness.

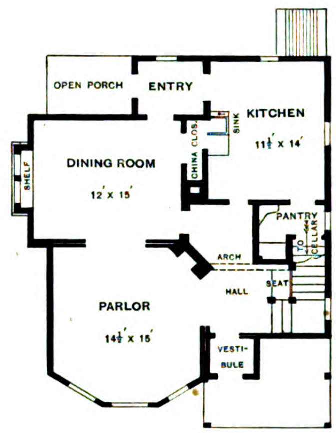
THE NEW BUILDING which is being put up on the site of the old *Commercial Advertiser* block, at the corner of Nassau and Fulton streets, New York City, will be ten stories in hight, the distance from the sidewalk to the roof being 130 feet. The new structure has a frontage of 114 feet on Fulton and 58 feet on Nassau streets. The frame work is of iron throughout, the first four floors having an exterior of stone, while the others are of dark buff brick and light terra cotta. There is an entrance on each street, the porticoes being of polished granite. The style of architecture is of the Italian Reniassance. The first floor of the building will be devoted to store purposes, while the upper portion of the block will be used for offices. Each apartment is so arranged that it can be divided into two without the sacrifice of light or ventilation. It is expected to have the building completed by November 1 of the present year, and the cost is estimated to be about $300,000.



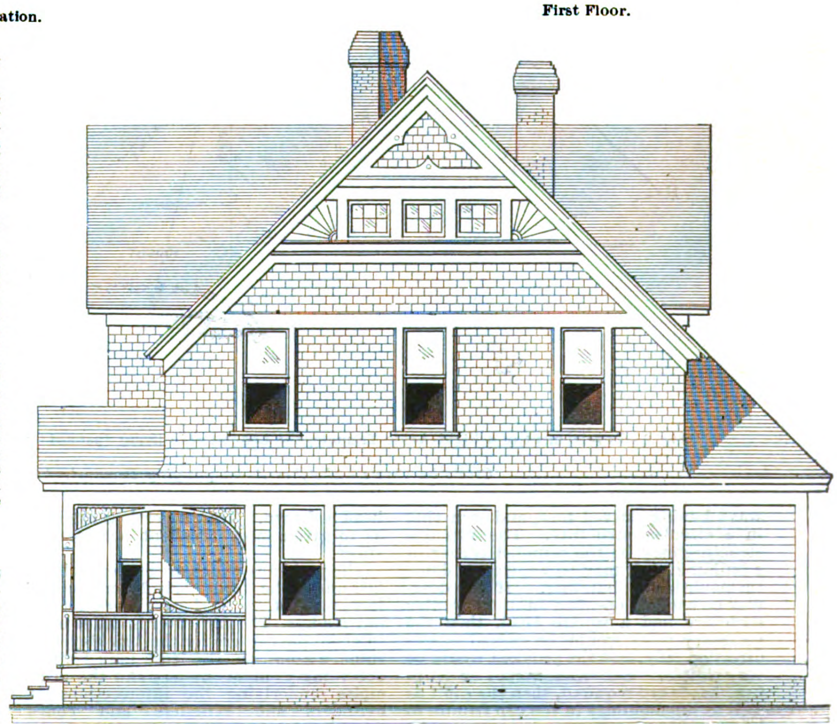
Second Floor.



Front Elevation.



First Floor.



Side (Right) Elevation.

Designs for Cheap Cottages.—Scales: Elevations, ⅛ Inch to the Foot. Floor Plans, 1-16 Inch to the Foot.

CIRCLE ON CIRCLE.

A QUESTION that is very frequently presented by the readers of *Carpentry and Building* relates to the development of surfaces having double curves. It occasionally receives the name of "circle on circle." What is wanted are rules and directions for obtaining the shapes necessary in wood, stone or metal for those parts which go to finish openings—as, for example, windows and doorways having curved tops, and occurring in a circular structure. The circular structure may be the rounded corner of a building, or it may be a tower or dome surmounting a building. If the doorway or window opening in the circular structure had a square head, then the necessary parts would be curved in one direction only, and the problem would be very simple. But where round or elliptical heads are required, then the soffit as well as the moldings in the cap require to be curved in two directions; whence the term "circle on circle."

Our supplemental plate this month represents, in a very pleasing manner, an attractive example of this work. It is the main entrance to the new building of the *Eagle* newspaper, Brooklyn, N. Y., a structure upon which a very large amount of money has been expended, and the architectural lines of which cause it to rank among the best buildings in the city named. The plan of the building shows that the corner represented in the photograph (which we have reproduced) is the arc of a circle of radius somewhat greater than that to which the arch of the doorhead is drawn. The proportions are such as to give a most excellent achitectural effect.

The problems which are properly classified under the term "circle on circle" have interest for various classes among our readers. The carpenter is called upon to make the centers for the bricklayer or stone mason, as the case may be, and accordingly must understand the principles underlying the intersections of cylinders and cylinders and cones in order to properly prepare his work. Again, the carpenter is called upon to fit window and door frames to openings of the kind described, and this special knowledge comes into play in such work also. The stone cutter is called upon to shape the individual pieces which go to form the arch occurring over a circular plan, and also those which constitute the molded finish, so that each may take its own proper place join its fellows on its several sides, and in conjunction with them give the lines which the designer intended. A third class interested are the sheet-metal workers, commonly called cornice men, who are called upon occasionally to imitate in their material the forms which we have long been accustomed to see in stone, terra cotta and cast iron.

We do not know of any book nor any series of articles in which this subject has been exhaustively treated. Paragraphs bearing upon it are to be found in different treatises upon geometrical drawing, upon stone cutting, upon carpentry and upon sheet metal work. Occasional tradepaper articles have also been published in which the principles have been more or less clearly defined, but the subject has failed, to date, of such treatment at the hands of practical men as seems to meet the reasonable wants of intelligent mechanics. It is our purpose in taking it

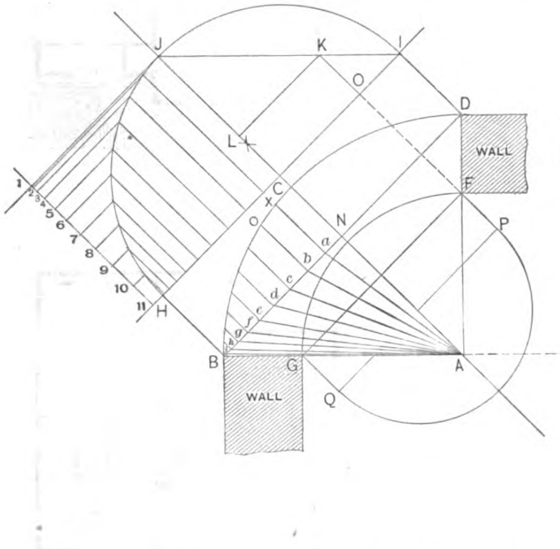


Fig. 1.—Plan of Wall Opening and the Elevation of the Arch.

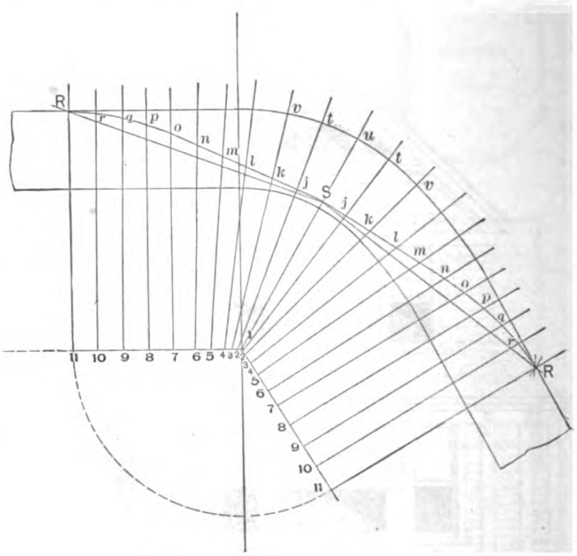


Fig. 2.—Development of the Soffit.

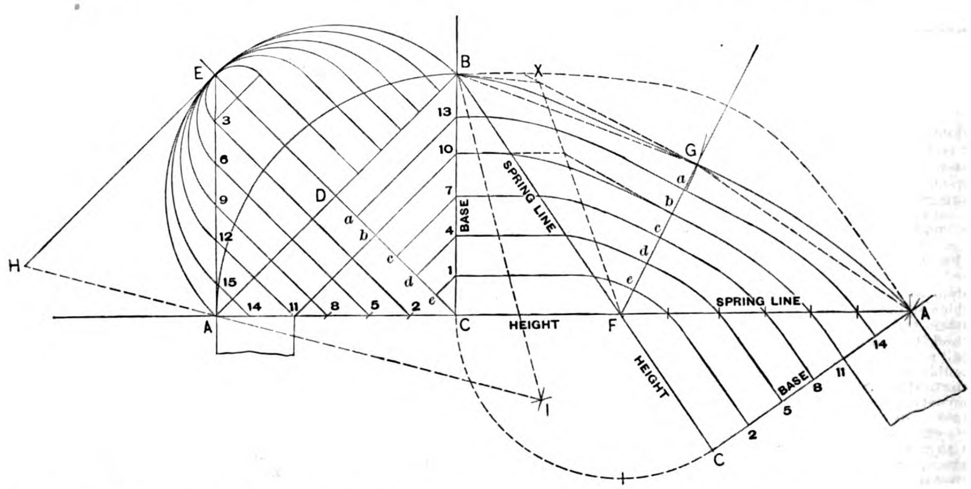


Fig. 3.—Development of a Right-Angle Triangle, the Longest Side Being Spanned by a Circular Arch to Finish Level at Top.

Circle on Circle.—Sketches Accompanying Demonstration of Mr. Secor.

up at this time (something, by the way, which we promised our readers a long time since that we would do as soon as arrangements could be made) is to present various phases of it, answer the questions that may be presented, and allow our readers to record the lessons of their own experience in doing work where circle on circle occurs. The subject is hedged about with difficulties. It is so far removed from the diagrams usually presented in a trade paper and the problems usually considered by mechanics as to be somewhat difficult of illustration and equally difficult of explanation. For this reason we shall, perhaps, employ more illustrations and make more frequen reference to models which may be worked out in better illustration of the principles than is our usual habit.

At this time we propose laying before our readers a part of a communication received some time since from J. V. H. Secor, which treats upon one phase of the subject. Mr. Secor is already known to our readers as the author of an important work on stair building, and is known among his associates in and about New York as a mechanical draftsman of high attainments. The problem which Mr. Secor sets out to solve is that of the head of a frame to be used in a window opening having an arched top occurring in a wall, the outline of which is the arc of a circle. Expressed in the language common in the shop, it is a problem in splayed jambs, the faces of the opening standing at right angles to each other, the opening being curved in plan, and the head a circular arch finishing level at the top. The diagrams used by Mr. Secor include Fig. 1, which is a plan of the wall-opening and an elevation of the arch. In Fig. 2 is shown the development of the soffit.

Mr. Secor's demonstration is as follows: From A, Fig. 1, as center describe the line of the wall. Let B G and D F be the face of the opening and the thickness of the wall. Draw H I parallel to B D, and from G as center, describe the line of arch. Divide the quarters H J in any number of equal parts—in this case we have 10; from the points thus established draw horizontal lines terminating at the perpendicular line at the left. Now draw the diagonal line I J; from F draw to K, and from L as center describe the line of the inner arch; this is also shown at G, Q, F, P; the principle of this arch will be explained more fully in Fig. 3. From the divisions in the quarter J H, drop perpendiculars crossing the curve in plan, terminating at the line B N, as shown at *a, b, c, d, e, f, g, h, i;* from these points draw to the center A.

To develop the soffit proceed as follows: Let 11 R equal A D; from 11 draw at right angles to R 11: let 11, 1 equal the hight of the arch as found at 1 H; let 1 S equal A N and R S equal the stretchout of the arch from J to H; divide this according to the spaces in the quarter, and draw from 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 through the points in the stretchout indefinitely. Now transfer the various lengths from A N-A *a* in the order as shown from *a, b, c, d, e, f, g, h, i,* and through the points established trace the curve. Now from this line we must find the outer line of the soffit; let it equal *a x;* and *k v* equal *b o;* and so on until all are marked, and trace the curve through the points thus established; the inner line can be set off with the compasses; leave some straight at the ends and square from 1-R.

To develop the covering for the triangle.—It is customary to use the elliptical arch in developing the covering, for the reason that the top is level but the sides contract. The true curve for the different arches is circular, but are lifted up to a spring line, as shown at A E. We have a right angle triangle in the solution of this problem, no part of which is curved. Let A B C, Fig. 3, be the base, A B the face of the first arch, as described from the center D; from the summit at E draw the diagonal line A E as the spring line; divide C D in any number of equal parts, as six in this case, as shown at *a, b, c, d, e;* now draw parallel to A B and through the points thus established, terminating at 13 14, 10 11, 7 8, 4 5 and 1 2; now from these points draw parallel to C D E, cutting the diagonal line at 3, 6, 9, 12, 15, and describe the several arches.

To line out the envelope.—Let C F be the hight as taken at D E, connect F B (this is the portion having no curve); at 1, 4, 7, 10, 13, erect perpendiculars, terminating at the spring line. From F as center and C D as radius describe the arc at G. From B as center and E H as the radius draw the arc, cutting G; connect F G and G B. On F G space off six divisions. From B, at right angles to the base line, draw B X; and from G, in like manner, connect X F; then B X and X G is tangent to the curve to be drawn. The other part of the envelope will be lined out in the same manner.

Let A B C D, Fig. 4, be the plan, D*x* and B *x* the thickness of the wall; let B E D be the base of the arch. From E as center describe the semi-circle B F D; from A as center describe the curve of the wall. To find the stretchout of the quarter D to F, prolong the center line F E A indefinitely; from D as center and D B, as the radius, describe the dotted line B H; from H draw H D *i*; from the summit at F draw parallel to B E D, touching at *i*, then F *i* is the length required. Divide the quarter circle F B in any number of equal parts—in this case eight. Let E B *h* equal A E C; from *h* erect the perpendicular *h* G; from the divisions in the circle draw horizontal lines, as 7 *g*, 6 *f*, 5 *e*, 4 *d*, 3 *c*, 2 *b* and 1 *a*; from *a b c d e f g h* draw the dotted lines to the summit at F.

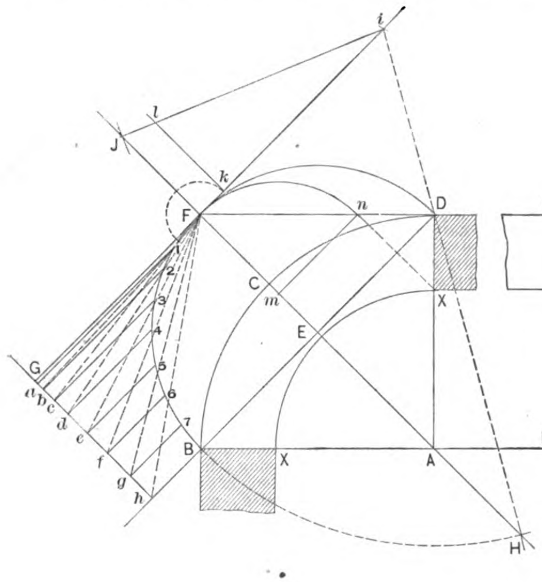


Fig. 4.—Another Method of Developing the Soffit.

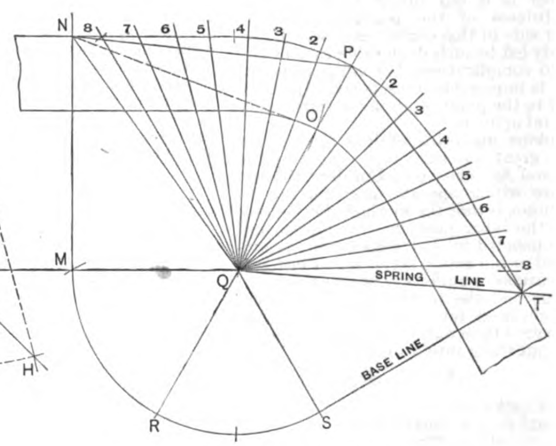


Fig. 5.—The Soffit Unfolded by Radial Measurements.

Circle on Circle.—Sketches Accompanying Demonstration of Mr. Secor.

Unfolding the soffit, let MN, Fig. 5, equal A D, and at right angles to N M draw M Q, equal to E F; from Q as center and A E as the radius describe the arc at Q; draw through O Q indefinitely. From Q set off to P equal to C E, connect N P. Now place the length P N at I J. This is now to be divided into eight equal parts corresponding to the divisions in the quarter circle; from F as center and F 1 as the radius describe the semi-circle 1 F *k*; from *k* erect a perpendicular cutting *i* J at *l*; space off the divisions, and through the points thus established draw the radial lines to Q. The other half will be lined in like manner. From Q as center describe the curve line M R S; from R as center and R M as the radius describe the arc cutting at S; let S T equal M N, and P T equal P N; divide P T the same as N P, and draw the radial lines; let 2 Q equal *a* F; let Q 3 equal *b* F; 4 Q equal *c* F; and so transfer all the lengths, and through the points thus established trace the line of the soffit. S T and M N will be level lines when in position, and the straight jamb is at right angles to this. The spring lines are Q T and Q N. The inside line or the width can be gauged.

(*To be continued.*)

Thoughts Suggested by the Situation at Homestead.*

WILLIAM H. SAYWARD.

THE SITUATION at Homestead, Pa., commands the attention of all civilized communities, and while many branches of business feel the liveliest concern in all that has led up to, all that is involved in, and all that may result therefrom, possibly the building trades have as immediate and as practical an interest as any. Much of the product of the mills concerned in this difficulty enters into the construction of buildings, and any embarrassment that is sure to result from stoppage of manufacture will be immediately felt by those who are engaged in building operations. To be sure, there are other sources of supply, but orders already placed with the Carnegie Company must of necessity suffer delay, and in many cases a serious loss will follow, whatever the final outcome may be. At the very best orders must be newly placed with other parties and inevitable delay in the completion of contracts must result. How great or how little this may be, is difficult to determine, and indeed any estimate would be of little practical value. The main point which we desire to consider in this article is rather the principle involved than the specific loss which may be sustained by one or another interest. Neither is it our intent to discuss the rightfulness of the position taken by either side in this controversy which has already led to such deplorable loss of life and to complications beyond conception, for it is impossible to properly adjust the mind to the point of giving a thoroughly judicial opinion.

Looking upon this affair in the interest of the great fraternity represented by the National Association of Builders, the one feature which appeals most forcibly to our minds is that the methods for dealing with the labor problem formulated and recommended by our association, as evidenced in the action taken at our last two conventions, would have proved most efficacious had the parties to this unhappy struggle been fortunate enough to have discovered their value and wise enough to have put them into operation.

ARBITRATION.

Arbitration, as it is commonly considered and as it is usually taken advantage of, is purely a *dernier résort* put into operation after affairs have been allowed to drift into a position so difficult and so dangerous that no other way is left open. But who can avoid the thought that the bitterness engendered in the minds of parties that struggle and fight for the mastery up to the point when arbitration is finally resorted to must unfit them for that willing and wholesome acceptance of the decisions reached through such arbitration? Is it not true that arbitration entered into after such inflamed conditions have been permitted to become fixed fails of its perfect work, and only secures a temporary cessation of hostilities, leaving both sides with wounds that they will not suffer to heal, and which they will keep alive to spur them toward future opportunity of avenging?

This kind of arbitration is not the best method that civilization offers for the settlement of differences, any more than the meeting of the two private armies at Homestead on July 6 represents anything but the crudest display of force and at the same time the most utter disregard of and lack of faith in those principles of law and order upon which the social fabric of the present century rests, and on which we, as American citizens, profess to place our utmost reliance. If all communities of employers and employed gain from such exhibitions the idea that action of this kind is permissible under any circumstances, then we may look for speedy dissolution of every safeguard which now makes home or country a reality and peace and security possible.

RATIONAL SOLUTION OF THE QUESTION.

True, arbitration is not a last resort, but is rather the first step in the advance toward rational solution of all questions that threaten the peace and prosperity of employer and employed of States or nations; and it is to the everlasting credit of the National Association of Builders that it alone of all organized bodies has had the confidence and courage to perfect a method which recognizes the obligations which we owe as citizens of the Republic to preserve the peace to which all of its communities are entitled, and which can only be maintained by rationally admitting the rights of others. The plan which the National Association of Builders has formulated, and which it is earnestly recommending to all its affiliated bodies, as well as to all others who may have similar conditions and opportunities, may fairly be said to be true arbitration—that is to say, arbitration which works at the very outset, which is recognized as the starting point, which furnishes a means of prevention, which provides against the growth of antagonisms and obviates the struggles and conflicts of opposing interests. It is, in short, a plan which honestly admits the proper rights of all, and presents a way in which these rights may be gained without disorder and with as near an approach to justice to all concerned as possible.

OBLIGATIONS TO LABOR.

It is plainly evident, to the close student of social and business economics, that the employer *per se* is prone to neglect a thorough training in regard to a portion of the business problem which has as great a bearing upon permanent success as any—namely, his obligations to labor. The business man in any calling trains himself to consider as essential certain principles as to manufacture or as to handling products of manufacture; certain principles as to methods of finance, &c., and the observance of certain obligations to others engaged in business operations, but he neglects most assiduously that grounding in the principles of the bearing and relation of labor to the industry in which he may be engaged, and then wonders that others whose interest begins and ends with labor have been led off into all sorts of dangerous vagaries by abnormally developed or ignorantly vicious persons, who never would have gained the vantage ground they occupy had the employer taken his true place; had he recognized his full obligations.

EMPLOYERS NEGLECTFUL OF OBLIGATIONS.

Employers have been so neglectful of their obligations in this direction in that they have assumed that organization of the workmen is none of their affair, and through this neglect forces have developed, attitudes have been assumed, and prerogatives claimed by organized labor which are beyond all right or reason. It is not sufficient, wise or just for employers to ignore this important branch of their business, and it may fairly be claimed that they are neglectful of their obligations to the general business world when they pay little or no attention to the true relations of labor in the industry in which they may be engaged, until they are forced to listen to a "demand" more or less injudiciously developed by one-sided counsels and formulated by prejudiced advisers. Employers have no right to wait until one-sided agitation produces one-sided "demands," which they thus conclude can only be met by equally one-sided refusals, for a condition is generated thereby which is excessively difficult to modify back within the lines of reason and justice. The ultimatum of one side is too likely to be met with an ultimatum from the other side, and while, as a matter of fact, neither side has a right to any ultimatum whatever, the reiteration of these finalties from one side to the other creates irritation of both parties, which too often leads to outbreaks similar in character to this terrible one at Homestead, where each assumed a right to use force of a private nature, which no conditions ever existing or ever to exist can warrant or excuse. Either side indulging in such means to preserve what it assumes to be its rights is outside the law, is beyond the sympathy of all believers in the sovereignty of the State, or, in other words, the supremacy of the rights of the whole over those of the individual.

We are or should be always amenable to the rules which recognize the preservation of the interests of the whole, and though it may often be irksome to await the slow process of regular and lawful measures, it is reckless and revolutionary to attempt to take into our own hands the adjustment of difficulties when such attempt puts into extreme hazard the safety and security of communities over which the law of the land throws its sure protection Employers, instead of letting all matters pertaining to the relation of labor go by default as far as they are concerned, instead of looking on complacently while the organization of labor is drifting into the hands of unwise and poorly equipped directors, and through such direction wandering far beyond its true limits, should see that it is their duty to enter into this matter of organization of their own accord, and by uniting their counsels with those of their workmen, by lending their aid and advancing their co-operation rid the situation of the dangers which will otherwise unavoidably menace their mutual interests. It is this method which the National Association of Builders has, after most careful and thorough consideration, formulated and recommended. It is a feasible plan for all kinds of business where the question of the relations of employer and workmen are involved.

TRUE FORM OF ARBITRATION

Briefly stated, it is this: Recognizing the fact that in the labor problem the rights of employers and the rights of workmen must receive fair and equal consideration, a joint standing committee, composed of equal numbers of each interest, is to be established. An umpire from some calling outside those concerned is to be selected at the first meeting of this joint committee, and as its first business. This umpire is not to be called upon to act until a need arises through an inability of the committee to agree upon any points at issue. The decision of this umpire is to be final. To the Joint Committee thus composed all matters of mutual concern are to be referred; no stoppage of work, either by strike or lockout, is to be permitted, and the decisions of the Joint Committee are to be final and binding upon all parties. What can be more fair, more just, more impartial? Wherever this plan has been established the most satisfactory results have followed, and the National Association unhesitatingly recommends its method to all employers and all workmen. Let this true form of arbitration prevail, and the world will be freer from the distressing and costly experiences which have so frequently alarmed all business communities. That it may prevail is the earnest hope of all true lovers of justice, and of none more than the National Association of Builders.

* [This article was written July 12, and has no bearing upon the events which have transpired at Homestead since that date.—ED.]

MASONRY AND STONE CUTTING.*

DANCING STAIRS.

IN THE Upper Class of Masonry at the City and Guilds of London Institute a model has been lately completed of the structure we are going to study under the name of "dancing stairs." The making of this model has revealed some points of great artistic importance for the designing of such staircases, which will be pointed out further on.

In Fig. 211 we have stairs formed of one straight flight and a circular end. In the straight part the steps lie at right angles with the string of the stairs; and in the circular part the steps converge to the center of the circle.

Such a staircase is defective both in convenience and appearance. Except on the treading line, where all the treads are equal, the steps suddenly change in width when one passes from the straight to the circular flight. This is positively dangerous for those who use the staircase. If, on the other hand, the steps are housed in a string toward the well hole, as shown in drawing, then this string, instead of following a flowing line, will present unsightly elbows, as shown in Fig. 212, where the line *a b c d* . . . *l m*, the well-hole end of the steps in Fig. 211, is developed, forming the broken line 11 *e' f m*.

Now, the so-called "dancing stairs" are a modification of the former structure, in which the direction of each step has been shifted so that the widths of the treads along the well hole diminish gradually from the lower to the upper step.

The direction of each step is determined as follows: Divide the treading lines 1 2 3 . . . 9 10 11 in parts equal to the length of tread adopted according to formula given in thirtieth lesson; then delineate the stairs as in Fig. 211. After this, draw, Fig 212, the development of the line *a b c* . . . *l m*, Fig. 211, which connects the ends of the steps along the well hole. This line is supposed drawn on a vertical cylinder, of which the well-hole *a b c* . . . *l m*, Fig. 211, is the base. To develop this cylinder, the lengths *a b*, *b c* . . . *l m*, will have to be carried on the line *a* . . . *m*, Fig. 212, and the hight of the steps will have to be placed on the vertical line 1 2 3 . . . 11. The points where vertical lines from *a b c* . . . on the ground line meet respectively horizontal lines from the points 11, 10, 9 . . . determine the ends of each step on the development. They are 11, *b'*, *c'*, *d'*, *e'*, *f*, *g'*, *h'*, *k'*, *l'*, *m*.

Connecting these points, the broken line 11 *e'f m* is obtained. Then simplify this line by substituting the line 11 *f m*, which omits one of the sides of the former polygonal line; and lastly, replace the broken line 11 *f m* by the arc of a circle 11 B' C' D' E' F' G' H' *k'*, which will be the development of the well-hole curve we wish to obtain. As the steps must conform to this curve, prolong the level lines of the treads until they reach that curve in B' C' D' . . . and deduce therefrom the lengths of each tread along the well hole by dropping vertical lines on the development of the base of the cylinder in B C D . . . Carry these distances on the plan of the stairs, as in A B C D E F G H of Fig. 215, and draw the riser of each step through the division point of the treading line and the corresponding point on the well-hole line; this will both be the most convenient and the most elegant, by allowing the string of the stairs to follow a graceful flowing line.

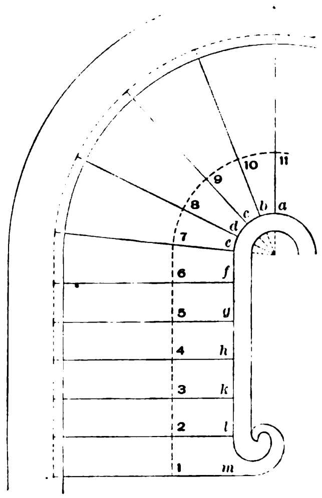


Fig. 211.—Plan of Dancing Stairs.

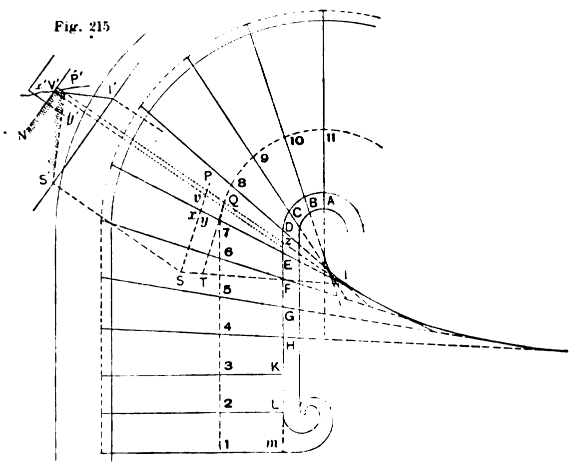


Fig. 213.—Showing Joint on Soffit of Stairs.

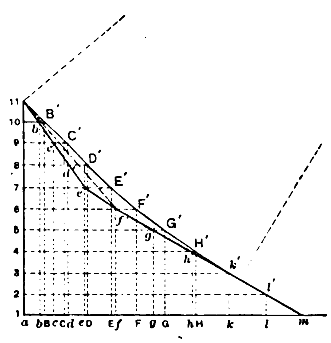


Fig. 212.—Rectification of the Falling Mold.

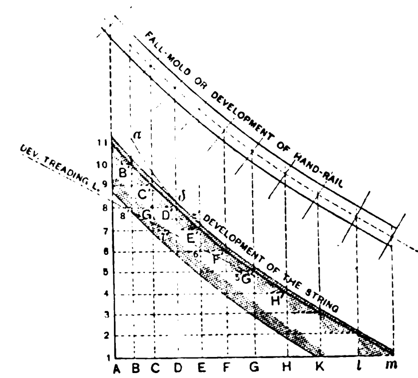


Fig. 214.—Falling Mold of the String and Hand Rail.

Masonry and Stone Cutting.—"Dancing" Stairs.

SOFFIT OF STAIRS AND JOINTING OF STEPS.

If the direction of the risers, Fig. 215, be prolonged, it will be found that the risers envelop a curve. If, on this curve as base, we erect a cylinder, then we may consider the surface which would connect all the edges of the risers as generated by a horizontal line, which in moving has to touch the treading line, and to be tangent to the above mentioned cylinder. The soffit of the stairs is a surface identical to the former, but placed at a lower level. The level of the soffit depends on the jointing of the steps.

*Continued from page 188, July issue.

Let the joint, Fig. 215, on the soffit of the steps pass through a point, Q, selected in a convenient position on the treading line, somewhere between 7 and 8. Then, as this joint is a generator of the soffit, it must be tangent to the cylinder which envelops all the generators of the surface; and, therefore, the direction of the tangent will be Q I. This mode of delineating the joint is theoretically correct; but it will be found in practice somewhat uncertain, on account of the difficulty of drawing the enveloping curve with perfect accuracy. For the present we shall assume it to be correct, and accordingly determine the surface of the joint. The surface of the joint should be normal to the surface of the soffit; if this condition were carried out the joint would have to be a twisted surface, for the normal would be much more upright toward the wall than toward the well-hole end of the step. To avoid having a twisted surface for the joint, we shall find the normal in the point P, half way between the two ends of the step, and work the joint plane through this normal and the joint line.

As the surface of the soffit is a skew surface generated by a horizontal line moving along the treading line and tangent to a vertical cylinder. If we take a paraboloid generated by a horizontal line having for directors the tangent to the treading line at the point Q, and the vertical line in I where the joint line comes in contact with the cylinder, then we know that the normals to that paraboloid and to the soffit will be the same in every point of the joint line. Q T is the plan of the tangent to the treading line in Q. If we take Q T as equal to length of two treads, then T is at a level of two risers below Q. I S, drawn through T, is a generator of the paraboloid; therefore, P S, parallel to Q T, is the plan of another director of the paraboloid. Make an elevation of this director, P S, taking as ground line S′ I′ at right angles with the joint P I; then P′ will be at the level of the two risers above the ground line, and P′ S′ will be the elevation of the director of the paraboloid in the point P. Moreover, P′ S′ will be the vertical trace of the point P; and, therefore, P′ V′ will give the inclination of the normal to the surface in P. At the level of about 2 inches above P′ we cut off the normal by the horizontal plane V′ W′ of the tread of the step. Drawing the riser x' of the step above, x' y' is the difference of level between the arrises of the steps and the soffit of the stairs.

To find the exact position of the joint P I, the safest way is to develop, Fig. 214, the treading line, and from Q′ on the treading line draw a horizontal, Q′ z' to the development B′ C′ D′ . . . of the well-hole line. Then find the position of z on the plan, and draw the joint line through Q z. For every step the distance of the point Q where the joint passes to the point 7 on the riser will be repeated, and the direction of all the joints will be determined, as above. Then it will be easier to draw the enveloping curve, which is required for determining the direction of the normal, as above.

It is to be noticed with "dancing stairs" that the steps should not be housed far into the wall, as is usually done, but only 2 inches at the utmost. The steps carry fully on one another, like the arch stones of a vault, and need no other support. On the other hand, if they be housed far into the wall, say 9 inches, this will seriously endanger the structure and cause the steps to split, as may be seen in several of the steps of the celebrated geometrical staircase in the south tower of St. Paul's Cathedral. The reason is obvious. Every stone in a wall supports a downward pressure from the wall above it, and an equally great upward pressure from the resistance of the wall and foundation below. It follows, therefore, that if a step be housed far into a wall, it receives inside the wall the action of the downward and upward pressures which balance one another; but outside the wall it receives only the upward pressure arising from the resistance of the steps below. In fact, the step acts like a cantilever against an ascending pressure, and if not strong enough it will break.

When ordinary straight flights are used, the steps must be housed far into the wall, as they do not sufficiently wedge into one another; but then the joints should be kept wide in order to prevent the steps resting on one another.

The String.—The stairs are complete without the string shown in drawing, the purpose of which is merely decorative, being a nobler finish than the open ends of the steps.

The development, Fig. 214, of the fascia of the string toward the steps is obtained by adding vertically 2 inches above and below the development of the well-hole end of the steps. This development, when wound round a cylinder or base A, B, C . . . Fig. 215, will give exact outline of the fascia of the string. Now, the upper and lower surfaces of the string can be formed in several ways, and the results obtained thereby are of the greatest importance for the designing of the balustrading and handrailing of these stairs.

If, for instance, it be intended to use balusters with square dies above and below, the generators of the upper surface of the string must be at right angles with the sides—that is, they must lie in the same direction as the steps in Fig. 211. Then the inside fascia of the string toward the well hole, Fig. 214, follows the same line as the other fascia up to δ, when it suddenly slants up to a, forming an unsightly elbow in δ. We see, therefore, that when balusters are used in a staircase which presents straight and circular flights, some unsightly feature is unavoidable; either the string presents an ugly elbow, or the bases of the balusters do not fit properly on the string.

The best design for the string of such stairs is to make the generators of the upper and lower faces follow the direction of the steps in the "dancing stairs," Fig. 215. The level lines will then no more be square with the sides, and balusters will have to be avoided. For this reason such stairs are usually furnished with wrought-iron balustrading, the flowing lines of which agree harmoniously with the lines of the structure. If a stone parapet be required, then pierced work should be adopted, forming a flowing scroll or wreath, so as to avoid all square connecting lines between the two sides of the string.

The steps being housed about 2 inches in the string, only a shallow molding can be used toward the stairs; but on the well-hole fascia the moldings can be deep and rich.

It must be borne in mind when designing these moldings that the string, Fig. 214, diminishes in depth from the lower step to the eleventh, and then augments again as it rises on the second branch of the stairs. The moldings should, therefore, be massed either on the upper part or on the lower part of the string, leaving a plain fascia between the upper and the lower edges of the string. French buildings of the period of Louis XIV present numerous examples of "dancing stairs" which may be studied with much profit; but students are recommended to construct several models of such stairs, and find out for themselves, independently of precedents, the best way of decorating them.

Handrail.—The construction of the handrail resembles that of the string. For its development a center line is first drawn, as dotted in Fig. 214; then the thickness of the handrail is measured on normals to the center line, so as to allow everywhere an equal space for moldings.

A NEW WOOD CONCRETE, according to the *Bautechnische Zeitschrift*, has been invented in Germany. Shavings and planing-mill chips, either of common or fancy woods, which may be stained before use if desired, are mixed with cheese, or rather, casein, calcined magnesian limestone, glycerine, silicate of soda and a little linseed oil, and this queer mess is forced by hydraulic pressure into molds, where it is allowed to harden. When dry, the composition is strong and solid, and can be sawed, planed, polished and varnished. It is expected that it will be found useful as an "ornament," in the shape of panels, or as a covering for entire wall surfaces.

Suggestions for the Apprentice.

Every boy starting out in seeking a trade must take into consideration the one thought, and that is, he must expect to commence at the bottom of the ladder and do his best to reach the top by strict attention to instructions given by older heads at the business. Boys are apt to know more in a few weeks or months than those to whom they must look for instructions. Our advice to the apprentice, says the *Canadian Magazine of Science*, would be for him to be careful and willing to do everything that he is told, and by so doing he will find that he will make friends and have no trouble in getting along with his trade. We must admit that all boys are not alike; some boys seeking a trade have a determination to master the art, knowing at the same time that they must depend on this trade for future support, and for this reason expect to master the trade. We like a boy of this stamp, and would take great delight in giving him all the instructions to aid him to accomplish the desire of his heart.

There is a vast difference between the apprentice of 25 years ago and the one of to-day. The boy of to-day comes and goes like the journeyman; the one of bygone days had all his cleaning to do, such as sweeping, &c., after the men had gone, so that the shop would be in proper condition in the morning when the men arrived for their daily work. We think apprentices have a much easier time now than they had years ago, because there is nothing binding them like the old indentured apprentice. For all this, our sympathy goes out for the boy who has the push and determination to have a trade, and we will venture to say the boy of this stamp will be master of the situation. There are several points to consider: He must do willingly what he may be given to do by taking into thought nicety and neatness; if it should take him much longer to accomplish it than some one else doing the same piece of work, it would be better to go slow and do his work neatly and get speed after accomplishing the desired object; and whatever may be given him to do it will require some one to instruct him, and this information should be given in kindness. Many willing boys have been ruined and made worthless in the shop by sour, grumbling journeymen who did not care to have the boys under them. We will venture to say that kindness will win any boy so that he will do anything that is possible for him to do.

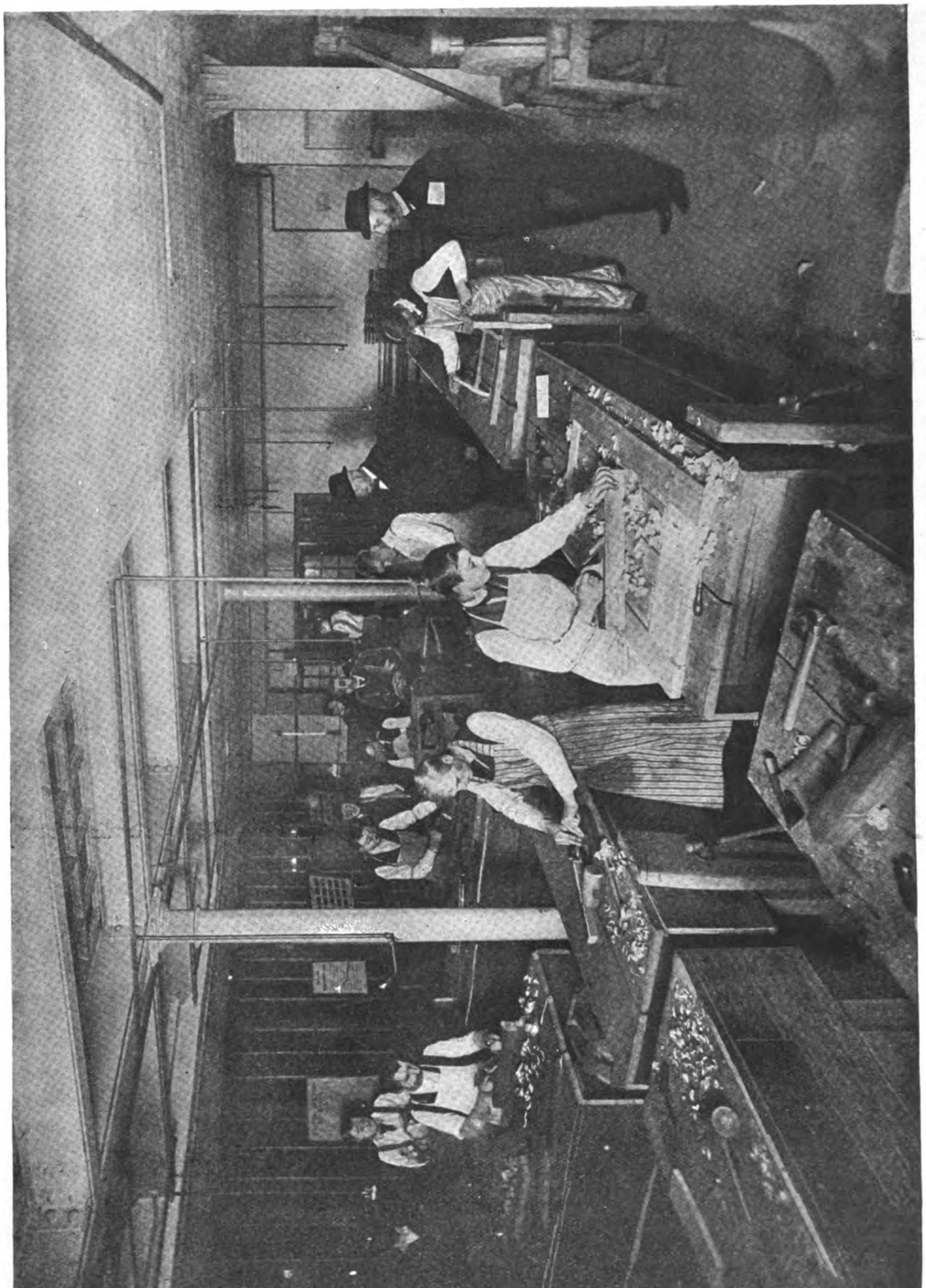
The apprentice must be a close observer, and glean all he can from others around him, and be ready at any time to ask for information regarding his work; not be over-anxious to have his work done because he has had the same kind of work before. If it should be a back or cushion he will find the more of them he makes the more perfect he will become in that part of the trimming.

Another important part for the apprentice: He must be supplied with the proper tools to work with, so that he will not have to depend on others in the same room with him. By having his own tools he will be more apt to have more freedom in his work and do more than if he were depending on others for implements to do his work with.

The apprentice may imagine he has a hard time while learning his trade, because he has to do many things that are not agreeable to him; but we all, old and young, have to pass through many disagreeable things in this life.

PHILADELPHIA TRADES SCHOOL.

THE COMPLETION of the second term of the Trades School of the Builders' Exchange of the city of Philadelphia shows very gratifying results, which testify in a marked manner to the wisdom of the originators of the movement which led to the establishment of this branch of the institution. The graduating exercises of the classes for 1892 were held in the rooms of the Builders' Exchange on the evening of June 22, and in response to invitations sent out a good sized audience was present. The exercises were of a very interesting character, and included addresses by George Watson, chairman of the School Committee; Franklin M. Harris, representing the bricklayers; Andrew McGill and other prominent members of other trades committees. There were 41 graduates that received diplomas, this number having acquired the necessary average of 65 per cent. A prize of a $20 gold piece was awarded to the pupil making the highest average in each trade. The winners this year were Gilbert S. Levering in the class in carpentry; C. C. Pennell in bricklaying; William Pendlebury in stone cutting; Hugh Andron in painting; Frank H. Rile in plumbing and George M. Coleman in blacksmithing. In the written examination several pupils received 100 per cent., which is the highest record possible.

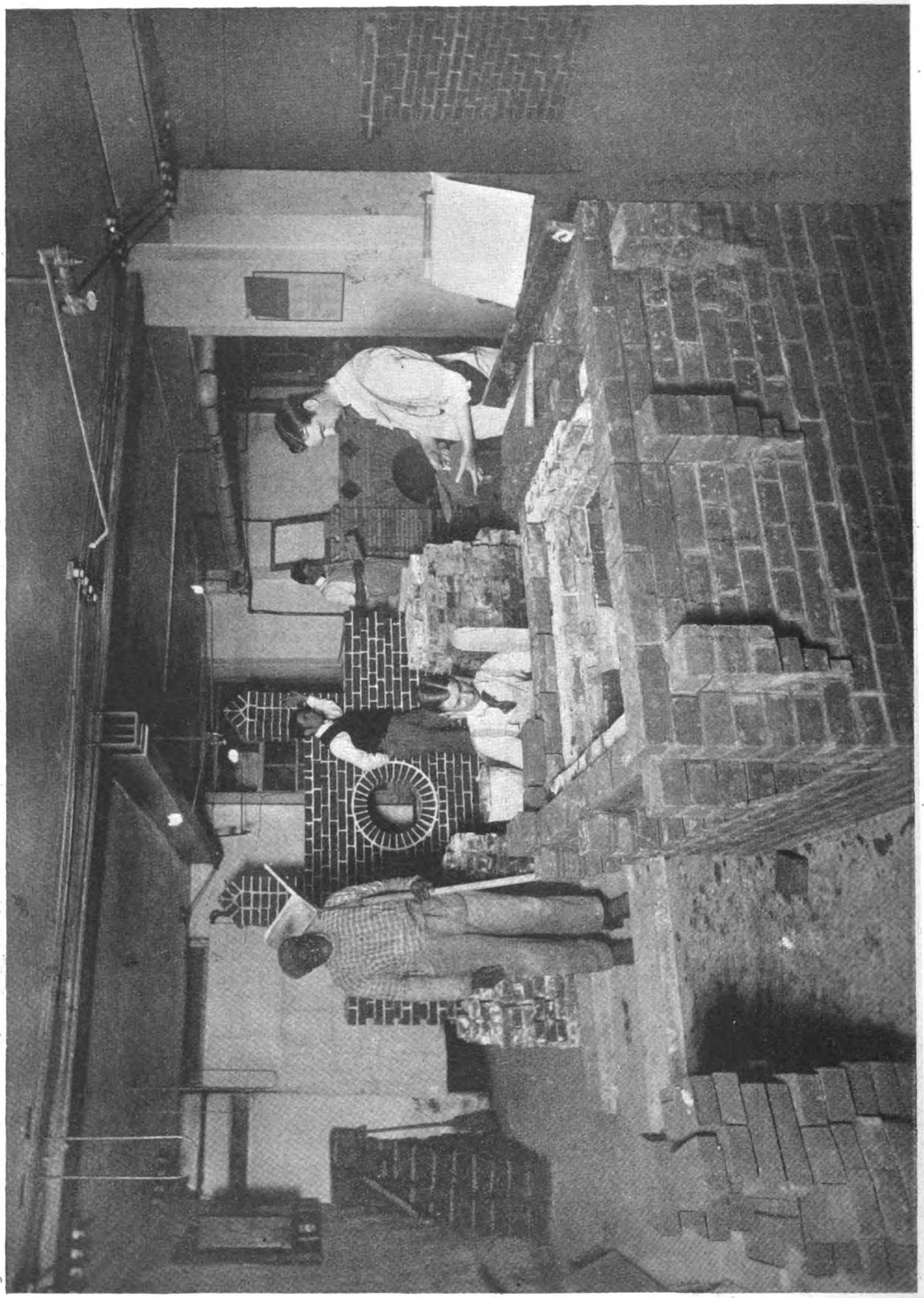


The Philadelphia Trades School.—Fig. 1.—Interior View of Carpentry Shop.

In shop work the highest average was 80 per cent.

The object for which the schools were established includes the instruction of two classes of pupils—namely, those who desire to enter as apprentices the trades chosen, and those who are already at work in the trades mentioned, but who wish to improve themselves more rapidly than is possible in connection with their daily work. The limit of age is sufficiently extended to include those to whom the elementary instruction is likely to prove valuable, for while younger pupils are more easily taught, it often happens that they do not so readily appreciate the importance of principles or the necessity of economizing time as well as material by the execution of work in a proper manner.

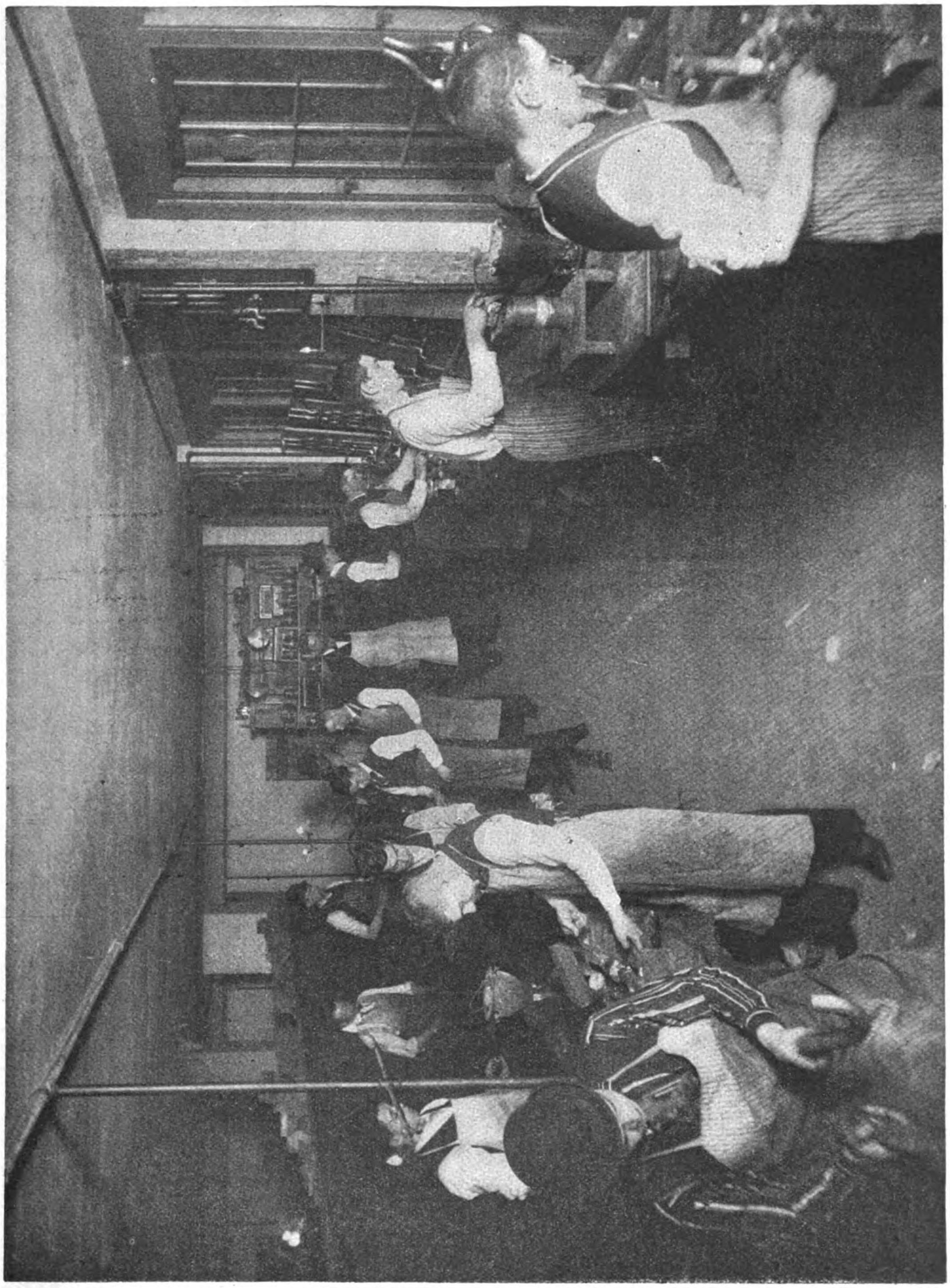
The general divisions of instruction include work in the shop consisting of manual training for the particular trade desired; work in the drafting room, which combines with theoretical instruction the preparation of the necessary working drawings and sketches, and finally the written examinations at the end of the term. The averages obtained in the several divisions are combined to produce the general average required for a certificate, and in reaching this general average mechanical work is of first importance. The minimum rating is fixed by the committee at the average of 65 per cent., and though it has been thought too low, a careful consideration of the circumstances is likely to correct this impression. The examinations consist of a list of questions selected by the various



The Philadelphia Trades School.—Fig. 2.—Interior View of Bricklaying Shop.

committees which are to be answered in writing by the pupils from memory. It is practically impossible for a pupil to obtain 100 per cent. for work done, and though the highest mark may be obtained for unbroken attendance, attention to work and care of tools, few reach an average for shop work of over 80. The written examinations do not tend to increase the general average, owing to the lack of appreciation of the value on the part of the pupils of written instruction and of the purpose of the examinations. Some of the pupils, however, who attended the first term of the school and failed to secure a certificate recognized the cause of their failure and made application for a second term with the intention of overcoming the difficulty. That this is possible is proven by the fact that the proportion of pupils of the second term entitled to certificates exceeded that of the first term.

Probably there is no part of any trade concerning which there is greater lack of information than the proper understanding of a drawing. Of those who are accustomed to working from a drawing many are incapable of dividing it into its component parts or taking from it a list of materials required. Few, indeed, can make on the spot where the work is to be executed a list from which the materials may be completely prepared in the shop. It is not intended to make the pupils of the trade school finished draftsmen, but to teach them first to understand a drawing and then to make one properly figured, from which they or any one else can execute the work. In the school the drawings are not marked for their finish, but rather for correct representation, proper



The Philadelphia Trades School.—Fig. 3.—Interior View of Plumbing Shop.

addition of the necessary dimensions and care in making the list of the size and number of required parts. In this direction very satisfactory progress has been made. Intimately connected with the drawing is the use of ordinary calculation. All the pupils have been found to possess the elements of a common school education, but want of practical application of the rules of arithmetic has had the effect of making many distrustful of the ordinary calculations, and in many instances a second term has been required for a thorough appreciation of the instruction other than that involved in the use of tools. Probably the most positive proof of the success attained in the Philadelphia Trades School is the number of pupils graduated and their increased value to their employers. The progress made in the brief working time of a single term and the estimation in which the graduates are held have been eminently satisfactory to the committees.

In the illustrations we present views in some of the workshops as well as a few specimens of work by the graduates of the plumbing class. Fig. 1 of the engravings represents an interior view in the carpentry shop: Fig. 2 an interior view of the bricklaying shop, while Fig. 3 is a view of the interior of the plumbing shop. Figs. 4 and 5 represent specimens of work by pupils of the plumbing class.

It is not surprising that in the establishment of a school of this character there should at first result more or less friction between it and several of the local trade organizations. Numerous distorted ideas prevailed at the outset as to the purpose of educating young men to enter the ranks of those engaged in various industries, but it was for Mr. Andrew McGill of the Journeymen Bricklayers' Association to emphatically proclaim not long since that the trades school would not have the slightest effect upon the wages of mechanics in Philadelphia or any other city, and declared that mechanics were wanted who are versed in all branches of the trade. Furthermore, he insisted that no mechanic should look upon the trades school as a menace to his interests, as the influence exerted would rather advance than decrease wages. Conferences were held between representatives of the exchange and the bricklayers, at which the matter was thoroughly discussed at great length. Not long since the system of apprenticeship suggested by the joint committee of the Master Builders' Exchange and the Journeymen Bricklayers' Protective Association in regard to the attitude which the latter should assume toward the graduates of the trades school was ratified by the bricklayers of Philadelphia, and at a meeting of the Trades' School Committee of the Builders' Exchange, held late in June, communications were received from the Master Bricklayers' Company and the Journeymen Bricklayers' Protective Association ratifying the following agreement :]

1. That the boys who have passed a satisfactory examination and have received a certificate from the mechanical trades' school of the Master Builders' Exchange of Philadelphia shall be given preference over all others in securing places with master bricklayers to learn the trade of bricklaying, and that this preference shall be in the order of their standing in their class, which shall be settled by the record of instructions of the mechanical training school.

2. That such boys shall in consequence of having received a certificate have one year taken from their term of apprenticeship as required by the Master Bricklayers' Company and the Journeymen Bricklayers' Protective Association.

The attitude which has been taken by the bricklayers' associations, will, undoubtedly, be followed by the plasterers and other organizations, thus opening up avenues of employment to the graduates of the school. Already the effect of the action in recognizing the trades school pupils is being shown in the flood of applications for admission to the bricklaying class.

One difficulty that has been encountered in some of the trades arises over the ages of the graduates. Few employers care to take an apprentice whose age is over 18 years. The schools do not aim to teach a trade in a year's course of study, and after the pupils graduate they enter their employer's service as apprentices. If the youth is 18 years old that limits his term of apprenticeship to three years, and if he is over that age there is a corresponding reduction.

There is also a course in architectural iron work in which instruction is given, taking the student from the use and care of tools to the manipulation of the various kinds of iron work employed in building construction.

The present accommodations of the school is 180 pupils. The management are looking into the future with lively hopes, and are even now formulating plans to increase the usefulness and scope of the work. Efforts are being made to procure an additional building, separate from the exchange, which is to be used entirely for the trades school.

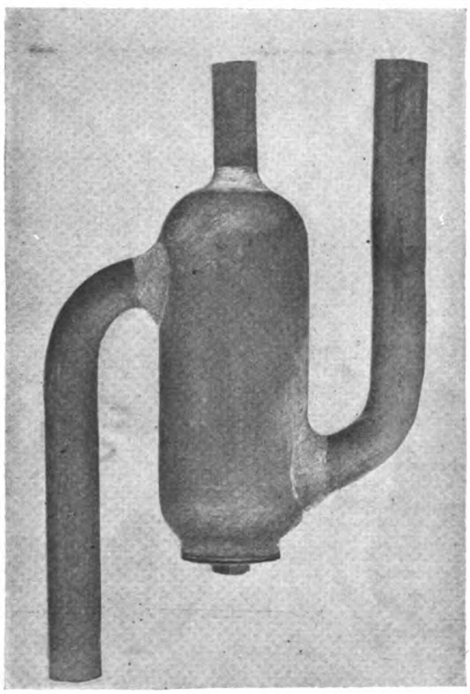


Fig. 4.—Bottle Trap.

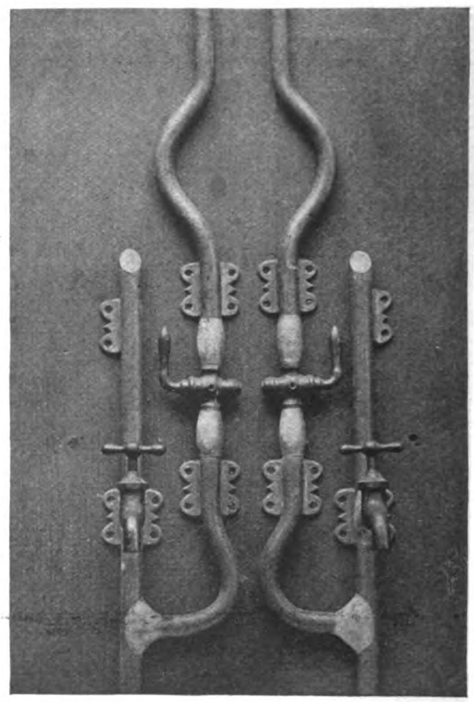


Fig. 5.—Sink Set.

The Philadelphia Trades School.

THE NEW STRUCTURE recently commenced on 120th and 121st streets, between Amsterdam avenue and the Boulevard, in this city, is intended for the new home of the New York College for the Training of Teachers. The plans which have been prepared by Architect William A. Potter call for what may be designated as four five-story buildings, constructed around a court. The main wing will have a frontage of 250 feet on 120th street and a depth of 85 feet. The exterior will be constructed of Long Meadow stone and red brick, and the entire building will be fire proof. The first floor will contain the kindergarten, the college lecture rooms and the assembly room, registry and reception rooms and an apartment for the president of the college. The upper floors will be divided into lecture and class rooms, libraries, &c.

SOME NOVEL FIRE ESCAPES have been added to the Narragansett Hotel, Providence. They form a spiral curving about a stand pipe 5 inches in diameter. This stand pipe is so adjusted as readily to be connected with the street hydrants, and at each story can be connected with hose, thus adding another precaution against fire.

WHAT BUILDERS ARE DOING.

THE CONDITION of the building business throughout the country generally seems favorable. The serious complications of the past month are the continuance of the trouble among the granite and stone workers, and, of course, the deplorable affair in the iron business at Homestead. The situation among the New England stone workers seems to have narrowed down to a question of whether or not the time of fixing the scale of prices for labor shall be in May or December, and whether or not the contractor shall employ non-union men. It is stated by the Granite Manufacturers' Association of New England that there are 80 per cent. of the paving cutters again at work in the quarries without any official knowledge of whether or not they are union men, as no questions have been asked. The association claims that the Paving Cutters' Union has abandoned its claims for change in the present conditions under which its members are required to work, and have practically acceded to the desires of the employers. A meeting of the Manufacturers' Association and the heads of the Stone Cutters Union was held in Boston on July 14, but very little was accomplished.

Boston, Mass.

The building business in Boston is in excellent condition, and operations are of such a character as will keep all branches employed during the remainder of the season. The building ordinance formulated for the city of Boston by the commission appointed for that purpose, about a year ago, of which the secretary of the National Association of Builders was a member, was recently presented to the State Legislature and passed without material alteration. A few minor changes were made in the ordinance by the mayor, as recommended by the commission, before it was presented to the legislature, but none of such importance as to conflict with the intent of the commissioners. The passage of the new law provides for a Board of Appeal to be composed of three members to be appointed as follows: One member at large appointed by the mayor, one member to be appointed by the Society of Architects with the approval of the mayor, and one member to be named by the Master Builders' Association, with the approval of the mayor. The Master Builders' Association have appointed W. H. Sayward secretary of that organization, and also secretary of the National Association of Builders. The duties of the board began on July 16. The Master Builders' Association have had a large number of copies of the new law printed in advance of the official document, which will probably not appear until some time in October. These copies have been supplied to all architects in Boston and New England, as well as to contracting builders and others. Copies will also be furnished to architects or builders who may desire the same upon application to the secretary of the Master Builders' Association of Boston. The new law contains many changes from the old one that have been dictated by the newer conditions that have grown up in the building business in recent years. There is a commendable quiet among the workmen's unions in the vicinity of Boston, and little immediate prospect of any disturbance.

Baltimore, Md.

The strike among the carpenters of Baltimore remains practically unchanged. The workmen claim that they have secured an eight hour concession from over half of the contractors, and the contractors state that they have all the men they want and are working nine hours.

A conference was held recently at the Builders' Exchange between a committee of the Master Builders' Association and a number of sub contractors with a view of arranging, if possible, a uniform time of nine hours' work upon all buildings in course of construction. Nine hours' pay will be allowed if the object is accomplished. At present only three trades—the bricklayers, granite cutters and free stone cutters—adhere to the eight-hour plan. Sub-contractors representing all classes of work in the construction of buildings were present and expressed themselves as in favor of the nine hours' uniform system, as it would enable all to go to work on a building at the same hour and to quit at the same time.

The carpenters express considerable feeling over the action of the bricklayers and granite cutters in withdrawing their support from them. Some of the carpenters think that they were on the eve of victory, and, with the continued support of the brother building trades, would have soon won their fight. They say they will now continue the fight single-handed and will yet win. In explanation of their withdrawal, the granite cutters and bricklayers say they would be of no material aid to the carpenters by abstaining from work, and they would be seriously injuring themselves. They express themselves as none the less favorable to and supporting the organization of labor, but believe they were of no use in the fight. They also say they wanted to relieve some of their bosses, who have been seriously embarrassed by their refusing to work, and who have never given them any cause for putting them in difficulty, as their own demands were granted without dispute. It has not yet been decided whether work will be resumed on the objected-to buildings, principally the Fidelity, but this matter is expected to be settled shortly. The hottest fight was over the Fidelity Building, but it is understood that work has now been resumed in all branches except that of carpentry.

The stockholders of the Builders' Exchange Building Company, which was formed for the purpose of erecting a home for the Exchange, at their annual meeting, July 11, elected these directors: James A. Smyser, E. L Bartlett, P. M. Wambold, Jr., S. B. Sexton, Jr., John L. Lawton, Noble H. Creager, Hugh Sisson, B. F. Bennett and J. T. Adams.

Since the foregoing was written it is stated that the strike of carpenters has been declared off and that the union men have returned to work, and it is expected that the majority will have secured employment by August 1.

Buffalo, N. Y.

The building trades of Buffalo are in an active condition at present, with an excellent prospect for the entire season. The formal opening of the new building which has been erected by the Builders' Exchange will occur on September 6, and promises to be a most enjoyable occasion. The annual outing of the exchange takes place on the day preceding the opening, and the builders are looking forward with enthusiastic anticipations of a good time. A large number of invitations will be issued to attend the ceremonies of dedication, and it is expected that there will be many members of other filial bodies of the National Association present. Secretary J. C. Almendinger writes that the membership of the exchange is steadily increasing and that the members are becoming more impressed with the benefits of the organization. In a statement of the affairs and present condition of the exchange, it is shown that the attendance during the 'change hour greatly increased in the past year, and that the architects are recognizing the association by sending plans open for competition directly to the exchange.

Chicago, Ill.

Reports from Chicago show that the volume of business among builders is even greater than was anticipated in the spring, and the relationship between employers and workmen is about as usual. War is again being waged by the painters. There seems to be a disposition among some of the bosses who signed the scale not long ago to ignore it and cut the wages. Some of them are reported to have already done so, and the men were called out. The painters are relentless toward the firms which have broken faith with them, and they now propose to compel them to sign an agreement whereby if wages are again cut they will be forced to pay a fine of $500. The fight promises to be a bitter one.

A very interesting meeting of the Builders' and Traders' Exchange was held on July 11, at which the delegates to the sixth annual convention of the National Association made a report of the deliberations. The meeting was sufficiently large and representative to secure for the report a comprehensive hearing and to assure for the delegates a full consideration of their statement.

Cincinnati, Ohio.

Nothing unusual has been reported from Cincinnati during the past month, and the building operations, while not being up to the mark, seem to be active. A recapitulation of the work done by and through the congress of master builders indicates that the balance of the season will be peaceful so far as the relationship between employers and workmen is concerned, provided that the rules which have been adopted by the two are adhered to without change.

The Builders' Exchange is in excellent condition, and the new quarters in the Opera House block are proving a decided improvement over the old location.

Denver, Col.

A rather nice question has arisen in Denver in regard to the awarding of the contract for plastering the Colorado State Capitol building. The Board of Capitol Managers met July 7 and allowed bills for the month of June as follows: Fred Stapp, State contractor, $3,631.28 ; Lane Bridge & Iron Works, beams, columns, &c , $2,341.21 ; Geddes & Seerle, forty-ninth estimate, $4,398.48.

Martin Currigan appeared before the board to remind the gentlemen that his bid for plastering the Capitol building, filed four years ago, is, in his opinion, still in force. The bid was the lowest one filed at the time, but no award was made, as the legislature increased the amount to be expended on the building from $1,000,000 to $2,000,000. Currigan's figures were $68,785, and as the amount was published at the time and other contractors are in possession of the information, he maintained that the board should not accept other proposals. No action was taken on the matter.

Detroit, Mich.

Building seems to be fairly active in Detroit. The Builders' Exchange has adopted an excellent means for showing what percentage of the work being done is in the hands of the members, by compiling a list of all contracts that have been let to contractors belonging to the exchange. This list is published weekly, and besides being valuable as an indication of the character and amount of work being done by the members of the exchange, it is valuable as a bulletin of information of work to be undertaken. The exchange is in excellent condition, and the new policy adopted immediately after the last convention of the National Association has been a more active one than existed for some time previously, and the effect of having a permanent superintendent to look after its affairs has proved very beneficial.

Indianapolis, Ind.

The Builders' Exchange of Indianapolis has appointed Charles Krauss secretary for the ensuing year. The exchange is already at work considering means for providing for the comfort of the directors of the National Association of Builders in attendance on the mid-year meeting to be held in that city some time in the early autumn. Business is reported as being lively among the builders.

Lowell, Mass.

The Master Builders' Exchange of Lowell held its annual outing on July 14 at a beautiful spot on the banks of a small lake near the city. The exchange had issued a challenge to the members of the Master Builders' Association of Boston to play a game of baseball. A large number of the Boston builders accepted the invitation of their Lowell brethren, and were most hospitably and pleasantly entertained. The day was warm and clear, and was employed by the "outers" in playing various games. Baseball and football were the most important of the amusements, and the supremacy of the exchanges was left to be decided next year, although it is suspected that the Boston teams were the winners. Boating and bowling were also provided, and in the evening a banquet was served in the pavilion on the shore of the lake. The dinner was enlivened by various toasts and responses, the speechmaking being of a humorous character. A most enjoyable time was passed by all.

Omaha, Neb.

The report of the monthly meeting of the Builders' and Traders' Exchange of Omaha for June, which was received too late for notice in the July issue, shows that the builders through the medium of the exchange are taking a much more active position in relation to the affairs of the city than formerly. The meeting was largely attended and the progressive spirit of the members was manifest throughout. The principal topic of discussion was the proposition of the Nebraska Central, which asks for bonds to the amount of $750,000 for the purpose of building a bridge across the river and for terminal facilities. The discussion was very warm and full, and resulted in a favorable vote for the proposition of 45 to 8. A committee has been appointed and is at work revising the building laws of the city, and it is expected that their work will require about a month for completion. The committee consists of two carpenters, two brick masons, two brick manufacturers, two iron manufacturers, one plumber and steam fitter, two architects and the Inspector of Buildings.

Building interests are continually growing more active, and the architects are beginning to appreciate the convenience and importance of using the exchange as the best place for sending plans opon to competition. During the previousm on th there were plans for three new public school buildings left at the exchange, the first at the instance of the School Board, and the designs for several other large structures were first given to the public through the exchange.

New York, N. Y.

The situation in the labor world of New York City presents its usual amount of complications, which during the past month have been unusually disturbed by the differences between the Knights of Labor and the American Federation. The establishment of the Iron League has bound the employers more closely together much in the same manner as exists among the workmen. Specific cases of strike and lockout are numerous and exist from a great variety of causes. It is stated that an effort is being made by the builders to secure so effective an organization that the business can be conducted without regard to whether or not the workmen are union men. The following clipping of part of the labor news from the New York *Herald* July 7 is a sample of the condition that is reported day after day.

Painters and varnishers employed on the West Side Presbyterian Church will be ordered out to-day, as non-union men are among those employed by Boss Painter Corbelly.

A strike will be ordered among the painters employed by Contractor Willett on the Pulitzer Building to-day. Non-union men are employed. Engineers and electric wire men will be ordered out also.

The Board of Walking Delegates yesterday indorsed the housesmiths in their strike against the Jackson Architectural Iron Works, and appointed an executive committee to take charge and order new strikes whenever and wherever advisable.

One hundred men, including steam fitters, helpers, carpenters, framers, machinists, engineers and cement men, will be ordered out today on a tenement house now building at Grand and Mott streets. Certain non-union steam fitters from Newark are employed there by Hughes & Phillips.

Delegate Sandemann was suspended by the Board of Walking Delegates yesterday. He refused to call out the German house painters from the new Broadway Central Hotel during the strike. His organization sustained him and in retaliation the board yesterday ordered strikes against the German house painters at Eighty-eighth street and Avenue B; in Eighty-third street, between First and Second avenues, and at Seventy-eighth street and Fifth avenue.

The contractors report a large quantity of work being withheld from the market, as capital is very loth to enter into transactions that are almost certain to involve complication and delay. It is stated that the New York pavers who went on strike May 9 out of sympathy with the granite cutters of New England, who were on strike, refusing to handle the paving blocks of the New England bosses, made a complete surrender July 8. Non-union men had largely taken the place of the strikers. The original strike was not for increased pay. While the strikers were out they received $12.50 a week from unions, while the non-union men who took their places received $4.50 a day. The striking pavers had received $20,000 in weekly benefits from the unions. About 5000 were thrown into idleness by the strike. They went back to work with the non union men, signing an agreement that the employers should employ whom they please, and both agreed on a 30 days' notice when wages were to be changed or hours of work, or as to employees quitting work in a body. The New England granite manufacturers may now win in the strike with the stone cutters. The New York cabinet makers who went on strike 14 weeks ago for an eight-hour workday, decided on July 8 to return to work, deciding in their meeting that the strike was a failure.

Philadelphia, Pa.

A report from the Master Builders' Exchange of Philadelphia shows the building business to be in excellent shape, with a large amount of work in the market. At a recent meeting called for the purpose, the subject of the relative merits of the systems of direct and sub-contracting were fully discussed. The majority seemed to favor the sub-contracting method, which is that the sub-contractors should make their contracts with the general contractor instead of becoming direct contractors by making contracts with the owner. The exchange will at an early date take up the revision of its by-laws. A very commendable move is being made by the architects and master painters.

The Master House Painters' and Decorators' Association has been invited by the Philadelphia Chapter of the American Institute of Architects to attend the next meeting of the chapter in order to discuss the best methods for remedying the abuses that exist in their trade. The invitation is the direct result of a resolution offered by Frank F. Black, secretary of the Painters' Association, to the effect that the custom of architects specifying particular brands of material opened the door to frauds and abuses. The resolution urges that architects specify what they want, allowing the master plumber to use his own discretion. As a class, architects favor the resolution whenever a reliable man receives the contract, but when through the present system of letting contracts to the lowest bidder, an unknown man secures the work, they prefer either to restrict him by carefully drawn specifications or induce the owner to employ one who is known to be reliable.

A strike was inaugurated July 11 among the lathers, plasterers and plasterers' laborers against their employers, that will affect nearly all the firms located in suburban wards of the city. The strike is strictly against the employment of non-union mon and is not a question of wages or hours.

The Strike Committee sent delegates to all of the firms employing non-union men, requesting that such be discharged and union men be placed in their stead, and several concerns refused to comply with the request. The strike will not affect the members of the Builders' Exchange, but will be confined to the several contractors referred to, who are engaged mostly in suburban work.

The men wish it understood that the trouble will in no way affect the agreement between the Master Plasterers' Company and the Journeymen Plasterers' Protective Association which was signed last February.

The various unions of workmen in the city are said to have effected a general organization which includes all branches of the building trades.

Rochester, N. Y.

In accordance with a previous agreement between Rochester contractors and the local Bricklayers', Plasterers' and Stone Masons' Union, the wages of masons were advanced, July 5, from 35 to 36 cents an hour for nine hours' work daily, making $3.24 instead of $3.15 as the day's wages.

About 15 masons, working on the new Trinity M. E. Church on Monrce avenue, went out on a strike July 5. They were employed by the Thompson-Decker Contracting Company of Birmingham, Ala. The men say they struck because the increase of 1 cent an hour was not granted, the same as by the other contractors.

W. H Thompson, a member of the company, who is in direct charge of the construction of the church, said: "When we came here we were told the wages of masons were fixed at 35 cents an hour. The sudden demand for an advance of 1 cent an hour was a surprise, therefore. It being a small matter, however, I was disposed to grant the increase, but the men also insisted on my discharging a non-union stonecutter. I therefore refused both demands and they quit work."

San Francisco, Cal.

The building business in San Francisco appears to be in excellent condition and the Builders' Exchange is flourishing. There has been considerable agitation among the workmen in the various branches of the trade during the season, but nothing has transpired which has seriously involved the builders The struggles between the Employers' and Manufacturers' Association and the Council of Federated Trades led to an investigation by the Labor Commissioner, which as yet has produced no particularly beneficial results.

St. Louis, Mo.

Everything is quiet among the trades unions in St. Louis and the building business is in good condition. The Builders' Exchange members are thoroughly enjoying their new quarters in the Telephone Building and are quietly at work preparing the details of the entertainment of delegates to the seventh convention of the National Association of Builders.

Notes.

A strike of carpenters is reported from Concord, N. H., in support of the nine-hour day, which is being advocated by the unions in that vicinity.

At the Mechanics', Dealers' and Lumbermen's Exchange July 12, the New Orleans Builders' Association was organized, with 15 of the largest builders in the city. The object of the association is the protection and progress of the building trade. A constitution and by-laws were adopted, and the following officers were elected to serve for one year: President, Fred. Rusch, Jr.; vice-president, A. Darcantel; secretary, J. H. Bruns; treasurer, W. H. Krone.

A report by trades from Salt Lake City shows that in the majority of building trades there is very little doing. Each branch reports that business is very dull.

The new exchange at Toledo seems to be progressing favorably, and the members evince a lively interest in its affairs. The exchange extended the hospitality of its rooms to the delegates of the convention of the Ohio Master Painters' Association, which was held in that city early in July.

The Builders' and Traders' Exchange of Kansas City is taking an active interest in affairs that affect the welfare of the city, as is evidenced by the following resolution passed July 8:

Whereas, At the present values of labor, material and real estate, we believe that public improvement may be carried on with the greatest possible economy to the city; and,

Whereas, it appears to us that Kansas City is now entering upon a new era of prosperity, to which nothing can add so greatly and encourage private investments as an extended and judicious public improvement; and,

Whereas, We believe the most needed public improvement is in the form of improved streets and the acquisition of a system of parks and boulevards; therefore be it

Resolved, that we heartily endorse the action of the Board of Park Commissioners, in reference to the proposed Eleventh street boulevard.

Resolved, That we believe the almost unanimous expression of our citizens, at the last spring election, favoring the park and boulevard laws, should encourage prompt and vigorous action on the part of the board in all matters of public improvement.

Resolved, That a copy of these resolutions be furnished the Board of Park Commissioners and the city press.

The third class in the trade school established by the Builders' Exchange of Pittsburgh for the training of bricklayers was graduated June 30.

The Master Painters' Association of Ohio held its first annual convention in Toledo on July 5. Considerable business was transacted and several very interesting addresses were made upon subjects pertaining to painting. There were about 70 delegates present and the following officers were selected for the ensuing year: President, Charles Kyle, Cleveland; vice-president, John J. Turner, Toledo; secretary-treasurer, Joseph P. Kealy, Cincinnati; Executive Board, Chas. Kyle, John J. Turner, Joseph P. Kealy, Lewis Fink, A. G. Meakin, G. W. Hall, F. J. Cook and L. N. Weber. The following committees were appointed: On White Lead, Wm. Downey and J. Grace; on the Rating of Journeymen, L. N. Weber; on the Responsibility of Master Painters for the Acts of their Employees, Thomas S. Parkhurst; on Dry Paints, W. J. Albrecht and J. Wildte. Springfield, Ohio, was unanimously chosen as the place for holding the next convention, which will be held on July 18 and 19, 1893. A vote of thanks was tendered the retiring officers for past services, the Toledo Association and the press for courtesies extended. The delegates were entertained with a boat ride and a banquet.

The stone masons and bricklayers of Canton, Ohio, are out on strike against the completion of a contract by a contractor who has failed to pay his workmen. The journeymen want the contract taken out of the delinquent employer's hands.

The employing builders of Bridgeport, Conn., are at work reorganizing an association which has been in a state of innocuous desuetude for the past five years.

The carpenters and contractors of Butte, Mont., have organized under the name of the Butte Contractors' and Builders' Association. At a meeting late in June the following officers were elected: President, J. Franklin; vice-president, J. D. Jencks; treasurer, J. C. Martin; secretary, J. Campeau; sergeant-at-arms, J. Franzman.

The Fire Underwriters' Association of the Pacific Coast are at work endeavoring to secure the adoption of some clause in builders' contracts which will establish a uniform custom in regard to the insurance of builders' risks.

VISITOR—Who owns that house across the street?

Resident—I do.

Visitor—Well, who in blazes built it?

Resident—An architect I employed.

Visitor—Did you kill him?

Resident (gloatingly)—Oh, no, I got a more satisfactory revenge than that. I made him live in it.—*Detroit Free Press.*

CHICAGO'S RAPID GROWTH.

ON THE BASIS of the new city directory, the canvass for which has just been completed, the population of Chicago now ranges between 1,450,000 and 1,500,000. The rapid growth of the city, which was phenomenal in the decade from 1880 to 1890, thus appears to be kept up. In the light of these figures, the activity in building now in progress in that city will be understood. We present below a very accurate statement of the more important business structures erected last year and in course of erection now.

Last year eight new steel constructed buildings were begun and partially completed, all but one of which are devoted to office purposes. They include the Unity, Monadnock, Title and Trust, Ashland, Woman's Temple, Schiller Theater, Masonic Temple and the Northern Hotel. All of these were completed this spring with the exception of the Schiller, which is to be ready about October 1. They contain 3000 offices, which were put on the market May 1, and a large percentage of which, far exceeding the expectation of their owners, were rented:

BUILDINGS FOR THIS YEAR.

This year 15 new buildings have been or are about to be begun in the district bounded by Lake street on the north, Wabash avenue on the east, Van Buren street on the south and Franklin on the west. They will all be steel constructed, and their total cost will be in the neighborhood of $8,000,000. The following is a complete list of the new buildings to be erected in the territory included in the above mentioned boundaries:

The Columbus, a thirteen-story structure, to be built by Higgins & Furber, at the southeast corner of State and Washington streets, at a cost of $800,000. This will be a very fine building architecturally, and is to combine the commercial idea with the sentimental. It is to be a monument to the four hundredth anniversary of the discovery of America.

Marshall Field will build a nine-story building at the northwest corner of Wabash avenue and Washington street, at a cost of $700,000, part of which will be used for his retail trade and the rest divided into offices and rented to physicians and other professional men. It is to be finished by May 1, 1893.

The Kedzie Deposit Company have begun work on an eight story office building, to be erected on Randolph street, 30 feet east of Clark, at a cost of $100,000. Its ground dimensions will be 50 x 80 feet, and it is to be ready by May 1, 1893.

The Hartford Building, now being erected at the southwest corner of Madison and Dearborn streets, will be one of the finest office structures in the city. It will be 14 stories high and will cost $600,000. The entire ground floor of this building has already been rented at a reported annual rental of $60,000.

W. D Boyce will ereet a 14-story building on Dearborn street, between Madison and Washington and adjoining the University Club, to cost $300,000. Part of the building will be used by Mr. Boyce himself for the publication of his weekly papers and the remainder will be rented for office purposes.

Work has been begun by the Brooks estate of Boston on a 16-story addition to the Monadnock Building. The extension will cover the entire vacant lot as far as Van Buren street and will have a frontage of 200 feet on Dearborn and also on Custom House place. The cost of this addition will be $800,000 and it is to be finished by May 1, 1893. When completed the Monadnock will be the largest office building in the city. It will have a total street frontage of 940 feet, or nearly one-fifth of a mile.

Bryan Lathrop will erect a 16-story office building on the southeast corner of Van Buren and Dearborn streets, to cost not less than $600,000. Work has already been begun and the building will be finished within the next ten months.

The Young Men's Christian Association has begun to tear down the old Farwell Hall, preparatory to erecting a modern 12-story structure to contain a large assembly room and offices for the Y. M. C. A., as well as several hundred offices to be put on the market next spring. The cost of this improvement will be $600,000.

W. C. Seipp and T. J. Lefens are about to erect a 12 story office building at the southeast corner of Washington street and Fifth avenue, to cost $300,000. It will have ground dimensions of 60 x 80 feet and will be known as the Teutonia, the name of the building that formerly occupied the lot. It is expected to have the building finished by May 1 next.

The Security Safety Deposit Company, of whom C. H. Marshall is president, are putting up a 14-story building at the southeast corner of Madison street and Fifth avenue, to cost $500,000. The iron work has already been erected to the hight of ten stories, and the building will be ready for occupancy about January 1 next.

Adjoining this on Fifth avenue is the new Wells Building, also a 14 story structure, to be used for offices and sample rooms for manufacturers' agents and dry goods commission men. This building will cost $300,000 and will be ready about November 1.

Wilson Bros. are erecting an eight-story building of steel construction at the southwest corner of Jackson street and Fifth avenue, to cost $250,000. This building will be ready about October 1, and will be occupied by the firm.

MEDINAH TEMPLE.

Plans have been prepared for a 12 story building at the northeast corner of Fifth avenue and Jackson street by the Medinah Shrine of the Masonic order. Stock is being subscribed, and the promoters of this enterprise claim that the building is practically assured. This corner is one of the most available sites in the city for a modern building. If this building should be erected, as now seems probable, it will involve the expenditure of at least $500,000.

The Mayer estate, represented by Levy Mayer, will build a seven-story structure at the southeast corner of Franklin and Van Buren streets, to cost about $250,000. This building will be of mill construction, and is to be arranged for the use of wholesale clothing houses.

Kuh, Nathan & Fisher have also begun to build on the opposite corner a building similar to that of the Mayer estate. It will be seven stories high, and will be occupied by this firm when completed.

The Dexter Safety Deposit Company are building an eight-story structure on Adams street, adjoining the Owens Building, to cost $100,000. This structure will be used for office purposes, and will be finished January 1.

The most important building operation in the city, however, is the new Congress Hotel, at Michigan avenue and Congress street, now in course of erection. This building will cost not less than $1,000,000, and is second in importance to the development of the city only to the construction of the Auditorium itself. This hotel, it will be remembered, was originally conceived by William Fitzgerald, who secured a lease to 84 feet on the corner, with a depth of 172 feet on Congress street. The Auditorium Association, seeing the harm that might be done by having the corner opposite its building controlled by some interest that might be antagonistic to itself, bought Mr. Fitzgerald's leasehold at a handsome bonus, and undertook to carry out the Congress Hotel project. The Auditorium Hotel Association agreed to take a lease of the new building to be used as an annex to its present hotel. The enterprise grew on the hands of the Congress Hotel Association, and they acquired one piece of adjoining property after another until now the company control 160 feet of frontage on Michigan avenue. The building to be erected will be 12 stories high, and will contain about 600 rooms. The building will have the largest frontage of any building on Michigan avenue except the Auditorium.

This activity in building is unprecedented. The completion of these structures will greatly alter the appearance of a large part of the city. Besides, very extensive alterations are being made in smaller business blocks. not of sufficient importance to be mentioned separately. And further, no account is taken of the great enterprises on foot in the immediate vicinity of the World's Fair. Nor is any attention paid to the erection of numerous important manufacturing establishments in various parts of the city and in the suburbs. If a list could be made of all these it would be startling in its proportions and in the amount of capital thus invested. Next year can hardly be expected to see this pace kept up, but not a few important projects are already assuming shape which will then be undertaken.

NEW PUBLICATIONS.

ATWOOD'S REVISED RULES OF PROPORTION. By D. T. Atwood, F. A. I. A.; 85 pages; eight full-page plates; bound in stiff board covers. Published by William T. Comstock. Price, 75 cents.

This is the third edition of a well-known work by a well-known author, and is divided into two parts, the first being introductory and explanatory, while the second consists of rules, notes and tables of comparative proportions. The plates are clearly printed, and the entire work has been adapted by the author to meet the requirements of modern practice.

Durability of Wood.

The problem has puzzled many why two pieces of wood sawed from the same section of a tree, should possess very varied characteristics when used in different positions. For example, a gate post will be found to decay much faster if the butt end of the tree is uppermost than would be the case if the top was placed in this position. The reason is, says an exchange, that the moisture of the atmosphere will permeate the pores of the wood much more rapidly the way the tree grew than it would in the opposite direction. Microscopical examination proves that the pores invite the ascent of moisture. while they repel its descent. Take the familiar case of a wooden bucket. Many may have noticed that some of the staves appear to be entirely saturated, while others are apparently quite dry. This arises from the same cause. The dry staves are in the position in which the tree grew, while the saturated ones are reversed.

CORRESPONDENCE.

The Science of Handrailing.—V.

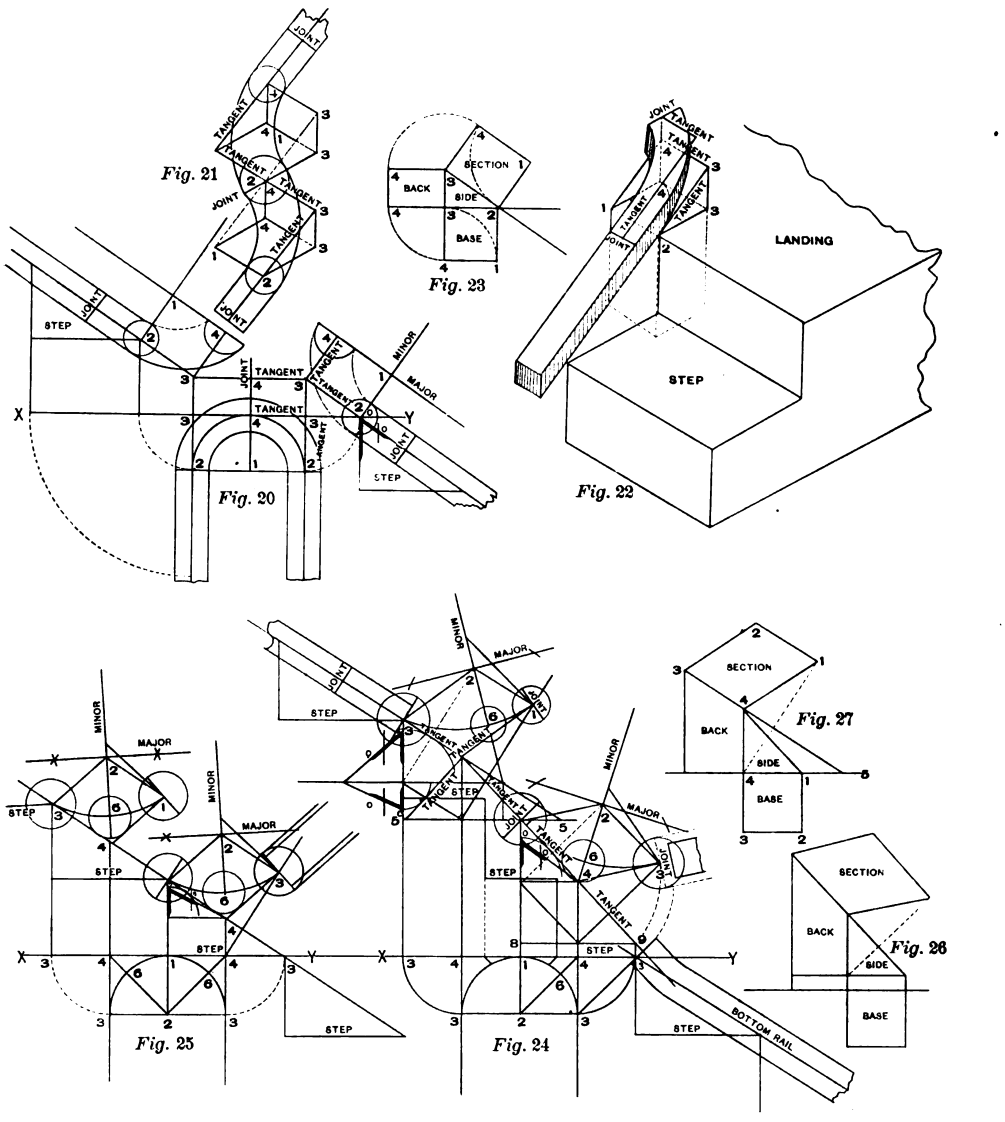
From MORRIS WILLIAMS, *Scranton, Pa.* —So far I have endeavored to explain how the outlines of sections of blocks of various forms are to be obtained, the use made of these outlines of sections in the manipulation of rails, how the center line of rail is located in the pitch plane of the section, the manner in which bevels are obtained and their use in squaring the wreath, as well as their relation to the width of face mold. I have also shown how to find the major and minor axis and the foci of the ellipse.

A thorough knowledge of these various methods is all that is required to enable any one to construct any and every kind of rail. They contain the fundamental principles of every system of handrailing.

In this articles I propose to make practical use of them in constructing rails for level landing stair, a stair with one riser in the well, and a stair with three risers in the well.

Fig. 20 represents a plan and elevation of a level landing stair, with the upper step of the lower flight and the lower step of the upper flight. The figuring of every point and line in the elevation has the same corresponding numbers in the plan. For example, the figure 1 in the plan represents a point from which the curve on the plan is struck. It is the center of the axis of the circle, a quadrant of which forms the plan of half the semicircle that forms the complete plan of the cylindrical curve around the landing. Fig. 1 in the elevation bears similar relation to the elliptical curve that the rail assumes in its travel in the pitch plane of the section. The numbers 1, 2, 3, 4 in the elevation will stand plumb to their corresponding numbers 1, 2, 3, 4 in the plan. The diagram, Fig. 2, in the first article will clearly explain my meaning.

In drawing the face mold and finding the bevels for a level landing stair of the plan shown in Fig. 20 we must find what kind of a sectional plane we have to deal with, whether it is a plane oblique to both sides of the block or to one side only. If to one side one bevel is required, and that bevel will be the top angle of the pitch board. If to one side the outlines of the section are to be formed by drawing perpendicular lines to the pitch line of the sectional cut. Fig. 1 of my first article explains this. Compare Fig. 1 with Fig. 20, and it will be seen that 1 2 3 4 below X Y in both diagrams are the outlines of the plan. 1 2 3 4 above X Y in both figures are the outlines of the section, and while 4 4 1 in Fig. 1 represent the side of the block, 3 3 2 in Fig. 20 represent it. So far the two figures correspond. We have the plan or base, the side, and the section of the block in both figures, but in Fig. 20 we have also the back of the block, which is represented by the numbers 4. 3 below X Y and 4, 3 above X Y. The block containing the plan, side, back and section, is geometrically represented unfolded in Fig. 23 and isometrically in Fig. 2 of the series. I advise the reader to have the diagrams represented in Figs. 1, 2, 20 and 23 laid on a table before him and compare one with another; he will undoubtedly find that the plane we have to do with in Fig. 20 is a plane oblique to one side of the block only, and therefore needs only one bevel, and that the outlines of the section are to be obtained by drawing perpendicular lines to the oblique cut of the section.



The Science of Handrailing.—Diagrams Accompanying the Fifth Article of the Series.

Fig. 21 illustrates the relation of the

wreath pieces to the block in going up and down stairs, also the principle of forming the joints square to the tangents. How to draw the face mold has been shown in previous diagrams. Fig. 22 explains itself.

In Fig. 25 we have the plan and elevation of a stair with one riser in the center of the well. The plane of a section of this kind of stair is illustrated in Figs. 3 and 4 of the series. How to obtain the bevels is shown, and also the width of the face mold. An examination of previous diagrams will enable the reader to understand this figure without further explanation.

Fig. 24 contains the plan and elevation of a stair having three risers in the well. This stair requires two different face molds and three different bevels, also an easement in the bottom straight rail. How to draw the face molds and find the bevels has been clearly explained in previous diagrams. There are two lines in this diagram which have not as yet made their appearance in previous illustrations.

They are marked in the elevation by the figures 8 9 and 5 5.

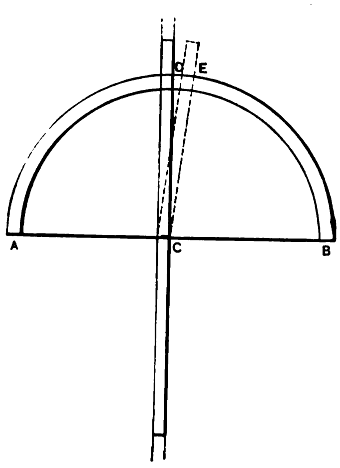
The line 8 9 shown raised above the ground line X Y shortens the oblique cut of the section an amount equal to the space between X Y and the line itself. This, as the diagram shows, is necessary, because the pitch of the tangents deviates from the pitch of the bottom straight rail. By raising the ground line in this manner a graceful easement can be formed in the bottom straight rail.

It is plain that this line in its relation to the sectional cut becomes the ground line or the intersecting line of the co-ordinate planes. So also does the line 5 5 in relation to the development of the upper section. With the exception of these two lines all the other lines have been previously explained.

Fig. 26 is a geometrical diagram illustrating the bottom block assumed in Fig. 24 unfolded, while Fig. 27 is the upper block unfolded.

Saw Kerfing.

From S. J. B., *Montgomery, Ala.*—In recent issues of the paper I notice several answers to the inquiry of "A. B. McD.," with regard to kerfing. I give my method



Saw Kerfing.—Fig. 1.—Method of Obtaining the Saw Kerfs.

for obtaining the distance which separates the kerfs and which has always proven correct. I first lay off my circle, both inside and outside, giving the thickness of the lumber to be bent. Referring to Fig. 1 of the sketches, let A B represent the spring line of the arch, C the center of the circle or radius. From C I draw a straight line at right angles with A B, extending it indefinitely and bisecting the circle at D. I then take a strip of the same thickness as that I desire to kerf and saw in it a kerf as indicated in Fig. 2, using the same saw that I expect to use in kerfing. Then lay the strip on as shown by the dotted lines of Fig. 1, and bend the strip until the kerf closes. I then mark the circle at E, which gives the desired distance. After this I set my compasses from E to D of Fig. 1 and step off the circle. I then step off the same number of spaces on the piece to be bent and proceed to kerf. If in stepping off for the kerfs the latter do not come out right at the spring line, I

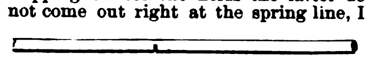


Fig. 2.—Strip with One Saw Kerf.

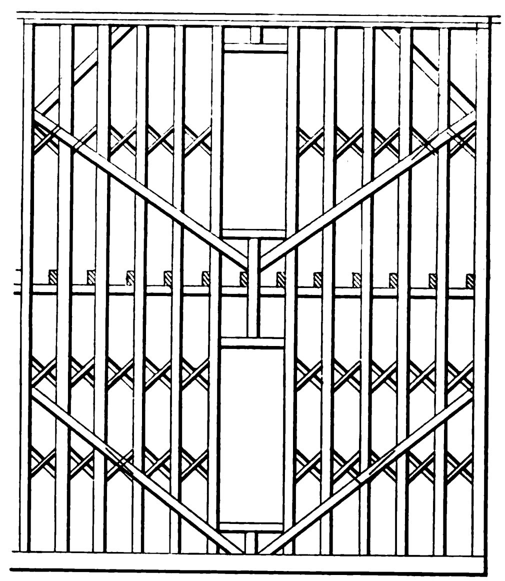
usually draw the compasses up and make an extra cut rather than leave one out. I use the gauge described in a recent issue by "M. E. J." of Williamsport, Pa.

Best Wood for Flooring.

From H. A. H., *Wawanesa, Manitoba.*—I would like to ask of the practical readers of the paper which makes the best flooring, hard or soft pine?

House Framing.

From H. T. B., *Sardis, Ky.*—I send a sketch showing a method of house framing which, I think, will interest the readers of the paper. We never use less than 8 x 8 sills, 5 x 7 angle and corner post studs, and 2 x 5 plates, double studs. All are mortised and tenoned together. The joist have ½ camber and the second joist notched ½ inch over joist bearer.

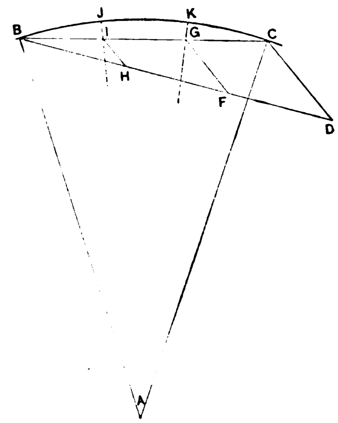


Method of Framing Employed by "H. T. B."

We use 5 x 5 girder on the ends. The braces are let in flush with the studs on the outside at any angle desired between openings and corners. On the inside walls we let them in ½ inch more than flush so as not to crack the plastering. The studs are bridged with one or two rows of bridging 1 x 2 inches, this plan being followed in connection with all walls in the first and second stories. The sketch which I send shows the method of framing employed. At the present time all who want houses built specify that studs have one or two rows of bridging. I raise the building plumb, stay it and set the frames. I then let in the long braces, bridge the joist and studding, and are then ready for the storm. I have been in buildings bridged this way during storms and have never yet felt the structure shake, as all are apt to do that are not bridged.

Trisecting an Angle.

From L. T. B., *Hamburg, Iowa.*—I send the following answer to "E. A. P.,"



Method of Trisecting an Angle Adopted by "L. T. B."

Carthage, Ill., who asked in the February issue of the paper how to trisect an angle of any size: In the first place, draw the triangle A B C and connect B with C. Construct B D in any direction and of any length. Divide this length into three equal parts and connect D with C. Draw F G and H I parallel with D C. Now with A for a center, strike the arc B J K C. Produce J I and K G, and I and G will trisect the straight line of the angle, while J and K will trisect the arc.

Number of Joists in a Building.

From S. McC., *Price's Branch, Mo.*—On page 35 of the February number of *Carpentry and Building* "L. J. N." desires to know of a shorter or better method of finding the number of joist in a building than to multiply the length of the structure by 3 and divide by 4. I will say that if he will subtract one-quarter the length of the building in feet he will have the number of spaces, and then by adding 1 to commence with he will obtain the number of joist required, 16 inches on centers. Suppose, for example, the building is 40 feet. One-quarter of this number is 10, which subtracted from the length, gives as a result 30. Add 1 to this number, and it will be found that 31 joist will be required for the building.

Design for a Hay Shed.

From J. C. M., *Oregon, Ill.*—In the May number of the paper there is a request from "J. J.," Victor, Mon., for a plan for a hay shed, and as it most haying time (May 10), I send sketches of a shed which I trust will prove of interest to the correspondent. The sketches which I send indicate not only the construction but also the manner of putting in the track for a hay carrier, &c. Fig. 1 is a section through the building, the space A being intended for the hay to travel from the front to any mow in the shed. In my opinion, it is best to fill one mow at a time, as the hay comes out so much the easier. There are six bents in the shed, making five mows, 16 feet wide. Fig. 2 is a view of a portion of the side, two bents being indicated. I think it is unnecessary to show the entire length of the building, as the construction is clearly indicated in this drawing. In Fig. 3 of the sketches is represented a section of purlin plate and post, while Fig. 4 represents the projection of the roof in order to keep the track dry, while at the same time giving support to the track where it projects from the end of the shed while unloading. The drawing also shows the rafters spaced 2 feet between centers. If a board roof is put on every other rafter could be omitted. Fig. 5 shows one way of hanging the track, allowing it to vibrate from side to side, and thus distribute the weight more uniformly. It is not easy to start the load plumb with the track, hence the side motion comes in play. It is best to nail on a board to the underside of the rafters from B, Fig. 4, to the plate, thus forming a brace. In Fig. 6 is shown a way to splice the track so as to avoid its coming between two bearings. It also shows the hook, which has a nut on the lower end. This nut must be countersunk in the bottom of the track so it will not interfere with the carrier. If "J. J." will go to a good hardware store, he can see cuts of haying tools which are better than I could show him. The trip is fastened on the end of the track which projects over the end of the shed. The dotted lines in Fig. 1 show where a timber could be put in at the rear of the shed to which to fasten a pulley. From this the rope goes to the ground, passing through another at a point where the horses are attached. Of course, the other end of the rope is run through one wheel on the carrier, then through the pulley on the frog, then through the other wheel on the carrier and finally fastened to it. My understanding is that "J. J." does not wish to inclose the building. If he does the braces will have to be changed. Some would have to be put in to withstand the pressure against the boards, and it would also be advisable to put in girts. To inclose the space at A, Fig. 1, I would make a door the full size and shape and hang it on weights a trifle heavier than the door. The latter could then be lowered at the end of the building the same as the top sash of a window.

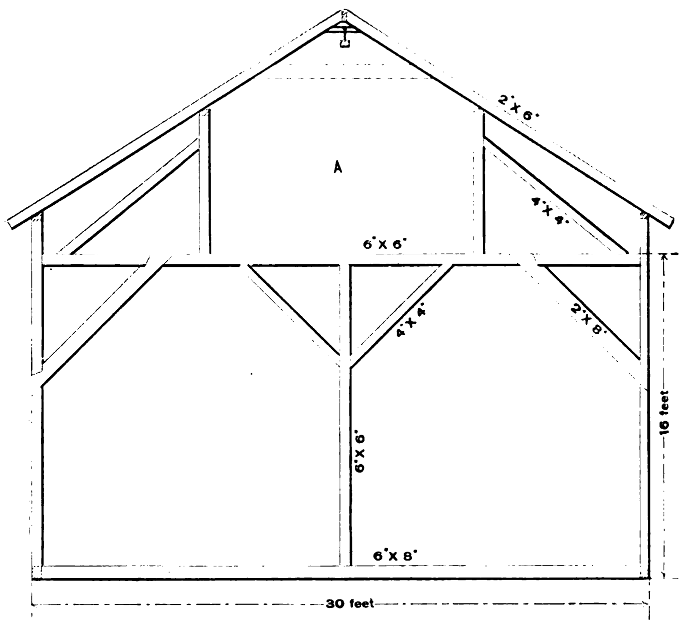


Fig. 1.—Cross Section through Shed.

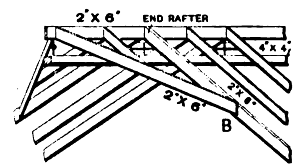


Fig. 4.—Projection at End to Cover and Support Track while Unloading.

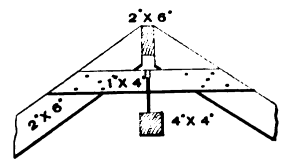


Fig 5.—One Method of Hanging the Track.

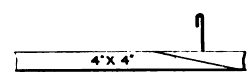


Fig. 6.—Showing Hook and Place to Splice Track.

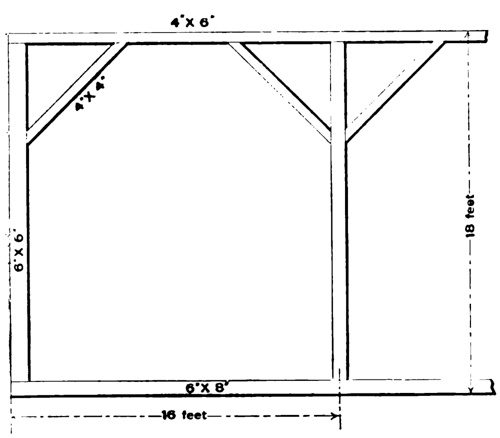


Fig. 2.—Side View, Showing Two Bents.

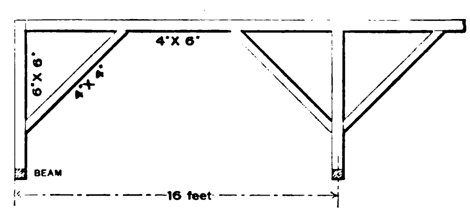


Fig. 3.—Sectional View, Showing Purlin Plate and Posts.

Design for a Hay Shed—Submitted by "J. C. M."

Laying out Strings and Winders.

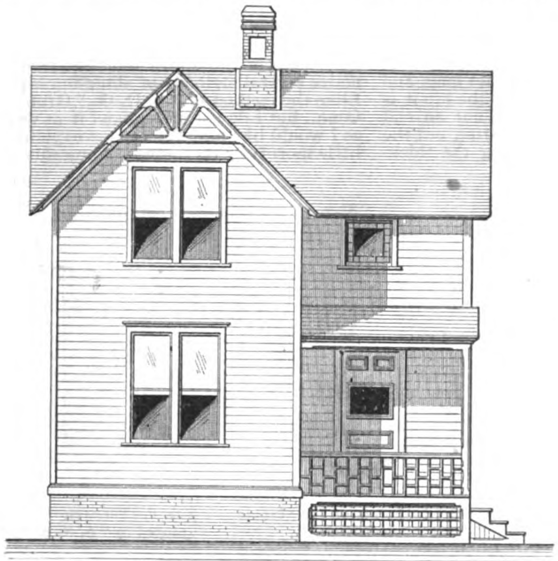
From A. A. S., *Newark, N. J.*—In the issue of *Carpentry and Building* for May I notice a detail of a housed stair string, which, to my mind, is a very important feature of stair construction. There is one thing, however, that I would like to know, and that is a good method of laying out winders. Some carpenters are of the opinion that running steps and platforms is the best method of entering the stories above, but I am of the opinion that winders are the better and easier method, while being more mechanical. Please give me a good method of running two or three winders, and the manner of laying out the string.

Framing a Roof of One Foot Rise.

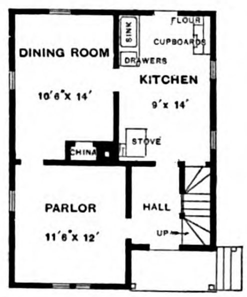
From C. H. B., *Jackson, Mich.*—With regard to the article in the March number of the paper contributed by "J. W. McK.," Sumpter, S. C., I desire to say that the portion of his roof plan referring to lengths of hip and jack rafters is, in my opinion, incorrect. If I understand the principle it will not work for any pitch less than one-half. Perhaps, however, the correspondent can explain away the difficulty.

Designs for Cheap Country Houses.

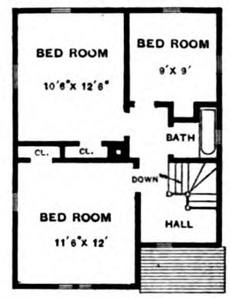
From ICH DIEN, *Providence, R. I.*—I send herewith sketches showing front elevations and floor plans of two cottages which may be of interest to "H. B." Justus, Ohio, whose inquiry appeared in the February issue of *Carpentry and Building*. The floor plans show the general arrangement of the rooms, while the figures show the general dimensions of the various apartments so clearly that a detailed description would appear to be unnecessary. If any of the readers desire to be further informed concerning them I shall be glad to have them make their wishes known.



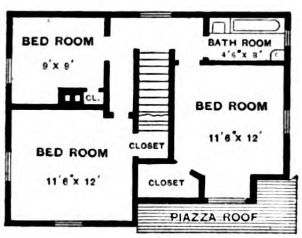
Front Elevation.



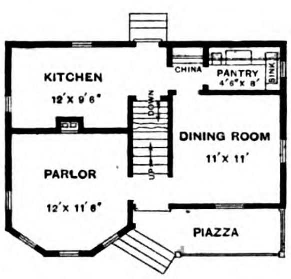
First Floor.



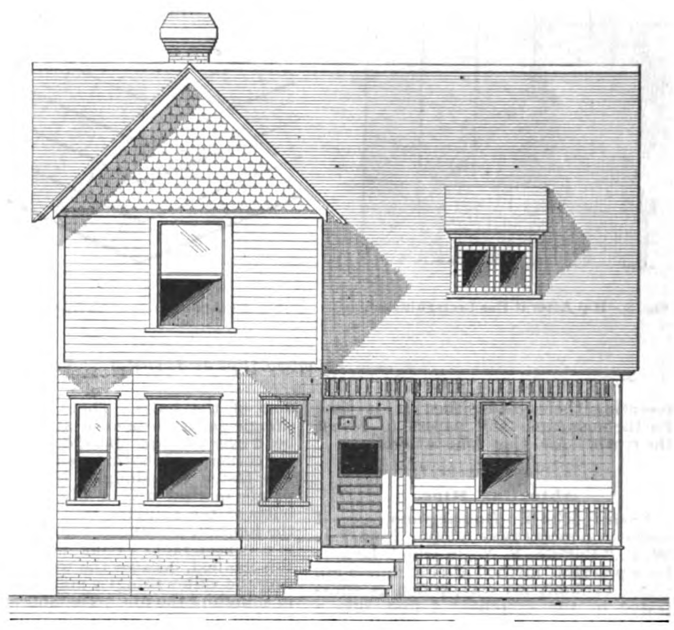
Second Floor.



Second Floor.



First Floor.



Front Elevation.

Designs for Cheap Country Houses.—Submitted by "Ich Dien," Providence, R. I.—Scales: Elevations, ⅛ Inch to the Foot. Floor Plans, 1-16 Inch to the Foot.

Some Heating Fallacies.

From EDWIN A. JACKSON & BROTHER, *New York City.*—John C. Clarey, whose article on "Some Heating Fallacies" was reprinted in the June issue of *Carpentry and Building*, truthfully illustrates the deceit of the general furnace or steam-heater agent, and the corresponding ignorance of so-called intelligent people. The same failings are seen in the grate trade, perhaps to a still larger degree. Of the number of patent grates, with their rotary drafts, their smoke-consuming fires, their heat-saving backs, or their air-destroying fronts, few have one virtue in their marvelously perfect construction.

Think of a firm claiming that by a patent arrangement foul air can not only be made pure, but destroyed entirely; that the gas (which is the fuel used) will not only burn without smoke or gas, but that the air which supplies the draft, and as well the fuel itself, is completely annihilated, leaving a vacuum! This vacuum, of course, must be filled, and fresh air rushes in, so that by this apparatus the manufacturers claim no flues either for inlet or exit of air or smoke are necessary, yet the room will be kept thoroughly warmed and ventilated. The absurdity of the whole scheme needs no comment.

In the same line, though to a more moderate degree, another firm advertises a patent fuel to burn "without smell, smoke or gas." The former are doubtful, but the average schoolboy knows that fuel of any kind cannot burn without making a gas.

Another company, with innocence and apparent truthfulness, recommend their patent grates for perfect heating and ventilation, when they do not allow any inlet for the fresh air. The essentials of ventilation are the inlet, the outlet and the power to cause the current or draft. With the grate referred to the latter two are found, but the first is missing. Their system consists of a fire place, in the back of which is an air chamber, connected at the lower end with the lower part of the room, at the other end with the upper part of the room. When there is a fire in the grate, air is drawn from the floor, cold; is heated in the air chamber, and thrown out at the ceiling. This causes the circulation. The fire with its draft causes a large amount of air to pass up the chimney—this is the outlet. Where is the inlet? Around the windows, through doors and cracks, the grate is sucking cold and often foul air to supply the draft of the fire. There is a constant stream of cold air passing across the floor. Is this ventilation, with cold floors swept by colder drafts of air partly pure, partly foul—the latter passing partly out the flue, partly through the air chambers to the room again? Do people believe that the heated air chamber is a help in purifying this mixed air? When architects allow such systems to be employed; when clients refuse to be enlightened, and persist in being deluded; when manufacturers continue misrepresenting their goods, then it is time for the magazines and papers to reveal the truth. And that time is here.

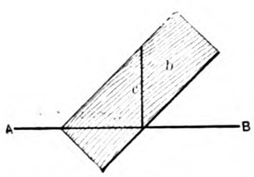


Fig. 1.—Showing Relative Position of Hip Shingle.

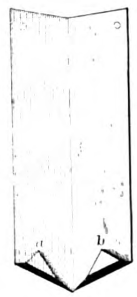


Fig. 3—Tin Shingle, Showing Points to be Bent Under.

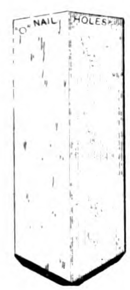


Fig. 4—Points of Tin Shingle Bent Under.

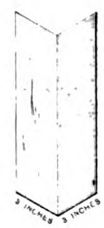


Fig. 6.—Tin Strip Employed by "A. H. K."

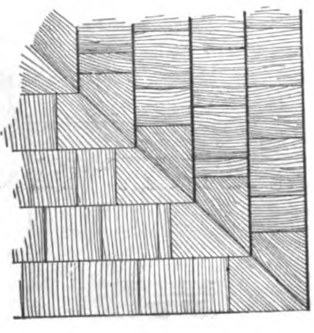


Fig. 2.—Hip After it Has Been Shingled.

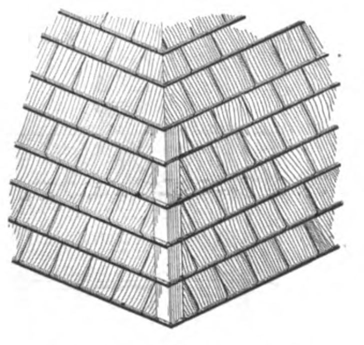


Fig. 5—Appearance of Completed Hip.

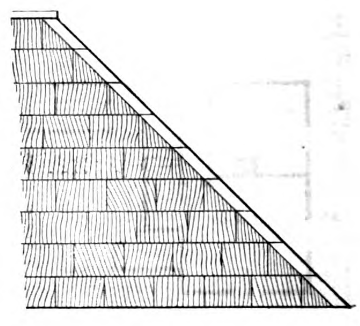


Fig. 7—Showing Hip when Completed According to the Method Suggested by "A. H. K."

Shingling Hips as Suggested by Various Correspondents.

Shingling Hips.

From C. E. H., *Birmingham, Ala.*—I notice in a recent issue a letter from "A. W. P.," Buffalo, N. Y., in which he asks for a practical method of shingling a hip roof. I submit my way, which is illustrated in the sketches. I first take a shingle and place it parallel with the hip, as indicated in Fig. 1. I then draw a line on the butt of the shingle, parallel with the base of the roof A B, after which draw the line *c* plumb with the roof. This gives the pattern ready for cutting. Commence on the hip and shingle back, then trim the points of the next shingles from the one sawed out and carry up both sides of the hip at once. The result will give joints broken twice before the corner or hip shingle goes on. I consider this the best and cheapest plan, for it is necessary to cut but one hip shingle, while the point of the shingle *b* can be used for the valley, if there is one on the roof. Fig. 2 of the sketches represents the hip after it has been shingled.

From W. F. Y., *Toulon, Ill.*—In the February issue of the paper, "A. W. P." of Buffalo, N. Y., desires to know of a practical method of shingling a hip without the use of weather boards. I will try to illustrate my method, which has been in use in this vicinity for a number of years and which makes a very pretty and durable hip. The method is entirely different from anything I have seen in any other section of the country. Hips shingled as far back as 1883, according to the plan indicated, are seemingly in as good condition to-day as when the shingles were first put on. Here we use strips of tin about 3 x 10 inches. We make a form out of a piece of 2 x 4, 12 inches long, and bevel one side until it forms the hip it is desired to shingle. We then cut an end to the angle of the butts, cutting out the underside at this end, leaving the thickness of the butts. Then place the tin shingle on the form even at the end and bend over the hip. Bend down and under the corners and the tin is ready for the hip. We fasten the shingles by forcing the points marked *a b* of Fig. 3 under the butts of the shingles, and with nails at the top end, as indicated in Fig. 4. There is a considerable saving of material by this method, because the waste from cutting the valley shingles may be employed in shingling the hip. The appearance of the hip after the shingling is completed is indicated in Fig. 5 of the cuts.

From A. H. K., *Byron, Ill.*—Being a reader of *Carpentry and Building*, I have noticed with much interest the several methods of shingling hips to make a neat finish, published in the May number of the paper, and I have concluded to send my method, which may prove of interest to the readers. Instead of weather boards or extra wooden shingles, I cut tins the size and shape indicated in Fig. 6 of the sketches, changing the bevel for the end of the tin shingle according to that required by the pitch of the roof. The tins before being bent are 6 inches wide and 8 inches long. In shingling, care should be used in selecting wide shingles for the hips, lapping the hip alternately each way. I lay the tin shingle with each course, allowing the lower end to come even with the butts of the course it covers, and nail so that the next course above covers the nails in the tin. This makes a neat and durable hip, and one that does not end up. I understand that a patent has been lately issued on this method, but consider it invalid, as we have used the plan for nearly ten years back.

From C. S., *Brunswick, Ohio.*—In the May issue of *Carpentry and Building* I notice several methods of shingling hips. I like the method of "S. H. G.," Groton, Conn., but I do not understand it as well as I would like to. Will he not explain a little more fully the method of procedure? He says he strikes a line 4 inches each way from the hip, letting the corner of each course come to this line. Now, I want to know what keeps it from leaking, as he says he lays the hip shingles square with the hip. I have no doubt this is all right, but I fail to see through it as clearly as I would like. I should be glad to have "S. H. G." show up his method a little more fully, using several illustrations to indicate just the way the shingles lay.

House Chimneys.

From R. B. W.," *New Orleans, La.*—Will the practical readers of *Carpentry and Building* contribute something with reference to the plans and runs of flues of house chimneys? I think this subject can be discussed to good advantage.

Pine for Inside Finish.

From H. A. H., *Wawanesa, Man.*—Will some one please tell me what is the name of that kind of pine which has a very pretty grain, and is used for paneling inside of houses with matched boards?

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

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Second Vice-President, HUGH SISSON, 19 W. Saratoga street, Baltimore, Md.
Secretary, WILLIAM H. SAYWARD, 166 Devonshire street, Boston, Mass.
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H. H. EDGERTON, Rochester, N. Y.
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Committee on Statistics.

S. D. TIPPETT, Chairman, Cincinnati, Ohio.
PAUL REISEN, Milwaukee, Wis.
J. E. BAKER, Syracuse, N. Y.

Committee on Building Law.

STACY REEVES, Chairman, Philadelphia, Pa.
ALEXANDER CHAPOTON, JR., Detroit, Mich.
A. A. BERRICK, Buffalo, N. Y.

Committee on Lien Law.

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C. W. GINDELE, Chicago, Ill.
J. MILTON BLAIR, Cincinnati, Ohio.
C. D. MORSE, Worcester, Mass.

The Membership of Exchanges.

A statement made by the Council of the British Institution of Civil Engineers, in its annual report for 1891-92, is one that commends itself to the members of the filial bodies of the National Association. It is as follows:

The Council had carefully guarded the admission of new members to every class, and the qualifications of all candidates had been subjected to rigid scrutiny. It was believed that a strict inquiry into each candidate's career was better than any system of examination. Members were again urged not to attach their names to the recommendation of any one for election or for transfer, unless thoroughly satisfied that the candidate was in all respects professionally and socially eligible.

Great care should be taken to secure and maintain the highest possible standard for an exchange, and in no way can it be done more successfully than by the careful selection of the material of which it is composed. A membership that includes only such men as have established a reputation for honorable dealing and skillful work is much more powerful for good than is an organization that can boast only of the quantity of its membership. Beside, such association as naturally follows the bringing together of the best elements of the business draws the best influence to it, and commands the respect of the entire community. A membership in such an exchange is a thing of value, and new applicants solicit admission instead of being solicited to become members, as is the case where the conditions are such that the value of membership is not plainly manifest. A comparatively small number of earnest workers can accomplish much more than a large and unwieldy body of men in which the spirit of progression and improvement is but partially alive. The very fact of a large membership that is not entirely and fully active is often productive of unfavorable results, for the apathy that is bound to exist in some of the members of an illy selected membership is almost sure to communicate itself to others in whom the active desire for improvement and greater benefits is but slightly developed. The important feature of a judiciously selected membership is in the fact that such selection makes admission something to be desired, and thereby creates a value for it. What every one can have no one wants.

Individual Effort.

One feature of the work necessary to the success of a builders' exchange that is frequently lost sight of by the members is the result produced from individual' effort. Every member of an exchange owes it to himself and to his organization to assist by his personal effort in the establishment of the objects of the exchange. The fact that desirable rules well calculated to create needed improvements are passed means nothing unless the members use their individual effort to secure their enforcement. These rules, no matter how desirable and advantageous they may be, will not enforce themselves; they must be enforced, and so long as the individual does not apply them to his affairs, they might as well not have been created and the work of formulation goes for nothing. It is often the case that while recognizing the value of new methods the builder will still continue following old practices, alleging that the old way is good enough for him. He uses this argument to himself, both from a natural antipathy to innovations and from an erroneous belief that the new way would involve more labor and he would be obliged to go out of his way to use it. His familiarity with existing methods makes the new ones seem complicated and difficult of accomplishment, and he prefers to put up with the evils as they exist rather than change his methods even though the change might promise the most satisfactory results. The truth of the matter is that the adoption and use of improvements in methods of conducting business is not so difficult as it seems. Rules and regulations that have been passed by an exchange for the good of the whole are just as easy of application as any other, and may be practically applied by each individual just as easily as the old regulations or customs that have been allowed to govern in the past. If each individual member of an exchange would, for instance, use the rules of his organization in relation to the method of submitting estimates, a new custom would be established that would improve that portion of the business, and the labor of its establishment would be exceedingly small. Upon each individual member depends a share of the responsibility of the success or failure of every project the exchange may undertake.

Suggestions for the Mid-Year Meeting.

Members of filial exchanges are urged to send to the National Secretary suggestions of subjects for consideration at the Mid-year meeting. As the work of the meeting is to prepare the program for the convention, and to formulate the questions that are to be discussed by the delegates, too much stress cannot be laid upon the importance of having brought up for consideration any and all subjects that the members of the local exchanges consider as needing revision or improvement. Any suggestions that the members have to offer should be submitted to the National Secretary as soon as possible.

The Uniform Contract.

The importance of continuing the work of securing more general use of the uniform contract throughout the country is again brought to the attention of the secretaries of the filial bodies of the National Association of Builders. The National Secretary urges renewed effort on the part of the members of the local exchanges to establish the contract as the only one to be used in the building business. The National Secretary suggests that the secretaries of all filial bodies secure copies of the form from the publishers, the Inland Publishing Company, Tribune Building, Chicago, and send a specimen to every architect doing business in their several cities, urging that the form be used in preference to any other. The importance of the builder insisting upon the use of the uniform contract only should also be kept before the members of the exchanges at all times.

The Cleveland Exchange.

At a meeting of the Builder's Exchange of Cleveland, held late in the month of June, the following preamble and resolution, expressive of the sense of the loss sustained by the builders of the country in the death of Marc Eidlitz, were passed:

Whereas, This exchange has learned since its last meeting of the death of Marc Eidlitz of the New York Exchange, and

Whereas, It seems fitting that an expression of the feeling of this exchange toward one of the leading spirits of the National Association of Builders should be made; therefore

Resolved, That we recognize in the character of Mr. Eidlitz those qualities of mind and heart that mark the highest type of American manhood; his genial disposition, his devotion to the interests of the National Association, his pride in and loyalty to his avocation, are all qualities that commend him to our highest esteem,

Resolved, That we extend to the New York Builders Exchange, and through them to his family, our sincere sympathy, and the assurance that we share their loss in common with the builders of the entire country; and

Resolved, That a copy of these resolutions be forwarded to the New York Builders Exchange and to the secretary of the National Association.

THE BUILDERS' GUIDE.*

By I. P. HICKS.

ON SMALL JOBS old contractors who have learned to judge from experience usually arrive at the quantities of nails by guessing. The following table, however, may be found available to many in estimating nails for various purposes. As wire nails are coming into general use, and are already extensively employed, the basis of estimating has been made on the number of wire nails to the pound. If cut nails are used add one-third to the amount :

TABLE FOR ESTIMATING NAILS.

1000 shingles require 3½ pounds 4d nails.
1000 lath require 6½ pounds 3d nails.
1000 feet of beveled siding requires 18 pounds 6d nails.
1000 feet of sheeting requires 20 pounds 8d nails.
1000 feet of sheeting requires 25 pounds 10d nails.
1000 feet of sheeting requires 30 pounds 8d nails.
1000 feet of sheeting requires 35 pounds 10d nails.
1000 feet of studding requires 14 pounds 10d nails.
1000 feet of studding requires 10 pounds 20d nails.
1000 feet of furring 1 x 2 requires 60 pounds 10d nails.
1000 feet of ⅞ finish requires 30 pounds of 8d nails.
1000 feet of 1⅛ finish requires 40 pounds 10d finish nails.

The following table shows the name, length and number of nails to the pound of the different sizes :

NUMBER OF NAILS TO THE POUND.

Name.	Length.	No. to a pound.
8d fine	1 inch	1150
3d common	1¼ inch	720
4d common	1⅜ inch	482
5d common	1⅝ to 1¾ inch	352
6d finish	2 inch	350
6d common	2 inch	252
7d common	2½ inch	192
8d finish	2½ inch	190
8d common	2½ inch	182
9d common	2¾ inch	110
10d finish	3 inch	137
10d common	3 inch	87
12d common	3¼ inch	66
20d common	3⅝ inch	35
30d common	4 inch	27
40d common	4½ inch	21
50d common	5⅛ inch	15
60d common	6 inch	12
70d common	7 inch	9

FORM OF CONTRACT.

Articles of Agreement, made on this.............. ....day of ...., A. D. 18........, by and between ...., party of the first part, and.......................... ...., party of the second part : *Witnesseth*, That for and in consideration of the money hereinafter stipulated to be paid to the party of the first part by the party of the second part, the party of the first part has, and by these conditions does hereby agree to furnish all labor and material of every kind and to build and complete on or by the............................ ....on the premises of the party of the second part, situated in........................... a residence as shown upon the drawings and set forth in the specifications. Said drawings and specifications being verified by the signatures of the parties are taken as a part of this contract. And the party of the first part agrees that all material furnished, or workmanship employed, shall be of the best character and quality, as mentioned in the said specifications. The party of the first part further agrees that he will complete, in accordance with the plans and specifications, to the full and entire satisfaction of the party of the second part, all the work that is to be done by the ....

In consideration of which the party of the second part agrees to pay to the party of the first part the sum of $.......... as follows :

When the foundations are completed.... $........
When the entire building is under roof.. $........
When the entire building is plastered.... $........
When the entire building is completed... $........

In Witness Whereof, the parties hereto have affixed their signatures :

..............................[L. S.]

..............................[L. S]

Witness :..............................

Practical Methods of Construction.

As most carpenters are familiar with the usual methods of construction in the line of carpentry, I will only mention a few points on this subject, which seem to me to be more or less neglected.

MAKING CORNERS.

It is customary, nowadays, to make the outside corners of many buildings by simply doubling and spiking two studding together, as shown by section in Fig. 48. By this method there is nothing to receive the lath from one side, and as soon as the lathers begin work, the carpenter is called upon either to put in another studding or the lather puts in anything he can find to which to nail the lath. In many instances it is nothing more than a double thickness of lath nailed up and down the corner. This does not make a solid corner, and as a consequence the plastering soon cracks, even before the carpenter is through finishing. It is almost impossible to put down the base in a house constructed with such corners without cracking them, simply because they are not solid. Fig. 49 shows a section of a corner which is a much better method of construction, and one which makes a solid corner. The corner is made of three studding, A. B. C., spiked together as shown. D is an open space between A and B, which may be filled in with blocks. Corners constructed in this way make solid nailing for the lath and base from both sides. Figs. 50 and 51 show two forms for making solid corners for partition angles by using three studding. If it is desired to save studding a board can be nailed to the back of studding C, which will often answer the purpose. It is a very common thing for carpenters in setting partitions to place the studding joining another partition half an inch away from it, so that the lather may run the lath through back of the partition studding, as shown in Fig. 52. This does not make a solid corner and is a very poor method of construction.

SPACING STUDDING.

As the second floor joists in buildings usually rest on a ribbon board framed into the studding, it is necessary that the studding on both sides of the building on which the joists have their bearing should be regularly spaced. Many are in the habit of laying off the openings and spacing the studding to conform thereto. This method causes great irregularity of spacing, making some wide and some narrow spaces, which either bring the joists overhead out of position or leaves them standing alone on the ribbon without any means of being properly fastened.

Studding should be spaced regardless of the openings, after which the openings may be laid out and the necessary studding may be cut and headers put in, as shown in Fig. 53. This method leaves the studding all regularly spaced, and the joists will all nail to the side of a studding and come in the proper order. Now, if the studding are set to conform to the openings, as shown in Fig. 54, it breaks up the often the plastering is not finished level and true with the jambs. All trouble with corner blocks may be avoided by taking a common board of the proper thickness, 1½ inches narrower than the inside head casing, 1½ inches shorter than the width of window and side casings, and nail it tight down on the head jamb, as shown in Fig. 55. By this method the corner blocks will nail up true and solid without cracking the plastering. Care should be taken that the board is not too wide nor too long, as the blocks and head casing should completely cover it from view.

MITERING AND COPING BASE.

Many mechanics have probably experienced more or less difficulty in mitering and coping base, particularly of the hardwood finish and molded-edge patterns. There are two distinct kinds of joints to make

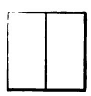

Fig. 48.—An Outside Corner.

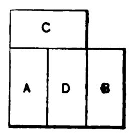

Fig. 49.—Section of a Corner Indicating a Better Method of Construction than shown in Previous Figure.

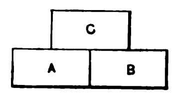

Fig. 50. Method of Making Solid Corners for Partition Angle.

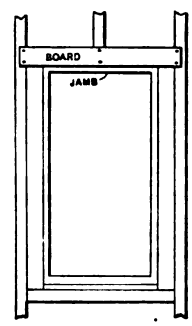

Fig. 55.—Method of Putting up Corner Blocks.

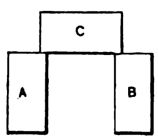

Fig. 51.—Another Method of Making Solid Corners.

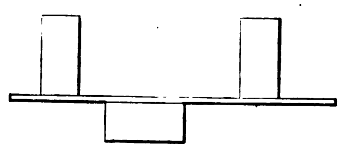

Fig. 52.—Showing Improper Manner of Running the Lath.

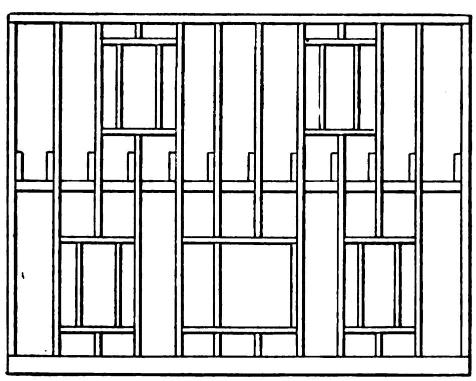

Fig. 53.—Showing Proper Method of Spacing Studding.

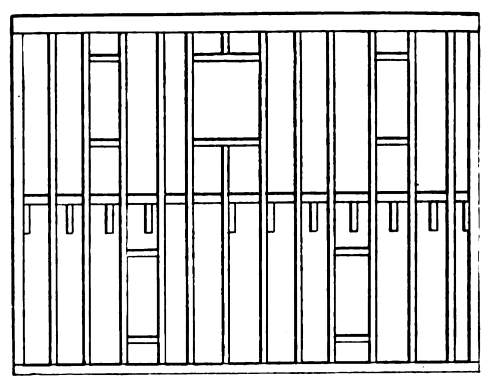

Fig. 54.—Showing Studding Set to Conform to Openings

The Builders' Guide.

regular order of spacing, leaving some spaces wide and some narrow. It will also be noticed that we have two more studding spaced on the sill and plate than in Fig. 53. It is, therefore, evident that if the joists are regularly spaced many of them will stand alone on the ribbon board, with no place to properly fasten them, as shown. If they are placed over to the side of the studding, as they frequently are, then they are thrown off their centers and the spacing is wrong.

CORNER BLOCKS.

Every workman has experienced more or less difficulty in nailing up corner blocks in casing doors and windows. The trouble all comes from the want of a solid background on which to nail the blocks. Very

in putting down base. The angles which form the four sides of a room are called internal angles, and the joints should always be coped. The projecting corners of a chimney, or any corners projecting into a room, are termed external angles, and the joints should always be mitered. To cope a joint in putting down base, cut and fit in square the first piece. Cut the piece which is to be coped to the other about 1½ inches longer than the actual length needed; place it as nearly as possible in position, and with the dividers set to about the thickness of the base, scribe down by the side of the piece already fitted and nailed in place; then scribe all the parts which is easy. Beads and molded surfaces which are difficult to scribe. Prick with the dividers near the center of each member; cut the square part of base as usual, but cut the molded part on an angle which will just touch all the points made by the dividers. This will give the true line for coping. After cutting the base to the coping line, first see that the joint will fit, as sometimes a little trimming is necessary; then obtain the proper length, cut off and place the board in position, putting in last when possible to do so the end which is coped. By this method a joint can be made very tight without the annoyance of the other end of the board scraping into the plastering. Many carpenters use a templet for obtaining the cut which gives the coping line. It, however, is of little use, as it is always made with the supposition that all angles are square and true, which is far from being the case. Scribing and cutting as above described is far better, as it will make a joint to fit any angle, and with a little practice a perfect fit will be obtained at the first cut.

To miter base around external angles, mark the proper miter on the square edge of the base and square across on the back side and the square part of the face side. Cut from the top edge of base, starting on back line and cutting on an angle which will just cut the line on the square part of the face side. A little practice will convince any one that a templet for cutting base is not really worth carrying around. When properly basing a chimney, fit all the joints before nailing, and then clamp all the pieces in their proper places by nailing blocks on the floor and driving in braces. One will be surprised at what a neat job can be done and how easy it is to do it. There will not be the usual difficulty in driving the nails, and cracked and mutilated chimney corners will not bear evidence of a bad job of basing around them. The great difficulty of driving nails into the bricks is largely overcome by having the work clamped tightly against it.

The Vanderbilt Bronze Doors.

The great bronze doors for the residence of William K. Vanderbilt, at Newport, designed by Richard M. Hunt, were recently completed by John Williams, whose works are at 544 to 556 West Twenty-Seventh street, this city. These doors are magnificent specimens of grille work, far surpassing anything of like character hitherto attempted in this country. It is further asserted by those who claim to be in a position to known that nothing so elaborate has been done in Europe in the last 25 years. There are really two grilles, the exterior one being of bronze and the interior of forged steel. The ornamentation of the exterior is duplicated on the interior. As these grilles form the entrance doors to the house, heavy plate glass will be placed between the bronze exterior and the forged steel interior, thus making a weather-tight door.

The plan comprises four panels, two stationary on the outside and the two next the center forming the doors. The hight from the floor to the top of the metal work is 16 feet, and the breadth over all is 25 feet 4 inches. The doors are 10 feet 8 inches high and each opens 6 feet, making a total opening of 12 feet. The chief lines in the work are vertical, thus giving an effect of greater hight. Six tons of bronze and 8 of steel were used in the construction of these grilles, but finished down to about 10 tons. The doors themselves weigh 1½ tons each, but have been so nicely poised that they can be swung with a touch of the finger. They were set on pivots, as the weight precluded the use of hinges. Notwithstanding these details as to weight, there is no sense of massiveness in the work. Even the four columns surmounted by Corinthian capitals are in open work. Each door is so designed that nearly the whole of its reverse side will be covered by a single huge plate of glass. A bronze frame to hold the glass is hinged to the door on the side near the door post. Outside of this frame is again hinged a steel duplicate of the bronze work of the door itself. When all are opened they are like the leaves of a book, but when closed the door appears as a solid structure. These doors are fitted so nicely that when closed the crack between them will admit the edge of a single leaf of writing paper, but not the thickness of two leaves. When put permanently in place, however, they will not be set so close together.

As before stated, the chief lines of the plane are vertical. Over the two doors are lions' heads with lions' skins and claws in festoons. In the center of each door are the initials "W. V.," in monogram. In the center of each side panel is a conventional child's head surrounded by rays. The top panels are elaborated with leaf work and scroll work of most artistic design. The leaf work is of a character which would only be attempted by the most skilled workmen. Designs were first made in iron, wrought by hand into the proper shape, with long, curving fronds and leaf edges waved and turned in different directions. Very thin patterns were thus secured. From these patterns the bronze castings were afterward made, which are so exquisitely turned and so delicate in appearance as to excite the admiration of art connoisseurs. The bronze front will be finished in verd-antique. The steel in the rear will receive a gun-barrel finish. Soft steel was selected for this work in place of iron in order to secure the beautiful polish of which that metal is capable. It was all forged to pattern, the workmen displaying remarkable skill in so precisely duplicating the bronze castings of the outside doors. The total cost of these grilles is about $40,000, and $10,000 more will be paid for a bronze railing and ten large candelabra to be placed along the terrace on the approaches to the doorway. This superb piece of work was executed under the special direction of H. B. Stillman, interested in the firm, who has immediate charge of the iron department.

COMPETITIVE DESIGNS from nine architects are expected to be ready soon for the magnificent building which the Manhattan Life Insurance Company propose putting up on lower Broadway, in this city. Beyond a few specifications, the architects are left entirely free. The structure is to be 16 stories high above the Broadway grade, and will be built of stone. The ground upon which it will stand has an area of 67 x 119.5 x 66 x 121.1 feet, and is at present occupied by two office buildings, one four stories and one five stories in hight. As soon as the plans have been selected the work of tearing these down will be commenced. The new building is to have as much office space as possible, consistent with due regard for wide halls and stairways and ample light. It will have four elevators. No limit has been placed upon the cost. The nine competitors are Charles W. Clinton, George B. Post, J. R. Thomas, Wood & Palmer, Babb, Cook & Willard, E. H. Kendall, S. D. Hatch, Carrere & Hasting and Kimball & Thompson. The unsuccessful ones are to be paid $500 apiece for their trouble.

CONTENTS.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
The Builders' Exchange.

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SEPTEMBER, 1892.

The Switchmen's Strike.

The outrages that have been recently committed by the striking switchmen in the vicinity of Buffalo are to be regretted and deplored, not only on account of the needless destruction of valuable property, but because of the handicap that is thus put upon the efforts of organized labor to benefit itself in legitimate channels. Such action as that of the switchmen in question prejudices every thinking person in the country against them, and the prejudice is in turn reflected to all organizations of workmen. The cause of organized labor is seriously injured by all such outbreaks, for every employer feels insecure and is impelled to regard the unions with increasing distrust and antipathy, instead of finding in and through them a medium for rational adjustment of the labor problem. He feels that his property is in danger of being destroyed, and, as a very natural consequence, he uses every means in his power to lessen the danger to his property by endeavoring to break up the organizations of labor. It is not a correct deduction that organization of workmen can accomplish more by force than by persuasion or arbitration. Temporary advantages may be gained by either side through force, but the gain is only temporary and the defeated side is simply biding its time for another attack. Popular opinion has very much to do with the success or failure of any undertaking by associated bodies of people, and by no such methods as have been adopted by the striking switchmen can popular favor be secured to the cause of organized labor.

History and Art.

We are indebted to Franklin W. Smith, Saratoga, N. Y., widely known to many art lovers by reason of his reproduction of a Pompeian house at Saratoga, for a copy of the design and prospectus of a National Gallery of History and Art. This publication is in advocacy of a national educational institution, in which art shall attract by beauty and illumination, thus stimulating inquiry, and, by actuality of environment of historical incidents in their order, impress and intensify memory. The book is a quarto of upward of 100 pages, handsomely illustrated by engravings, many of them half tones, and is devoted, first to the design, second to a bird's-eye-view of Washington, showing where the national gallery might be located, and third, to a map of Washington, also indicating the location of the proposed gallery. Then follows the introduction, in which incidentally the Pompeian house at Saratoga Springs is described. Next is a chapter entitled "The National Gallery a National Necessity," and then follows some accounts of foreign museums and galleries. The description of the design and plan for the American National Gallery next occupies a number of pages. Then ancient and modern concrete are compared with reference to the material to be used in the construction of the National Gallery. Other portions of the book relate to galleries that are to be provided in the museum, all illustrated by judicious selections from the art treasures of the period, including Moorish courts, Gothic courts, Roman courts, coins, armor, furniture, &c., and then follows an outline of appropriate lectures. The propaganda for the National Gallery takes the form of an appendix. Single copies of the book are sold at 50 cents, and in large quantities they can be obtained for much less, ready to mail. In the appendix there is also shown the appearance of the site in Washington as it is at present in contrast to what would be the appearance of the same space devoted to this gallery. The modest sum of $10,000,000 is estimated to be required for the purpose of establishing and maintaining this institution. Mr. Smith contemplates a preliminary gift from some munificent patriot of $1,000,000, hopefully followed by a series of private subscriptions. He proposes that a gift of $100,000 shall constitute a "founder," one of $1000 a "benefactor," and one of $100 a "patron." This preliminary secured, Congress will be asked to aid the gift, chiefly in the condemnation of the site of land, the greater part of which is now in the possession of the Government.

Code of Practice.

Frequent complications arise among contractors, and between them and architects, over the awarding of contracts and the treatment of bids. The principal reason why these complications occur is because of the lack of a clearly defined rule in relation to the way in which bids are submitted and the manner in which they should be treated while in the hands of the architect. In every city some more or less elastic practice prevails in this regard, but it is so indistinct and ill defined that its conditions are not binding upon either side. The contracting business would be very greatly benefited by the establishment of some rule or code of practice, which should be thoroughly understood by every builder and any infringement of which should be considered dishonorable. The main trouble lies in the fact that through the lack of definiteness no one knows just exactly where the lines are drawn, and those who are inclined to indulge in sharp practice are afforded plenty of latitude in which to justify themselves.

The Code Suggested.

The National Association of Builders in 1890 formulated and recommended to all its filial bodies a code of practice to govern the submission of estimates and the treatment of estimates after they had passed out of the hands of the bidder. This code has been adopted by many of the exchanges with success, and it has also been used as the foundation of a number of codes that have been adopted by exchanges desiring to incorporate the various features of the form into language of their own. The adoption of a well-defined code of practice by the members of a builders' exchange has invariably resulted in benefit to the entire building fraternity.

The Herald Building.

The magnificent structure which it is proposed to erect on the block of ground bounded by Broadway, Sixth avenue, Thirty-fifth and Thirty-sixth streets, New York City, for occupancy by the *Herald* newspaper, is likely to be one of the architectural ornaments of the metropolis. The new building will have a frontage of 212 feet on Broadway, while its dimensions on the other three sides will be 198, 187 and 61 feet respectively. The style of architecture will be pure Italian renaissance, and the structure will resemble in some considerable part the Palace of the Counsels of Verona, with reminiscences of the palaces of Padua and Venice. The arcades, of finely formed columns of polished granite, will constitute an attractive feature of the edifice. The rest of the *façades* will be of artificial stone richly embellished with marbles. The front of the building facing the square will be crowned with an enormous clock with bells in distinct tones, similar to those in the clock tower of the Plaza San Maria of Venice. On both sides of the bell will be two gigantic figures representing typesetters with maces with which to strike the hours, halves and quarters. In the cornices there will be large statues of Minerva at and near the corners, and owls at all other points. The eyes of the owls will each contain an electric light, visible and invisible at intervals. The main entrance to the offices will be from the *façade* on Thirty-fifth street, through a deeply recessed porch into the counting room, which will be very large and rich in marbles and metal work. The basement will contain the engine room, machine shop, boiler room, &c., and here also will be the foundation of the pressroom, which will extend in hight to the second story. The second floor will contain various offices and departments, while the third or top floor will be occupied by the composing and art departments. The building will be entirely of solid masonry and iron work, and as will be seen from the above description, is low in its appearance, the hight to the eaves being only 42 feet and to the crown of the pitched tile roof only 54 feet. It will be constructed from drawings prepared by the well-known architects, Messrs. McKim, Meade & White of New York City. The building will be occupied by the *Herald* only, thus differing from the structures erected by its contemporaries.

St. Louis Buildings.

From present indications St. Louis is likely to have in course of erection in the not very distant future a multitude of imposing edifices, which will add in no small degree to the architecture of the city. The plans for a number of buildings have been completed, among the largest and finest called for being that of the Union Trust Building, which will have a frontage of 84 feet on Seventh street and a depth of 146 feet on Oliver street. It will be 16 stories in hight, and cost nearly $1,000,000. Another magnificent structure will be the Patterson Building, covering an area of 120 feet square, and which will tower upward ten stories. The total cost of this building will probably be about $250,000. A 12-story structure, 103 x 106 feet in size, to be constructed of natural granite on a steel frame work, is about to be put up on Ninth and Pine streets at a cost of about $450,000. The Martin wholesale office building, to be constructed of red granite and brick, with copper trimmings, will cover an area of 127 x 216 feet, and cost about $1,000,000. Other large buildings, for the erection of which preparations are being made, is a 12-story structure, 98 x 111 feet, to cost $600,000; the New Planter's House, which will probably be one of the largest hotels west of the Mississippi, and cost $1,000,000, while the building to be put up on the corner of Eleventh and Washington avenues will be 114 x 137 feet in size and eight stories in hight, and cost several hundred thousand dollars. In addition to these will be many others for which the plans have been drawn and the sites selected.

Rock Ashlar for Dwellings.

One of the English papers, commenting on the front of a Chicago residence, recently illustrated in one of the Western architectural papers, says: "As in many other buildings in American cities, rock ashlar is largely used in the exterior, and the dressings of marble or other fine stone have produced the most effective contrast. The roughness of so large a part undoubtedly aids in imparting a sense of strength, and one feels that such a house as represented is made to endure for centuries." After thus recklessly complimenting the American style, the writer seems to recover himself, and accordingly hastens to explain why equally pretty work is not done in England. We quote again: "In England the same arrangement of masonry could not be adopted with as much success, for the best masonry is associated with engineering works, and only as rustication has it been used for the lower parts of buildings. So much soot is attracted by the rough surface it is not considered judicious to use it." Here is a back-handed slap at America. Some of our citizens are living in houses having the architectural appearance of masonry usually associated with engineering works, and after all such work is not very clean in a sooty atmosphere, and therefore Englishmen do not like it. This is a fair sample of English criticism of things American, however hard it may be on the smoky city of Chicago.

The Mason Builders of Boston.

BY WILLIAM H. SAYWARD.

The relationship between the employing masons and the bricklayers and journeymen stone masons in Boston affords one of the best examples in existence of the value of arbitration as advocated by the National Association of Builders. Since the establishment of the joint committee the relation between the employers and workmen has been one of perfect harmony. Various questions upon which the two differed have arisen from time to time, and have at once been referred to the joint committee for settlement. The action of the committee has been attended by the utmost deference and courtesy on both sides, and its decisions have been accepted by both sides without question. The importance of joint action at a time when both sides are desirous of securing only justice, and before the two sides have become embittered by struggle, cannot be overestimated. Questions of difference can under such circumstances be considered dispassionately and without that feeling of animosity which is bound to exist where the difference is allowed to create a strike or lockout. The mason business in Boston has never been in such good condition as it is at present, so far as the relation of the employer to the workman is concerned, and each day demonstrates more fully the value of the existence of the joint committee, which is virtually a board of reference composed of equal numbers from each side, with full power to decide all points at issue without cessation of work from any cause. The principal reason why arbitration is not more often effectual in the settlement of difficulties between employers and workmen is because it is not proposed until after a long struggle, and then only as a means for ending the fight. At such a time the mental attitude of each side is one of strong antagonism to the other, and it is more than likely that the side which considers itself the strongest would refuse arbitration in the hope of winning unconditionally. Arbitration to be effective must be instituted as a preventive instead of as the last resort for a settlement. The principle is the same under all conditions, but human nature is such that its use under one condition would be perfectly satisfactory and successful, and under the other it would be useless except for the most temporary purposes.

The Contractor and the Architect.

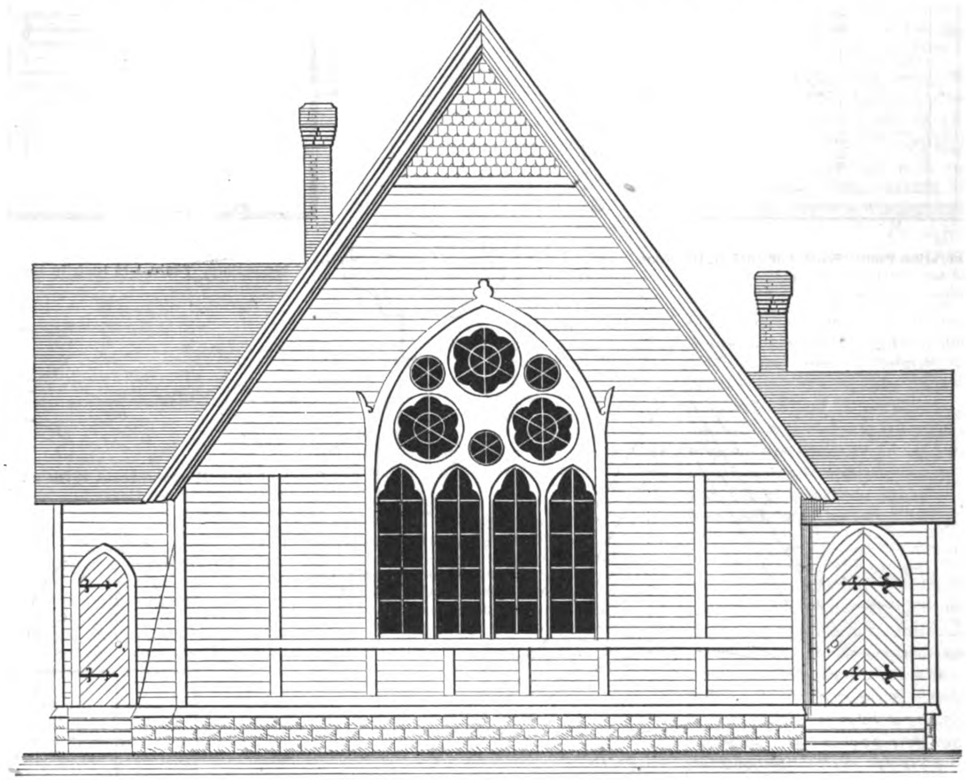
Among the many features of the building business susceptible of improvement is one which affects the builder in the execution of a contract under the existing practices or methods of competition. It is customary for a contractor to sign a contract agreeing to erect a building according to certain specifications and drawings, to supply all materials and perform all work incident thereto, whether or not it is mentioned in the specifications or shown on the drawings; the architect to be the sole judge as to what is incident to the completion of the building. The fact that such a clause exists in a contract, granting that the architect intends to be perfectly fair in all cases, makes the agreement unjust, as it places in the hands of one party the power to require of the other an unknown quantity of labor, or material, or both. The architect may maintain with much force that certain things are incident to the completion of the building, while the contractor maintains the reverse with equal force, and apparently with justice: yet the contractor is expected to accept the decision of the architect as final. The contractor is asked to accept as final an interpretation by the architect which he was unable or unwilling to give the contractor at the time he presented his specifications and drawings and asked for estimates of the cost of the building. In no other business does such a condition of affairs exist, where one party to an agreement consents to do a certain thing for a certain sum of money and at the same time gives the other party power to make such interpretation of the work incident thereto as he sees fit; and this, too, after the cost has been based upon certain definite descriptions and certain definite drawings. As Colonel McAllister of Cleveland, then president of the National Association of Builders, aptly put it at the sixth convention of that association: "If a contractor agrees to build a church he also agrees to build a steeple, although none is specified, for no church is complete without a steeple." The bone of contention lies in the fact that there is opportunity for such an interpretation of the specifications and drawings, that the contractor may be forced to do much more than the interpretation given to him at the time the specifications and drawings were submitted for estimate would demand. As it seems at present to be an impossibility to secure specifications and drawings which are sufficiently complete to cover the entire construction there is need for the establishment of some method whereby the contractor may be assured full equity in the premises. Where there is necessity for interpretation of the specifications and drawings the contractor should not be forced to accept any interpretation without appeal

BOARD OF REFERENCE.

A board of reference might be provided in order that when questions of interpretation arise upon which the contractor and the architect do not agree they can be referred to an entirely disinterested and impartial tribunal for final settlement. When a contract is signed provision could be made for the appointment of two members of such a board of reference: one by the owner or architect and one by the contractor, these two to choose a third; and to this board all questions of dispute between the contractor and the architect to be referred for final settlement. This board need not be active, except in cases where the contractor and the architect cannot agree, and an equitable adjustment of the expense of calling it into action could be arranged in the terms of the contract. Such a board would prevent many complications which now arise, and would present an entirely fair and just means, which would be always at hand, for the settlement of all possible contingencies that might arise out of misinterpretation of what might be considered incident to the completion of the building by the architect and not by the contractor. The appointment of such a board would be comparatively little trouble, and the end gained would simplify the execution of a contract immeasurably. The existence of such a means of settlement need not delay progress of work, for it could be provided that the architect's interpretation could be carried out and the adjustment of the same as to additional allowance to the contractor be matter for adjudication by the board of reference. The present custom in regard to the interpretation of specifications and drawings is manifestly unfair, notwithstanding the fact that many buildings are erected without serious difference between the contractor and the architect, as it allows the contractor no voice in the settlement of questions that are of vital pecuniary importance to him. Contractors have always submitted to a large amount of injustice in the demands made upon them, but there is no good reason whey they should continue to suffer.

DESIGN FOR AN EPISCOPAL CHAPEL.

THE ENGRAVINGS which we present herewith illustrate the Calvary Protestant Epispocal Chapel, now being rapidly completed at Shenandoah, Va., from drawings prepared by H. N. Sims, C. E., of that place. In the course of construction certain changes were made in regard to the front elevation of the chapel. Instead of leaving the entrance at the right, as shown, the large central window was omitted and double doors substituted. From the architect's specifications we learn that the piers for supporting the main girder are capped with 2 x 8 inch plank, laid lengthwise of the building. The girder is 6 x 10 inches pine, while the sills are 4 x 6 inches set in mortar, halved and spiked together at the corners and midway between the main trestles. The floor joists are 2 x 12 inches set 16 inches between centers, and bridged with two rows of diagonal bridging, one row between each wall and the girder. The studs are 2 x 6 inches, set 16 inches between centers, and doubled at all corners and openings. The plates are 4 x 6 inches and the rafters 2 x 8 inches, set 2 feet between centers. The studding is covered with clapboards laid 4½ inches to the weather upon a good quality of sheeting paper. The upper portion of the front gable is covered with pine shingles 6 inches wide and laid 5½ inches to the weather. The corner boards, paneling and outside casings for doors and windows are 1¼ x 6 inches. All flashings, &c., were painted on both sides with one coat of metallic paint before laying. The flooring is of narrow ⅞ inch white pine tongued and grooved boards, blind nailed. The glass employed is what is known as the first quality "single thick" American. All the doors are white pine, the exterior ones having on the outside wrought-iron false hinges, a detail of which is shown in the illustrations presented herewith. The doors from the vestibule into the auditorium are double. The walls of the auditorium are wainscoted to a hight of 3 feet 6 inches with yellow pine. The vestry has a ceiling 9 feet in hight. The wood work exposed to the interior of the building is machine dressed and all timbers 2 inches or more in thickness are chamfered to within 6 inches of their connection with other timbers. The trusses are of frame, as indicated in the illustration. The interior walls are plastered and finished with what is known as "sand finish." The exterior wood work is covered with three coats of paint, while the shingling on the gable is stained with Cabot's creosote stain. All interior work has two coats of strong spirit shellac. The contract price of the structure was $1650, but the total cost will probably approximate $2000. It is intended to be heated with stoves, although the architect suggests that a preferable method would be to place a furnace under the chancel and heat the building with hot air, steam or hot water.



Design for an Episcopal Chapel, H. N. Sims, Architect, Shenandoah, Va.—Front Elevation.—Scale, ⅛ inch to the Foot.

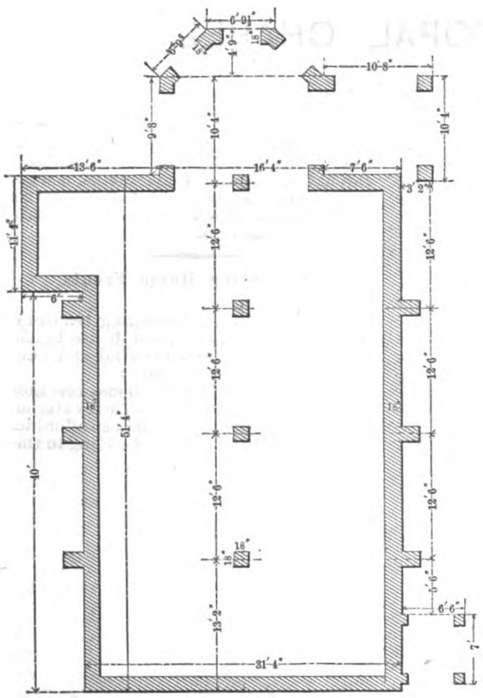
A California Flume.

The flume which conveys the water from the mountains to the reservoir at San Diego, Cal., is said to be the largest and longest thing of the kind in the world. It is 35 miles long, and is composed almost wholly of redwood. In its course this monster flume crosses 315 streams and cañons on trestles, the longest of which is 1700 feet long and 85 feet high. It is known as the Los Cochos trestle. The Sweetwater trestle, the second longest, is 1200 feet long and 85 feet high. The timbers used in them were put together on the ground and raised to their present position by horse-power. Besides its many trestles this flume passes through eight tunnels, the longest of these being 2100 feet in length. The tunnels are each 6 x 6 feet in size, with convex roofs. Building a water-tight box 35 miles long, over fathomless chasms and through the hearts of mountains, is a gigantic undertaking which many believed could never be accomplished. The result has proved different.

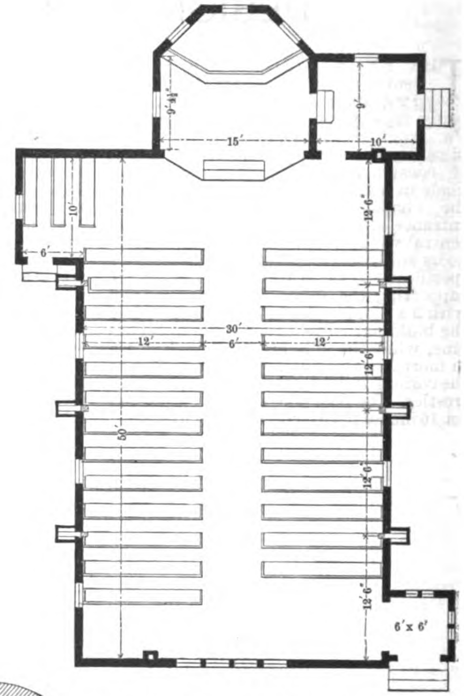
Ornamenting House Fronts.

With regard to the prevailing tendency to vary the modern styles of house building, and to secure new material and new effects, the *Brickmaker* says:

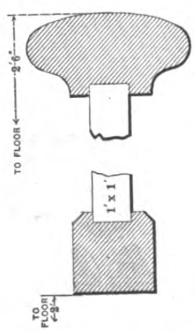
The aim of all dwelling-house erection these days is to ornament their exterior walls as highly as the builder can afford to do it, which has the effect of adding to the beauty of all such structures, as well as to highten the picturesqueness of all localities in a city where building material is used for this purpose. A late invention is that of a white brick made precisely as is the old style red brick, and as durable in all respects as the latter. The monotony of the red brick front has become of the character of an offense, and, therefore, it is not to be wondered at that so many people paint such walls all sorts of colors. When white brick are introduced it will most likely lead to the manufacture of brick of other colors—brown, in all shades, as well as red in like varieties. There is talk among some builders of introducing the white brick in Harrisburg, Pa., where the rivalry to secure ornamented house fronts has resulted in much artistic work of this kind in all parts of the city, and is destined to place the capital of Pennsylvania in the front rank of the beautiful cities of its interior. This is what can be truly called the ornate period in dwelling-house erection in all parts of the country.



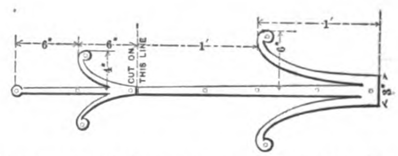
Foundation Plan.—Scale, 1-16 Inch to the Foot.



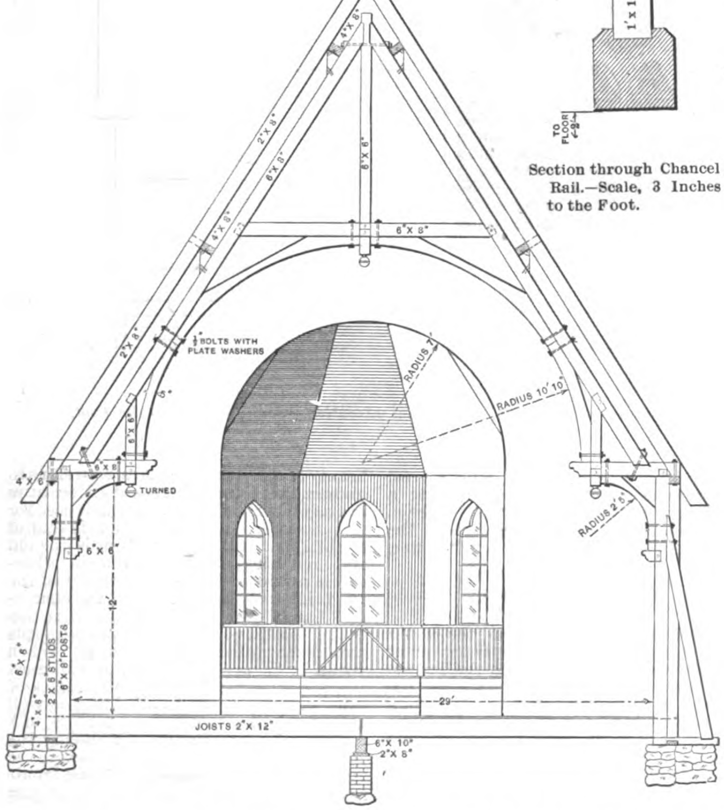
Floor Plan.—Scale, 1-16 Inch to the Foot.



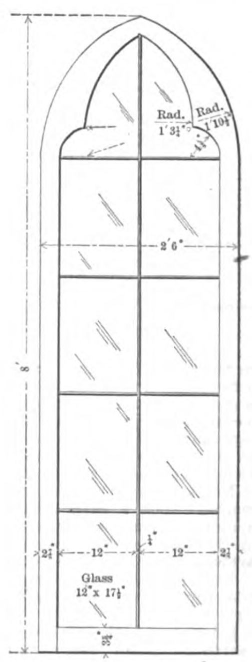
Section through Chancel Rail.—Scale, 3 Inches to the Foot.



Detail of False Hinges.—Scale, ¾ Inch to the Foot.



Elevation of Chancel and Section through Building.—Scale, ⅛ Inch to the Foot.



Side and Front Windows, those in Chancel being One Light Shorter.—Scale, ⅛ Inch to the Foot.

Plans, Elevation and Miscellaneous Details of Episcopal Chapel at Shenandoah, Va.

BLUE PAPER PRINTING.—I.

By JAMES F. HOBART.

THERE ARE SEVERAL METHODS of reproducing drawings, but the one commonly employed by draftsmen is known as the "blue process," and technically known as the "Cyanotype." The paper when prepared for making blue prints, is also called "Ferro-prussiate" paper. Any close-grained, well-sized paper may be employed for making blue prints, the only requirement being that the paper shall be waterproof enough to stand the coating and washing processes. Whattman's drawing paper is the best foundation, but it is expensive, and paper similar to that on which this is printed will answer for all ordinary blue paper jobs. The chemicals required will be a bottle of red prussiate of potash (ferrocianide) and another bottle of the ammonia citrate of iron. The ordinary citrate of iron will not answer, because it is not soluble in water, while the ammonia citrate is very soluble and even attracts moisture from the atmosphere, if the bottle containing the chemical be left uncorked; therefore, it should be kept tightly closed all the time. Sometimes the bottle comes marked "Ammonia citrate of Iron," and again it will be "Citrate of Iron and Ammonia." It makes no difference which term is used; both mean the same thing.

It will be well to get the druggist to weigh out 10 drams of the potash, and also 15 drams of the iron. Put each in separate bottles, and when it is desired to make up some blue paper, there is enough of each salt to mix separately with 4 ounces of water. But this amount of solution would cover a great many sheets of paper; therefore, it would be better to take only a small quantity at a time, and not mix up any more than is immediately to be used, for it does not keep well.

SENSITIZING.

Indeed, when only one or two sheets of paper are to be sensitized, it is the writer's practice to take up a little of each chemical on the point of a pocket knife, drop it into a teacup, and stir in a couple of teaspoonfuls of water. Then with a brush, which is always kept for this purpose, the solution is spread over one surface of the paper, and immediately hung away in the dark to dry. The drying operation may take from ten minutes to as many hours, according to the dampness of the place where the paper is hung and the humidity of the air. If it be necessary to use the paper immediately, it can be dried in an oven or by holding close to a steam pipe, but care should be taken that the paper is not exposed to considerable heat, as the paper will be colored by this as quickly as by sunlight.

There is some danger of exposing the print to sunlight too long, but a little over exposure is better than under exposure, for continued washing will take out a good deal of the blue, and leave the lines white, as they should be, but no amount of manipulation will save a print which is under printed—that is spoiled from the word "go"—and it will not pay to bother with it.

EXPOSING.

An ordinary printing frame—the same as is used for making photographs—is the best thing for exposing the paper. Put the tracing or drawing next to the glass; then put in the piece of prepared paper, with the prepared side next to the drawing, which should be placed ink side out, and its back against the paper if a copy is desired which is not reversed. As stated, the printing frame is the best, especially for small work; but when prints three or four feet long have to be made some other means must be used for holding them during exposure, and a heavy pane of plate glass is usually used for this purpose. It answers well for making the exposure, but there is no way of telling when the print is done, as the paper cannot be exposed and looked at as when a printing frame is used; therefore it is necessary to put a small bit of the sensitive paper under the drawing on which the paper is made in such a position that it will not interfere with the print that is being made. This piece, or several of them, will serve as test pieces, and they may be pulled out occasionally to see when they are sufficiently "cooked."

PRINTING.

The printing should be carried to a point where the paper appears of a dull gray color, except where the lines are. These should be of a very light bluish-green color when the paper has been exposed to sunlight long enough. Then the paper should be removed from the frame and put into clean water. The color immediately begins to wash out, and all the parts which were protected from the sunlight by the ink lines become white, while the parts of the paper which had received the sunlight become a deep fine blue. In other words, the water dissolves out all the excess of the reagents used in the preparation of the paper, the action of the sun serving to "set" the color whenever they were exposed to its action.

The method here described yields a fine white line on a deep blue ground, and the next paper will tell how to get a blue line on a white ground, which is more pleasing to the eye.

(To be continued.)

Restoring an Old Virginia Church.

A rather unique specimen of church architecture is the structure now in progress of restoration at Smithfield, Va., the building being one of the oldest church edifices in this country. It was built of brick in the early part of the seventeenth century, and has a massive Norman tower, 50 feet in hight, at the western end. The walls of the tower are nearly 3 feet in thickness at the base, tapering slightly toward the top. That it was built in 1632 is proved by written records and well-sustained tradition, and if any doubts exist they are dispelled by the bricks, many of which bear that date. The tower overshadows the less pretentious nave, which suggests many of the parish churches in England.

The church, says a recent issue of the *Sun*, is surrounded by a grove of sycamores, walnuts and oaks. The entrance is through a low arched door, the masonry denoting the prison rather than the sanctuary. On either side are portholes. The interior of the edifice is not spacious, the dimensions being 62 x 26 feet. The tower is nearly 20 feet square. The orientation is perfect, the sun rising directly on the great chancel window, 18 x 12 feet, and composed of 17 separate windows divided by brick mullions. Twelve of these windows under the restoration are memorials of Washington, General Robert E. Lee (given by his eldest son); Captain Bridger, who built the church, Parson Hubard, its last colonial rector; Parson Blair, founder of William and Mary College; the four deceased bishops of Virginia—Madison, Moore, Meade and Johns—and Sir Walter Raleigh, John Rolfe and Capt. John Smith, settlers of Virginia. The nave has eight memorial windows, four on a side. The principal one is in memory of Pocahontas, given by her descendants; another is of Parson Whittaker, who married her to Rolfe, and another is in memory of Parson Hunt, the first missionary who came with Smith. Five of the others are to the memory of local parishoners, and the last, a beautiful English window, was donated by Brinton Coxe of Philadelphia in honor of the Society for the Propagation of the Gospel in Foreign Parts. The vestry room is in the second story of the tower, and is lighted by three double-lancet stained glass windows, all being memorials of local celebrities. The pulpit and sounding board and the heavy oaken communion table, elaborately carved, are memorials donated by the descendants of early parishioners now living in Maryland and Pennsylvania.

The church was in use as a house of worship for 204 years, or until 1836, when it was abandoned owing to lack of a congregation. During the intervening years the relic hunter was actively at work, and whole sections of the interior, including parts of the gallery, disappeared. The walls withstood the elements. In 1887 the work of restoration was begun by the Rev. David Barr, now senior assistant rector of the Church of the Epiphany at Washington, and to his zeal is due the churchly and artistic interior. Contributions toward the restoration have come from 21 States and the District of Columbia; from people of all denominations, besides prominent Episcopalians. Many colored people have sent contributions.

The new chancel rail is to be made of the oak frame of the orignal top, which fell in 1887. One of the most interesting features in the work of restoration was the incorporation in the walls of more than 2000 bricks remaining from another colonial church 9 miles up the James River, which was destroyed many years ago. The two churches were for years before the Revolution under the care of the same rector, living then near Smithfield. The work of restoration is being pushed forward by Mr. Barr, who, since his removal to Washington, has continued in charge by request of the vestry, and the completed edifice may be ready for worship this summer.

ACCORDING TO THE PROSPECTUS of the Metropolitan Museum of Art, it is the purpose of the trustees to arrange for the fall and winter course of 1892-93 for public lectures upon the various branches of art illustrated by their collections, and to organize special classes of artists and artisans for the study of special classes of objects. Among the features which, according to the prospectus recently issued, are promised for this year, are classes in drawing, painting, modeling and architectural drawing. We understand that it is the object of the class in the latter branch to give attention in architectural draftsmanship, so as to fit students either to enter offices as draftsmen, or to pursue to advantage more advanced courses of study, either in architecture or in decorative arts. The use of the pencil, brush and drawing pen will be taught; and the rendering of plans and elevations, as well as of details both of construction and of ornament. Such technical instruction will be given in projection, in shades and shadows in perspective and architectural detail as is necessary for an intelligent performance of this work. The class will make sketches and drawings from the casts in the museum. We understand that, so far as it goes, this work will be the same as the course of architecture in the School of Mines at Columbia College. Still another feature promised for this year is an arrangement with Columbia College by which students in the Museum may attend lectures on fine arts given by that college.

THERE IS A CHURCH in the town of Bergen, Norway, that is built entirely of paper. It can seat 1000 persons in comfort, and has been rendered waterproof by a solution of quicklime, curdled milk and white of eggs.

CIRCLE ON CIRCLE.

IN OUR AUGUST ISSUE, we presented a part of a demonstration by J. V. H. Secor of a problem coming under this title. At the present time we continue Mr. Secor's work, giving the remainder of his diagrams, and showing how the model was built, demonstrating the correctness of his conclusions.

Let *a a*, Fig. 6, be the thickness for the staves or covering of the center and placed against the side of the opening. Mark the inner line of rib, as at 3–4, and thickness, 1–2. Draw the face of the angular rib, as shown at 5–6 and 6–7; let the staves project 2* inches outside of the wall line and the same over the inner rib. From 6 draw 8–9 at right angles to the rib.

From 3 and 7, Fig. 7, as the inner and outer face of the ribs erect perpendiculars, as X and XI; from 8 as center describe the line of arch XI, *o*, *c*; from B, the center of the inner arch, draw the curve. This rib is shown in position with the line of the staves. The outer rib I have purposely omitted in this view. In building centers for arches that are to be lined with wooden jambs, it is well to make the ribs small enough to admit of two thicknesses of staves, the first course put on nicely and dressed off; the top can be common stuff; these can be cut to the wall line. The object of this is to save time, as the outer covering can be taken off and the form will be ready for use in the shop. Let one or two of the center staves be long enough to reach the center, so that a nail may be driven into line from in cleaning or dressing the face; this is shown at *d*, Fig. 6, and A, Fig. 11.

To prepare the quarter arch from which to develop the angular rib, Fig. 9, let *c d*, Fig. 8, be the length of the rib 5–6; at random points in the arch, as at 9, 10, 11, 12, 13, 14 and 15, drop perpendiculars cutting the incline at 1, 2, 3, 4, 5, 6, 7. From 9, 10, 11, 12, and so on, draw horizontal lines indefinitely. Draw *e*, *f*, XII, Fig. 9, from *f* erect the perpendicular *f g*; now, with a strip of wood or paper placed along the incline line mark the spaces from 1 to 7, and transfer them to *g h i j k l* and *m*, and erect perpendiculars cutting the horizontal lines at X *v u m p y z*; and through the intersections trace the curve. Let *e t* be straight wood below the spring line. As these ribs are ellipse in curve, they may be drawn with trammel or string: A A are the foci. Take 8, 9, at Fig. 6, to make the miter, and apply on each side of the center *f*, as shown by the dotted lines, also at *t t*, to bevel the edge of the rib; this will die out at the summit. Cut and bevel the joint and nail together, as shown in plan, Fig. 6. The recess S is made for a stud, as shown at D, Fig. 11.

Let A H I B, Fig 10, be the foot, E L the spring line, K the center, R the tie piece; the dotted lines C and D are the lines to bevel the edge; nail together as shown.

Fig. 11 shows the center constructed and in place as viewed nearly at right angles to the center, A B the summit, A C the spring line, D the stud set bracing, E F inside line of staves. In brick work there should be a timber laid in the wall crossing the opening a few inches below the chord or spring line to support the ends or foot. If in stone, then studs must be used.

At the time he presented his demonstration of the problem, we asked Mr. Secor if he would furnish us with a wooden model showing the manner in which the various parts were constructed. This he readily consented to do, and in Figs. 12 to 16 we show the model complete in every particular. The engravings here presented were made directly from photographs of the model, and while faithfully representing it in all its details, the reader should bear in mind that the illustrations do not indicate full-size work actually executed in building construction, although the correspondence in parts is very close.

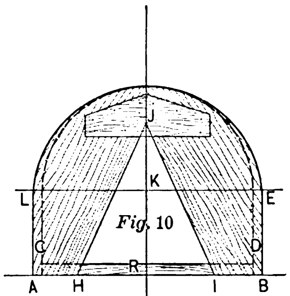


Fig. 10

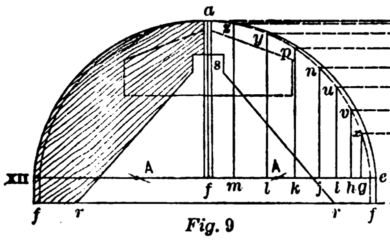


Fig. 9

Fig. 9.—Diagonal Rib as traced through perpendicular and horizontal intersections.

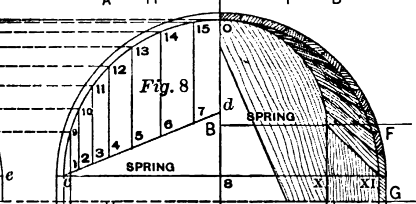


Fig. 8

Fig. 7

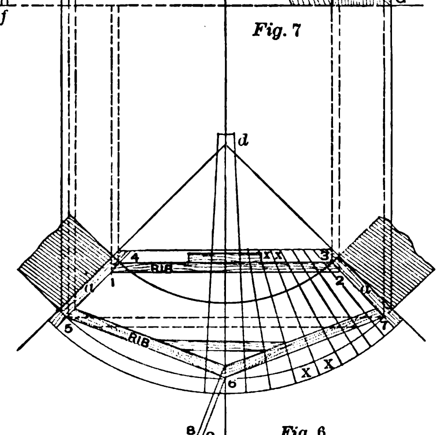


Fig. 6.

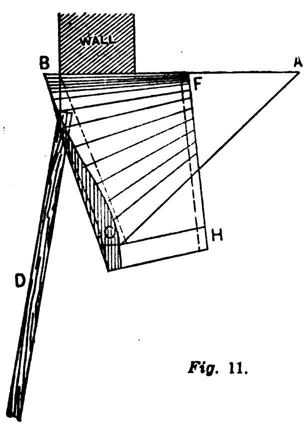


Fig. 11.

Fig. 11.—Side view of the center as constructed.

Fig. 6—Plan of Drum on which to build the Arch.

Fig. 7.—One-half of Arch with center in place, showing the inside Rib and Staves.

Fig. 8.—Elevation of outside Arch and its divisions from which to draw the diagonal Rib.

Fig. 10—Construction of the inner Arch.

Circle on Circle.—Diagrams Accompanying Demonstration by Mr. Secor.

* This is for the purpose of clamping if the center is used in bending the soffit.

How Theaters Should be Constructed.

At a recent meeting of the Franklin Institute, Philadelphia, C. J. Hexamer read a paper on the subject of "The construction and interior arrangement of buildings designed to be used as theaters," which he illustrated with diagrams and pictures of some of the local theater buildings. Among other things he said:

Ten years ago I read a communication before the institute on "The prevention of fires in theaters," which was general, applying to the theaters of our country. I have been called upon by your Committee on Meetings to say a few words on the same subject to-night, but more specifically in regard to local conditions. My remarks ten years ago seemed of sufficient importance to secure the appointment of a special committee, with myself as chairman, to investigate and suggest better features in our American theaters. Although not as much good as we had anticipated resulted from our labors, we at least had the satisfaction of knowing that many of our suggestions were adopted in the rating schedules of underwriters. Some, which had been described as impractical by stage carpenters, have been introduced and are now in daily use in a number of places of amusement.

SOME SUGGESTIONS.

Allow me to rapidly make a few suggestions which are no longer novel, recapitulating much that I have said on former occasions, before proceeding to what is new and of local importance. A theatre should consist of four separate and distinct buildings, like the Park Theatre, separated by substantial brick walls rising above the roofs, all communications to be cut off by the best-known fire-resisting means. 1. There should be a fire-proof auditorium, like a fire-proof office building. 2. A stage building. 3. A fire-proof building for dressing rooms. &c. And 4. A fire-proof storage room for scenery, properties, &c., with fire-proof doors. The proscenium wall should rise well above the roofs of all the buildings, with an iron girder covered by a good non-conductor, relieved by an arch. The wall should be cut to the stage floor, as in the Academy of Music, and the curtain should be of pure asbetos, with an interior network of strong, woven, pliable wire to give it tensile strength, and sliding in iron grooves on both sides of the stage, securely bolted into the masonry of the proscenium wall.

All the four buildings should be provided with large, separate exits to the open air. Every part of the auditorium should have separate exits, and never should the exit of one part be allowed to discharge into that of another. All corridors should increase in width from the theater to the open air. All extra exits (fire corridors) should be marked as such in large, bold letters; should be lighted by oil lamps (not petroleum products; sperm or lard oil is recommended), and should be unbarred from the opening of the theater until it is closed. Before the close of every performance they should be opened, so that the extra exits may become known to the public. All doors should open outward (which is still neglected in many concert-club halls). Long rows of seats should not be permitted. Rows should be cut by aisles at short intervals. Movable seats should not be allowed. Seats should be tightly screwed to the floor. Fixed chairs with a spring attachment, which throws back the seats when not occupied, are strongly recommended.

No scenery, properties, materials or impediments of any description should be allowed to remain in the corridors. The fire-proof drop curtain should be kept down at all times except during rehearsals and performances, after which it should be immediately let down, and not raised until a few minutes before the beginning of the next performance. The lowering apparatus should be so arranged that the curtain will be lowered automatically in case of fire. Doors in fire walls should have stone sills, tin lined on both sides, constructed according to the underwriters' specifications, without springs or latches, so they can readily be opened. Incandescent electric lights should be used throughout, and all others should be prohibited on a stage. The system of lighting the stage should be separated from that of lighting the auditorium; each should have a distinct circuit. The system should be installed under the direction of the electric-light inspector of the Fire Underwriters' Association, and an ordinance should prohibit the use of lights until so approved and the certificate of approval has been issued. Where electricity is generated in the theater the boilers, engine and dynamo should not be located in the stage building, and lights in stairways should receive their currents from outside independent sources. A large reservoir, the bottom at least 10 feet above the highest sprinkler, holding at least 5000 gallons, should be introduced, always full of water, connecting with the stand pipes and not allowed to freeze.

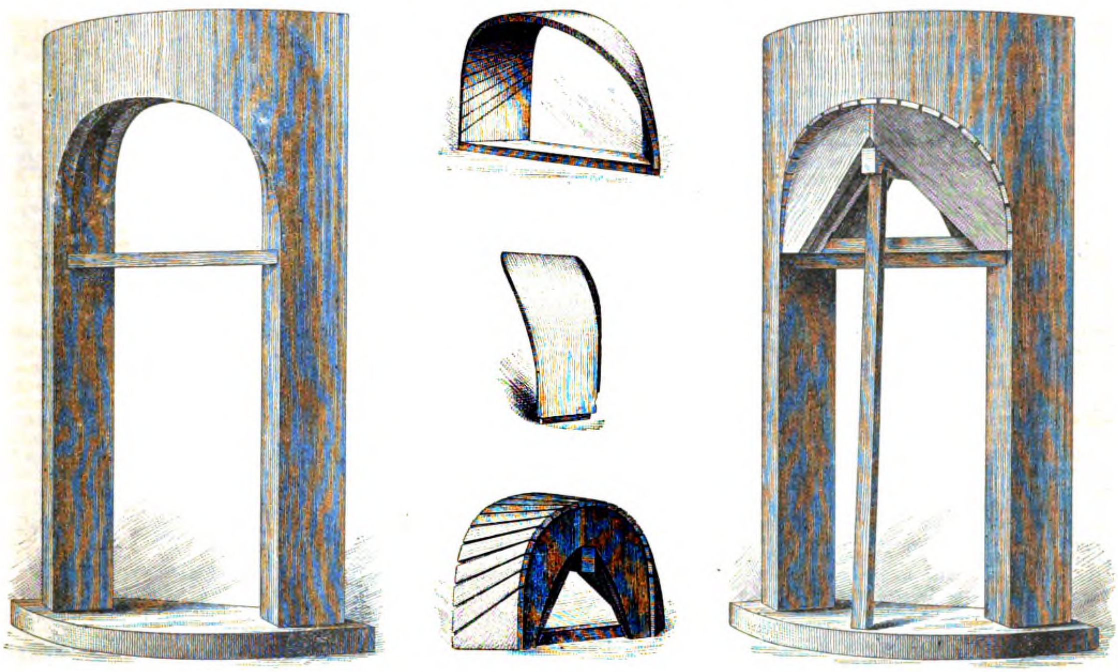
FIRE EXTINGUISHING APPARATUS.

Every theater should be supplied with a sufficient number of fire hydrants, with hose and nozzles attached ready for instant use and not removable, connected with the tank. The stage and workshops should be fully equipped with an approved system of automatic sprinklers, connected with two supplies, an approved pump and tank, both of which should be located outside of the stage building. A sufficient number of fire buckets (used in case of fire only), kept always filled, should be distributed conspicuously over the premises. Every theater should be connected with the nearest fire station by electric alarms in the office and on the stage, the latter to be further thoroughly equipped with automatic alarms. Steam or hot water should be exclusively employed for heating. A large smoke flue should be provided above the stage. Automatic devices are recommended. That the public itself may have control in this matter, a complaint book should be laid open to the public in every theater, where any individual may enter faults of construction or arrangement which he has noticed. This book should not be the property of the proprietor of the theater, but should belong to the "theater inspector," the fire marshal and building inspectors. The workshops and paint loft should be outside of the stage building.

SAFETY PRECAUTIONS.

We all know by experience that any matter which devolves on a number of persons, especially when their time is fully occupied by other duties, is done badly or not at all. As the old adage has it, "Everybody's business is nobody's business;" therefore, in order to keep control of the various theaters, a theater inspector should be appointed who should have full power to enter a theater at any moment, and whose duty it should be to see that these or other suggestions, made law by ordinance of councils or an act of the legislature, are faithfully carried out, test fire appliances and once a month make a report on each theater. These reports are to be kept on file, and can be used as evidence against managers or against the inspector, should he become derelict in his duties.

The only way in which theaters can be made safe is to place them fronting broad streets not less than 60 feet wide, with wide open spaces on both sides not less than 20 feet—30 would be better—in width. Then fire escapes which are what the name implies can be erected, not arrangements the descent of which tests the skill of an acrobat in broad daylight. I believe we have the right to require of our legislators that they prohibit the erection of additional fire traps. But what shall we do with our present theaters? Force the owners to make them as safe as possible by ordinances or acts of legislature, and let the city condemn the requisite adjoining properties, buy them, tear them down, and place breathing spaces on sides which are now without outlets.



Figs. 12-16.—Various views of Wooden Model illustrating Circular Arch in Circular Wall.

Circle on Circle.—Photo-Reproductions of Model as prepared by Mr. Secor.

NEW PUBLICATIONS.

PRACTICAL CARRIAGE BUILDING. Volume II. Compiled by M. T. Richardson. 280 pages; illustrated with 283 engravings; bound in cloth covers. Published by M. T. Richardson Company. Price, $1.

This work consists of a collection of articles compiled from those contributed to the columns of the *Blacksmith and Wheelwright* during the past few years, and covering the entire range of the art of carriage building from the planning of a vehicle to its completion. It begins with information concerning axles, and considers in detail the plumbing of spokes, gather of wheels, making of yokes and whiffletrees, laying off a fore carriage, gives attention to special tools, the making of ovals, blocking corners, making and laying off patterns and the drawing of tools. Complete instructions are also presented with regard to the laying off and framing of carriage bodies, the construction of carriage parts and wheels, as well as of light and heavy sleighs. As stated above, the volume is profusely illustrated with well executed engravings and is printed and bound uniform with the first volume.

GALVANIZED IRON BUILDING FRONTS.

TWO INTERESTING EXAMPLES of the use of sheet metal in building construction are presented in the accompanying illustrations, which show elevations and sections of building fronts composed entirely of galvanized iron. This work was recently executed in Jersey City, N. J., by Jacob Ringle & Son of 83 Newark avenue, that city. The elevation presented in the first illustration represents a front constructed of No. 24 gauge galvanized iron, which extends from the cornice of the first floor to the top of the pediment on the roof. The front, as shown by the sectional view, is studded from the cornice to the roof line and sheeted with 1-inch tongued and grooved pine boards. All the columns and window frames, as well as the belts of the cornice, are made in sections, being so constructed and securely anchored to the building that in case of fire each section will retain its place and not fall until the entire front comes down. The work was executed from designs prepared by Lewis H. Browne of Jersey City. The second engraving represents a store front constructed in the same general manner as that just described, from designs furnished by Edward Patterson of the city named.

The Arch.

The earliest trace in antiquarian researches has assisted us in detecting the first bridge, says a writer in an exchange, and to show that it was a tree which had fallen from one bank to the other of some mountain torrent. The method of communication thus supplied by accident men would soon learn to obtain for themselves by the rude resources of art, and ere long the opposite banks of rivers would come to be connected by means of timbers or flag stones, supported upon piers.

The application of this notion of a bridge seems to have constituted the whole art of bridge making up to a comparatively recent period. It is, however, altogether inadequate to the passage of deep or rapid currents, and fatal to navigation. We accordingly find that the Egyptians, although they swarmed along the banks of the Nile, never built for themselves a permanent bridge across that river.

The Tigris to the Euphrates, on whose banks dwelt that enterprising nation of remote antiquity, the Chaldeans, was bridgeless. And even in the age of Pericles there was no stone bridge over the River Cephissus at Athens.

Necessity is said to be the mother of invention, but there are certain matters which she has been exceedingly slow in coming to. The birth of the discovery of the arch is a memorable example. Of Europeans, the first who appear to have made the discovery were the Etruscans; the earliest existing specimens of the arch in Europe are said to be found among the ruins of the Etruscan tower of Volaterra.

To the Chinese the secret of the arch appears to have been known from time immemorial. In fact, it is difficult to fix upon any useful contrivance which is not at present in some degree known to that singular people. They certainly used the arch long before the idea was conceived in Europe. It covers the gateways in their great wall; they availed themselves of it in the construction of monuments to their illustrious dead, and in the formation of their bridges; and we are told there were stone bridges in China 3 or 4 miles long, and arches 600 feet in span.

From the Etruscans the secret of the arch passed to the Romans, and it was soon employed in the construction of bridges over the Tiber. Of these, several remain; they are, however, but awkward specimens of the art of bridge making. Their narrow arches were supported upon high, unsightly piers, which formed a serious obstruction to the current. The Romans have, nevertheless, left us, in other parts of their dominions, bridges of extraordinary strength and beauty. Of these, that of Alcantari is, perhaps, the most remarkable; its roadway is above 150 feet above the level of the stream which it crosses, and its arches are 100 feet in span. It was built by Trajan, in whose reign was also erected a bridge over the Danube, of which many incredible things are told by Dion Cassius, of which nothing is to be seen but now and then the foundation of a pier. He built it that he might conquer the Dacians; his successor destroyed it that he might restrain their incursions into the Empire.

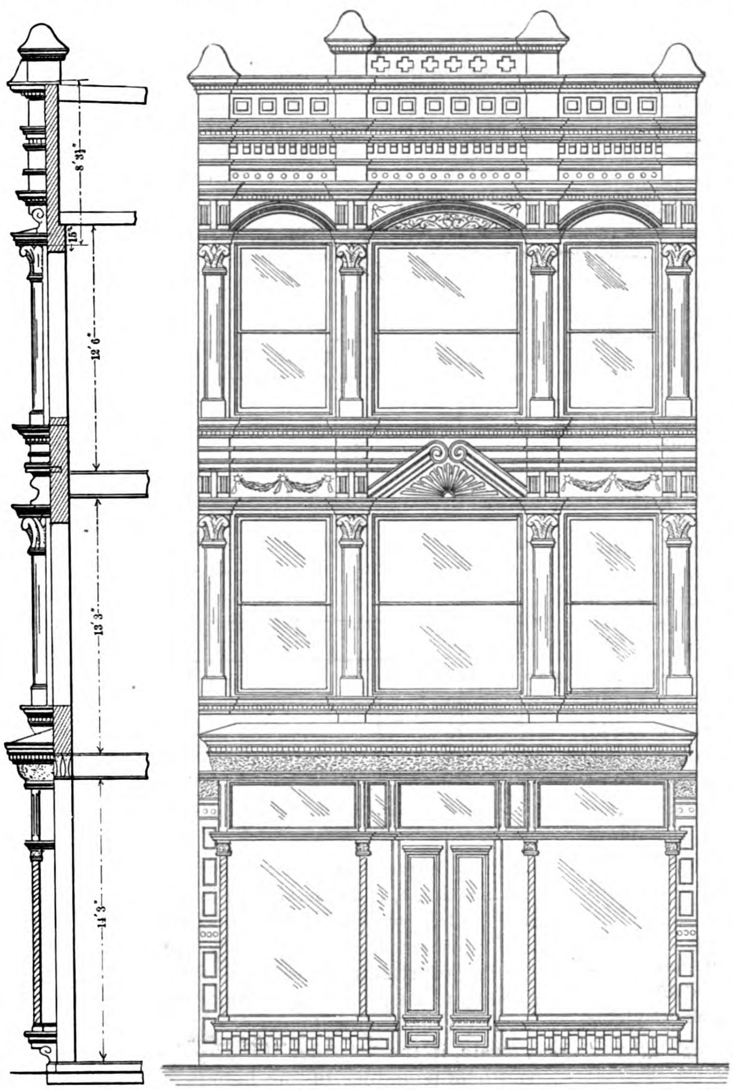
In those troublous times which succeeded the fall of the Roman Empire no bridges were built. Rivers were for the most part passed by fords or ferries; these frequently became subjects of contention between neighboring barons, or were taken possession of by outlaws, and travelers in availing themselves of an insecure method of transfer were subject to the certainty of being heavily taxed, and the chance of being plundered.

It was about the commencement of the twelfth century that one Benezet, a cow-

Galvanized Iron Building Fronts.—Fig. 1.—Elevation and Section.—Scale, ⅛ Inch to the Foot.

herd, appeared in the cathedral of Avignon, and announced to the multitude a special mission from Heaven for the erection of a bridge over the Rhone of that city. By efforts little less than miraculous this singular enthusiast contrived in the course of a few years to erect a bridge, which, whether considered in reference to its enormous dimensions, or the local difficulties to overcome in its construction, claims to be ranked among the most remarkable monuments that have been erected by the skill and ingenuity of man. Unfortunately a flood of the Rhone carried it away. The labors of Benezet did not, however, altogether disappear with this bridge; he obtained a place among the saints of the Roman calendar, and became founder of a religious order called the Brethren of the Bridge, by whom some of the finest bridges in Europe were erected. Of these, that of St. Esprit, on the Rhine, is nearly a mile in length, and that called La Vieille Bronde, over the Allier, is a single semicircular arch of 180 feet in span, and, until the erection of the Chester Bridge, which is 200 feet in span, was the largest arch in Eupope. Of the same date was the old London Bridge, the work of Peter of Colechurch. It would, however, greatly suffer by comparison with the labors of the Brethren of the Bridge.

From this period up to the present the art of bridge making has continually progressed, and most of the European rivers are now spanned by arches with which the labors of former ages will bear no comparison, either as respects the boldness and grandeur of design or the perfection of their detail.



Galvanized Iron Building Fronts.—Fig. 2.—Elevation and Section.—Scale, ⅛ Inch to the Foot.

Quality of Brick.

In commenting on the quality of brick a recent issue of the *Brickmaker* says: There are three main points which have to be taken into account. 1. The power of resistance under pressure. 2. The appearance of the fracture, which should present an even texture, and a fine, brilliant grain, without cavities in the interior and neither ribbony nor stony. 3. The exterior, which should be smooth and regular, the angles and edges sharp and straight. When the size of the brick is equal throughout the mass it is a proof that the brick earth has been well prepared and the brick generally well made. A brick, when struck, should give forth a clear, ringing sound. Good brick are generally of a dark reddish brown color, and sometimes they show vitrified spots on the surface; it is not well, however, to depend too much on this last fact, for it is often only an indication of the amount of heat to which the brick has been subjected, while the clay of which the brick is made may be impure and ill prepared.

Bad brick are readily recognized by their reddish yellow color, but still more by the dull sound which they emit when struck; their grain being soft, they crumble easily and absorb water with avidity. A good brick should not absorb more than about one-fifteenth of its own weight of water; it should appear and in reality be dry. A brick that does not take up any water at all is too much burnt: the mortar adheres to it imperfectly, but is a good conductor of heat. Such brick may be used in damp soil and for pavements. When a brick left in water either scales or swells, it is of bad quality and contains caustic lime. A brick which being made red hot, and then having water poured on it, does not crack, is of extraordinary and rare quality, and those which have borne the effect of moisture and dryness during two or three winters without scaling or cracking are excellent.

In order to try if brick will bear the effect of frost, let one be boiled for half an hour in a solution of sulphate of soda, saturated cold, and then suspended by a string over the vessel in which it has been boiled. In 24 hours the surface of the brick will be covered with small crystals; the brick is then to be immersed again in the solution until the crystals disappear, and again suspended; repeating this operation for five days, the crystals reforming after each immersion. If after this treatment a number of particles of the brick are found at the bottom of the vessel containing the solution, the brick are incapable of supporting the effects of frost.

German Theater Construction.

The Prussian Government has published police regulations for the construction of theaters, which closely resemble those incorporated in the building laws of most of our large cities, says a recent issue of the *American Architect and Building News*. There are, however, a few provisions in regard to the number and spacing of seats and the width of doors and corridors which are worthy of imitation. For ordinary seats, the minimum space to be allowed is 18 inches wide by 32 inches from back to back. Where the seats fold back, the depth may be reduced from 32 to 28 inches. The number of seats between two aisles may be 15 on the floor and first balcony, but must not exceed 12 in other portions of the house. What seems to us very ample provision is made for exits, the rule being that 1 m. in width of clear opening must be allowed in all openings and passageways leading to the auditorium for every 70 persons to be accommodated. In exceptional cases only, by special permission, a somewhat smaller provision will be approved; and, where sufficient exits are arranged into a court or garden, the openings from this court or garden into the street need not afford greater width than 1 m. to 300 persons. Workrooms and storerooms are permitted in or under any part of the building only on condition that they are of completely fire-proof construction, and have no direct communication with either the stage or auditorium. It is interesting to find that the regulations apply to the audience as well as the proprietors. Smoking is absolutely forbidden in any part of the theater building, except that special permission may be given for smoking in certain rooms in restaurants, in private apartments and in business offices. This restriction, which would put an end to cigarette smoking in the vestibules and corridors, would be unpopular here, but to the Germans, who barely take their pipes out of their mouths to put a piece of sausage in, and who can absorb beer and nicotine together without difficulty, it must be very oppressive. However, when the Prussian police administration takes it into its head to prevent the citizens from getting burned up in theaters, it does not consult the opinion of those citizens as to the agreeable or disagreeable character of the measures which it thinks fit to adopt.

THE BUILDERS' GUIDE.*

By I. P. HICKS.

BINDING SLIDING DOORS.

I have frequently noticed that a remedy is wanted for binding sliding doors. This question is very frequently asked, and it is not to be wondered at, for not one sliding door in ten put up works in anything like a satisfactory manner. I have had a great deal of experience with sliding doors, and am pretty well acquainted with the common defects and causes of unsatisfactory working. I do not wonder that a good remedy is wanted for these troublesome doors, for unless they work properly they become a great inconvenience. The causes of the unsatisfactory working of sliding doors are many, and a little general information on the subject may not come amiss. Nearly all the causes of the imperfect working of sliding doors can be traced directly to the improper construction of some part of the work in putting them up, and in most cases an ounce of prevention is worth about 4 pounds of the cure. As overhead hangers are almost exclusively used these are the ones we will take into consideration. First, it is necessary that the floor under sliding-door partitions should be perfectly solid and very nearly level.

It is a common occurrence for buildings to settle, and if partitions, which often have a great weight to support, are not provided with a properly constructed foundation, they will settle enough to throw the ordinary sliding door entirely out of working order. It will not do to block up under sliding-door partitions with a little chip, a piece of a shingle, a little loose dirt under a post in the cellar bottom or some fresh mortar, as is often practiced. As the increased weight of the plastering and floors is put upon the partitions above, the floors begin to settle. I have seen floors under sliding doors 3/4 inch out of level. How can sliding doors work when put up under such circumstances? If the track was level, one door would be sure to strike the floor as it was rolled back, while the other door would rise almost 1 1/2 inches from the floor. Again, if the track was not level, but placed parallel with the floor, then the doors could not be adjusted to hang plumb; consequently, they would not fit the jambs, unless the jambs were set to fit the doors 3/4 inch out of plumb.

Thus far we see that the floor must be perfectly solid and level, the partitions must be set plumb, the headers put in solid and of sufficient strength to carry all the weight placed upon them without yielding or sagging. We will now turn our attention to the putting up of the track. This should be level and straight, and it should be straight sideways as well as on top where the rollers run. This is a point overlooked by many. They think if the track is straight on top that is all that is necessary, but short kinks sideways in a track will cause the doors to run crooked—running away from the stops on one side of the jamb, and crowding them on the other, often causing binding. Again, most hangers require a double track, constructed in the following manner: The track is 1 x 1 1/4 inches, and screwed to the edge of a board 7/8 x 6 inches. These boards are then fastened to the partitions at the proper hight for the doors, and another piece 4 3/4 inches wide, called a spreader, is placed over the top. The sketch, Fig. 56, gives a general idea of the construction of the track and boxing. In the diagram it will be noticed that the opening between the tracks and between the jambs, through which the lower part of the door hanger passes, is only one inch wide. The hangers have small friction rollers, which run between the two tracks, serving as a guide for the wheels above, and not leaving more than 1/8 inch play between the two tracks. This 1/8 inch is plenty of room if the work is properly done. It is necessary that the friction rollers run close to the track in order that the doors may run true and without crowding the door stops. But suppose the boxing is insecurely fastened to the studding, and the dampness from the plastering, when it is put on, causes the two 6-inch boards to cup. The tendency at once is to narrow the opening required by the friction rollers of the hangers, thus causing a binding of the door hangers between the two tracks. Again, suppose the spreader, which is

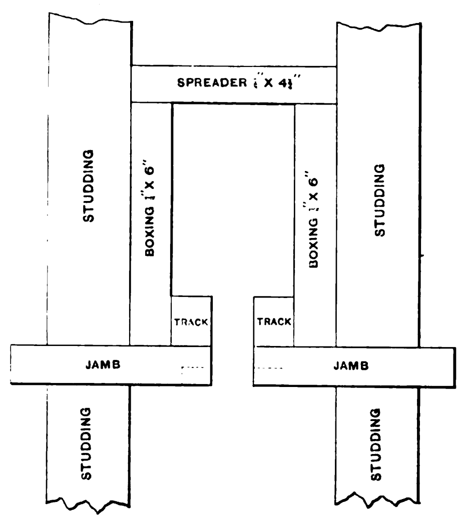


Fig. 56.—Section showing Construction of Track and Boxing for Sliding Doors.

for the sole purpose of keeping the tracks the right distance apart, is carelessly put in a little narrow, or, perhaps, left out entirely, as it is occasionally by some, who consider it an unnecessary appendage to the working of sliding doors, then there is practically nothing to keep the tracks from springing together, causing a binding of the doors.

Again, if the spreader is narrow or left out, the continual pounding of the lathers on the partition walls, and the carpenters in finishing, have a tendency to drive the partitions a little closer together, especially if they are not securely fastened at the top. Fully as many binding sliding doors are caused by the tracks springing together as in any other way, and when from this cause, the remedy is a difficult one to apply, as the doors may have to be taken down and the sides of the track trimmed off with very long-handled, sharp-edged tools. This cause of binding is likely to be overlooked, as it is the least suspected, and comes very near being an invisible cause. Again, we will suppose that a building being erected is to have sliding doors—that the tracks are put in level and at the proper time. Now, after the building has been plastered and the carpenter comes to finish the sliding doors, he finds that the weight of the plastering or something has caused the floor to settle and the track is out of level. Well, about nine carpenters out of ten will put the head-jamb level, which will bring one end of the jamb down from the track just as much as the floor is out of level. The consequence is that when the doors slide back, one of them will rub the head-jamb and quite likely stick fast. The head-jamb belongs snug up to the bottom edge of the track, as shown in Fig. 56, and there is where it should be placed, even if the track is out of level. To level the head-jamb when the track is not level only makes matters worse. A doorway with the head-jamb slightly out of level will not be noticed, but a door that will stick fast will be noticed every time it is opened. Of course I advocate doing the work correctly in the first place, and am now showing what to do in cases of emergency. Sometimes it is necessary to rabbet the head-jambs at the lower portion of the inside edge, as shown by the dotted lines in Fig. 56. Again, some workmen do not plow the groove in the bottom edge of the door deep enough for the floor guide. It might work when the door was first fitted, but a little settling of the track would cause binding of the door. This can be easily remedied by letting the floor guide into the floor, or by taking the door down and plowing the groove deeper. The former is the easiest and quickest and in every way just as good. The binding of sliding doors is often caused by the door stops being placed too close to the doors. When this is the case a removal of the stops and placing them a little farther away will remedy the trouble.

In hanging sliding doors it is better, if possible, to do so before the jambs are set. Many times little things that would interfere with the proper working of the doors can be easily remedied; whereas, if the jambs were set, they would be concealed from general view and not discovered until they had caused a considerable amount of trouble. Is there any difference in door hangers? is a question which very naturally arises. In our estimation there is considerable difference, although any of them, I think, would give satisfaction if every part of the work in putting them up was done in a substantial manner. Some hangers have more points of excellence than others, but I think the Prescott hanger the nearest perfection. With this hanger there is no track and no rollers. The doors hang suspended from the back edge, the hangers being fastened to the studding back of the jambs. They are as nearly frictionless as a door swinging on hinges, and there is no binding of doors from tracks and rollers. In fact, there is no more chance for the doors to bind from settling partitions than there is with the ordinary swinging doors on common hinges. Of the double-track overhead hangers, I think the Annex a very good specimen. All parts of the hanger are accurately fitted and the adjustment is as good as could be desired. The Standard door hanger is another good specimen, and I think sometimes it will allow doors to work free and easy under circumstances which other overhead hangers would not.

TO PREVENT LEAKS IN BAY WINDOWS.

It seems to be a very difficult matter for a carpenter to build a bay window that will not leak in a bad rain storm. There are comparatively few bays built that do not have a window or a large double window directly over them, and the leak is almost invariably down the side of the casings of these windows. The bay window may be well roofed and the tin turned up under the siding for 5 or 6 inches, yet it will leak, and where the water gets in will be a mystery to a close observer. Water-tight joints are not always made in siding, and sometimes the casings shrink from the siding; then the rain beats in by the side of the casing of the upper windows and runs down behind the tin turned up from the roof, thus causing a leak. To prevent this, saw through the sheeting under the window casings and to about 6 inches each side, slanting the same upward in sawing. Now put a piece of tin well into the saw kerf, and bend it down over the tin that turns up from the roof; then, after the siding is properly put on, we have a bay window that is positively water tight. Care should be taken in siding and not drive nails too near the roof. It is better to slant them a little upward in driving. In no case should the sills of the upper windows come closer than 4½ inches to the roof of the bay window, as it is necessary to have room for the tin to insure a good job.

SHINGLING HIPS AND VALLEYS.

There are several methods of shingling hips and valleys, but as most mechanics are familiar with the different methods, I will briefly describe only a few of the best and most practical ones. In shingling hips both sides should be shingled up at the same time, and on hip roofs of unequal pitch it is necessary to lay the shingles more to the weather on the long side of roof than on the short side, in order to have the courses member evenly on the hip. One method frequently employed is to cut the hip shingles so that the straight edge of the shingles will line with the center of the hip when laid, and the grain of the wood run parallel with the hip instead of straight up the roof, as in the case of common shingles. Some are inclined to think this method makes a nicer looking job than the old way of placing the sawed edge of hip shingle to the hip line. As it is customary to use tin hip shingles, I think the old way is by far the best, as the water which falls on the roof will run with the grain of the wood, and not soak into the shingles, as it would running diagonally across the grain.

The same is true in shingling valleys. Always place the valley shingles with the grain of the wood running up the roof the same as the common shingles, then the water running down the roof to the valley will run with the grain of the wood. Some trouble is experienced in shingling valleys straight The usual custom is to put in a strip of 14-inch tin for the valley, and strike two chalk lines, leaving a space in the center of the valley 2 inches wide at the top and 3 inches at the bottom for the valley. It is a very particular job to shingle to a chalk line up a valley and shingle it straight. Then again, the line will be rubbed out before the shingling is half done. A better way is to stand a 2 x 4 up edgewise in the valley, fasten it straight with a few pieces of shingles for braces and shingle to the 2 x 4, which answers as a straight edge. In this way one will get a respectable looking valley, even when shingled by inexperienced hands. I have frequently seen valleys which some one had tried to shingle to a line that were at least 2 inches crooked, and between 5 and 6 inches wide in places, generally wider in the middle than at either end. Wide valleys should be avoided, as they are very liable to leak. In shingling a valley no nails should be driven through the valley tin except near the outer edge, as a nail hole will frequently cause a leak by water getting under the shingles. The best way to shingle a valley is to use single sheets of tin 10 x 14 inches, under each of the courses of shingles, leaving only about ¼ inch of the tin exposed below the butts of the shingles. Make a close joint with them in the valley, and a good as well as a neat looking job will result when the work is finished. To increase the durability of the valley, paint the tin flashings before laying.

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

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The National Association and the Local Exchange.

The National Association provides a means for furnishing the local exchanges with information, of which advantage is too seldom taken and too little used. For example, there may be an evident need for improvement in some particular condition which exists in some given locality, and a number of suggestions are offered in solution of the problem. Much work may be involved in perfecting what is only an experiment at best, and which may or may not prove successful. Now, it is more than likely that some community of builders has already wrestled with exactly the same condition which needs reform and has secured some effectual method of improvement. The local exchanges, not knowing this fact, are unable to profit by the experience of their brother builders, and without the National Association would be compelled to go through all the work for themselves. The constant correspondence of the National Secretary with the local exchanges puts the National Association in possession of information which belongs equally to all filial bodies, and which would be given to them immediately upon the receipt by the National Secretary of the knowledge of the particular information desired. There is another phase of the relationship of the National Association to the local exchanges which is but little considered. It is frequently the case that the local secretaries are men who are engaged in active business, and are unable, therefore, to devote their entire time to the welfare of the exchange. Various ideas and plans for the improvement of the customs and conditions under which the business is conducted occur to them from time to time, but owing to the necessity of attention to their private business affairs, or from lack of long training in dealing with such situations, they are prevented from perfecting a plan or putting new methods into form for action by their exchange. This is where the value of the National Association is again apparent. The National Secretary is devoting his entire time to the consideration of all possible situations that might arise in the building business, and also has the benefit of the experience which each exchange is passing through upon which to base advice to the filial bodies. The secretary of every local exchange should take advantage of the benefit which the National Association can confer upon his organization in the way of advice, and should also keep the National Secretary fully posted in regard to any movement that might be taking place in his locality. Ideas that local secretaries are attempting to elaborate, no matter how purely local or how comparatively unimportant they may seem, should be submitted to him in order that he may not only have the benefit of them for the entire constituency of the National Association, but in order that the local secretary may have the benefit of advice that is based upon years of close study of the problems which occur for organizations of builders to settle.

A Builders' Exchange.

A builders' exchange offers the best possible facilities for discussing and considering topics and questions that are of general interest to the building fraternity. No other form of organization is so well adapted to the needs of the builder as an exchange, in which the members recognize the fact that the association was formed to protect their common interests and to facilitate the transaction of their business. An exchange includes in its membership representatives of every branch of the trade, and is, therefore, much more comprehensive in its action than an organization composed of members of only one branch of the business could be. The decision of the whole is doubtless very greatly assisted through the consideration of a subject by each branch prior to discussion by the full exchange. There are many cases where only one branch of the trade is affected, and in such a way that its relationship to other branches is not disturbed; in such cases the members of the branch which is disturbed settle the difficulty among themselves, being sure all the time of the full moral support of the entire fraternity as represented in the exchange. The fact that members of an exchange are in the habit of meeting daily makes the organization much stronger and more efficient in time of need than an association of only carpenters or masons, for instance, with quarterly or even monthly meetings called for the purpose of transacting routine business or the consideration of some one subject. The daily meeting of the different interests creates a familiarity not only with the various conditions which exist in the separate branches of the trade, but also with the individuals of which it is composed. Through this familiarity the conditions which obtain are unconsciously discussed and methods of improvement suggest themselves. The importance of the prevention of difficulties with the workmen is suggested instead of tardy means for the settlement of troubles that have been allowed to embitter both sides. It has been proven repeatedly that the best relationship between employers and workmen in the building trades exists where there is a well organized and properly conducted builders' exchange.

Code of Practice.

The "Code of Practice" adopted at the fifth annual convention of the National Association has been found very beneficial wherever it has been adopted, and has resulted in more clearly defining the manner in which bids should be submitted, treated and opened. Copies of the code in leaflet form can be had upon application to the national secretary, and the adoption and use as well of some distinct code or rule is urged upon all the filial bodies.

The Mid-Year Meeting.

Attention is again called to the near approach of the date for the mid-year meeting of the National Association of Builders, and the importance of having all suggestions of subjects for consideration in the hands of the National Secretary as soon as possible. Secretaries of filial bodies, and individual members as well, should forward immediately all subjects which are desirable for the consideration of the Board of Directors.

Good Advice.

The following, taken from the report of the last regular monthly meeting of the Builders' and Traders' Exchange of Omaha, is good advice for the members of all the filial bodies:

The president delivered a thoughtful address covering a number of points of interest to builders of all sorts. He said that if ever the builders of this city and this country are elevated to their proper plane it would be through holding fast to their organization and keeping faith with one another and with the rest of the world. He admonished the members to avoid petty jealousies and hard feelings. He had heard of little differences which existed between the contractors, and he wanted to warn the association that as individuals they could accomplish no good, but as an association they could do a great deal. He urged them to preserve their organization.

Notice to Secretaries.

Secretaries of local exchanges are requested to notify the National Secretary of all cases of difference between contractors and architects in reference to interpretation of specifications and drawings. This information is desired in order that actual cases may be considered as illustrative of the necessity of the establishment of some uniform method of appeal for the contractor in the event of his differing with the architect as to the interpretation of specifications and drawings. The necessity for the existence of a board of reference is becoming daily more apparent.

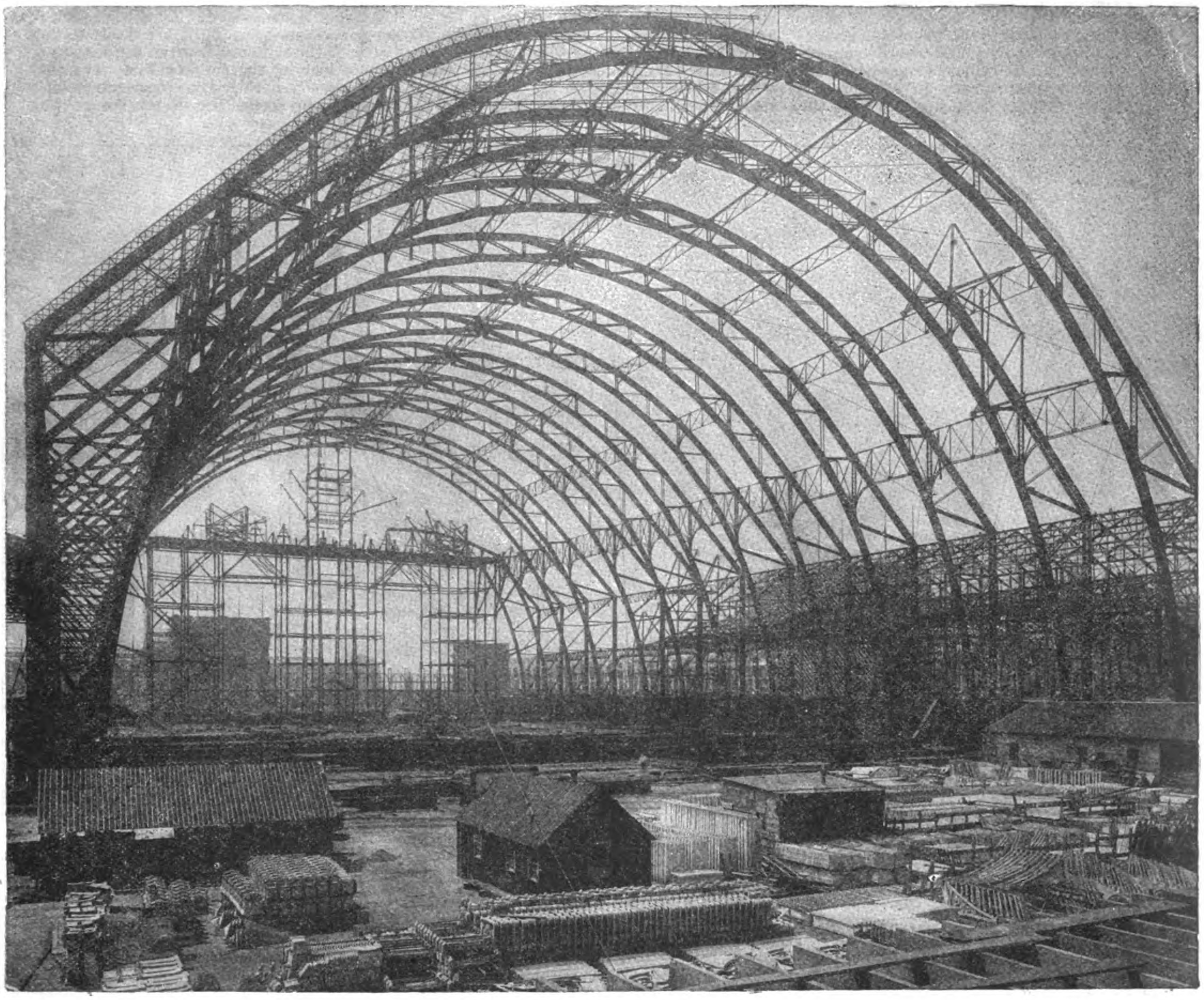
WORLD'S FAIR BUILDINGS.

ONLY THOSE whose privilege it has been to watch the progress made at Chicago can clearly comprehend what an enormous amount of work has been done, and of the magnitude and beauty of the buildings. Our plate engravings have been prepared from photographs specially taken for us by C. D. Arnold of Chicago, the official photographer.

Fig. 1 is a view of the arches of the main building of the exposition, which is usually called Building of Manufactures and Liberal Arts. This view is taken looking south and is intended to show the character of the work supporting the roof on the center of the building. The photographer has not attempted here to show any considerable part of this building, which is an immense structure, covering over 30 acres.

Fig. 2 is a good view of Machinery Hall as it appeared on July 2. The view here taken represents the main portion of the building, the annex, which is a large structure in itself, being seen to the left. There are three rows of arches in this building, all of steel construction.

Fig. 3 shows the foot of one of the great arches of the Manufactures Building. It is an excellent illustration of the massive character of the work employed in the construction of these immense arches, which cover a span of nearly 400 feet and are 210 feet from the floor of the building to the center of the arch.



World's Fair Buildings.—Fig. 1.—The Arches of the Building of Manufactures and Liberal Arts.

Cologne Cathedral.

An example of building construction in which architects and builders not only of this country but of all the world are deeply interested is the Cologne Cathedral, a structure which without doubt is one of the finest specimens of Gothic architecture in existence. According to the best information, the original structure was put up during the reign of Charlemagne, in 814, but was destroyed by fire in the year 1248. Later in that century the present cathedral was commenced, and the choir, which was the first part completed, was consecrated in 1322. The work upon the remaining portions was, however, continued very slowly, and later discontinued for a long period. On September 4, 1842, the King of Prussia laid the foundation stone of the transept, and in 1848 the naves, aisles and transepts were opened. The south portal was completed in 1859, and in 1860 the iron central spire was added. With the exception of the towers, the church was completed in 1863, while the towers were finished in August, 1880. The latter are more than 500 feet in hight, and are beautiful examples of architecture. Our supplement plate this month represents the details of the western spires of this magnificent edifice.

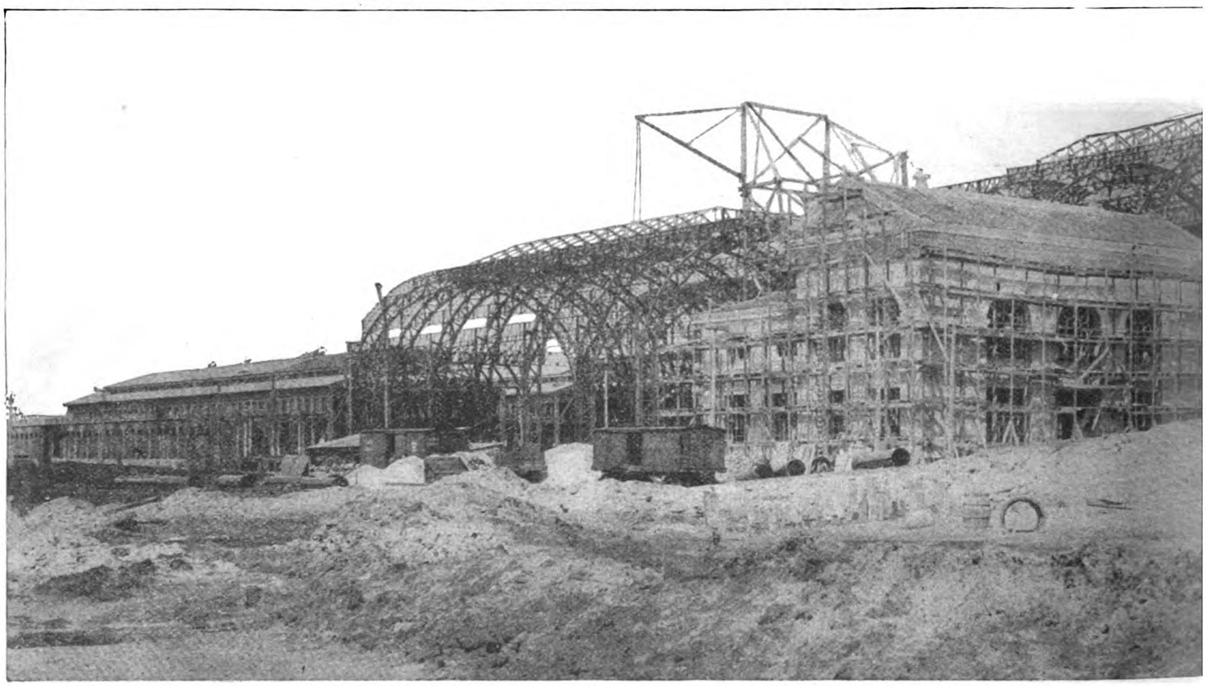
Rivalry Between the Architect and the Engineer.

There is an old saying to the effect that in utility we have the greatest beauty, and there are many who believe that which is the most useful in construction and that which derives its form solely from the conditions under which it is erected, is more beautiful than that which is given an outward form simply for the purpose of pleasing the eye. One of our English exchanges, *The Building News*, discussing this question, seems to think that there are exceptions to this general rule. The writer of an article that recently appeared in the columns of the journal named takes the ground that what the engineers are doing, for constructive and commercial reasons, is opposed to true art, and that beauty is sacrificed because the trained architect is set aside and the untrained engineer is allowed to have his way. We admit that there are two sides to the question thus raised, but our sympathies go out to the engineer. We feel that he is the pioneer and that after all he is the one who is constructing the skeleton, and giving strength to the structure, even if the architect comes later and gives it the outward semblance of beauty. How could an architect have improved the graceful and beautiful lines of the Brooklyn Bridge, for example? This, we believe, stands as an instance of pure engineering, independent of any attempt at artificial embellishment, and yet for beauty it probably ranks among the most notable structures of the world. Again, is it not probable that the men who built the model structures of past ages, those who gave us the Grecian and Roman styles, our Gothic studies, and various others to the end of a long list, were builders and engineers rather than architects or mere decorators? Has not the skeleton structure always gone first and the decoration followed? These remarks suggest themselves as a preliminary to a quotation from an article that appears in the stores and other buildings of mercantile importance. Very little room is left for walls, engaged columns, handsome vestibules, staircase halls or internal architectural decoration. The building stands on a series of iron legs or stilts, tied together by iron girders and cross beams on the first-floor level; sometimes the iron frame work is carried up two or more stories—a mode of erection, by the way, coming into repute in the large American cities like New York and Chicago, where iron skeletons or frames are put up and filled in between the vertical supports and horizontal members by partition work. If there is any architecture at all according to traditional modes, it is left to the superstructure thus perched on iron legs, or rather to the façades."

Sometimes an attempt is made to give character to the ground story by large arched openings or windows, as in the new City Bank, Ludgate Hill, where the basement is built of solid masonry, with wide arched openings in the sides and in the rear, while the interior will form a he is hopelessly wrong: some copy of a Flemish Renaissance façade is chosen, windows and gables are introduced which express a totally different interior design, for they have in the original proceeded from the requirements of a plan in which separate rooms divided by cross walls existed.

CHARACTER.

Only a few architects essay to express the character of the interior, a large, lofty apartment requiring an equal distribution of light, with side windows between piers. The custom of selecting fronts of old town halls and palaces for buildings of a totally different purpose, erected for commercial uses, has rendered the architect's mind oblivious of any difference suggested by internal arrangement; so the error is repeated. Then those who set precedent at naught are likely to do better if they did not so often fall into the trap of leaving the construction to somebody else—generally the engineering contractor, who settles the design before the



World's Fair Buildings.—Fig. 2.—App

columns of the exchange above named. In reading what follows we cannot help thinking that if there is a special function which the architect ought to employ, then it is high time he studied engineering as a foundation, in order that the world may have combined in one the science of construction and decorative ability. Taken as it reads, what follows puts the architect in a rather poor light. It virtually acknowledges that he of his own accord has taken the second place instead of qualifying himself for the leading place. Our contemporary says:

EARLY STRUCTURAL METHODS.

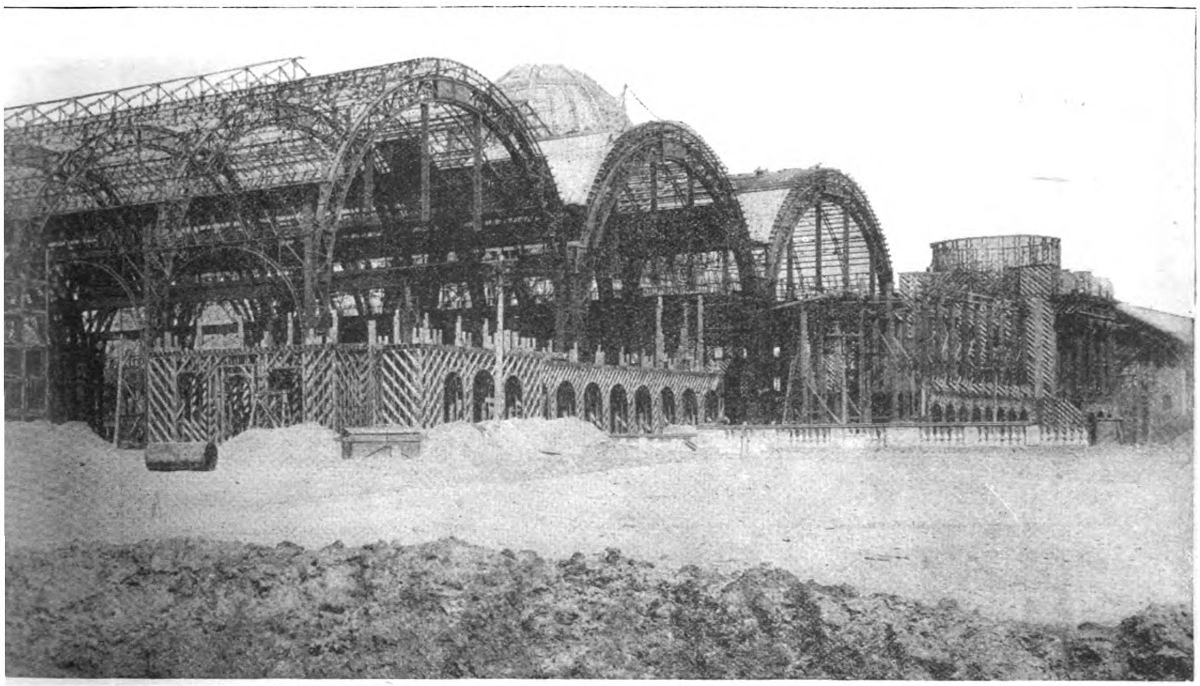
"In these days of commercial activity, when space and utility are more essential than solidity and architectural beauty in the structures we treat, we cannot be surprised if the engineer has not somewhat impaired our sense of art by the introduction of structural methods unknown to our forefathers. What with all kinds of iron flooring, columns, stanchions, fire-resisting appliances and materials disposed in the most economical forms, architectural effects can be very seldom realized. Take, for example, the large city warehouses, retail shops, banks, large open space for the bank clerks or cashiers. What would our forefathers have thought of these skeletons of iron-work and floors, as we see them now erecting in all parts of London, especially in the city? All this work is strictly engineering; it does not require any architectural aid except to define where each stanchion or iron column is to be placed, and where the main beams are to be put. The architect's work *par excellence* is to encase the structure, to design a front, or two or three fronts, in some taking style of Renaissance of red brick and terra-cotta. Now, we say that this mode of building is not strictly architecture; it is rather engineering construction. But if merchants and tradesmen will have large warehouses and shops in confined sites, the architect has no other alternative than to provide these iron structures, or invent something better. To iron or steel he must go, and if he is anxious to impress his art on this kind of structure, he must begin to rely more on his own resources than on the iron merchant or engineer. His only other alternative is to set up as the architectural designer of façades or cases of brick terra cotta or stone. So long as he follows precedent elevations are prepared—a far more sensible way, if the architect has any idea as to the shape the building ought to take, and studied both the iron work and masonry together.

IRON CONSTRUCTION.

It will be said there are few ways of making iron construction tractable. Columns and beams must be cast or rolled into certain forms or sections, and to make them architectural we require to add to their bulk or incase them in some material. But did not the introduction of brick and the arch vault impose upon the Roman architects the same difficulties? Was not the change from trabeate architecture, with its massive entablatures resting on close-set columns, to the vault system, repugnant to the taste of those who had adopted for centuries the Greek methods? Yes, it will be answered, but the bricks could be used in large masses like stone, and the arch and vault were capable of artistic combinations; but iron cannot be so employed, unless we sacrifice the principle of economy. It would be wasteful and unnecessary, for instance, to group together a number of iron pillers or to cast a girder in the form of a solid entablature. Yet the architect ought not to be disheartened. The early iron-girder floor has undergone many changes; the iron beams can be introduced to give rigidity and yet preserve a level ceiling, as in the "improved flat-brick fireproof floor," and other kinds in which specially-molded bricks are used, which protect the lower flanges. For factories, hospitals and large buildings the architect has the choice of several systems of flooring, like those in which trough girders are used, or a species of corrugated metal or tubular-shaped lintels of fire clay fill the spaces between the iron beams and produce strong, compact and fireproof floors. In column design he has several varieties to choose from: among these the built-up forms of wrought iron in which angle, channel-shaped and other sections are bolted together to give rigidity and strength. What a decided improvement, structurally and æsthetically, this composite form is upon the old round column, hollow or solid! Even the engineer could do something to make this here again the details, the connections, the modes of riveting, the calculations for strength are points which keep the specialist of iron in possession. The architect is afraid to think, because of the penalties which, according to the poet, fall on those who "meddle with cold iron."

There are other directions in which modern invention has rather dulled our artistic sensibilities. The vault in its many varieties of groining for covering space has been rather shelved by the employment of iron trusses. How few churches are now vaulted in brick or stone? Stone as a material, and stone cutting as an art of the first importance, have suffered by the introduction of materials that are capable of being cast and molded, like, concrete, terra cotta and brick. The facilities afforded by mechanical invention for molding brick have almost done away with the stone-mason's craft in its higher branches of constructing groined vaults, domes and arches. Ornamental brick and terra cotta have taken the place of carving. Machinery and machine-turned out joinery have placed an obstacle in the way of artistic woodwork. In these great branches of manufacture and craftsmanship the architect has also lost his influence. How he can regain his position is the question of the hour which calls for his earnest and first attention.

The question has the greater interest when rival parties in the profession are taking very distinct and opposite views of the proper method of educating the architect. Those who wish to instruct him in the principles and theory of art and science in a systematic course are alive to the many technical requirements that are now to be met, and they attempt to reach art through knowledge. Others, including, it must not be forgotten, many of the most eminently gifted artists in the profession, advocate a totally different system, as they seek to develop the artistic susceptibilities of the candidates, and to make art the first and foremost qualification. It will be for the future to determine which mode of training or instruction is calculated to give the highest results with the many new elements we have described.



rance of Machinery Hall, July 2, 1892.

form architectural. We might not despair of seeing columns of this kind molded, or even fluted, to fulfill the place of Corinthian columns, without any waste of material or strength. The ordinary double angle or Z-shape is capable of forming several combinations of value; but in rolled iron there are many sections built up by riveting together angles, plates, channels, which form segments of a column of any size. Some of these sections admit of filling in with brick or terra cotta, or of being encased. The design of the iron capital, and the means of connection with beams and columns above, are questions which deserve the attention of the architect. Hitherto the engineer has had his own way in these details. Why? Because the architect has not taken any interest in these matters. Drawings and specifications of iron construction are left to the engineer or manufacturer. The ornamental details are largely restrained by his hand.

IRON ROOFS.

Then as to iron roofs, how much there is that could be improved if only the profession set themselves to the task! But

Copper-Plated Zinc in Building Construction.

Copper plating sheet zinc for building purposes has recently been tried abroad with considerable success, says an exchange, the process being especially recommended where mechanical wear takes place. The zinc combines very well with the copper. The galvanic method of copper plating is advantageously used, but the zinc may also be coated with copper by ordinary means. In the first place the sheet zinc is cleaned with soda from any adhering dirt or grease, and is also purified by a weak acid bath from the coving of zinc oxide. There are then dissolved, in 24 parts of water, 1 part of refined verdigris and 12 parts of tartar, the mixture being heated to boiling point, after which 3 to 4 pints of Spanish white are added. The Spanish white is here decomposed, and is precipitated as lime tartrate. The dark-blue liquid is poured off and filtered, and can be used either as a bath for the sheet zinc or for the production of a copper plating paste. The first mode of action is the more recommendatory, as the fluid forces its way into the corners and angles of the zinc articles, and is uniformly distributed all over. If it be desired to coat an immovable zinc object with copper the article, after being cleaned, is painted with the copper solution and chalk compound, and after drying brushed. This very simple operation would likewise prove of value to architectural purposes where it is desired to remedy the generally unpleasing effect of zinc adornments.

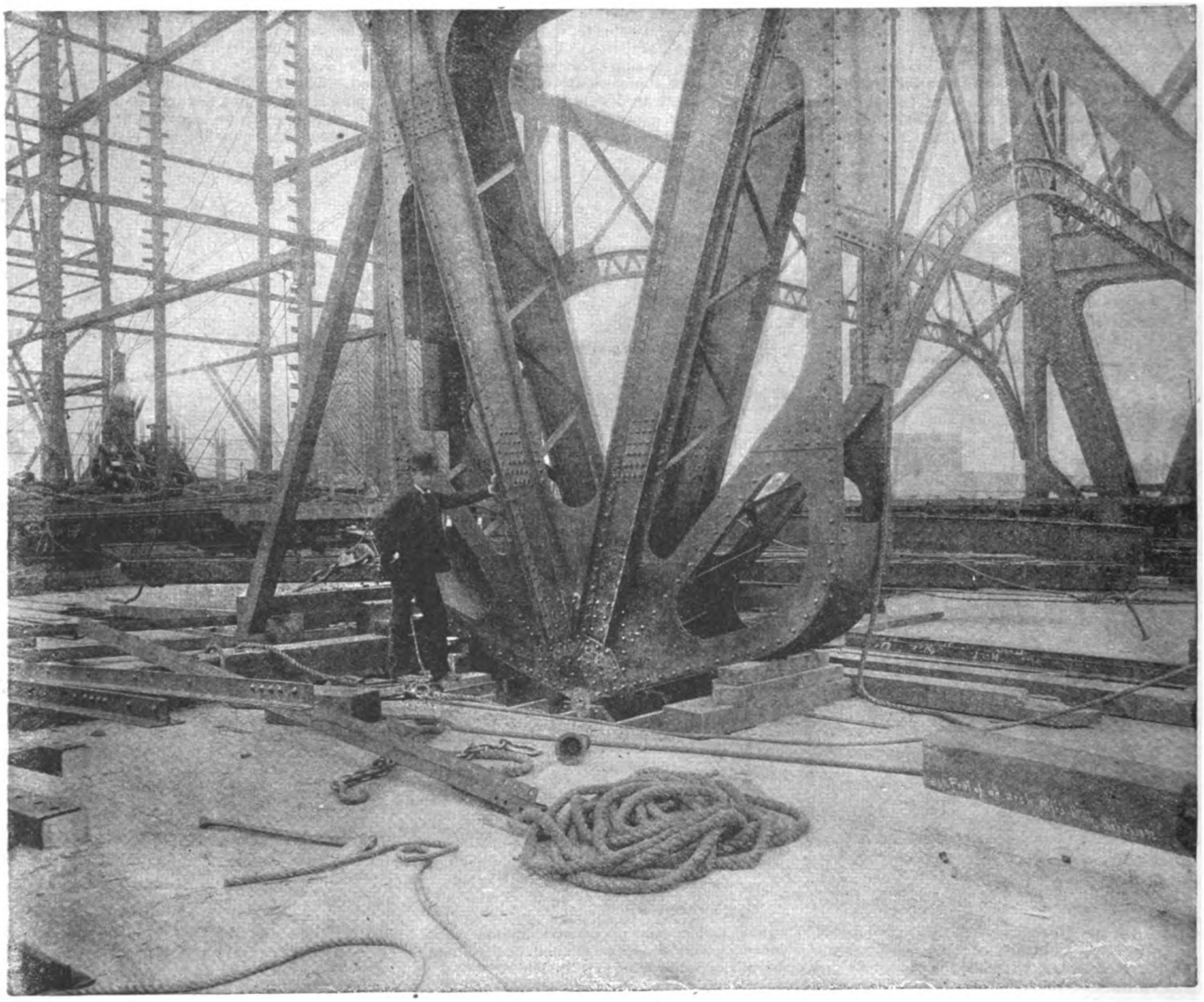
Labor Unions of the United States.

The hand-book of the Federation of Labor shows the strength of the 74 national trade unions of the United States to be 675,117. The Carpenters' Brotherhood leads with 65,000 members; Amalgamated Iron and Steel Workers, 60,000; Iron Molders' Union of North America, 41,000; International Bricklayers' and Stone Masons' Union, 35,000; Brotherhood of Locomotive Engineers, 30,000; International Typographical Union, 28,-

000; Cigar Makers' International Union, 27,000; Brotherhood of Locomotive Firemen, 23,000; United Mine Workers, 20,000; Granite Cutters' National Union, 20,000; Journeymen Bakers' Union, 17,500; Journeymen Tailors' Union, 17,000, and the Brotherhood of Railroad Trainmen and Brotherhood of Painters and Decorators, each with 16,000.

Ventilation of Public Buildings.

At a recent meeting of the Royal Society of Edinburgh, Dr. C. Hunter Stewart gave a paper in continuation of his researches on the subject of the "Ventilation of Public Buildings." It was not the carbonic acid, but the organic matter in the air, he said, which had the baneful effect on public health, and if the organic matter could be got rid of the question of ventilation would be simpler and cheaper. The origin of that organic matter had been very generally attributed to respiration; but that view had now been definitely set on one side, and experiment had shown that the breath was not to be blamed as the source of the organic matter in badly ventilated buildings. He mentioned the case of a German army doctor, says *Invention*, who had all the soldiers of a particular barrack compulsorily bathed, with the result of a very marked improvement in the state of the ventilation, and he added that if persons could be compelled by law to bathe regularly and to have their clothes periodically cleaned, the cubic space necessary for the healthy existence of persons would be very much smaller than it is. Taking, however, the quantity of carbonic acid present in the air as a test of the state of the ventilation, Dr. Hunter Stewart gave the results of analysis of the air in different public buildings in Edinburgh. The best results had been got at the infirmaries, where the carbonic acid was less than 6 c. cm. per 10,000—showing excellent ventilation—and the quantity varied through different classes of buildings, the worst record being that of St. Cuthbert's Church during service, where 63 c. cm. per 10,000 were found in the lower gallery. In other churches it varied from 20 to about 50. Investigations were made in a number of public schools, and results were got in some measure corresponding to the accommodation per child. In one school, where a fan was used to ventilate the rooms artificially, it was found that when the fan was idle there were 12.1 cubic centimeters of carbonic acid per 10,000, and when the fan was working 15.56. In the public library, when the fan was at work, the carbonic acid was 8.9 per 10,000, and when it was idle about 10. Lord Kingsburgh commended the law courts to Dr. Stewart as a field for research. He would find them a much richer field in the way of organic matter and everything else that was bad than any other place he had yet tested. Their ventilation there consisted in this—that when they had been tortured for a few hours, those of them who could leave did so for a few minutes, and ordered every window to be thrown open, so that everybody who remained behind had a bath of cold air. There could be no doubt that the "great unwashed" frequented the law courts more than any other class in the community. It was the only theatre they had for which they had to pay nothing; and it was at the time when judges and counsel were under the greatest mental strain that the courts were crowded with human beings, most of whom would be the better of having the German doctor's discipline enforced. Lord M'Laren said he thought that, since the courts must be open to the public and only a limited number could be admitted, they should insist on no one coming in without being decently attired. That was the true solution of the matter.



World's Fair Buildings.—Fig. 3.—Foot of Arches of Building of Manufactures.

THE KING OF SIAM has just had a pavilion of glass built for himself by a Chinese architect, the material for which was furnished by a French company. Walls, floors and ceiling are formed of slabs of different sorts and thicknesses of glass joined by impermeable cement. By one door only can the King enter, says a recent issue of *Invention*, and this closes hermetically when he comes in, and ventilator valves in tall pipes in the roof open, as does also a sluice beside a large reservoir in which the glass house stands. The transparent edifice then becomes submerged, and the King thus finds himself in a cool and perfectly dry habitation, where he passes the time singing, smoking, eating and drinking.

WHAT BUILDERS ARE DOING.

BUILDING generally seems to be in a fairly active condition, and the average is good. Throughout the larger cities of the East there is probably more work in progress than in the larger cities lying between the Mississippi River and the mountains. There seems to be no specific reason to which the activity or quiet may be attributed, for in neither case is the condition excessive. Purely local causes appear to govern in most cases, and the quiet throughout the West seems to mark a period between the over-supply of buildings for present needs and the reconstruction of older buildings into the more commodious structures necessary for the accommodation of increased business. The condition among the workmen, aside from the branches in which the two great strikes have recently occurred, and which are neither of them directly connected with the building interests, seems to be very quiet. Leaving out New York City and one or two other cases which have been cited as they occurred, the condition of affairs between employers and workmen may be said to be very satisfactory. The condition in the granite industry of New England, which has been felt to a greater or less extent throughout the East, seems to be much improved. The manufacturers make the following statement:

Replies have been received from 305 of the 446 granite manufacturers attached to the New England Granite Manufacturers' Association by the secretary, giving the number of men now in their employ.

The manufacturers of Maine have 85 journeymen granite cutters; New Hampshire, 24; Vermont, 80; Massachusetts, 258; Rhode Island, 42; Connecticut, 85. In these several States there are now working for the association manufacturers 828 apprentice granite cutters, 377 paving block cutters, 1731 quarrymen, 277 blacksmiths, and 814 other men variously employed.

There are 141 manufacturers yet to hear from, and it is expected that when their replies are received the number of men employed in the quarries and granite yards of New England will increase the total of 4624 now at work largely.

Manufacturers state that every man of the number now at work has signed an individual contract, and has withdrawn from the unions.

Boston, Mass.

The building business in Boston and vicinity is generally in excellent condition, with plenty of work in progress. There has been no trouble in the labor market during the past month, and with the exception of some unimportant talk of a strike on one or two buildings against the employment of non-union men, everything is quiet. The relationship between the members of the bricklayers', the stonemasons', and the building laborers' unions and the Mason Builders' Association is all that could be desired. The wisdom of the adoption of arbitration for the settlement of differences between the employers and workmen in these branches of the trade, and the establishment of a joint committee, is demonstrating itself every day. Various of the labor unions have recently been taking action in support of the strike at Homestead and have been contributing funds to its support. The Master Builders' Association is in a prosperous condition and is constantly increasing its membership.

Baltimore, Md.

The building interests of Baltimore are rapidly recovering from the effect of the long strike of carpenters, which ended late in July. Most of the men are again at work, and operations are going on about as usual. Some trouble was feared early in August, as the bricklayers stated that they would not work for any contractor who employed non-union men, but nothing in the nature of a disturbance transpired. The building project which the Builders' Exchange have in hand is progressing favorably, and the exchange will soon have a home of its own that will compare favorably with that of any other similar organization in the country.

Buffalo, N. Y.

Reports in regard to the building interests in Buffalo indicate that everything is in good shape and a large amount of work being carried on. The members of the Builders' Association Exchange are not content with having erected for their own use one of the handsomest office buildings in the city, but want a bank of their own as well. They propose to establish a bank, with a capital of $200,000, in their new building, and an office is now being prepared in the corner room of the ground floor for banking purposes. A subscription list has been in the hands of Secretary Almendinger for some time, and the necessary amount of stock is rapidly being taken up by the builders. The new institution will probably be called the Builders' Exchange Bank.

The members of the exchange are making elaborate preparations for the formal opening of their new building on September 6. They have moved into their permanent quarters on the second floor, having previously occupied temporary rooms on the first floor, and the furniture and fixtures are all in place. On the 5th, Labor Day, a trip is planned down the Niagara River, with short stops at various points of interest. Refreshments will be served on the steamer and a dinner at Navy Island. This trip will consume the day, and will be a sort of preparation for the dedication of the new building on the 6th. The new exchange will be formally thrown open to the public on the morning of the 6th, and in the evening the dedicatory exercises will take place, to be followed by a banquet served at one of the hotels. The exchange has extended most cordial invitations to builders from outside the city to be present, urging them to arrive on the 4th if possible, and not later than 8 o'clock a.m. of the 5th, in order that as many as possible may participate in the trip down the river, which will without doubt be a most enjoyable excursion. A delightful time is anticipated by every one, and if elaborate preparations and hearty welcome will count for anything, no one will be disappointed.

Chicago, Ill.

The unusually large amount of building in Chicago which marked the beginning of the season is still being kept up. The season has passed thus far with a remarkably small amount of trouble in the labor market. Where the interests are so vast as they are in Chicago, it would be wonderful if an entire year went by without some serious trouble between the workmen and the employers, but this year has been free from long, serious strikes or lock-outs, although there have been several large strikes of short duration. The Builders' and Traders' Exchange has lately been considering the subject of discounts, and on August 3 a committee of five was appointed to formulate a set of resolutions on the subject to be presented to the exchange for action. The committee consists of W. H. Alsip, chairman, E. E. Scribner, R. Vierling, W. L. Hoffman and E. Kirk, Jr.

Detroit, Mich.

The weekly report showing the work awarded to members of the Builders' Exchange of Detroit indicates that building operations are active in that city. The exchange is in a flourishing condition, and is daily gaining in influence and position as one of the important institutions of the city.

Grand Rapids, Mich.

Grand Rapids builders are nearly all busy, and there is at present nothing in the action of the labor unions to cause apprehension of any change in the present amicable relations which exist between the employers and workmen. There is some talk in the Builders' and Traders' Exchange of the importance of establishing a more stringent code of practice among contractors in reference to the manner of submitting bids for work, and the manner in which the bids should be treated while in the hands of the architect previous to the date of opening. The necessity for some definite plan to be followed by all builders is one that exists in many localities, and the adoption of a code would greatly benefit the business.

Milwaukee, Wis.

The building interests in Milwaukee are in about their usual condition, the average amount of buildings being in course of construction. The building inspector is at present engaged in an active crusade against architects and contractors who have been in the habit of neglecting to comply with the city ordinance. The inspector has asked the city council to grant him more assistance in order that each district of the city may be thoroughly inspected.

The Builders' and Traders' Exchange is rapidly pushing its new building to completion, and expects to have it ready for occupancy at an early date.

Minneapolis, Minn.

Reports from Minneapolis state that the building business is in good condition, and there are very few idle workmen in the city. The various trades-unions have been more active lately in attending to the details of their various organizations than formerly, and there is some talk of an effort being made to form a central union which shall embrace all the trades.

Louisville, Ky.

The Builders' and Traders' Exchange of Louisville report that its plan to erect a building for its own use is progressing finely. The provision for the expense is rapidly being completed, and while the success of the project has been assured for some time, it was thought best to have the money in sight before breaking ground. The exchange is doing some excellent work in the way of defining just what methods are correct and honorable in regard to the treatment of bids, and is making a strong effort to impress upon its members the importance of living up to every detail of the code of practice which the exchange has adopted.

New York City.

The situation in the building trades in New York City during the recent strikes has been so complex that it has been difficult to arrive at an accurate conclusion as to the number of men involved or the cause of their being ordered out. The building interests of the city have been disturbed this year by three great strikes, two of which have been referred to from month to month in these columns. The third strike, which was against the employment of non-union men and against all buildings which were being supplied with material by members of the Iron League or the Building Material Dealers' Association, and was practically abandoned about the middle of August. It is variously estimated that there were from 20,000 to 30,000 men idle during the past two months as a result of the effort by the Board of Walking Delegates to prevent the employment of non-union men. The trouble in the latest general disturbance began with a strike ordered against the Jackson Architectural Iron Works over its refusal to discharge a union man who had been fined $50 by his union for some alleged infraction of its rules. At the instance of the Commissioner of Public Works the fine was settled and the strike for that cause against the Jackson company was declared off, but was continued because the company employed certain non-union men, and workmen were ordered out of all buildings which were being supplied with iron by this company. Then the Iron League, of which J. M. Cornell of the firm of J. B. & J. M. Cornell is president, took up the fight in behalf of the Jackson Architectural Iron Company. At a meeting of its Executive Board the Iron League resolved to lock out all the housesmiths and to take back only such men as were not union men.

The fight was next taken up by District Assembly 253, Knights of Labor, representing the building constructors, and the Master Workman, Henry E. Hicks, instituted a series of strikes against all the buildings for which J. M. Cornell had contracts, on the ground that he was the principal supporter of the Jackson Architectural Iron Works. At first the public cartmen and engineers were ordered out on these buildings, cutting short the supply of materials. The Public Cartmen's Union consists of small employers, each one of whom own from one to four or five horses and trucks. The Building Material Dealers' Association, which controls nearly all the building materials supplied to New York, could not get the public cartmen to deliver materials for the blacklisted buildings. Its members represented to their workmen that they had nothing to do with the quarrel between the housesmiths and J. B. & J. M. Cornell, but the men would only obey the call of the union.

The building material dealers followed the example of the Iron League and ordered a general lockout of all public cartmen, taking back only those who were willing to deliver material to any building, whether a strike was on or not. Only a few of the men returned to work, and the strike was taken up by the Board of Walking Delegates of the Knights of Labor, which instituted a series of general strikes against the Building Material Dealers' Association, involving nearly all the building trades. About 15,000 people were thrown idle and 125 buildings tied up. The bricklayers and several other trades, which refused to strike, were forced out by the non-delivery of material, and the building contractors with whom the Walking Delegates had no quarrel were losing money. It finally became a fight of the employers against the Walking Delegates. Although some of the building material dealers were driven to the verge of bankruptcy, they decided that it was necessary to stand up against capricious strikes ordered by the Board of Walking Delegates, and a resolution was passed to fight to the end. In the mean time the men began to grow uneasy, and the Board of Walking Delegates professed to have a plan to supply building material from firms outside of the association. The framers now returned to work in a body. There were complaints every day, especially from the public cartmen, who were losing heavily, and there was every chance of the men hurrying back to work in a mass. The delegates, seeing that they could not hold the men, declared the strike off, and as many of the men as could find employment returned to work.

Omaha, Neb.

The building interests of Omaha are reported as being quiet, although there is considerable work being done in and about the city. The Builders' and Traders' Exchange is in excellent condition, and at the regular August meeting for the discussion of important topics affecting the welfare of the business there was a very full attendance. The subject of the discussion was: "Does the fact of having always done good and reliable work on the part of a contractor receive its just consideration on the part of the public, and to whom can we charge the faults of irresponsible contractors in a community?"

President Hussey said it was often the experience of an honest, responsible, faithful and competent contractor that he was put up against an irresponsible contractor, and owners, architects or agents would let a contract to an irresponsible bidder for such a small difference as $5 in $5000. Who is at fault? Is not the responsible contractor himself largely at fault? It is because he cheapens himself and his ability, leaving no margin for contingencies and little for profits. His bid is almost as low as that of the irresponsible bidder who never expects to pay his bills The low bid of the responsible bidder elevates the irresponsible bidder almost to a level of responsibility and the owner does not see much difference. Another thing at fault is that architects do not insist as strongly as they should that owners should not have dealings with irresponsible contractors.

Architect Blake said there was a great deal of truth in the last assertion. But many owners seemed to be looking for architects to whom they could dictate and who would submit to doubtful methods. Again, the lien laws foster irresponsible contractors.

Martin Ittner thought the great oversight that allows of irresponsible contractors was that contractors were not held to their agreements. That is where the irresponsible contractor has his own way.

Gustave Andreen said that there was less trouble with irresponsible contractors than with deadbeat owners, for the sub-contractors really put up a building.

Contractor Coots said every contractor had his friends, and the way to do was to always do the first work you could and never take a job unless you can fulfill it. Mr. Coots said in every city, particularly a growing city like Omaha, there would always be irresponsible parties. They are men who drift from town to town and never stay in one town long at a time.

Mr. Woodman thought the architects frequently bid so low that a contractor could not erect a building as solid as he desired.

Several gentlemen combated Mr. Coots' belief, and one said that if the architects bid right there would be no fault finding with the contractors. Mr. Coots arose to say that a full set of plans and specifications must be given to the contractors and then there will be better work and satisfaction to all.

The customary lunch was served at the close of the meeting and was, as usual, enjoyed by all. The committee who have the revision of the building laws of the city have taken a recess for several weeks; but their work will be resumed about the last of the month.

Philadelphia, Pa.

The metal roofers, tin-plate and sheet-iron workers of Philadelphia have been ordered by their union to stop working for a number of contractors who do not conform to the union's scale of wages. The strike is not expected to seriously affect those branches of the business, and is not likely to extend to others. The Master Builder's Exchange is progressing in its usually favorable condition, and its building exhibit department is becoming daily better known as one of the most complete and well conducted collections of building materials in the country.

Worcester, Mass.

The members of the Builders' Exchange of Worcester participated in an excursion to Providence and Narragansett Bay on the occasion of the annual outing. About 150 ladies and gentlemen from Worcester were joined at Providence by a like number, consisting of members of the Providence Exchange and their ladies, and the party took the steamer John A. Morgan for a trip down the bay. At Silver Spring a clam bake was served and most thoroughly enjoyed by all. The committee having the excursion in charge was composed of R. C. Markham, Richard Hayward, William F. Cady, of Providence, and E. B. Crain, W. H. Eddy and C. D. Morse, of Worcester. The admission of ladies as participants in the pleasure was introduced for the first time since the organization of the exchanges.

Notes.

The builders and contractors of Houston, Texas, have formed an exchange mainly upon the lines advocated by the National Association of Builders. The name adopted for the organization was the Builders' and Material Men's Exchange of Houston, Texas. C. E. Jones was elected president, and the other officers as follows: Vice-president, J. J. Clede; secretary, John H. Cato; treasurer, N. Randolph; sergeant-at-arms, D. McMahon. Messrs. James P. Ealy, Dan Crowly and C. E. Jones were appointed a committee to select suitable quarters for the exchange. There were 40 or 50 of the leading contractors, builders and material men present at the meeting, and the active interest manifested shows that the organization starts out on a firm foundation.

Toledo has been rightly called the Workingman's Paradise, and that it is no misnomer is evidenced by the fact that he not only does not have to ask for a holiday, as in days gone by, but is given one without the trouble of asking, and the employers foot the bills. At least that is the era that is being introduced by the individual members of the Carpenters' and Builders' Association. On August 6 Messrs. Bentley, Friend, F. & J. Files, Witzman, Cavanaugh, Arnsman Bros., Sheeby & Dirkman, Jackson, Lee, Brown, Ravel, Malone and others took their employees and their families to Put-in-Bay on the City of Toledo. This is an innovation that cannot be too much encouraged, and the thoughtfulness and liberality of these gentlemen is worthy of all praise. There were about 600 in the party.

The Toledo Builders' Exchange is growing every day and its members are getting a large majority of the work that is in the market. The various trade associations are making the exchange rooms their headquarters, and the entire building interests of the city are gradually centralizing about the exchange.

The following special dispatch to the Boston *Herald* will prove interesting to stone workers:

HARTFORD, CONN, Aug. 11, 1892.

James G. Batterson of this city, who built Connecticut's great marble capitol building and now has the granite contract for the $6,000,000 National Library building at Washington, gives some interesting facts and figures regarding the long strike in the New England quarries. He says that in his own quarries at Westerly, R. I., the strike this season has cost the quarrymen about $150,000 in wages. Their only grievance was that wage contracts were not dated from May 1. The quarry owners were compelled to refuse because they had to make their contracts with customers earlier than that date, and it was imperative that they should know in advance of their contracts just what they would have to pay for quarrying and cutting the stone.

"I made an interesting computation last week," said Mr. Batterson. "It was this: I found the number of granite cutters in the United States and the sums they lose by assessments, dues and lost time. I assumed that they should appoint a trustee and pay to him all their union fees, strike assessments and losses, he to deposit the money at the rate of 3 per cent.

"I found that in five years the Granite Cutters' Union would have money enough to buy out the principal granite quarries, with all their machinery, in New England, and pay the cash for them."

"Do the quarry owners intend to comply with the demands as to the time of making contracts?"

"It is impossible; the leaders boldly say that unless they can strike in the middle of the year, when large contracts are in course of completion, they will have less chance of success. For the same reason the quarry owners say that unless they can know what the work is going to cost they cannot safely make contracts.

"The granite cutters in New England have lost in wages by this strike about $2,800,000. This sum would have purchased half a dozen of the principal plants in New England, with all the cash capital needed for the business, and the strikers would have had something to show for their money.

"A few cents a day contributed by each man would enable them in a few years to buy out the plant and make their own wages without a resort to strikes."

At the semi-annual election August 1 of the Contracting Carpenters' Association of Springfield, Ohio, the following officers was chosen: President, E. M. Arbogast; vice-president, C. E. Miller; secretary, E. M. Crumley; treasurer, W. S Gladfelter; directors, A. M. Jenkins, W. S. Gladfelter and Geo. H. Harris.

There was a little flurry among the painters of New Orleans about August 1. The journeymen boycotted one of the members of the Master Painters' Association and the association notified the union that unless the boycott was raised the workmen in the employ of members of the association would be locked out. The workmen paid no attention to the notice and at the appointed time were locked out, but a compromise was soon effected and the men returned to work.

A committee of the striking stonecutters of Newark waited on the bosses August 12 and notified them that the men had declared the strike off. This means that the men go back on worse terms and work forty-eight hours instead of forty-four per week. Non-union men will not be discharged to make places for the union men. The year is to begin on March 1.

The Song of the Dollar.

The following verses, bearing the title given above and dedicated to William McKinley, Jr., are sent us by a journeyman carpenter signing himself Hank Hand from Sullivan, Ind.:

We've all heard the songs of the "Blue and the Gray,"
And the "Sword of Bunker Hill,"
But the song that I sing is a song of to-day;
It's the song of the dollar bill.
Then a health to the men who labor and toil
And fight in the battle of life,
And shed their sweat and carry the spoil
To parents, or children, or wife.

The Frenchman will fight for the lily,
The Englishman fights for the rose,
And they fight just for fun in the Emerald isle,
The land where the shamrock grows.
The Scotchman will fight for the thistle
That waves from the brow of the hill,
But the war that is waged in this land of the free
Is the fight for the dollar bill.

Oh! the eagle of Rome was a powerful bird
And the eagle of France had its day,
And the eagle that carries our standard aloft
Is a bird that has come here to stay.
But the bird that brings joy to the workingman's heart,
The songster that "beats them all holler,"
Is the venerable fowl on the time-honored coin,
The bird on the "Old Daddy Dollar."

Then hustle around for a dollar or two,
Don't repine if your portion is small,
The man with a million of dollars or so
Can never enjoy them all.
The dollar that pays you full value, I trow,
And the one of which little is said,
Is the dollar you earn by the sweat of your brow
That buys your daily bread.

Oh! It is not wealth or station,
It is not rank or state,
But "Git up and git" and manhood and pluck
That makes men truly great.
We cannot all be rich or great,
Or stand at the nation's head,
But the sinew and bone of this land of the free
Are the men who earn their bread.

Then a health to the jovial hammer and saw,
And a health to the anvil, I trow;
And a health to the brush, the trowel, the spade,
And a merry "God speed the plow."
Here's a health to the mattock, the pick and the bar,
To the mallet and chisel and sledge;
They're the buckler and shield and the weapons of war
To fight the great battle for bread.

HEATING GREENHOUSES.

WE print the following extracts from an interesting address delivered before the Gardeners' Club of Montreal by J. W. Hughes:

There are some good points that every good boiler should possess First, it should have an ample fire box, both in size and depth. This, of course, covers the question of grate area. It should be so arranged as to be easily fired and cleaned; have an ample and easily cleaned ash pit; the flues must not be small or complicated, and be easily accessible for cleaning, because soot "carbon" is one of the best non-conductors known to science, and unless the surfaces are so constructed as to prevent the accumulation of soot on them they must be so constructed that it be the work of a few minutes to clean them, and they must be kept clean if the best and most economical results are to be gained. As much surface as possible must be exposed to the direct glow of the fire. Piling sections one on top of another has its limit of usefulness, as after the smoke and gases have traveled a certain distance they have given off all the heat they contain over and above the heat of the boiler itself. Then they are useless as a heating medium, and the sooner they go up the main flue the better (see Hood, 83). The water spaces must be thin, but every precaution must be taken to insure the freest circulation, because water is a poor conductor of heat, but the slightest application of heat sets up the motion which we call circulation, and when the freest circulation is provided for nature's law of heat, which is motion, can come into free play, and the heated particles of the water at once move off from the boiler, where we do not want them, to the pipes in the house, where we do want them, and where, quickly giving off their heat, they want to travel back to the boiler, and they will do so without fail if you have your boiler and pipes constructed in such a way as to enable them to do so. For this reason I favor 4 inch pipes, as for the quantity of water they contain, and that means heat, they afford the least amount of friction, and friction means loss of power and requires fuel to overcome it, for the power is in the heat; in fact, heat and motion or power are the same thing. For this reason many long and complicated runs are to be avoided, and the fewer bends or angles you have the better. Some, I know, advocate small pipes because they heat up quicker. Well, this is an undeniable fact; but they heat quicker because they are conveying less heat, and for the same reason they cool quicker—not always a desirable thing in our climate. A good draft is an imperative necessity, without it you can have no success. With it you may get excellent results, even with a very poor apparatus. A poor draft, strange as it may seem, is a great waster of fuel, as instead of perfect combustion, and, as a result, getting out all the heat there is in the coal, it merely smolders. You can always check the draft—there is no difficulty about that; but when you cannot get up a white heat in your fire if you want to, there is room for an improvement in the draft. Your boiler should also be constructed of some material that will not be destroyed by standing in a moist place during many months in the year. For this reason cast iron is best, although for other reasons it may not be as good as wrought in some respects. Always put in a boiler having ample capacity, so as not to have to force the firing in any weather. A very important factor in the heating and ventilating of a house is its construction. It is a big contract to "heat all out of doors," and if every pane of glass is leaking at the joint, if the frames do not fit, if the sides are single instead of double glazed, the heating of such a house is difficult and the ventilating almost impossible. But given a reasonably tight house you will have plenty of heat with economy and can work your ventilators so as to get such results as you may require. The question of ventilation is too large for me to attempt to elucidate to-night, but on that let me say a few words. They are—you must have an inlet as well as an outlet. A hole in the roof does not mean ventilation unless you have a corresponding hole somewhere else to let air in. You cannot ventilate a bottle unless you make a hole in the bottom or rig it with some contrivance at the neck that will let air in as well as out.

HOT-WATER HEATING APPARATUS.

My remarks, of course, had reference to a hot-water heating apparatus, as I believe that is the best for a gentleman's greenhouse. It is simple, direct, carries heat a long time after the fire has gone down, requires no special skill in its management, not liable to break downs or breaks, not dependent on pumps, injectors or a constant pressure supply of water; has no safety valves, try cocks, automatic feeder, &c., to get out of order, and has behind it a weight of experience and trial that is important. In making these remarks I am not saying anything in disparagement of a steam plant, which may be, for aught I know, very suitable for heating commercial conservatories where there would be some one in attendance day and night, but even then I should advise that the plant be doubled, the same as is done in newspaper offices, electric light stations and such like, so that when an accident occurs a boiler may be in reserve and ready to put into operation in a short time. Steam-heated greenhouses have been spoken of recently as something new, but it was used for heating greenhouses in 1788 by T. Wakefield, Esq., of Northchurch, England. I know of a greenhouse in this city that was heated with steam 20 years ago. It ran for a few years, when the steam boiler was removed and a hot-water boiler substituted, which contributed not a little to the success of the house and vastly to the comfort and peace of mind of the gardener in charge. The same boiler has ever since been doing good work as a house-heating boiler, the difference being that when any little thing goes wrong in the house-heating boiler necessitating the lowering of steam for a few hours, nothing more serious occurs than a little discomfort to the inmates of the house, while a deprivation of heat for a similar length of time in a conservatory would be disastrous.

PIPE JOINTS.

Another question of importance I may touch upon is the best kind of pipe joint. In my opinion nothing equals the joint made with red lead and hemp packing. It is easily made, durable, perfectly water tight and at the same time has a certain amount of give in it, and when it is desired to make a change it is a simple matter to pick them out. A short time ago a couple of my men removed several hundred feet of 4-inch pipe from an old conservatory, separated it all into lines and had it all piled in the yard inside of two days, and not a pipe or fitting broken. Now with rust joints this would have been simply impossible. Cement and hemp has its advocates, and I have no doubt of its being an excellent joint, but great care must be taken in properly mixing fresh cement every time a joint or a small number of joints has to be made. The great feature about the rust joint is its durability, but I know of no reason why a red lead joint should not last quite as long. The worst scrape I ever got into in the way of a greenhouse trouble was from rust joints. The house had been fitted up in the usual way and did good work without leaks for two seasons, the third the joints began to leak, as they must, in the most awkward places and in the most unaccountable way. The result was I had no end of worry and expense and lost a good customer. I never could account for the trouble except on one theory, and perhaps some gentleman here may throw some light on the question. My idea is that the pipes were emptied and left dry all summer, and the joints became dry and baked, so that when the water was turned on in the autumn the water striking the dried up rust on the inside, a chemical action was set up; in other words, a fresh rusting process was begun, and as the joint was solid on the outside there was no room for expansion and the joints burst. Another trouble with rust joints is their rigidity. In most conservatories some little twisting or settlement will take place, and snap goes your joint or fitting, and it is generally in the most awkward place and season that this occurs. In case of a break down necessitating the putting out of fires, I know of no better or more quickly put in operation plan to keep up sufficient heat to save the plants, if there is no way of setting up a stove, than to get a number of large coal oil lamps and set them burning. They may be set in large tin dishes containing an inch or two of water for the sake of safety; but it is generally possible, if the trouble occurs in daylight, to get up a stove, even if you have to punch out a pane of glass in the roof for the pipe. But sometimes a breakdown will occur in the night or on a Sunday or holiday. In such a case the gardener is all right, provided he has a supply of coal oil and half a dozen or more good big lamps to set agoing. Tubs of warm water set about the house also retard the rapid fall of temperature. For this reason the big tanks of water in the houses are of benefit, as they not only serve as reservoirs of water and moisture, but also of heat.

A Modern Church Structure.

The temple of the Grace Baptist Church at Broad and Berk streets, Philadelphia, is probably among the most remarkable buildings in the world. It contains Sabbath school rooms, dining rooms, kitchens, business offices, boiler room, electric light plant, an armory, reception, reading and library rooms. It has the largest unpaid choir in the world, whose bill for sheet music alone is over $400 per annum. The main auditorium of the temple seats more people than any other church in the country, its present seating capacity being 4108, which can be increased to 4600. Over 9000 people have been known to be present at some of the temple services. Its Sunday school rooms will seat 1500 pupils. In the rear of the lecture room is a dining room with accommodations for 500 people. Opening out from this dining room on two sides are the rooms for the Board of Trustees and Business Men's Union; the parlors and reading rooms of the Young Men's and Young Women's Associations, the kitchen, carving room, cloak room, armory of the Temple Cadets, and through this latter passageway to the engine and boiler rooms. Connected with the temple are no less than 14 organizations, all more or less religious in character, and all eminently successful.

CORRESPONDENCE.

Convenient Tool Chests.

From W. J., *Meadville, Pa.*—I have been a reader of *Carpentry and Building* for some time and have noticed the different methods of building tool chests suggested by various correspondents. None that I have seen thus far suit me as well as the chest which I now have. It is 36 inches long, 24 inches high and 29½ inches wide inside. It is divided into two parts, an upper and a lower, which are divided into small compartments. It will be seen from an inspection of Fig. 1 of the sketches, which represents a section through the chest, that the bottom is divided into five places. The middle compartment is 8 inches high in the clear, while those at the right and left of it are 10 inches high. The chisel rack is also 10 inches high, the partition being made of a 1¾ inch strip notched on the inside against the wall so that the chisels will set in without coming in contact with the wall. The upper portion of the chest is divided into four sections represented by the numbers 1, 2, 3 and 4. A perspective view of No. 1 is shown in Fig. 2 of the illustrations. The space marked "6" is only 4 inches deep and 2 inches wide, owing to the back being set in to make room for the chisels, as indicated in Fig. 1 of the drawings. The space marked "5" is intended for the saw, which is also reached from the top. Nos. 1, 2, 3 and 4 are drawers 4 inches wide in the clear, these being intended for brads, chalk and lines, &c. Next to this box, which is marked "No. 1" in Fig. 1, are boxes 3 and 4. The former is intended for large planes, is 4 inches deep in the clear and has the ends cut out 2 inches, as shown in Fig. 3, so the box will drop 2 inches into the lower portion, as shown in Fig. 1. On top of the plane box is the carrying case or shoulder box, which is used in connection with small jobs and where only a few tools are needed. This box is shown in general view in Fig. 4. The fourth section of Fig. 1, marked "2," is represented in general view in Fig. 5 of the sketches. The space marked "1" is intended for files, No. 2 for auger bits, No. 3, squares; No. 4, twist drills, and No. 5, panel plow bits. These spaces are 2 inches deep and open at the top. Nos. 6 to 11, inclusive, are drawers used for small tools The chest is made of butternut and is hard finished. Each drawer and lid is fitted with a lock and when packed can be rolled over and over without danger to the tools. The handles are on the end, and I have an axle mounted on wheels and so constructed as to hook on to the end of the chest, which enables me to haul it about as I please.

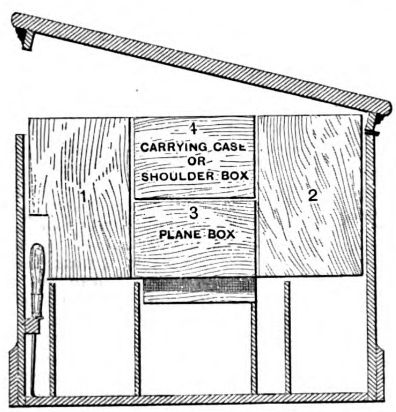


Fig. 1.—End View of Chest.

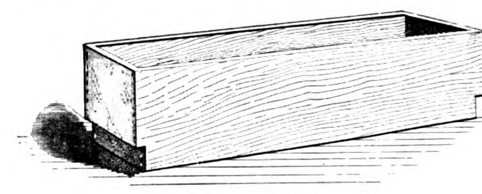


Fig. 3.—Plane Box.

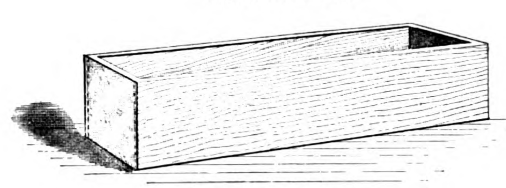


Fig. 4.—Carrying Case.

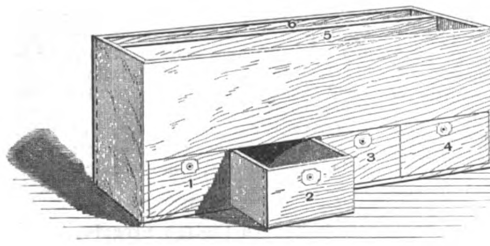


Fig. 2.—General View of Box marked 1 in Fig. 1.

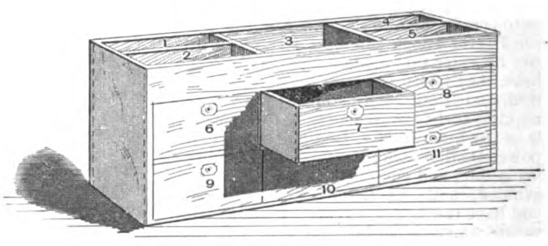


Fig. 5.—Perspective View of Box marked 2 in Fig. 1.

Convenient Tool Chests.—Drawings Submitted by "W. J."

Lengths of Tank Hoops

From SUBSCRIBER, *Hickory Corners, Mich.*—In answer to "E. G. B." whose inquiry appeared on page 179 in the July issue of *Carpentry and Building*, I would say that if the outside diameters of the tank at the top and bottom are given, as well as the distances between the hoops, it seems to me the problem is easy to solve.

Making Blue Prints.

From W. B., *Lansing, Mich.*—Will you please publish in the next issue of *Carpentry and Building* a recipe for making blue prints; also for making white prints with blue lines?

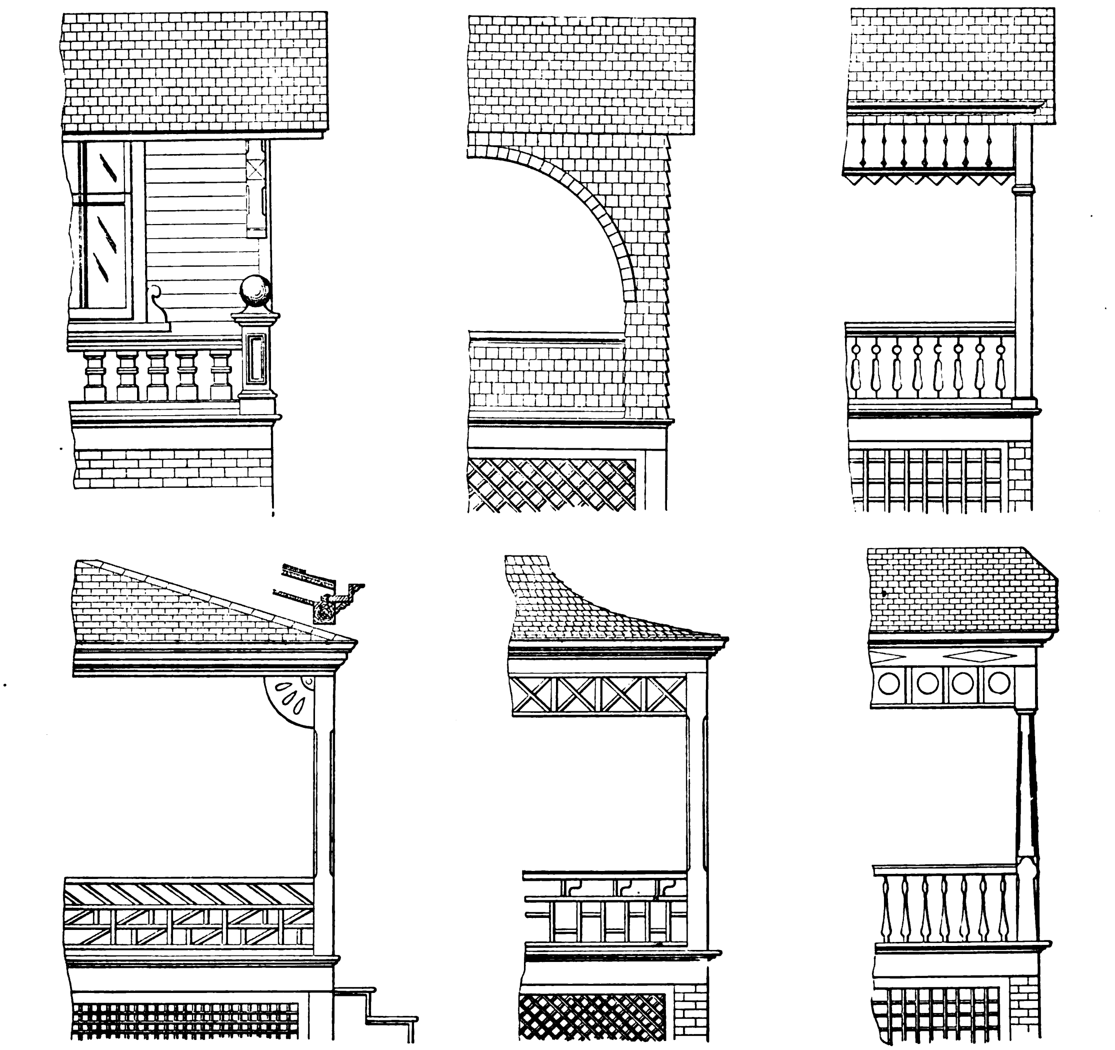
Note.—If our correspondent will refer to page 196 of the August issue of *Carpentry and Building* for last year, he will find a very complete description of the method of making blue prints. We also begin in another part of this issue a serial article treating of the subject in a way to interest our readers. With regard to making white prints with blue lines, we think our correspondent will be successful in adopting the following plan; Make a blue print on very thin paper, according to the process described in the article above referred to, and then by placing a sheet of prepared paper upon this blue print used as a negative, our correspondent will secure a white print having blue lines. There are other processes for obtaining this result, but we think our correspondent will find this a simple one and entirely satisfactory for his purpose.

Advantages of a Knowledge of Carpentry.

From G. M., *New Albany, Ind.*—Nearly every family needs some one who shall be equal to all emergencies, and can fit, make or repair, as the case may be. Happy is the woman who is independent in the use of the hammer and saw, provided she has no male relation as handy as a pocket in a shawl in the use of these implements. A safe knowledge of the use of the hammer and saw can be conveniently stored away for an emergency even if a male relative does exist. It is an accomplishment to be able to put in a screw here, drive a nail there, fix a lock or hinge, or do any of the multitudinous little things which will come up for immediate attention in every home. Saws of two sizes, hammers the same, a plane, a screw driver and a chisel are necessary tools, and in addition an assortment of screws, nails, tacks and a pot of glue. The tools should be kept sharp and free from rust, the latter being accomplished by rubbing them with a mixture of 2 parts of glycerine and 1 part of alcohol. If the tools be very fine use a little more of the alcohol, and if packed in a little coarse bran or well dusted with lime when not in use, they will always remain bright and in good condition. Among the various contrivances which are convenient in houses, particularly where space is limited, is a hinged shelf fitted to the sill of each window. The shelf can be lifted at pleasure and affords a place for the reception of different articles. Small corner cupboards can be fashioned of four or five shelves of different sizes with the edges rounded off. If they are fastened to the wall by brass plates no supports are visible, and they can be stained or varnished according to the taste. These shelves are useful for a variety of purposes. A shelf about 6 inches wide and some 4 feet from the floor, with an edge finished with a molding or a railing, and run about the wall of a dining room, will prove very convenient for the reception of any number of dishes. Boxes can be fitted into window seats, making them very desirable as receptacles for linen or clothing, and if the woodwork of the room is stained, painted or enameled, the boxes should match it in color and ornamentation. At the present time white and gold appear to be the favorite colors for a number of rooms. An ivory room or hall is not difficult to arrange. The tint is a little more creamy than white enamel. Screens, mantel shelves and dado are all painted in this ivory white tint, and if shelves, cupboards and brackets are needed they should be put in before the work of decoration is commenced. According to my mind, a house cannot have too many shelves for the convenience of the housewife. She will find something to put on any number of them from the attic to the cellar, and a woman who can saw a board, plane the edge and with a hammer and nails fix it in place, can, on the average, have more shelves than the woman who is depending upon the carpenter or upon the convenience and good will of some one else to do the work. The gift of handling tools, however, does not belong to every woman. If it comes at all it must be by some effort and practice; yet it can be acquired by constant and persistent effort.

Verandas and Gable Finish.

From L. J. A., *Atlantic Highlands, N. J.*—I send herewith several sketches of verandas which may prove of interest to "Jack" of Ontario, Ohio. I lay no claim to having designed them, but I do not remember having seen any exactly similar to them. I am positive I have never executed any work just as the designs here presented call for. I trust they may be of some use to the correspondent named, if only as curiosities. He need not let any one see him looking at them.



Designs for Verandas Submitted by "L. J. A.," Atlantic Highlands, N. J.

Obtaining Bevel of Jack Rafters.

From W. A. H., *South Bethlehem, Pa.*—I notice in the correspondence from "J. E. S." of Jacksonville, Ill., a rule for roof construction. I like it very much, as it is simple and to the point. I have framed one roof by it with entirely satisfactory results. There is one thing, however, that I would like to have the correspondent demonstrate, and that is the manner of obtaining the bevel of the jacks. I cannot comprehend his meaning when he says: "Take the thickness of the stuff and square across from the plumb cut for the side bevel."

Discussion of Various Topics.

From APPRENTICE, *Freeport, Ill.*—The following thoughts suggested themselves on reading the correspondence in the March number of *Carpentry and Building:* "Why do we not have better workmen?" asks "J. Mc.F." In reply I would say, because the average contractor has one journeyman and five apprentices, and neither boss nor jour. has time to teach them the trade.

The splice of "H. B.," presented in a recent number, should be labeled "Shaky." I do not like a splice that cuts away half the strength of the stick.

The method of finding the dimensions of an octagon suggested by "E. A. P." is of no use to me, as I am short on algebra. Why can we not get it in figures which any one may understand?

"A. J.'s" steel bar is all right, but mine has a pinch at one end and a chisel point at the other.

To find the length of any rafter, whether hip, jack or common, take the run of the rafter on the blade and the rise on the tongue of the square, measure with the pocket rule from one to the other, and the result is obtained. Lay the square on the rafter with the figures representing the rise and run up even with the top edge of the rafter, and mark along the blade for the heel and along the tongue for the perpendicular cut. This plan is just as good for cutting a brace or a leaning post as for the rafter.

I do not like "H. R. McK.'s" method of framing a two-story house. I would much rather have my studding in one piece from sill to plates, with suitable ribbing to carry the second-story joist.

Bevels For a Diamond Spout.

From J. A. F., *McKinney, Texas.*—In the February issue of *Carpentry and Building*, "W. A. L." asks for an easy method of finding the bevels for a diamond spout. In reply to this request I submit sketches which I think will serve his purpose. Referring to Fig. 1, draw A B and at right angles to it C B. Connect C and A, which will be the seat of the spout. Now produce C D at right angles to C A, the hight. Connect D A, which is the length of the spout. Now continue B C to E, making B E equal to C D. Connect E A. Now take E A on one blade of the square and C B on the other and lay it on the straight edge as indicated in Fig. 2 of the sketches. D will then be the bevel required, also the bevel cut across the top and bottom. D of Fig. 1 will be the bevel for the plumb cut.

From F. T., *Findlay, Ohio.*—In the February issue of *Carpentry and Building*, "W. A. L." of Kansas City, Mo., asks for a short method of finding the bevel of a diamond spout. Having had some experience in this line of work I will endeavor to answer his question. In the first place, the holes having been cut from which the spout leads, fasten the end of a fine millwright line in the upper corner—that is, the one which is to be the upper corner of the spout—and stretch the line taut to the corresponding hole where the spout empties. In the next place, find the angle of the line on two sides by the figures on the square, placing the tongue at the edge of the hole and leaning the blade against the line, as shown in Fig. 3 of the sketches which I send. We will assume the figures to be 8 x 12 on one side and 7 x 16 on the other, the figures representing the cuts of the ends of the spout. Next take a piece of ⅞-inch board, about 16 inches wide and 2 feet 6 inches long. Draw a line lengthwise in the center, as indicated by A in Fig. 4. Next take the figures on the square, 8 x 12, as obtained in Fig. 3, and draw the line B for Fig. 4; then take the figures 7 x 16 and draw the line C. After this has been done, draw the line D at right angles to the line A, cutting the lines B, A and C at any point. Now, with the dividers find the distance from the intersection of B A C to the intersection of C D, and at the intersection of A D, as a center, describe the arc at E. Find the distance from the intersection of A D to the intersection of C D, and, with E as a center, describe the arc at F. The next in order is to find the distance from the intersection of B A C to the intersection of B D, and, with the intersection of A D as a center, describe the arc G. Next take the distance from the intersection of A D to the intersection of B D, and, with G as a center, describe another arc at F. Connect F E and G F, and the result is the bevel of a diamond spout. Having employed this method for several years, I find it entirely satisfactory, being short and accurate as well as applicable to a spout of any angle.

Note.—While giving the letters of the correspondents above, we would also direct the attention of our readers to previous communications on the same subject, in which, no doubt, many will be interested. In the issues of *Carpentry and Building* for November, 1888, and February and May, 1889, the subject of the bevels for a diamond spout was treated at considerable length.

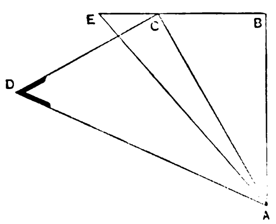


Fig. 1.

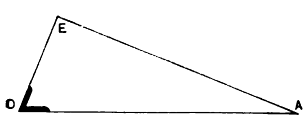


Fig. 2.

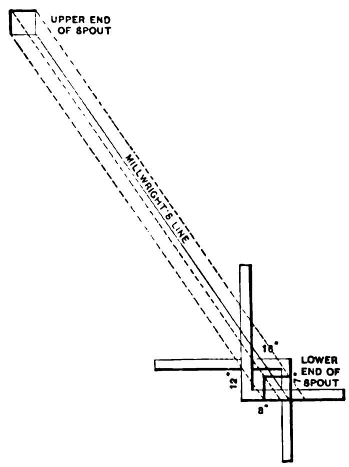


Fig. 3.

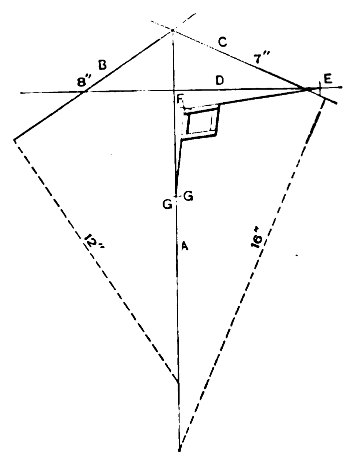


Fig. 4.

Bevels for a Diamond Spout.—Diagrams Submitted by "J. A. F." and "F. T."

The Contractor and Material Dealer.

From DEALER.—I read in the April issue of *Carpentry and Building* an article entitled "Contractor and Material Dealer," in which I was interested. As I am a dealer in building material I will concede that the first statement is correct. We sell one bunch o shingles at the same rate we do thousands. There is only a margin of 14 to 15 cents on a thousand, so there is no chance to cut the price for any one. A man asks the price of shingles, and we do not know whether he wants 15,000 or a single bunch. If he takes one bunch now we look ahead with the certainty that he will want the 15,000, so are satisfied. Now, as to the contractor. A dealer in a neighboring town where the practice of contracting prevails sold out after five years' dealing, having over $1200 of contractors' debts and never obtained a cent of it. I have discouraged that kind of dealing. I tell the owner of a building that he can buy just as cheap as the contractor, and can obtain just what he wants in the way of material. My loss from contractors in 20 years will not exceed $100. The article in the April issue states "if the dealer sells to the owner he deprives the contractor of his margin," or words to that effect. But, remember, I save my margin, and that is the part that interests the dealer. It must be remembered that our lien laws are very slow and cumbersome, and it does not pay to depend on them. Then, again, there is the question as to the average contractor and builder. In the first place, they are not responsible; in the second place, they cannot figure out a full and complete bill, and as a consequence get left, while a very, very few never intend to pay. They would bid very low to obtain the job and then beat the dealer and the owner; so from my standpoint as a dealer I will sell as cheaply to the owner as to the contractor. Here is the way one of my few contract jobs worked: A contractor took a job and asked me to fill the bill, 18,000 feet of lumber. I told him he had it too small, but he was sure he was right. The result proved that it took 24,000 feet of lumber. He saw that he was beaten and so left the job for the owner to complete. It was five years before I received all my pay. If all the contractors were competent to figure on a job and did not become so anxious to obtain the work as to bid below living prices, and all were honest. I would rather deal with them than try to deal with all the peculiarities of owners. I do not claim that all dealers are saints, but when the goods are delivered and are entirely satisfactory we ought to receive our pay; and to my mind the only sure way is to deal with the owners. All this, however, is said from the standpoint of a country retail dealer. I can readily understand, however, that the article referred to would apply to the city contractor and dealer in a very different manner than it would to me.

Grain Elevators.

From S. B. S., *Xenia, Ohio.*—I am working with a company who have to do with elevators, and I frequently have trouble in getting the elevators to work satisfactorily. I should be glad to have some of your readers give me their opinions as to the proper construction of elevators for grain or nitrate of soda.

Design for a Boat.

From L. W., *Grand Forks, N. D.*—As I am a reader of *Carpentry and Building*, I take the liberty of asking a few questions through its columns. I am contemplating a trip from St. Paul, Minn., down the Mississippi River to New Orleans and along the east coast of the Gulf of Mexico to Key West. I desire to ask some of the practical readers of *Carpentry and Building* of the kind and style of a boat best adapted to the purpose. The entire party will consist of four men and the power will be either sail or steam.

The Science of Handrailing.—VI.

From Morris Williams, Scranton, Pa.—In this article I shall take as my examples the problem presented by "Constant Reader," Canada, in the June issue of the paper. He asks for a drawing of a face mold for a rail of the plan shown in Fig. 28. The difficulty of drawing the face mold lies in the necessity of raising the rail 4 inches above the pitch of straight rail, this creating a variation in the pitches, as plainly seen in Fig. 28. I make use of the correspondent's plan in Figs. 28, 29 and 30. In Figs. 28 and 29 the rail is raised 4 inches above the pitch of straight rail, and in Fig. 30 it is raised 11 inches. Each of the three diagrams demonstrates a method of raising or lowering the rail at pleasure. The method exemplified in Fig. 28 does away with the necessity of finding the bevels, as the wreath is located in a plane oblique vertically only. The horizontal trace of this kind of plane is at right angles to X Y, and the minor axis of the elliptical curve of the face mold is consequently at right angles to the pitch plane of the plank or the pitch line of the tangents.

To draw the face mold, first locate the joint in the straight rail at any convenient point. Run the center line of straight rail to the perpendicular line 6 5. From the point of intersection raise 4 inches, which will be the center of the square section of the wreath piece. From the top corner of the square section draw a line to the top corner of the joint at 4, and from the opposite corner diagonally draw a line parallel to this last line till it meets the square joint of the straight rail. The space between these parallel lines will be the thickness of plank required for the wreath piece. From points of intersection of the vertical lines with the pitch line 4 5 draw perpendicular lines as shown. Make 0–1 2 3 equal to 0–1 2 3 on the plan. Draw lines through 1 2 3 and parallel to the pitch line 4 5, until they meet the perpendicular line from the joint 4. These lines form the shank. Extend the center line 2 to the perpendicular from point 5. These two lines will be the tangents transferred to the section. The joints are to be square to the tangents. The line 4 5 is the major axis and the line 0–1 2 3 is the minor axis. The shaded portions are waste wood to be chopped off after applying the bevels, as shown in the diagram.

The method exemplified in Fig. 29 is in accordance with the principles I have endeavored to explain in previous papers. To those who have followed me the diagram is self-explanatory. The lettering on elevation is the duplicate of lettering on plan. Point I on the plan is the center of the quadrant, so also is the point I on elevation the center of the ellipse. The line 1–1 2 3 6 on plan is duplicated in the line 1–1 2 3 6 on the elevation. All the other letters in the elevation bear similar relation to their corresponding letters on the plan. To draw the pitch line of tangents, continue the center line of straight rail till it cuts the perpendicular line 3 3 in point 3. The conditions laid down by "Constant Reader" are to raise the rail 4 inches above this point. Square over from 3 to 4 and from 4 raise 4 inches to 2. Join 2 3, which will be the upper tangent. From point 3 on plan as center, radius 3 4, turn over to 5, raise a perpendicular line from 5 to 8 and join 8 3, which will be the bottom tangent.

The two tangents thus formed differ in pitch and in length, the result being that two different bevels are necessary. To find the bevels draw a horizontal line from point 6 where the miner axis cuts the continued pitch of upper tangent to point 0. From 0 continue to 7, making 0.7 equal to the radius of the center of the rail on the plan. Take 0 as a center, radius touching upper tangent, and turn over to the vertical line 2 2. Join the intersection to 7, and in the angle is the bevel for upper tangent. Again, take point 0 as center, radius touching the line 3 10, which is the lower tangent reversed, and turn over to the vertical line 2 2; join the intersection to 7, and in the angle will be the bevel for bottom tangent. The only difference between Figs. 2 and 3 is in the pitch of the upper tangent. Instead of the rail being raised 4 inches, as in Figs. 28 and 29, it is in Fig. 30 raised 11 inches. A study of the diagram and a comparison between it and Fig. 29 will suffice without further explanation. It strikes me that the last two diagrams may appear to the reader to contain too many lines. My answer is that every line is essential in theory, but when they are properly understood more than half of them can be dispensed with. Before I am done I propose to give a few examples to show the minimum number required when the theory is understood.

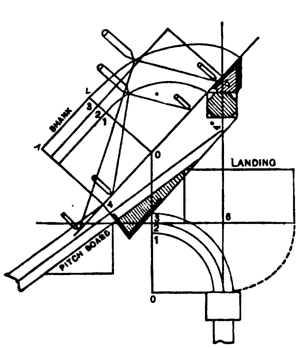


Fig. 28.

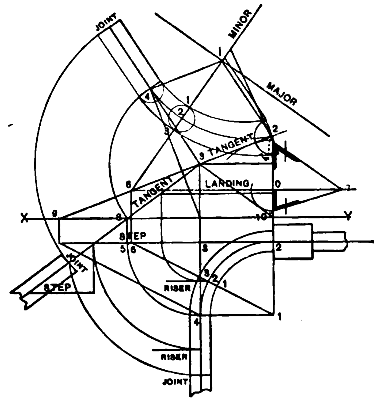


Fig. 29.

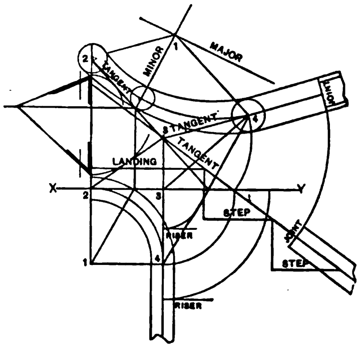


Fig. 30.

The Science of Handrailing.—Face Mold for Stair Rail.

Setting Kitchen Sinks.

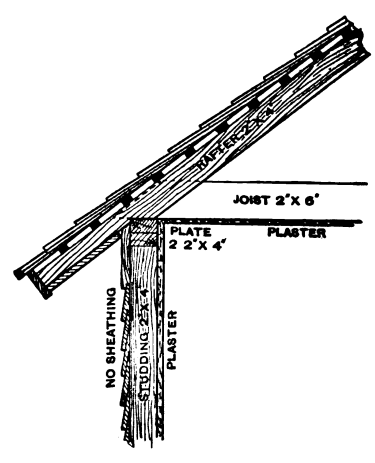
From S. B. S., *Xenia, Ohio.*—I would like to have some of the readers of *Carpentry and Building* tell me the proper hight for setting kitchen sinks in order to secure the best results.

Laying off Degrees of a Circle with the Steel Square.

From L. T. B., *Hamburg, Ohio.*—Will some of the readers of the paper please show me how to lay off the degrees of a circle with a steel square? I once saw a method, but have forgotten how it is done.

Raising an Old Roof.

From W. E. G., *Watseka, Ill.*—I have two roofs to raise, one being large with massive return cornice, while the other is small, light and plain. The smaller roof is to be raised first, and is the one concerning which I desire advice, as I can manage the other by the time I have completed the first job. At present I have had no experience whatever in raising old roofs. The house has been constructed but a short time and seems to be in good condition. It is desired to raise it 8 feet and fill in the second story. I should like to avoid disturbing the cornice. The building is 16 x 24 feet, with 9-foot ceiling, there being a partition 8 feet from one end. The structure has a saddle roof with plain cornice, 12-inch planceer and 8-inch frieze. The sketch which I send will, I think, clearly show the method of framing employed.



Raising an Old Roof.—Sketch Sent by "W. E. G."

Skirting Board for Stairs.

From H. L., *Moorestown, N. J.*—Will some of the readers of *Carpentry and Building* tell me how to lay out and cut a skirting board for stairs with and without winders? I desire to know how to do this in such a way as to make a good, tight job.

FIRE-PROOF CONSTRUCTION.

THE IMPORTANCE of erecting fire-proof buildings is becoming each year more apparent. Architects generally, and real estate owners who have their own and the public interests at heart, are endeavoring more and more to lessen the risk of fire, and are planning and building edifices which are not only beautiful to look at, but which are designed to be perfectly fire proof. Heretofore, on account of the great cost of such construction, only a few of the largest, and those carrying the greatest risk of life or of valuable goods, have been made thoroughly fire proof. The cost, in a great measure, has been owing to the excessive weight of the floors and of the minor partitions, the former usually being constructed of heavy iron beams, filled between with solid brick or with hollow terra-cotta blocks loaded up to or above the top of the beams with concrete, making a weight of from 70 to 110 pounds for each square foot of the floor area, in addition to the weight of the iron beams; and the latter of solid or hollow bricks, weighing, with the plaster, from 35 to 55 pounds for each surface foot of wall. This enormous load of brick and concrete necessitates the use of very heavy beams, and of correspondingly heavy and strong walls and foundations. Nor has this construction proved effective in all cases where it has been put to a severe test. The late large fire in Boston is an example of this.

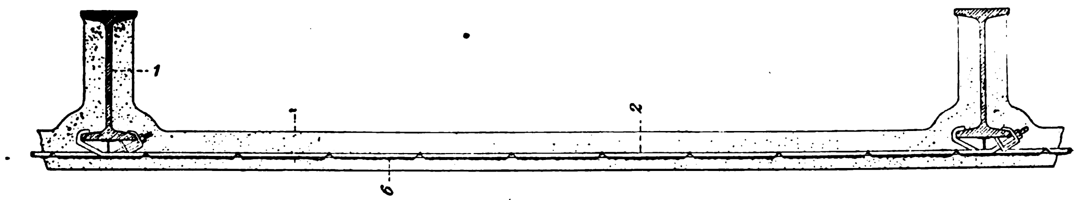


Fig. 1.—Sectional View of Beams and Floor.

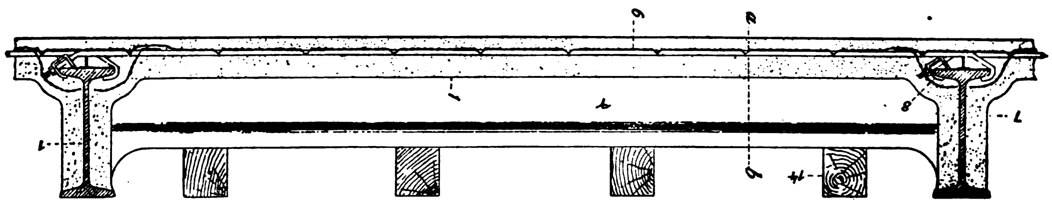


Fig. 2.—Similar to Fig. 1, but adapted to carry Floor and Ceiling Load.

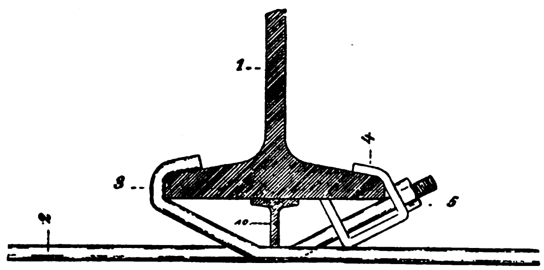


Fig. 3.—Half-Section of 10-Inch Beam.

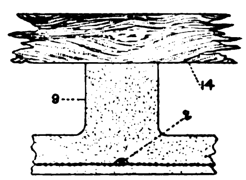


Fig. 4.—Section through *a b* of Fig. 2.

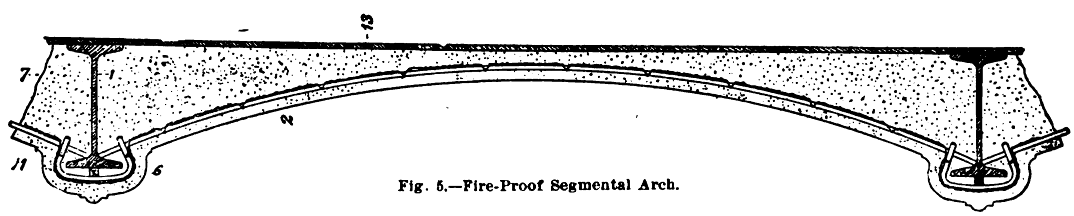


Fig. 5.—Fire-Proof Segmental Arch.

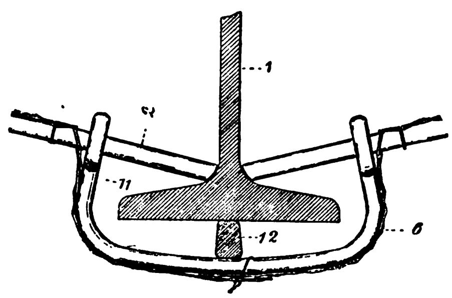


Fig. 6.—Enlarged Section of Beam of Fig. 5.

Fire-Proof Construction.

IRON RODS EMBEDDED IN CONCRETE.

Within the past few years experiments have been made with concrete in the form of slabs and beams, to test its ability to support loads and to take the place of brick arches. The result has been highly satisfactory. Its ability to support great weight without crushing and its enduring and fire-resisting qualities are well known. Its low tensile strength and liability to fail under tensile or transverse strain is also well known, and has hitherto prevented its use in the parts of buildings where tensile strength is required. These experiments have shown, however, that iron may be incorporated with the concrete, and can be depended upon for its full tensile strength under all conditions, provided the iron be well anchored at intervals in the concrete. If not anchored, and a heavy load were applied, the slab would deflect, causing the concrete to crack and open on the under side (probably at or near the center of the slab or beam), the iron all the while slipping in the slab, and the crack opening wider till the mass fell. The iron must be held rigidly in place to insure the best results.

In the following we illustrate and describe a method of fire-proofing buildings by the union of concrete or mortar with iron wire and rods, supported by the beams and studding. This protects the iron beams and permits the construction ling's Sons Company of New York, Chicago and San Francisco.

RESULT OF TESTS.

Following is the result of a few of the tests made with slabs constructed of concrete strengthened by a framework of iron:

each foot of surface between bearings. None of the iron blades broke; the concrete crushed, the slab being so thin that the neutral axis was so near the top that the upper or compressive part or member of the slab was weaker than the iron strips which held the lower member together. The deflection of the slab was about $\frac{7}{16}$

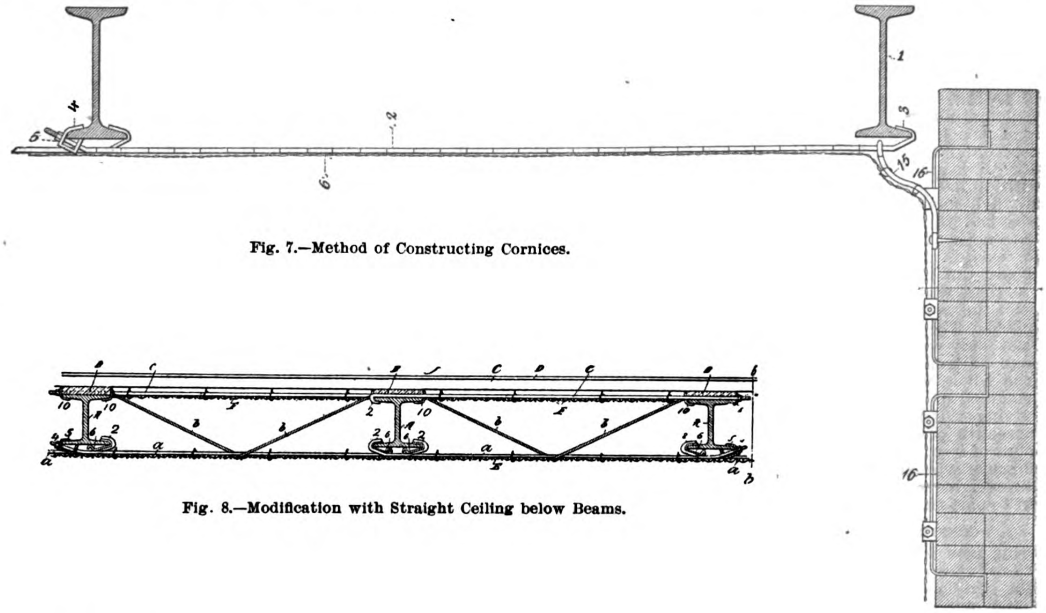


Fig. 7.—Method of Constructing Cornices.

Fig. 8.—Modification with Straight Ceiling below Beams.

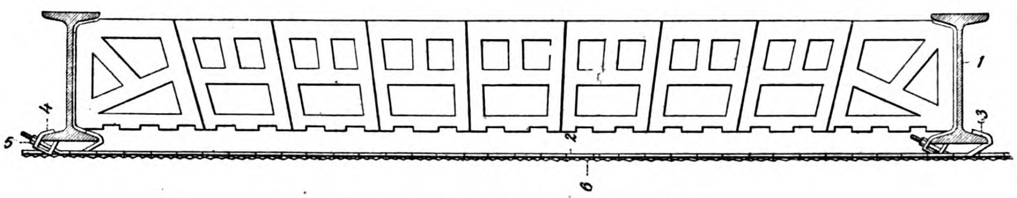


Fig. 9.—Lathing Applied to Beams to make a Ceiling.

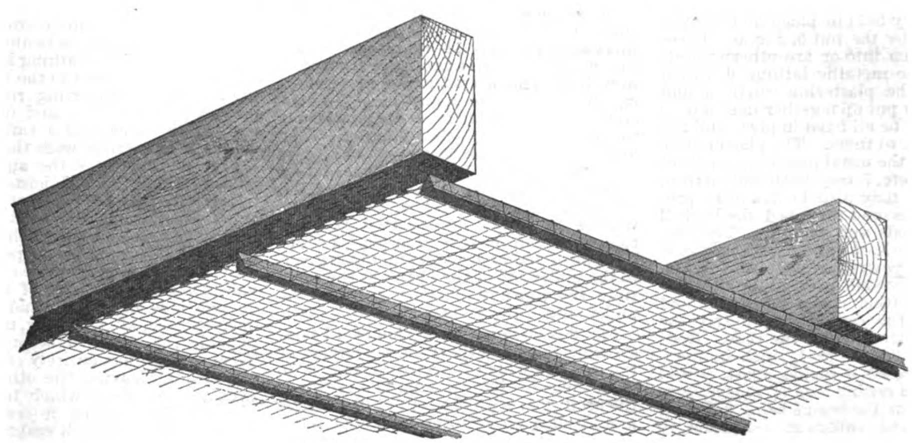


Fig. 10.—Ribbed Lathing to Wood Joists.

Fire-Proof Construction.

of floors and ceilings impervious alike to fire and water and capable of sustaining, on flat arches with spans of from 4 to 8 feet, a load of from 100 to 300 pounds to the square foot. In segmental arches made by this method the safe load would only be limited by the strength of the beams and of the walls. This material is manufactured by the New Jersey Wire Cloth Company of Trenton, N. J., and is put on the market by the John A. Roeb-

One slab, 12 x 24 x $1\frac{5}{16}$ inches thick, made of one part Portland cement to one part coarse sand, and having five strips of flat iron $\frac{1}{8}$ x $\frac{5}{8}$ inch running lengthwise through it, the strips being punched at intervals to allow wires $\frac{3}{32}$ inch in diameter to pass through for anchors, the iron frame being imbedded near the bottom of the slab, which rested on 1-inch bearings, broke with a center load of 2750 pounds, or 3000 pounds for

inch before it broke. Age of slab, 41 days.

Another slab, 54 x 54 x 3 inches thick, was constructed in a similar manner, but having 19 iron strips $\frac{1}{8}$ x 1 inch punched for $\frac{1}{4}$-inch wires. Composition of slab, one part cement, two parts sand. It was supported by bearing 3 inches at each end. This slab broke with a load of 36,375 pounds, equal to 2000 pounds per square foot. Deflection, $\frac{5}{8}$ inch. All the iron strips broke on line of the wire nearest the center. Age of slab, 62 days.

Another experiment was made with a beam 7 x 14 inches in section and 10 feet 6 inches long. Through this, near the bottom, and running its whole length, were seven vertical blades; three were $\frac{1}{4}$ x 1 inch, and four $\frac{1}{8}$ x 1 inch, anchored with $\frac{1}{4}$ inch rods passing through holes in the blades. The composition of beam was cement, 1; sand, 1, for the 4 inches at top and bottom; and cement, 1; sand, 2, for the 6 inches of center. The beam was supported by 9-inch bearings. The weight required to break it was 53,654 pounds, all of the longitudinal blades breaking on the line of one of the cross wires. Deflection before breaking, $1\frac{3}{16}$ inches; deflection with load of 40,000 pounds, $\frac{3}{8}$ inch; with 20,700 pounds, $\frac{1}{16}$ inch. Age of beam, five months. Had these last two slabs had the whole benefit of the tensile strength of the iron blades the concrete would no doubt have been crushed and the blades would not have parted, as there was iron enough to have stood twice the weight had it been properly applied. The holes made in the blades not only weakened them by the percentage of iron removed, but transferred the whole weight of the mass to what remained of the blades below the holes, giving them less than half the actual strength of the iron. Had half the amount of iron been used in the slabs in the shape of wire and rods rightly applied, the weight would not have been sufficient to part them.

CONSTRUCTION.

Referring now to the drawings, Fig. 1 is a sectional view of two of the supporting beams of a floor, showing the ceiling construction and beam protection. The ceiling is attached to the beams 1 by rods 2. These rods are preferably made of hard-drawn iron or steel; at one end a hook, 3, is made to conform to the shape of the flange around which it hooks; the other end is screw-threaded; they are made long enough to reach from one beam to a little past the adjacent one, and are held in place by the hook 3 and by the clip 4, through which the rod passes, and which is made to hook around the flange of the beam, and is also arranged to offset the rod from the under side of the beam to provide an air space between the plaster and the beam. The clip is securely held in place and the rod drawn taut by the nut 5, Fig. 3. These rods are woven into or are otherwise attached to the metallic lathing 6, which constitutes the plastering surface, and may be either put up together in sheets or the rods may be all fixed in place and the lathing laced to them. The plaster may be put on in the usual manner, or a thin coat of concrete, 7, may be spread on from above. This may also be made to protect the beams and to imbed the hooked end of the rods and the clip. This imbedding of the hooks and clips would give the rod more power to resist tensile strain, as the concrete would prevent the straightening out of either under the strain, and would give the ceiling very nearly the full tensile strength of the rods. Rods made of No. 3 wire, or $\frac{1}{4}$ inch in diameter, and spaced 9 inches apart, would carry safely a ceiling load of 75 pounds to the square foot (the beams being 6 feet on center) without sufficient deflection to crack the plaster. If concrete were used in the construction, spread on from above, a finishing coat of plaster could be applied below, or the concrete could be smoothed off to give a finish.

Fig. 2 is of similar construction to Fig. 1, but is adapted to carry the floor load as well as the ceiling load. In Fig. 1 it will be noticed that the rods are the principal support of the ceiling, the wire lathing giving no supporting strength whatever. By carrying the ends of the sheets of lathing over the upper side of the lower flange of the beams, as at 8, Fig. 2, and imbedding them in concrete, there is added, when the concrete has become hard, the tensile strength of the longitudinal wires to the strength of the rods. The wires, however, depend entirely upon the concrete for the strength they add to the supporting rods. As has been noted in tests made with slabs, the thin slabs broke by the crushing of the concrete, and the thicker ones by the parting of the iron. This, Fig. 2, illustrates a method whereby the crushing strength of the concrete is made equal to, or greater than, the tensile strength of the wires and rods by the use of a minimum amount of concrete. The lower member is made of sufficient thickness to thoroughly imbed the rods and the wire lath and to lap well over the flanges of the beam, and is built up so as to fill between the flanges to protect the web. From this lower member are built up a succession of ribs, 9, at 2, 3 or more feet apart, as may have been determined upon (the ribs being easily and quickly made by placing light wood formers in position and pouring the concrete between), the width and depth of the ribs being determined by the amount of resistance to compression required.

Fig. 4 shows a section of this rib, with the wire lathing and one of the supporting rods imbedded in the concrete, and one of the scantlings, 14, to which the floor is nailed resting on the top of the rib. The scantlings may either be laid at right angles to the ribs, as shown, or at right angles to the iron beams, the scantlings resting on the ribs with their ends wedged under the flanges of the iron beams to hold them in place.

Fig. 3 shows a half-size section of the lower half of a 10-inch beam with the supporting rods in position. The attaching clip 4 is more distinctly seen; and the manner of holding the rods offset from the beam, against the strain of the screw, by inserting strips or pieces of light T or other shaped iron, is shown at 10.

FIREPROOF SEGMENTAL ARCHES.

Fig. 5 shows the system of fire-proofing in the construction of segmental arches. The rods 2 are cut the required length to reach when bent into the required curve from web to web of the adjacent beams, their ends resting upon the flanges at their junction with the web; they are then either inserted between the meshes of the wire lathing 6 or otherwise attached to it, and the sheet, which would be 3 feet or more in width, would be bent to the curve required and sprung into place. A succession of these sheets placed side by side would fill the entire space from wall to wall, making a continuous network of iron wire and rods upon which the concrete could be spread from above without the usage of any other support. The lower flanges of the beams would be covered by the wire lathing, attached to a succession of rods, 11, hooked over the arched rods 2, and held in place by the wedges 12, which are inserted between the beams and the rods. The plaster could be applied and an ornamental finish given to the underside of the beams at the same time the finish was being given to the under side of the arches.

Fig. 6 is an enlarged section of a beam, showing more clearly the arrangement of the rods to which the wire lathing is to be attached. By carrying the crown of the arch even with the tops of the beams and leveling up with the concrete a foundation is made upon which to lay tile floors, 13; or it may be arranged as in Fig. 3 for scantlings and a wood floor by making a flatter arch, so that the crown will be a few inches below the tops of the beams, and the scantlings laid on ribs of the concrete level with the crown and extending to the beams. The concrete at the crown of the arch in either case need not be more than 2 inches thick.

Fig. 7 illustrates the method of constructing cornices and of applying the ribbed lathing to the outer walls of buildings so as to leave an air space between the wall and the plaster. For the cornice is used a succession of light rods, 15, one end of which is attached to the rod 2 by a hook or an eye, and the other end to the wall by a nail with a washer under its head, the nail passing through a hook or an eye in the cornice rod and into the mortar between the bricks. The wire lath is then bent to the form of the rods and laced to them. In preparing the wall for the lathing a series of strips of flat iron, 16, is anchored to the brick work. They are spaced from 3 to 6 feet apart, as required, and are built in a regular line up and down the wall, care being taken to have the row at the corners at least an inch from the corner to give room for the hooks and clips of the supporting rods 2. The rods 2 are attached to the strips 16 the same as to the beams in Figs. 1 and 2, but they are not offset, the strips 16 giving all the offset required to secure an air space.

Fig. 8 is one of the modifications in the application of the ribbed lathing. This figure shows a method of construction with iron (or wood) beams, whereby a straight ceiling is made below the bottom line of the beams, and a still further protection to the floor is obtained by a plastered surface extending from beam to beam, even with or above the top of their upper flanges. A, A, A are the beams, B planks resting on them and held in place by pieces of iron bent to about a right angle, a hole having been made in one of the angles through which a nail or spike may be driven into the edge of the plank; they are put on at intervals, one angle passing under the flange of the beam, as at 10. C shows the floor planks and E the floor boards; *a* is a supporting rod for the ceiling and E the wire lathing attached to it for a plastering surface; *c* and F show the plastering surface on the line of the top of the beams; *b*, *b* are supporting rods or wires, which may be used in very wide spacec to prevent any sag midway between the beams; they may simply pass over the beams and under the rods, as shown in this figure, or they may hook over the flange of the beam and into the rod.

Fig. 9 illustrates the lathing as applied to beams to make a ceiling where common or hollow brick arches, either segmental or straight, have been made to fill the space between them. Many architects will not allow a ceiling to be made directly on the bricks on account of the liability of the plaster to drop off or become filled with unsightly cracks. In such cases a series of angle irons are bolted to the under side of the beams. To these angle irons the wire lathing is laced, and the plaster is applied to the lathing. By the use of the supporting rods about 50 per cent. of the cost and delay of this method is saved, and a safer and truer ceiling is made than with the angle iron.

Fig. 10 illustrates the application of ribbed lathing to wood joists. The ribs, in this case may be made of round iron, or of sheet iron cut into strips about 1 inch wide and bent into V-shape, longitudinally. The rods or strips are woven into the meshes of the wire cloth at intervals of $7\frac{1}{4}$ inches. Half of the wires are on one side of the rib and half on the opposite side, alternatively, making it impossible for them to become detached. These ribs project entirely on one side of the lathing, leaving the other a smooth, even surface upon which to spread the plaster. The lathing is secured to the wood by staples which embrace the rods and are driven into the joists or studding, if solid round rods are used; or if V-strips are used, by nails driven through the strips and into the wood, or by staples over the strips.

(*To be continued.*)

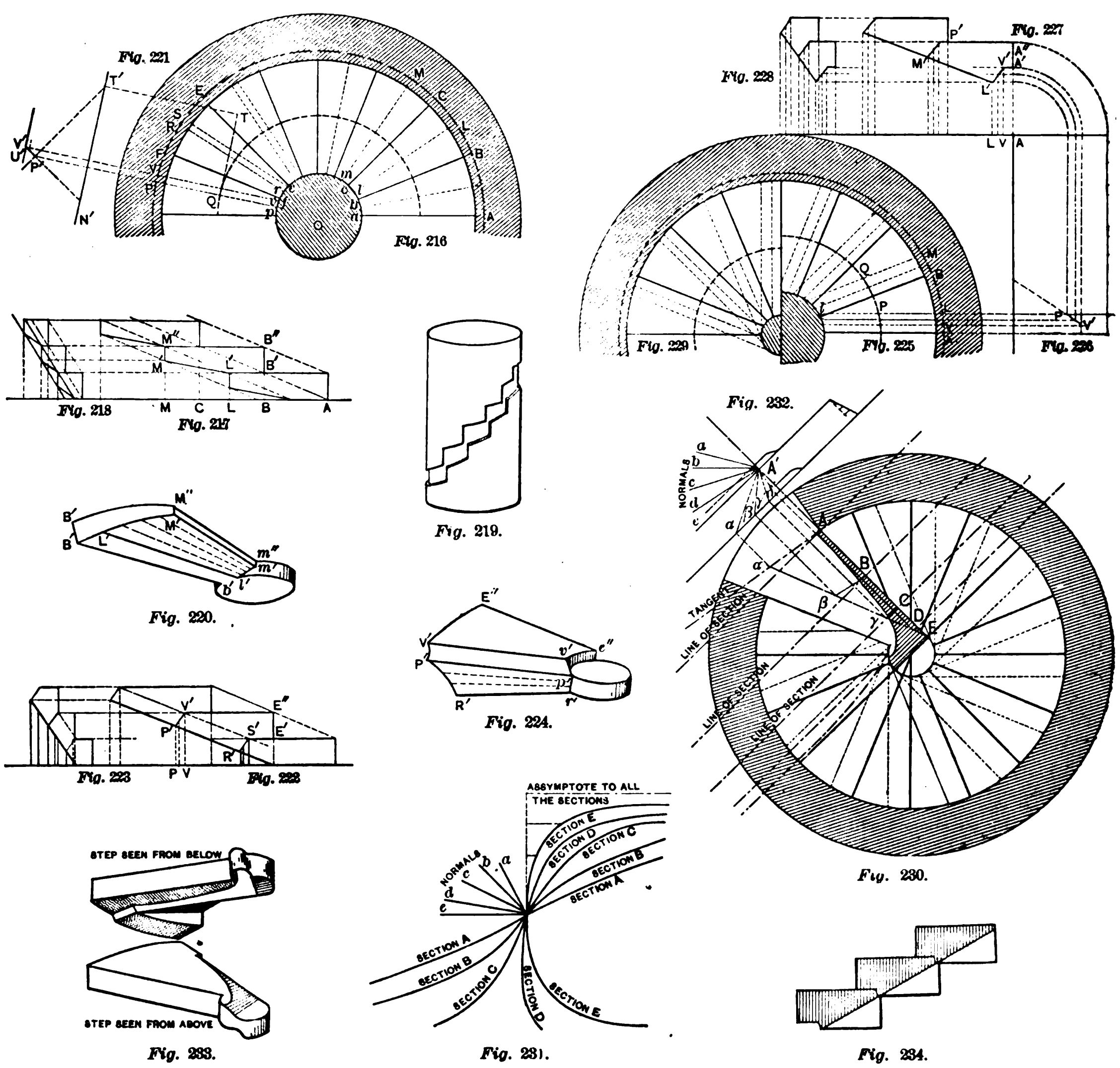
BAMBOO SHEETING is a new Chinese manufacture, which is extending in the province of Wenchow. The cane is split up so as to form a sheet, which, after being softened in boiling water, is pressed out flat. The sheets, says an exchange, are used for veneering, making trays, fans, screens and carved fretwork.

MASONRY AND STONE CUTTING.*

CIRCULAR STAIR WITH SOLID NEWEL.

HERE the stairs are circular in plan, and instead of an open well hole, there is a circular pier in the center in which the end of the steps are notched, as in Fig. 216, or which is formed by the end of the steps themselves, as in Fig. 230. As the width of these kinds of stairs does not usually exceed 8 feet between the central pier or newel and the exterior wall of the stair-step converge to the center of the stairs, and the steps are simply placed one above the other, without any rebate at the joint. The back of the steps may be either left square, as in several of the circular stairs in St. Paul's Cathedral, London, or the under side of each step may be worked off, as in Figs. 217 and 218, when the developments of the steps along the outside wall and the newel are shown. In the latter case the spirals on the soffit de-

The joint P p is convergent to the center of the staircase, and the soffit forms an helicoid exactly identical to that which comprises the upper arrises of the steps, but placed at a lower level. It is evident by Figs. 222, 223 that if the joint were to be made normal to the soffit it would have to be a twisted surface; but in Fig. 221 the joint is made plane, and is only normal to the soffit in the midpoint Q. The construction for finding the normal in Q



Masonry and Stone Cutting.—Figs. 216 to 234 Inclusive.

case, the treading line is taken half way between the wall and newel. This treading line will be divided into a certain number of treads according to formula given in a previous issue. But in selecting the width of the tread especial care should be taken to obtain a clear headway of at least 6 feet 6 inches between the treads of the steps below and the soffit of the steps above. Usually, the division of the stairs into 16 steps per convolution will be found convenient.

There are several way of forming the steps, according to circumstances. The simplest is the one shown in Fig. 216, where both the riser and the back of each

* Continued from page 202, August issue.

velop along straight lines. To work the surface of the soffit, the outer spirals, Fig. 217, and the inner spirals, Fig. 218, are divided in an equal number of parts and then are connected respectively by straight lines.

The steps may be simply notched into the newel, the outline of the notches, Fig. 219, being obtained by winding on the newel the development, Fig. 218, or each step may comprise a section of the newel, as in Fig. 220.

Instead of having a stepped surface for the soffit of the stairs a continuous surface is often used, as in Fig. 221, of which Fig. 222 is the development along the wall, and Fig. 223 the development along the newel.

is shown on the left-hand side of Fig. 221. The length of the two steps of the treading line is developed in Q T. Taking an elevation parallel to Q T we have P′ at the level of two risers above the ground line. This allows us to draw the inclination of the tangent P′ T′ and the normal P N′. The normal is cut in V′ by the tread of the step.

On the developments along the wall and along the newel, Figs. 222, 223, the joint appears as a segment of an ellipse, for it is there the intersection of cylinders by a plane not parallel to their center lines. To get these curves, an intermediate point is found, as shown in Figs. 221, 222.

Here, again, the steps may comprise a slice of the newel; but, as each slice of the newel must be of the hight of the riser E' E'', Fig. 222, it follows that the portion of the step forming the joint S' R' would be below the slice of the newel. As this proportion would present a very sharp angle next to the newel, Fig. 223, the lower plane of the newel is kept at the level of R', and the upper plane of the newel is dropped below the tread of the step, as shown in Fig. 224.

In both the former modes of constructing the steps there is a narrow strip of stone where the step joins on to the newel, which is a cause both of weakness in the step and of waste of stone in the working thereof. To avoid this defect the steps are usually made as in Figs. 225 and 229, where the joint does not converge to the center of the stairs, but runs parallel to the riser of the step immediately above it. Such is, for instance, the form of the steps of several of the circular stairs in St. Paul's Cathedral. In Fig. 225 the steps are shown housed in a central pier. In Fig. 229 each step comprises a slice of the newel, which is so narrow that the joint line of the step is tangent to the cylinder of the newel.

Now, in the construction adopted in both Figs. 225 and 229, it is clear that the surface of the soffit of the stairs does not resemble the helicoidal surface which comprises the upper edges of the steps, but it is a surface of quite another character. The soffit is here generated by a horizontal line, which moves in contact with a spiral identical to the treading line, and has to remain also in contact with a vertical cylinder, the cylinder which forms the newel of Fig. 229. When the step is housed in a central pier, as in Fig. 225, the joint may be plane, so as to be normal in the point P. But a plane joint, as shown in Fig. 229, will give very bad results.

To find out how this joint should be formed, cut the soffit of the same kind of stairs, Fig. 230, by vertical planes in A, B, C, D, E at right angles with the joint, and you will obtain the curves shown in Fig. 231. Now, in considering these curves, it is evident that the joint at E should be horizontal, whereas at the other end of the step in A it should have the very steep inclination of the normal *a*. This shows that the joint must necessarily be a twisted surface.

To determine the surface of the joint, produce a paraboloid formed by a horizontal line sliding on the tangent to the spiral along the soffit in contact with the wall in A, and sliding also on the vertical line E of the cylindrical newel. We know that this paraboloid will be in perfect contact with the soffit all along the joint A E (that is, the soffit and the paraboloid will have the same tangent planes in every point of the joint line); then, of course, the normals to both the soffit and the paraboloid will be identical. These normals are *a b c d e*, Fig. 232, and their intersection with the plane of the tread of the step gives the curve shown on plan. When the curve reaches the circumference of the newel, the intersection of the cylinder of the newel with the normals of the joint is drawn as shown in the development, Fig. 232. These lines are then drawn on cardboard molds, which serve to delineate them on the stone step. The form of the step may be perhaps better understood by the views given, Fig. 233.

The author begs to add that a staircase formed of 16 steps was constructed according to this design by the Upper Class of Masonry at the City and Guilds of London Institute, and the steps were quite as easily and rapidly worked as those with plane joints. The author can therefore recommend this construction as the most practical as well as the best construction of circular stairs where a continuous soffit is required.

Merely as an interesting point in geometry, it may be observed that the intersection of the plane of the tread with the surface of the joint is an hyperbola. The joint is simply the same paraboloid as the one tangent to the soffit, turned round one-quarter of a circle. The guiding plane of the joint is therefore vertical instead of horizontal; and, as we know, the sections of the paraboloid by planes at right angles with the directing plane are hyperbolas.

IMPORTANT PRACTICAL OBSERVATION.

When the steps of circular stairs comprise a slice of the newel, and are housed deep into the staircase wall, it is very important that the wall be built of freestone of the same hight of bed as the steps themselves; otherwise the wall of the staircase will settle more or less than the newel, and in that case the steps will be broken at their narrowest end near the newel. If the outer wall of the staircase is to be built in brick—say as a turret to a brick building—the steps should be simply housed a few inches in the outer wall, and should be built after the wall of the turret has had time to settle. If it be desired that the steps go through the wall, as shown in Fig. 230, then the outside of the turret should be decorated with pilasters or chains of freestone, which will practically support the ends of the steps, the brick work being a mere filling of the panels within these features of freestone. Lastly, the same result may be obtained by using cement instead of mortar, for in that case there will be no settling.

As it is important that the newel and the outer wall be submitted to the same pressure, it follows that if a turret containing a circular staircase has to be covered with a stone vault, that vault should bear equally on the newel and on the exterior wall.

The Architecture of Arabia Felix.

The city of Sanaa, the capital of Yemen, contains, it is said, about 150,000 inhabitants. It is a town of extreme antiquity, and was, before the time of the prophet Mohammed and before even the Christian era, one of the strongholds of the ancient Himyar race, who have left in the surrounding hills, and within a few hundred yards of the city itself, abundant proofs of their presence in the form of ruins and cave tombs. In the early annals of Mohammedan history, says a writer in the *London Times*, we read of it as a city of great importance, even in the time of Abu Bekr, the immediate successor of the Prophet. The town is situated on the great Yemen plateau at an elevation of 7600 feet above the sea level. It is surrounded by walls of stone and mud, which, although they would offer but slight resistance to any organized force, are sufficient to withstand the attacks of the Arabs, who do not, or did not at the time of the siege, possess any cannon. To the east of the city is Gibel Negum, rising to a considerable elevation, a bare, rocky mountain completely overlooking the town below. On a spur of this mountain at a slight elevation above the plain on which the city stands is the Turkish fortress, strongly built of stone. From this fortress the city extends to the west in the shape of a fan, the whole forming a triangle of which the kasr, or castle, forms the vortex. The Jew's town is divided from the Arab quarter by a deserted strip of ground, and, although they are allowed to pass freely in the city and to own shops, they are confined to their own quarter at night. The architecture of Sanaa is peculiar to Yemen, and exhibits probably one of the purest forms of early Arabic style. The houses are high, often four stories, the lower part built principally of stone, the upper stories being composed of brick. The stone is often arranged in lines of different colors running parallel with the ground, and no doubt this exhibits the origin of the painted, striped houses of Egypt and elsewhere. The brick work, too, is arranged so as to form geometric designs. The windows are long and narrow, the lower portions made to open with "musharabiyeh," or trellis work, the upper filled in with slabs of alabaster or arabesques in plaster and colored glass. The use of alabaster is very ancient, and the light admitted through the semi-opaque stone gives a very pleasing effect. The streets, with the ex-ception of one or two, are narrow and dirty, but there are frequent open spaces about the town. There are several mosques—one, the largest, a plain square court, partly roofed and inclosed with a high stone wall, and possessing two rather dilapidated minarets. The Turkish Government erected some years ago, during the governorship of Ismail Pasha, a mosque in the style of those of Constantinople in front of the Government buildings. The bazaars consist of a great semicircle of low buildings, divided and subdivided by small intricate streets, on to which look the shops, for the most part small booths. The principal manufactures of Sanaa are woven silks and arms, the silver work of the latter being exceptionally good. The town, spread out like all Oriental cities, covers a great acreage, but, with the exception of the suburb of Bir-el-Azab, in which are many gardens and country houses, the whole is surrounded by the stone and mud wall mentioned above, while, to render the defenses still more strong, towers are erected every 200 or 300 yards at a distance of about a quarter of a mile without the city. On these towers, since the relief of the place, the Turks have erected guns. Such then, briefly, is Sanaa, a city in a plain, triangular in form, overlooked by Gibel Negum. It was on this mountain that the Arabs massed their forces, and continued day and night to pour into the city the contents of their guns and rifles.

CONTENTS.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
The Builders' Exchange.
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Employers and Workmen.

A recent correspondence between the secretary of the National Association of Builders and the general secretary of the United Brotherhood of Carpenters and Joiners has developed the fact that the means advocated by each organization for the adjustment of differences between employers and workmen are not so widely different as they might seem. The system of apprenticeship adopted by the Mason Builders' Association of Boston under the recommendation of the National Association of Builders was favorably commented upon by the secretary of the Brotherhood, as was also the agreement between the same association and the stone masons', the bricklayers' and building laborers' unions, which was secured through the establishment of a joint committee of arbitration between the employers and workmen in these branches of the mason business. The secretary of the Brotherhood said, in alluding to the importance of amicable adjustment of affairs between employers and workmen in this connection, that he thought "if employers and workmen would meet each other in a reasonable spirit, they might by conciliation and negotiation accomplish much more than by standing apart in hostility to each other." It is undoubtedly the fact that by conference and conciliation, by equal consideration on either side, much more beneficial and permanent results can be obtained than now prevail where settlements are affected for the sake of cessation of hostilities, and where one side or the other is forced to unconditional surrender. Those who think upon the subject and who are not biased by personal prejudice recognize the importance of the prevention over the cure of disturbances in the field of labor.

The Value of Example.

Another good example has been set for the builders of the country by the Builders' Association Exchange of Buffalo, in the new home which that organization has just dedicated. This exchange has again demonstrated the feasibility as well as the desirability of placing an organization of builders upon the same plane among the institutions of a city as the Chamber of Commerce and other similar bodies. The value of examples of this kind is very great, and they are practical indications to the builders' exchanges in every large city in the country of what can be done and of the result which follows such action. The Buffalo builders profited by the example which was shown to the delegates to the fifth convention of the National Association in the exchange at Philadelphia, as have also the builders of Milwaukee, and they in turn are offering a newer example to the associations in other cities. These exchanges are teaching the lesson that the craft is bettered by assuming, in the public eye, a position of importance equal to that of any other commercial pursuit, and while they are benefiting themselves, they are also benefiting every community of builders in the country by the influence of their example. The public is quick to recognize the energy of an organization which successfully undertakes the erection of a building to be devoted to its own use. By the same token, the public looks anew at the men composing such an organization, but who have previously been scattered about the city, lacking the attention which identification with conspicuous and successful organization commands.

Boston's Board of Appeal.

The recent passage of a new building law for the city of Boston establishes a board of appeals, to which the contractor or the owner of a building may appeal from the decision of the inspector. The conditions mentioned in the law under which appeal may be taken from the building inspector's decision are, refusal to grant permit for building, the incurring of expense by order of the inspector, and injury to value of property by work to be done under permit from the inspector. The action of the board is to be binding upon the inspector. The board consists of three members, one appointed by the mayor of the city, one architect and one builder appointed by local organizations of architects and builders, with the approval of the mayor. In the several cases which it has been already called upon to adjust its action has been very satisfactory. One of the principal objects in the establishment of the board of appeals was to provide a means for the settlement of questions affecting the decision of the inspector of buildings by a committee of experts without the delay and expense of proceedings at law. The advantages of the existence of such a board are manifest and have already demonstrated the wisdom of its establishment. The method of selection of the members of the board insures the appointment of persons fully qualified for the work and also insures perfect impartiality. Some fault has been found with portions of the new law which relate to the character of the materials which must enter into the construction of new buildings and the requirements under which buildings must be constructed, it being alleged that the cost of building has been increased. It was the purpose of the commissioners who framed the law to establish such requirements as would provide better security from fire waste and insure the erection of only the best class of buildings in the business districts of the city.

The Origin of Buildings.

The origin of buildings is a matter of considerable interest to all students. It has been very generally assumed that wood supplied the first means by which the primitive man formed a shelter to himself as a protection from the weather. A very slight consideration of the subject, however, brings to the mind the possibility that this all depends upon where the primitive man found himself. If he lived where trees were scarce, it would seem that some other material must have been resorted to. Besides, those who began their architectural style with branches of trees could not have made any advance until some kind of implement was invented by means of which the wood could be cut and fashioned. This would seem to bring the beginning of wooden structures down to the Stone Age, when stone tools came in'o use. And this, as the geologists tell us, is a comparatively late one in man's history. William Simpson, an English specialist, in discussing this subject in view of researches through Persia and other Eastern countries, comes to the conclusion that mud as a building material preceded wood. By mud he includes sun dried bricks. When bricks have been burned in the fire the material becomes entirely changed and ceases to be what is designated by the term mud. Therefore he excludes them from consideration. Wet earth, on the other hand, made into blocks and dried in the sun differs in no way from a layer of the same earth laid on a wall. Both methods of building, he asserts, were used in the East, and in many cases are found combined in the same building. The reason for this is easy to discover. A layer of 2 or 3 feet thick must be allowed to dry and consolidate before another is placed on it, because the weight above would press out the soft material below, and the whole would tumble down. In some localities, he asserts, a layer of mud is put down at the commencement and while that is drying bricks are made to be placed above.

Mud Architecture.

Referring to mud architecture and contrasting the idea of mud building preceding wooden structures, the writer directs attention to the fact that the mud builder required no tools. His unaided hands were sufficient for every purpose. The primitive builder may have been content at first with the inclosure formed by four walls, but a covering of grass or reeds would soon suggest itself, and these, although rude and primitive, would finish the first complete human habitation. But more than that, it would be the beginning of the "house," the "home," which, from the relations and associations it produced, must have been one of the most important steps in the history of early civilization. The writer from whom the foregoing has been borrowed further points out that the great antiquity of the use of mud as a building material can be established from a number of references to history. Like most things that were important to man in his early condition, this can be traced back even to the mythical period. The making of bricks is often represented in the sculptures of Egypt. It is naturally inferred that the bricks made by the children of Israel in Egypt were sun dried from the use of straw in them. The Assyrians had a month called *Sivanu*, which translated means, "the month of making bricks." It was the season after the rain, when the sun had begun to be hot and when the drying of bricks was easily accomplished.

Researches in Persia.

The author, in a paper recently published, describes the various details of mud buildings examined while he was in Persia. In the larger towns, in entering a house, he says, it is often necessary to descend from the level of the street to the ground floor. This results from utilizing the earth upon which the house stands for making the bricks, and thus saving the expense of transporting the building material from outside the town. Without following the author through various interesting details we may allude to one or two very important facts to which he specially directs attention. Vaulted roofs are frequently found in these mud houses, and investigation of their construction results in the interesting discovery that they were constructed without centers. The bricks employed in the vaulted portions are about 8 inches square and 2 inches thick. This gives a large flat surface, but not a very heavy brick for its size. These bricks are placed not perpendicularly but at an angle, so that the one rests partly on the other, and by the use of a little gypsum, which is plentiful in Persia, the author asserts, they can be made to adhere until the key brick is set in place. The possibility of forming vaulted roofs without centers is, no doubt, new to many. But the facts which this writer mentions would seem to prove that this has been done by the ancient builders of the region named beyond the chance of dispute.

Durability of Mud Architecture.

One would scarcely expect much durability from walls made of mud or sun-dried brick, and yet the author from whom we have quoted learned that there are walls of sun-dried brick in Ispahan which are as much as 300 or 400 years old. This quality of durability, however, depends upon the character of the soil, as well also as the treatment of the exterior of the wall for the purpose of resisting the action of the rain. The better houses of mud architecture, we are informed, are provided with a good stone foundation extended somewhat above the ground so as to protect the lower part of the wall, and they are also carefully roofed in a way to save the top of the wall from the influence of rain. At the close of the paper referred to above the author alludes to the employment of mud architecture in other parts of the world, particularly in the Peninsula of Mexico, Southern California, &c. While he credits this style of construction with much more in the way of origination of forms than has heretofore been credited to it by writers, he is not at all sanguine of its future. While in some cases it may be chosen for the pioneer and the emigrant, and at their hands may answer a most excellent purpose, it is not likely to be permanent alongside of improved processes and better materials.

Pompeian Life and Customs.

A novelty in the rounds of public entertainment at Saratoga the past summer was the exemplification of life and manners in ancient Pompeii in connection with the house of Pansa, the reproduction of one of the homes of that ancient city by Franklin W. Smith, with whose work our readers are more or less familiar. A series of Roman pictures showing the life of an Italian aristocrat in the days before the great lava flow were presented in this *fac-simile* house. The representations included the offering of sacrifices of the household gods, a poet reading his ode, Roman women offering their jewels to the treasury for defense against the Gauls, a Roman dinner, a Bacchanalian procession or dance, and others. These pictures were given with the same accurate fidelity to the originals which has characterized Mr. Smith's efforts to show people of to-day what life was in Pompeii eighteen centuries ago. At the dinner nine guests reclined about the table with chaplets on their heads, while graceful girls danced before them in imitation of the famous Roman feasts. Some scenes from the last days of Pompeii, as written by Bulwer, were also given. The gentle Nydia, in classic tunic, with white soft drapery, groped her way among the columns of the old Roman house, with Gaucus and Ione not far away. The Bacchanalian procession was a dance to the ancient music of pipes and reeds. These moving tableaus and animated groups attracted wide attention.

The Granite Situation.

It has been currently reported that an agreement has been signed between the Granite Manufacturers' Association and the Granite Cutters' Union. An agreement was effected through the instrumentality of Hon. J. G. Batterson of Hartford, president of the New England Granite Works, but proved futile after being submitted to the Manufacturers' Association. The agreement made was as follows, and the subjoined letter from Mr. Batterson gives the reasons of the association for refusing to accept the agreement:

It is hereby agreed between the Granite Manufacturers' Association of New England and the Granite Cutters' National Union of the United States of America that bills of prices shall continue until March 1, 1895; and that three months' notice shall be given by either party to the other, before the expiration of said period, of any change which may be contemplated at the end of such period.

It is also agreed that any contention which may arise during the said period as to the performance in good faith of said agreement by either party shall be referred to a local board of conciliation, consisting of three referees appointed by each party interested, and in case of failure by a two-thirds vote of said referees, in arriving at a conclusion, then the matter in dispute shall be referred to a committee consisting of three members, to be selected from the executive committees of each association, which committee shall act as a board of arbitration, and, failing to agree by a two-thirds vote, said board, by a five-sixths vote, may agree upon and select an indifferent person to act as umpire, and the board thus constituted shall hear the parties and make the award by a majority vote, said award to be final. Pending such arbitration, it is mutually agreed that there shall be no strike, lockout or suspension of work.

If five of the board of arbitration shall fail to agree upon an umpire, then such failure to agree shall be reported back to the original parties that appointed them, and a new board shall be appointed, which board shall proceed as before provided, and so continue until a settlement is reached.

If any arbitration shall be in progress at the expiration of said term, said arbitration shall continue until an award is made, unless notice shall have been given aforesaid by one of the parties of changes desired at the end of said term.

If no notice of change is given by either party three months prior to the expiration of the period before named, then the agreement in force at that time shall continue three years from and after March 1, 1895. This agreement is a settlement of all matters in controversy which can be adjusted between the Manufacturers' Association and the National Committee.

March 1, 1895, is a compromise date for the beginning of the new bill of prices, the manufacturers having originally desired January 1 and the National Union May 1 as the time. The other subjects in dispute between the cutters and manufacturers must be settled with local branches.

It is anticipated that the principal issue between the manufacturers and local organizations will be relative to non-union men hired and union men who returned to work since the trouble began. It remains with local branches to complete the general settlement.

The negotiations were without results, as indicated by the following letter sent to Secretary Dyer by Mr. Batterson:

Josiah B. Dyer, Secretary Granite Cutters' National Union:

DEAR SIR: I regret very much that my efforts in bringing about a settlement appear to be fruitless, so far as the Concord branch is concerned. I have decided to stand by my proposition, as published in the *Evening Monitor*, September 6. Further than that I cannot go.

I find that it is now impossible to do the work which was to have been done this autumn; and as it must go over the winter, under any circumstances, the immediate settlement is not so important as it was a month ago. The conclusions arrived at with the national committee are satisfactory, but the discriminations made against the New England Granite Works by the Concord branch are not satisfactory. Some concerns are permitted to have as many apprentices as they please, while we are limited to one for each gang. The prices for piece work of library work is about 40 per cent. higher than any other building work. I am informed that the branch allows men to work for other dealers cheaper by the hour or day than they are allowed to work for us. In short, for some reason, good or bad, there seems to be an unjust discrimination against our works, which cannot be tolerated.

The hours of labor have been shortened and the wages increased materially in Concord since I took this contract. I have conceded one thing after another until there is no margin left for further concession. I am quite willing to test by arbitration or otherwise the legality and propriety of the position now assumed by the branch, and will abide the result if the men choose to go to work. Respectfully yours,

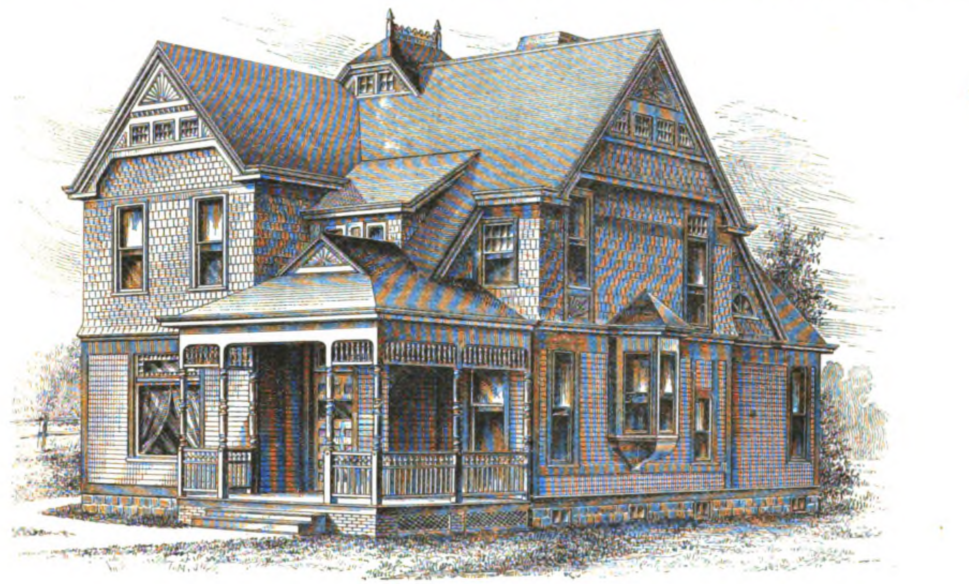
J. G. BATTERSON, President.

Since the above was written we learn that an agreement between the Granite Manufacturers' Association and the Quincy branches of the Granite Cutters' National Union was signed September 24, under which work is resumed at the old prices, contentions are to be submitted to arbitration, the number of apprentices is to be discretionary with the employers, and no discrimination is to be made between union and non-union men by the cutters, provided the manufacturers do not discriminate against the cutters who have been prominent during the recent suspension. The agreement, it is reported, does not expire until March, 1895.

DESIGN FOR A FRAME DWELLING.

THE FRAME DWELLING which is illustrated upon this and the following pages has recently been erected for S. H. Ferris from plans by Architect George W. Payne of Carthage, Ill. On the first floor is a large reception hall, which is reached from the porch through a vestibule; also a parlor, dining room and kitchen. The parlor and dining room are connected by folding doors and may be thrown into one room when so desired. In the dining room is a fire place fitted with a neat mantel. The kitchen is placed in the rear of the house and is so located as to prevent the odors arising from cooking escaping to other portions of that floor. The pantry, between the kitchen and dining room, is of ample size and is fitted with shelves, bins and a china closet. A slide panel connects the drain table in the pantry with the sink in the kitchen, a feature which will result in the saving of a great many steps to the housewife. The rear stairs are inclosed and have doors at the bottom and the top, which prevent smells from entering the second story. Going back to the reception hall, it will be seen by inspection of the first-floor plan that the hall is provided with a cozy arched recess containing an open fire place, above which is a neat mantel.

On the second floor are three large sleeping rooms, a dressing room, servant's room and bathroom, besides a commodious hall. The chamber directly over the dining room is provided with an open fire place, while in connection with the other apartments are closets of ample size. The house is heated by a furnace in addition to the open grates. The finish is in white pine throughout, with the exception of the kitchen, where yellow pine is employed. The first floor and upper hall are finished in natural wood. The dwelling is of the usual frame construction and was completed at a total cost of $3000. The hight of the first story is 10 feet, and of the second, 8 feet 6 inches in the clear.



Perspective View.

Design for a Frame Dwelling.—George W. Payne, Architect, Carthage, Ill.

Brick Work.

In some of the ruder kinds of early masonry bricks were often employed as mere lacing or string courses, to bind together at varying vertical hights the whole of the underlying constituent parts of the masonry. When so used in the construction of arches in combination with stone, the object of their use with the builders seems to have been to obtain even and equal bedding planes here and there throughout the arch by the insertion, as it were, of bricks or brick courses, irregularly alternating with the rough, unworked, or rudely "scraped" stones of uneven beds, chiefly composing the body of the arch. Bricks are still sometimes so employed, says the *Building News*, and as inclosures to flint diaper work, but more in the capacity of ornamentation, and as units or scales of a known dimension to aid the eye in the realization of the extent and effect of the composition as a whole, than as parts of constructive necessity.

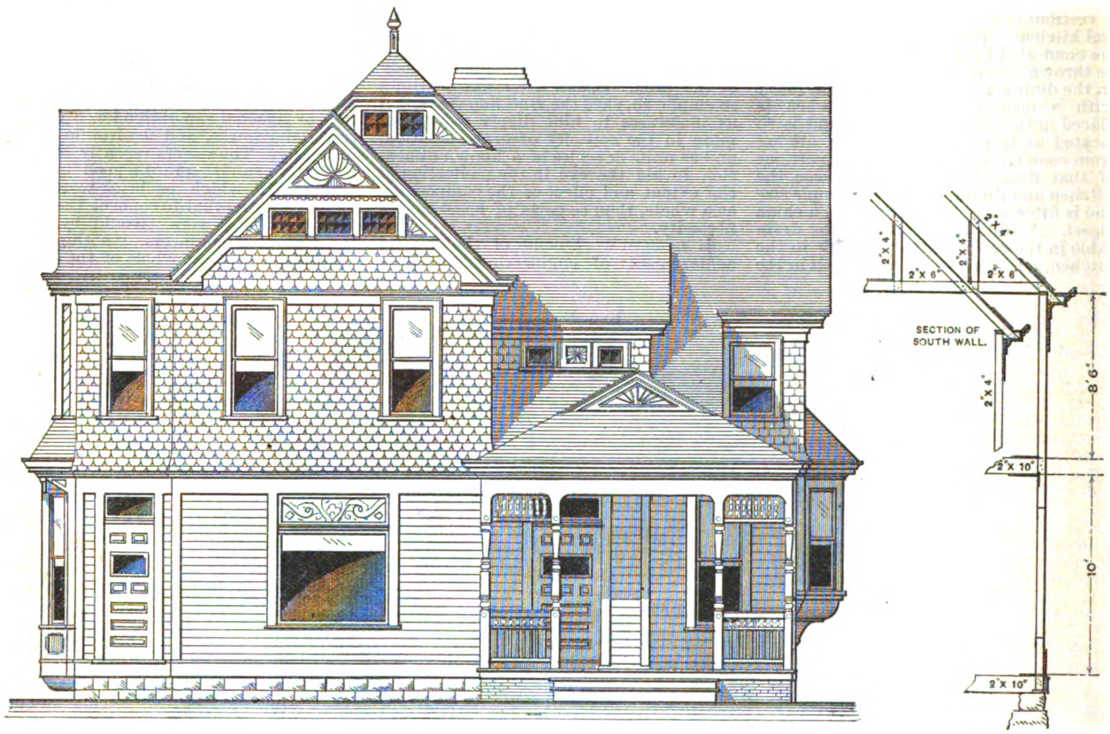
In modern work some of the greatest achievements of engineering skill have been carried out chiefly in brick work, and in some instances almost to the entire exclusion of the aid of stone. This being so, it will not be out of place to consider the essential conditions of what is now universally accepted as being worthy the name of good brick work. In the first place, brick work has made rapid and well-marked strides in the last quarter of a century, or since the decadence of the stuccoed front, and the revival and use of red bricks and terra-cotta under the sympathetic and able advocacy of our architects and masters of modern refined thought as applied to architecture. Prior to the time mentioned, the shuff, the grizzle and the rough stock were mostly in demand, but which are now happily supplanted by bricks of a better class and quality, except in the erection of suburban villas and other jerry-built structures. One of the recommending advantages of the use of bricks over stone is the thorough and perfect bonding which may be obtained throughout the mass of the work; the ease and certainty of obtaining solid and homogeneous bedding of the bricks when laid by skilled bricklayers working under the recognized conditions essential to the production of good work. Also the imperishable nature of the material as compared with most of the building stones in use—even the granites, and the ease with which they lend themselves to the construction and production of complex forms and outlines under a skilled treatment as compared with the vastly greater expenditure of labor and material required to bring about similar results in stone.

BEDDING BRICK.

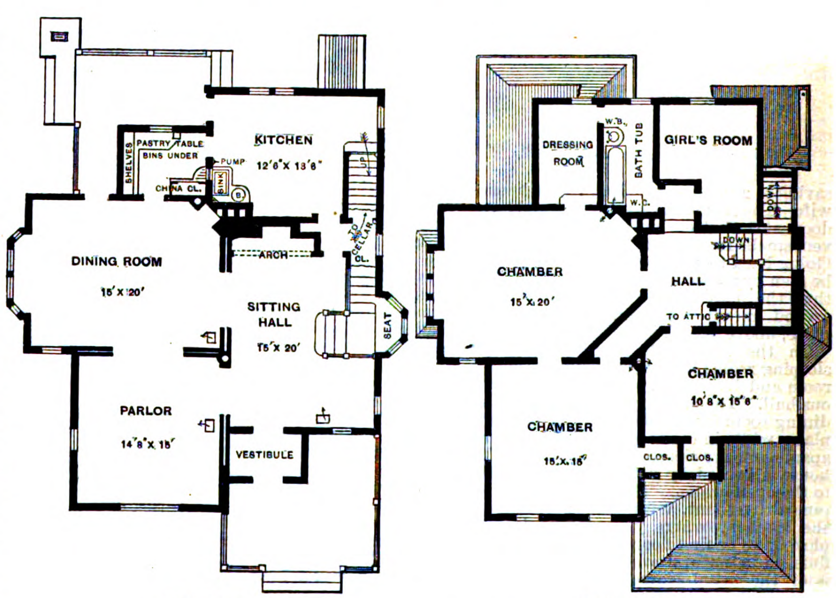
Of the importance and necessity of solidly bedding the bricks and effectually flushing up the interior joints (known as cross joints and wall joints), no one is so fully alive as the civil or municipal engineer, long experienced in the construction or personal superintendence of sewers, water works, and hydraulic works generally. The sewers recently built in a Western suburb afford a good instance —a case in which the brick work is so badly executed that to connect the house drains to the sewers "would be," said the reporting engineers, "nothing less than converting the whole of the inhabited area into a hotbed of typhoid fever." The question of flushing up, as applied to a building, differs in degree of importance as applied to a sewer or similar work. Apart from flushing up the brick work, as a means of obtaining the maximum amount of tensile strength, in addition to that obtained by good transverse and longitudinal bonding, to carry the loads to which most walls are subjected, and to provide against the possible lateral movement of any of the constituent parts when the whole is under strain, the question has its sanitary aspect also; and by reference to most of the published engineers' pocketbooks will be found formulæ to find the amount of air in cubic feet which will in a given time, under certain conditions stated, pass through walls of varied thickness, built of different kinds of material.

AIR FILTERS.

The walls of dwelling houses defectively flushed up are, therefore, admittedly air filters on a very large scale. They are also liable to be receptacles of damp driven in by storms, and induced by the hollow, or partially hollow, state of the brick work, leading up to disease, and in some cases probably to fatal consequences. The seemingly paradoxical aphorism that "a wet building makes a dry house" is worthy of all acceptance. Walls built wholly of dry or insufficiently wetted bricks will be found wanting in the two chief characteristics of good work—viz., solidity, and a firm and binding adhesion of the bricks and mortar. This is nowhere better exemplified, on the one hand, than in old brick footings and walls in situations subjected to the continuous presence of adjacent moisture—many retaining walls, for instance, supporting an undrained or badly-drained bank of non-porous earth—in which case the chemical action set up between the sandgrains and the lime has gone on so uninterruptedly that the mortar has crystallized and attained that condition known to practical men as water-bound brick work. In this condition the mortar, though set, is not hard and could easily be reduced to a plastic pulp by heating, yet the adhesion between the bricks and mortar is so firm that to separate them is no easy task, the mortar very frequently tearing away with it portions of the bricks at the line of separation, the separation being generally effected by steel-pointed wedges driven by sledge hammers. The extreme opposite case is that of building walls with dry bricks in the hight of summer. The dust coating the bricks is unremoved, forming a separating medium or layer between the bricks and the mortar, and so preventing adhesion. And where dust is not present the moisture of the mortar is taken up with such avidity by the dry bricks that very little or no adhesion is the result, and the mortar, by examination when dry, is found to be little better than a cake of slightly moistened compressed dust. On the other hand, the bricks should not be wetted to the degree of saturation, or they will be incapable of absorbing the finer particles of the mortar into their body, which they should do, forming so many threads binding the bricks and the mortar together. Unless the bricks be well wetted to induce the mortar into the cross joints and wall joints during the *modus operandi* of flushing up every course, the work should be grouted. But under any conditions or circumstances the bricks should be wetted before use, except in winter or frosty weather, when the air is generally so humid as to reduce the absorbant power of the bricks. It is, then, advisable to forego the risk of wetting the bricks, especially if the work is in exposed situations.



Front Elevation and Sections.—Scale, 1/8 Inch to the Foot.



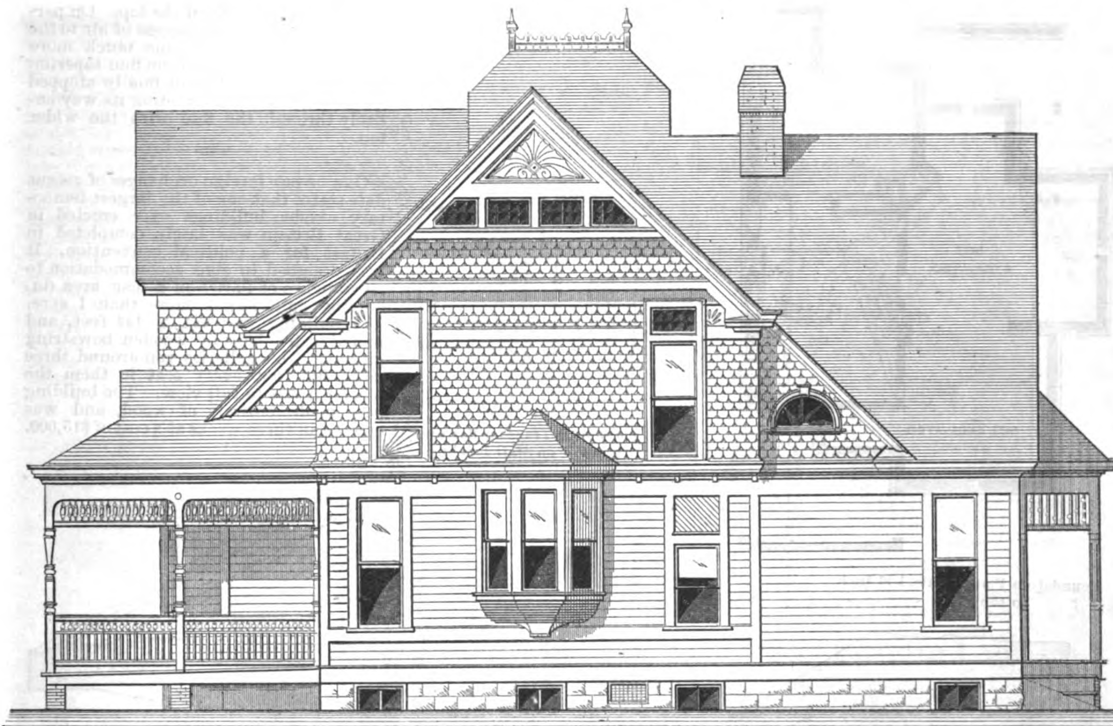
First Floor. Second Floor.

Scale, 1-16 Inch to the Foot.—(See Foundation Plan page 252.)

Design for a Frame Dwelling.

Proportions of Chimneys.

The old rule concerning chimneys was to the effect that the flue should be tapered to the top on the theory that, as the hot gases pass upward they become cooled, and, in the process of cooling, become contracted. Also, that it was important to reduce the size of the flue in proportion to the reduction in volume of the gases, as otherwise cold air from the top would descend and fill the vacancy caused by the contraction of the gases, and in nace flues are, at least, as good as the tapered ones, and within a few years practical engineers and architects of experience in such matters have shown a disneer made experiments to see whether the facts bear out the old rule or support the more modern practice. To make the test he built a chimney over a furnace



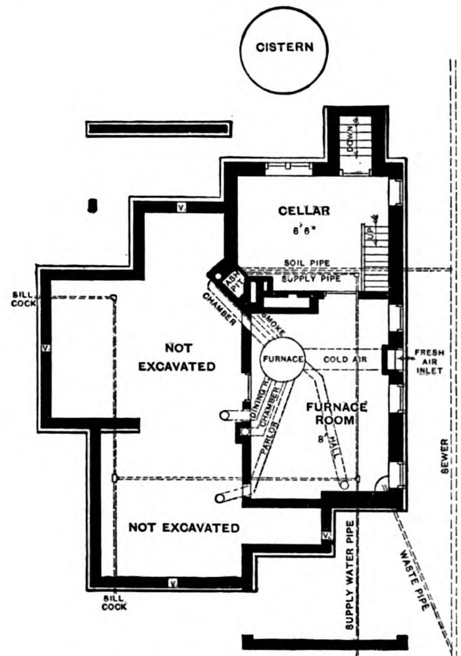
Side (Right) Elevation.

Side (Left) Elevation.

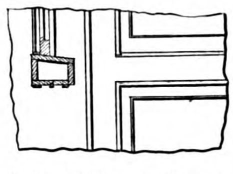
Design for a Frame Dwelling.—Elevations.—Scale, 1/8 Inch to the Foot.

this way the draft would be checked. Reasonable as this theory seemed, says a writer in one of our exchanges, practice has shown that cylindrical boiler or furposition to make them slightly larger at the top than at the bottom, the increase of diameter being, perhaps, 1/8 inch to 10 or 12 feet. Not long since a Swiss engigrate, the stack having two flues. One flue tapered upward and the other downward, and the flues opened side by side over the grate, with openings of the same size. On lighting a fire on the grate, with unlimited access of air under it, the smoke was seen to issue nearly equally from the top of both the flues, but with an unmistakable preponderance in favor of the flue which enlarged toward the top. On partially shutting off the access of air to the fire, the difference became much more marked ; the current in the flue tapering upward diminished, and finally stopped altogether, the smoke finding its way entirely through the flue with the wider top.

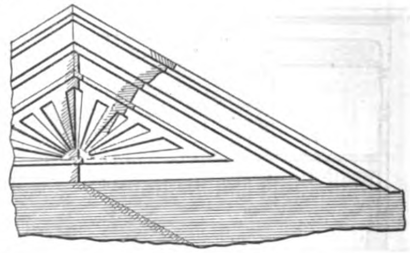
ONE OF our foreign exchanges of recent date states that one of the largest temporary wooden buildings ever erected in Great Britain was lately completed in Belfast for a political convention. It was designed to give accommodation to an audience of 10,000 on a floor area (including galleries) of more than 1 acre. The building was 224 x 144 feet, and roofed in five bays by wooden bowstring girders. The galleries ran around three sides, and from every seat in them the platform was in full view. The building was made entirely of wood, and was erected in three weeks at a cost of $15,000.



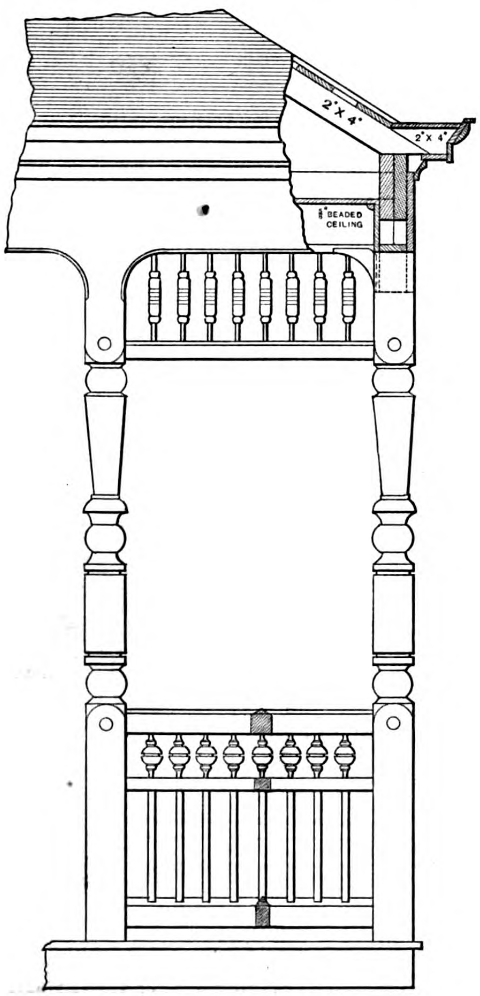
Foundation Plan.—Scale, 1-16 Inch to the Foot.



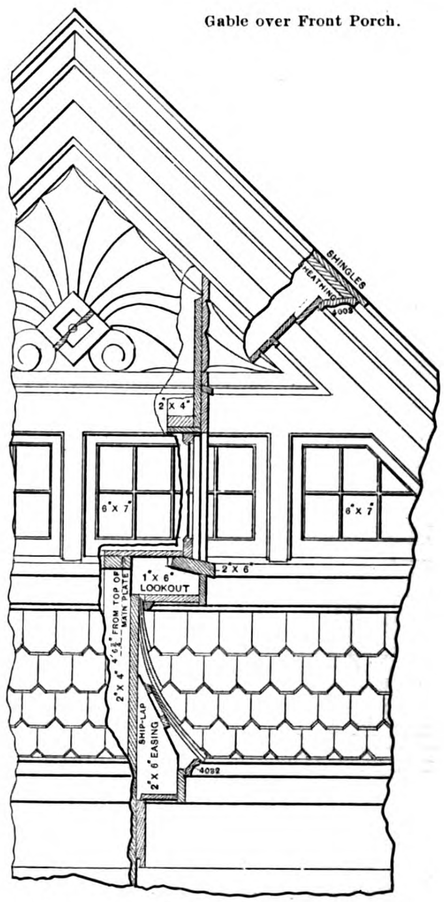
Section of Transom-Bar over Window on Stair Landing.



Gable over Front Porch.



Detail of Front Porch.



Detail of West Gable.

Details of Frame Dwelling.—Scale, ½ Inch to the Foot.

SAFETY ARRANGEMENT FOR JIB CRANES.

DURING the process of erecting buildings, especially those which may be several stories in hight, it is usual in many sections of the country to employ a derrick for the hoisting of materials. The employment of apparatus of this kind has often resulted in accidents of a more or less serious nature and it is to prevent the possibility of mishap that certain improvements have been made in jib cranes or derricks by an English mechanic. A simple arrangement has been introduced into the metal head of the jib, so that the instant the jib chain breaks or ceases to hold, the heaving chain takes up the jib, maintaining it in position, as well as the load at the end of it. The pulley over which the heaving chain runs has ratchet teeth attached to each side and in the stirrup to which the jib chain is usually fastened. There is also a hooking-on rod provided with a spring at one end and a lever at the other, attached to the two pawls which work into the ratchet teeth. When the jib chain is properly performing its function the spring is drawn home and the pawls are kept from contact with the ratchet teeth. If, however, the jib chain breaks, or becomes loose, the spring, being released from compression, pushes forward the lever and causes the pawls to engage with the ratchet; thus the pulley is immediately gripped and the links of the heaving chain imprisoned in the pockets of the pulley, the jib being thereby as firmly grasped in its angle of position as it was by the jib chain itself. The spring, we understand, is not a cumbersome affair, while the side ratchets add very little to the dimensions of the pulley. The stirrup is said to be no longer than that in ordinary use, as the rod and spring work within it and the lever and pawls within the head in the space behind the pulley. A very good idea of the safety arrangement provided may be gathered from an inspection of the accompanying illustration, which, with the particulars, are taken from a recent issue of an English exchange. Some tests of the device were made during the past summer, in which a 3-ton derrick crane, fitted with the safety appliance here described, was employed. The jib was 45 feet long, made of 10½-inch timber. A large block of stone was attached to the end of the heaving rope and the jib chain, hauled taut, was secured at the drum end by a hemp rope. The chain on the drum was then unwound so that the rope held the jib. This rope was then cut with a hatchet, and it is stated that the metal head of the jib did not fall 6 inches before the spring lever and pawls acted, the jib being firmly held by the heaving chain on the pulley.

Safety Arrangement for Jib Cranes.

The Administration Building.

By popular verdict, the Administration Building is pronounced the gem and crown of the Exposition palaces. It is located at the west end of the great court in the southern part of the site, looking eastward, and at its rear are the transportation facilities and depots. The most conspicuous object which will attract the gaze of visitors on reaching the grounds is the gilded dome of this lofty building. This imposing edifice will cost about $450,000. The architect is Richard M. Hunt of New York, president of the American Institute of Architects, to whose established reputation it is a notable contribution. It covers an area of 260 feet square, and consists of four pavilions 84 feet square, one at each of the four angles of the square, and connected by a great central dome 120 feet in diameter and 220 feet in hight, leaving at the center of each façade a recess 82 feet wide, within which are the grand entrances to the building. The general design is in the style of the French renaissance. The first great story is in the Doric order, of heroic proportions, surrounded by a lofty balustrade, and having the great tiers of the angle of each pavilion crowned with sculpture. The second story, with its lofty and spacious colonnade, is of the Ionic order.

The four great entrances, one on each side of the building, are 50 feet wide and 50 feet high, deeply recessed and covered by semicircular arched vaults, richly coffered. In the rear of these arches are the entrance doors, and above them great screens of glass, giving light to the central rotunda. Across the face of these screens, at the level of the office floor, are galleries of communication between the different pavilions.

The interior features of this great building even exceed in beauty and splendor those of the exterior. Between every two of the grand entrances, and connecting the intervening pavilion with the great rotunda, is a hall or loggia 30 feet square, giving access to the offices and provided with broad, circular stairways and swift-running elevators.

Above the balcony is the second story, 50 feet in hight. From the top of the cornice of this story rises the interior dome, 200 feet from the floor, and in the center is an opening 50 feet in diameter, transmitting a flow of light from the exterior dome overhead. The under side of the dome is enriched with deep panelings, richly molded, and the panels are filled with sculpture in low relief and immense paintings representing the arts and sciences. In size this rotunda rivals, if it does not surpass, the most celebrated domes of a similar character in the world.

The principal contractors engaged in the erection of this building were: Steinmetz & Eilenberger, carpenters, Chicago; Mount Vernon Bridge Company, iron and steel constructors, Mount Vernon, Ohio; Smith, Crimp & Eastman Company, staff makers, Chicago; James A. Miller & Bro., roofers, Chicago. The picture of the building which forms our supplement plate is a reproduction from a photograph taken by C. D. Arnold of Chicago. It shows well the method of construction of the great dome.

Kauri Wood.

Kauri is known to be among the most valuable and generally useful of the many excellent timbers produced in the forests of Australia, says a recent issue of the *Engineer*. Trees of large size are not uncommon, but one which has recently been converted is said to surpass in this respect any hitherto reported. The province of Auckland, New Zealand, is that in which this monster has been felled, and its dimensions almost approach those of the famed giants of Yosemite Valley, in California. The trunk rose 84 feet to the lowermost branch, and the log cut from it measured, when trimmed, 51 feet in length, 18 feet 3 inches girth, and over 6 feet in diameter, its cubical content being estimated at between 13,000 and 14,000 feet. None of the appliances erected in the colony were found adequate for its conversion, and special means for doing this had to be devised and erected. Not only was this the case, but the log had to be given the honor of a special train for its sole transport. Several exceedingly fine specimens of this Kauri timber, both in sectional cuttings and in log, formed part of the attractive exhibits of England's Australasian colonies at the Colonial and Indian Exhibition at South Kensington. The specimen now obtained, however, is said considerably to surpass any of those which were sent to England on the occasion named. But it must be doubtful if timbers of this great size can be of use in any special way; their application as timber in any constructive work is, in these days of iron, quite out of the question; and it is further doubtful if the great cost of their transport and conversion would not render the felling of such timber commercially unprofitable.

GERMANY'S BUILDING at the World's Fair will cost about $125,000, and will be a combination of typical styles of German architecture, such as are seen in perfection in Nuremburg. It will be massive in construction, the first story being of great blocks of sandstone, and the second of a combination of brick and cement. At one end will be erected a Gothic cathedral, the windows of which will show artistic effects, being the work of several of the most famous designers in Germany. The interior of the building will be finished throughout with natural woods unpainted. Much of the building material has already been received from Germany, and the construction of the edifice is in progress.

FIRE-PROOF CONSTRUCTION.

[illegible] floor and ceiling [illegible] of beams. The weight of the rods, wire lathing and concrete forming the floor will be from [illegible] to [illegible] pounds per square foot, or from [illegible] to [illegible] pounds per square foot represents the whole of the fixed load beams, or attached to them by clips designed for that purpose. The rods are placed 12 inches apart (or more or less as the case may require), and over them are spread sheets of wire lath-

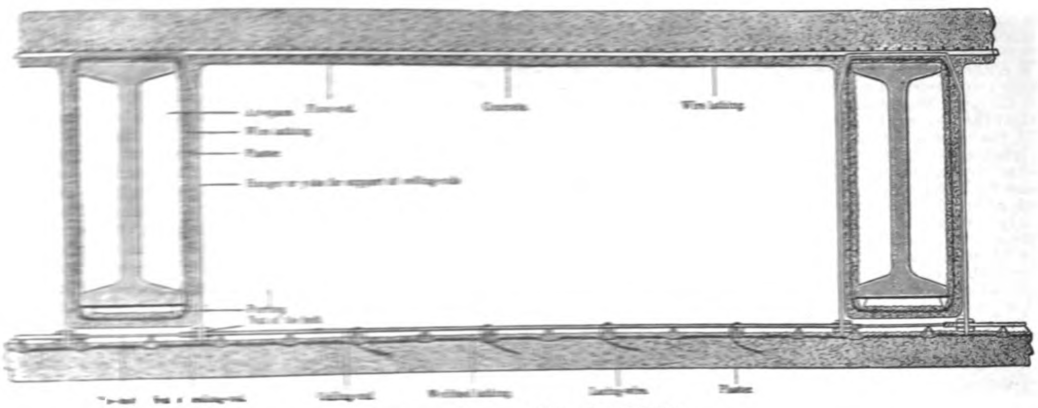


Fig. [illegible].—Floor and Ceiling Construction.

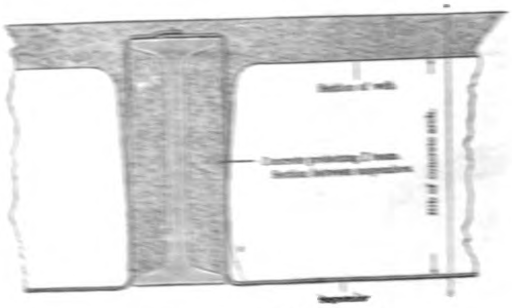


Fig. [illegible] Construction.

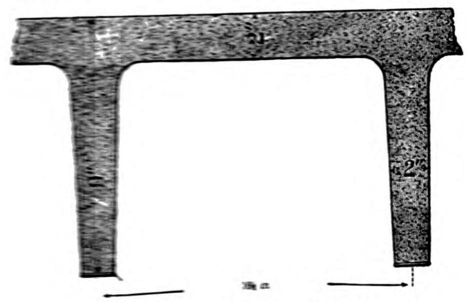


Fig. 13.—Section through [illegible] of Fig. 12.

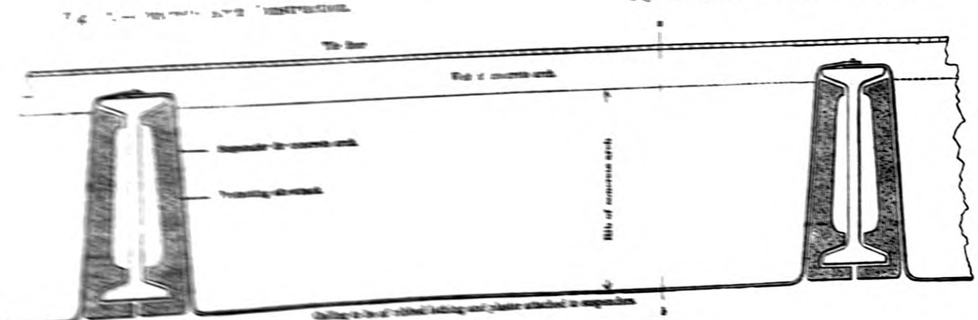


Fig. [illegible]—I-Beams Protected by Skewbacks.

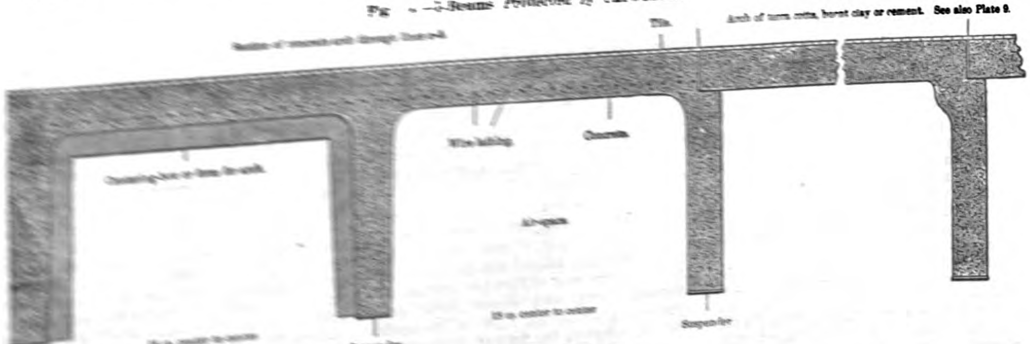


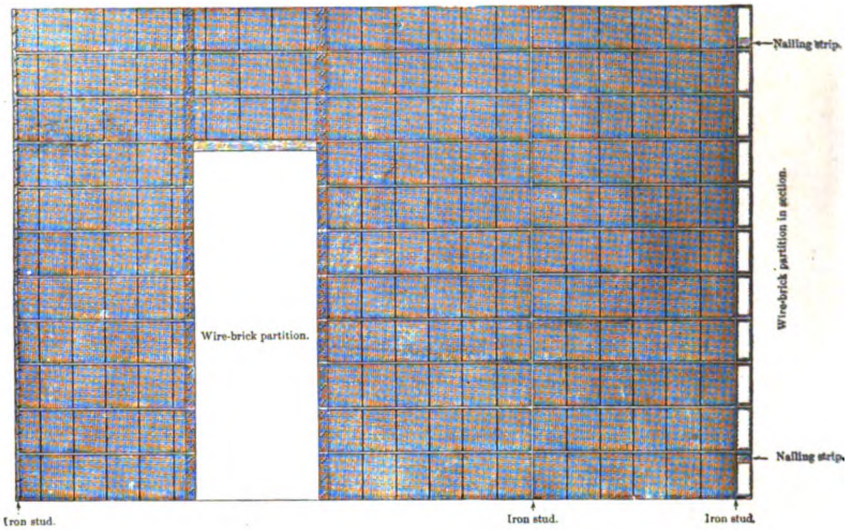
Fig. 15.—Section of Fig. 14.

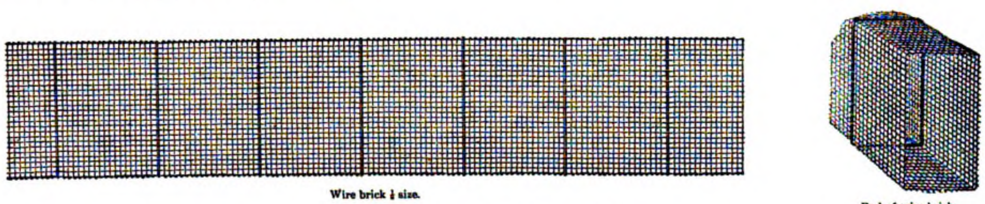
Fire-Proof Construction.

[illegible] construction. A load [illegible] pounds per square [illegible] of safety of 6 can be [illegible] feet between center with the exception of the wood floor and partitions carried by the beams. The basis of this floor construction is a series of rods hooked over the flanges of the ing, running parallel with them and over the top of the beams. The concrete is then spread on from above to a depth of 2 to 3 inches. No centering will be required, as the cross meshes of the lathing will be so close together that only enough concrete will go through to firmly anchor the wire. After the concrete is set the under side may, if required, be smoothed off and the wires and rods entirely imbedded by applying a single coat of cement or plaster.

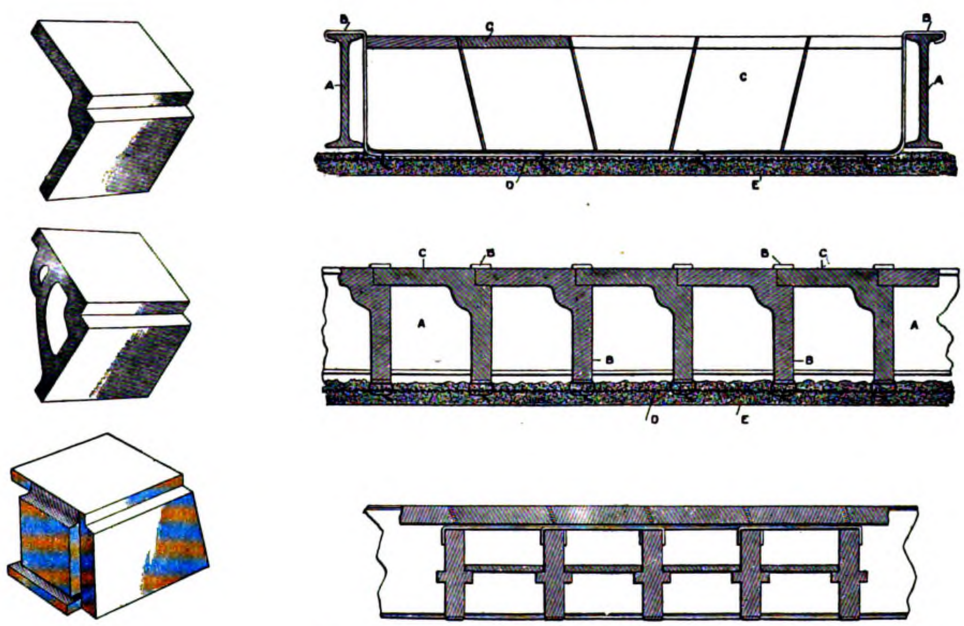
The rods used in spans of $4\frac{1}{2}$ to 6 feet are from $\frac{5}{16}$ to $\frac{7}{16}$ inch in diameter, with tensile strength of from 5000 to 8000 pounds each, and the combined tensile strength of the lateral wires in the lathing would add from 30 to 60 per cent. to this strength. For wider spans than above and for same floor loads it is only necessary to increase the size of rods, to use larger wires in lathing, and to increase slightly the thickness of concrete. In all cases the tensile strength of the rods and wire should be greater than the estimated crushing strength of the concrete at center of arch, for if the former fails the whole will fall, but if the concrete crushes the leverage on the rods and wire will to a great extent be removed, and they would be capable of holding an increased load; so that, although load enough were put on the floor to crush the concrete, it would be held suspended by the rods and lathing without any injury to the ceiling.

Three slabs recently constructed, as shown in Fig. 11, were tested to find their carrying capacity. The I-beams were 6 feet on center, and the concrete 2 feet wide by 3 inches thick at center, and 2 inches thick over the beams, making an an anchorage, the netting answering the double purpose of a centering for the concrete and a bond for the bottom of the slabs. In five days it was begun to weight one of the slabs, and put on a distributed load of 1750 pounds in plates of zinc. This caused a deflection of $\frac{3}{32}$ inch 4200 pounds. This weight crushed the concrete and allowed the slab to deflect $1\frac{1}{2}$ inches at center, at which point the rods and lathing held the mass suspended for 24 hours; 700 pounds were then added, causing a further deflection of $\frac{5}{16}$ inch. The addition of 350 pounds, or a total





Figs. 16, 17, 18—Wire Partition Bricks.

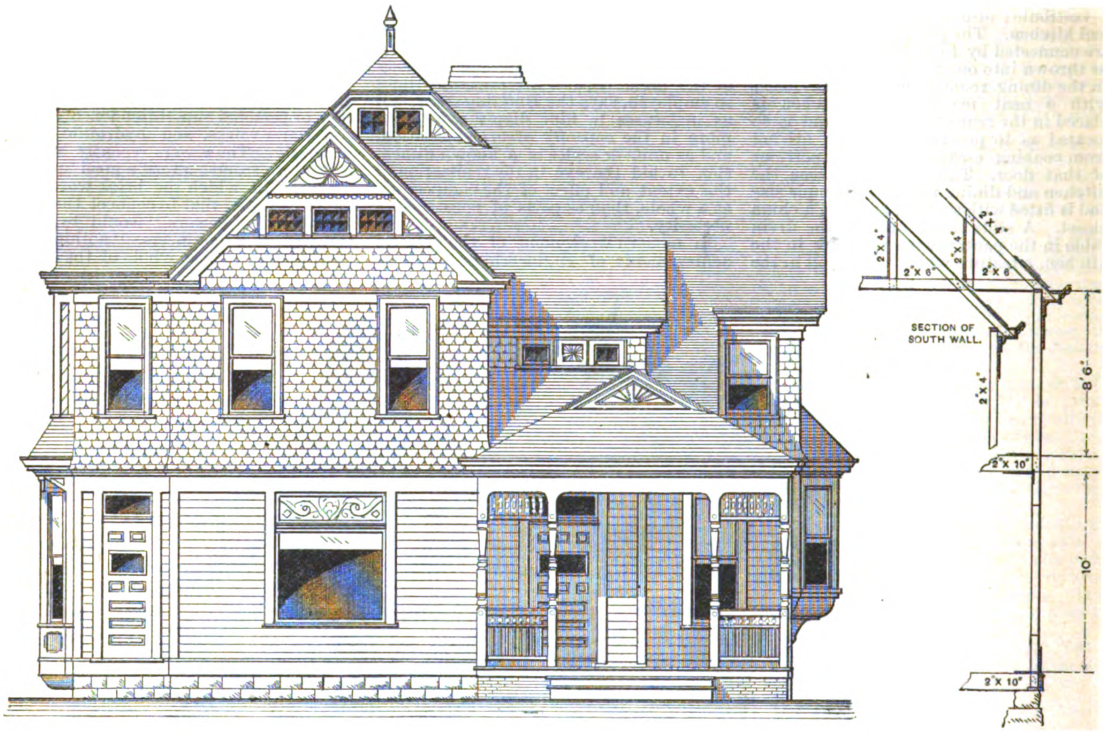


Figs. 19 to 24.—Suspended Floor and Ceiling.

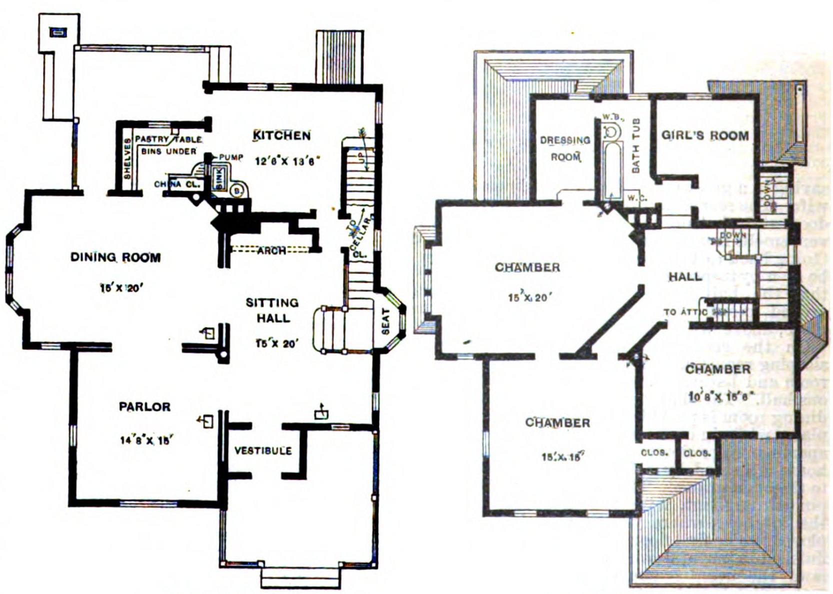
Fire-Proof Construction.

average of $2\frac{1}{2}$ inches of thickness for the slabs. The concrete, which was 1 of cement to $2\frac{1}{2}$ of common sand, was supported by three $\frac{5}{16}$-inch rods hooked over the flange of one beam and attached to the other by clips, and by a web of wire lathing attached to the rods and bent around the outer flanges of the beams as at center of slab. In 24 hours 350 pounds were added with no further deflection. After standing 24 hours 350 pounds additional weight was put on, causing a deflection of $\frac{1}{32}$ more, or $\frac{4}{32}$. The next day 350 pounds added weight added $\frac{1}{32}$ more to the deflection. The tenth day we added 1400 pounds, making in all load of 5250 pounds, broke one of the rods at the hook, broke one of the clips, and straightened the hook of the third rod, drew the lathing from its anchorage and dropped the load. The second slab gave very nearly the same results as the first.

Slab three was the same as the others, with the exception of the supporting rods, wetted bricks will be found wanting in the two chief characteristics of good work—viz., solidity, and a firm and binding adhesion of the bricks and mortar. This is nowhere better exemplified, on the one hand, than in old brick footings and walls in situations subjected to the continuous presence of adjacent moisture—



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



First Floor. Second Floor.

Scale, 1-16 Inch to the Foot.—(See Foundation Plan page 252.)

Design for a Frame Dwelling.

many retaining walls, for instance, supporting an undrained or badly-drained bank of nonporous earth—in which case the chemical action set up between the sandgrains and the lime has gone on so uninterruptedly that the mortar has crystallized and attained that condition known to practical men as water-bound brick work. In this condition the mortar, though set, is not hard and could easily be reduced to a plastic pulp by heating, yet the adhesion between the bricks and mortar is so firm that to separate them is no easy task, the mortar very frequently tearing away with it portions of the bricks at the line of separation, the separation being generally effected by steel-pointed wedges driven by sledge hammers. The extreme opposite case is that of building walls with dry bricks in the hight of summer. The dust coating the bricks is unremoved, forming a separating medium or layer between the bricks and the mortar, and so preventing adhesion. And where dust is not present the moisture of the mortar is taken up with such avidity by the dry bricks that very little or no adhesion is the result, and the mortar, by examination when dry, is found to be little better than a cake of slightly moistened compressed dust. On the other hand, the bricks should not be wetted to the degree of saturation, or they will be incapable of absorbing the finer particles of the mortar into their body, which they should do, forming so many threads binding the bricks and the mortar together. Unless the bricks be well wetted to induce the mortar into the cross joints and wall joints during the *modus operandi* of flushing up every course, the work should be grouted. But under any conditions or circumstances the bricks should be wetted before use, except in winter or frosty weather, when the air is generally so humid as to reduce the absorbant power of the bricks. It is, then, advisable to forego the risk of wetting the bricks, especially if the work is in exposed situations.

Proportions of Chimneys.

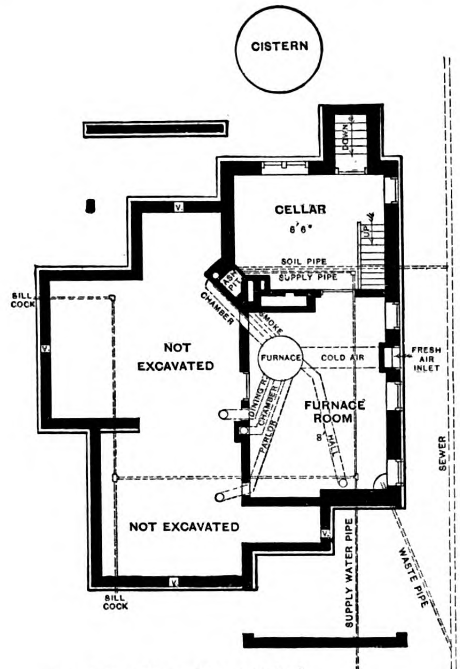
The old rule concerning chimneys was to the effect that the flue should be tapered to the top on the theory that, as the hot gases pass upward they become cooled, and, in the process of cooling, become contracted. Also, that it was important to reduce the size of the flue in proportion to the reduction in volume of the gases, as otherwise cold air from the top would descend and fill the vacancy caused by the contraction of the gases, and in nace flues are, at least, as good as the tapered ones, and within a few years practical engineers and architects of experience in such matters have shown a disneer made experiments to see whether the facts bear out the old rule or support the more modern practice. To make the test he built a chimney over a furnace

Side (Right) Elevation.

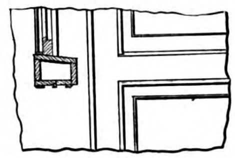
Side (Left) Elevation.

Design for a Frame Dwelling.—Elevations.—Scale, ⅛ Inch to the Foot.

this way the draft would be checked. Reasonable as this theory seemed, says a writer in one of our exchanges, practice has shown that cylindrical boiler or furposition to make them slightly larger at the top than at the bottom, the increase of diameter being, perhaps, ½ inch to 10 or 12 feet. Not long since a Swiss engigrate, the stack having two flues. One flue tapered upward and the other downward, and the flues opened side by side over the grate, with openings of the



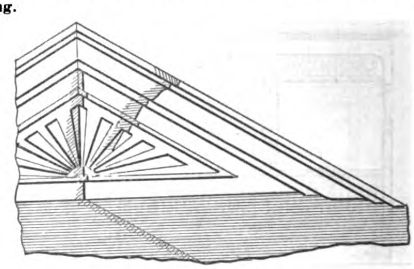
Foundation Plan.—Scale, 1-16 Inch to the Foot.



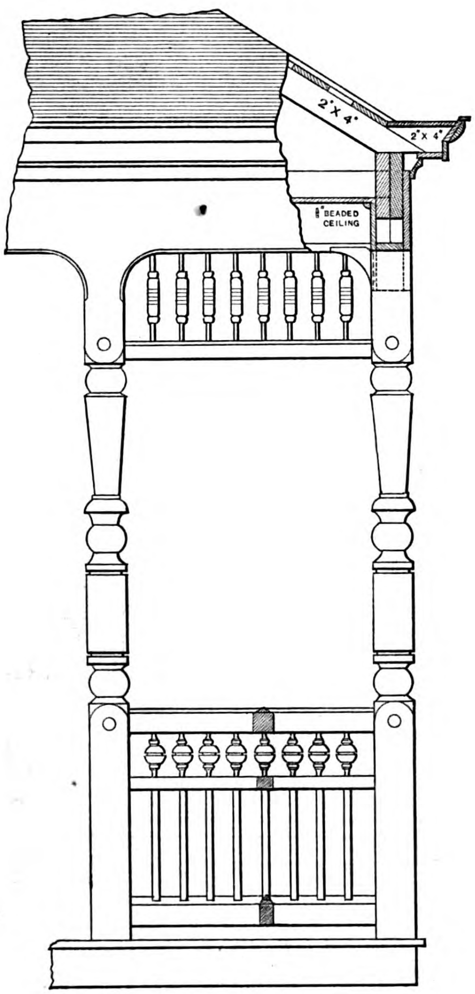
Section of Transom-Bar over Window on Stair Landing.

same size. On lighting a fire on the grate, with unlimited access of air under it, the smoke was seen to issue nearly equally from the top of both the flues, but with an unmistakable preponderance in favor of the flue which enlarged toward the top. On partially shutting off the access of air to the fire, the difference became much more marked; the current in the flue tapering upward diminished, and finally stopped altogether, the smoke finding its way entirely through the flue with the wider top.

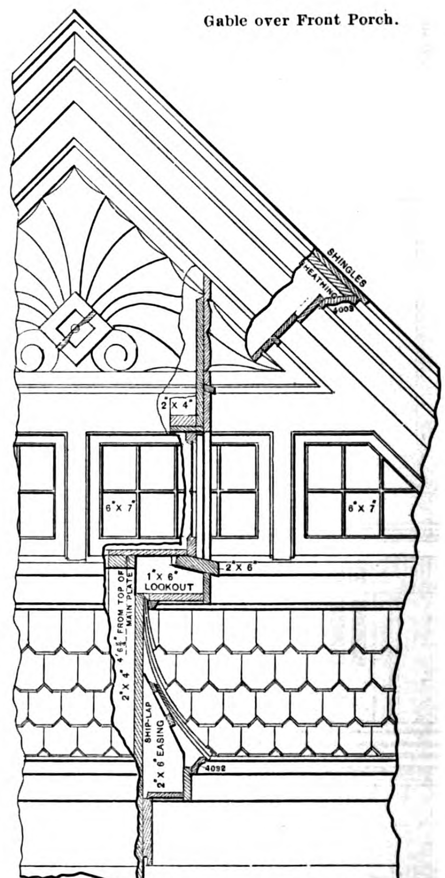
ONE OF our foreign exchanges of recent date states that one of the largest temporary wooden buildings ever erected in Great Britain was lately completed in Belfast for a political convention. It was designed to give accommodation to an audience of 10,000 on a floor area (including galleries) of more than 1 acre. The building was 224 x 144 feet, and roofed in five bays by wooden bowstring girders. The galleries ran around three sides, and from every seat in them the platform was in full view. The building was made entirely of wood, and was erected in three weeks at a cost of $15,000.



Gable over Front Porch.



Detail of Front Porch.



Detail of West Gable.

Details of Frame Dwelling.—Scale, ½ Inch to the Foot.

SAFETY ARRANGEMENT FOR JIB CRANES.

DURING the process of erecting buildings, especially those which may be several stories in hight, it is usual in many sections of the country to employ a derrick for the hoisting of materials. The employment of apparatus of this kind has often resulted in accidents of a more or less serious nature and it is to prevent the possibility of mishap that certain improvements have been made in jib cranes or derricks by an English mechanic. A simple arrangement has been introduced into the metal head of the jib, so that the instant the jib chain breaks or ceases to hold, the heaving chain takes up the jib, maintaining it in position, as well as the load at the end of it. The pulley over which the heaving chain runs has ratchet teeth attached to each side and in the stirrup to which the jib chain is usually fastened. There is also a hooking-on rod provided with a spring at one end and a lever at the other, attached to the two pawls which work into the ratchet teeth. When the jib chain is properly performing its function the spring is drawn home and the pawls are kept from contact with the ratchet teeth. If, however, the jib chain breaks, or becomes loose, the spring, being released from compression, pushes forward the lever and causes the pawls to engage with the ratchet; thus the pulley is immediately gripped and the links of the heaving chain imprisoned in the pockets of the pulley, the jib being thereby as firmly grasped in its angle of position as it was by the jib chain itself. The spring, we understand, is not a cumbersome affair, while the side ratchets add very little to the dimensions of the pulley. The stirrup is said to be no longer than that in ordinary use, as the rod and spring work within it and the lever and pawls within the head in the space behind the pulley. A very good idea of the safety arrangement provided may be gathered from an inspection of the accompanying illustration, which, with the particulars, are taken from a recent issue of an English exchange. Some tests of the device were made during the past summer, in which a 3-ton derrick crane, fitted with the safety appliance here described, was employed. The jib was 45 feet long, made of 10½-inch timber. A large block of stone was attached to the end of the heaving rope and the jib chain, hauled taut, was secured at the drum end by a hemp rope. The chain on the drum was then unwound so that the rope held the jib. This rope was then cut with a hatchet, and it is stated that the metal head of the jib did not fall 6 inches before the spring lever and pawls acted, the jib being firmly held by the heaving chain on the pulley.

Safety Arrangement for Jib Cranes.

The Administration Building.

By popular verdict, the Administration Building is pronounced the gem and crown of the Exposition palaces. It is located at the west end of the great court in the southern part of the site, looking eastward, and at its rear are the transportation facilities and depots. The most conspicuous object which will attract the gaze of visitors on reaching the grounds is the gilded dome of this lofty building. This imposing edifice will cost about $450,000. The architect is Richard M. Hunt of New York, president of the American Institute of Architects, to whose established reputation it is a notable contribution. It covers an area of 260 feet square, and consists of four pavilions 84 feet square, one at each of the four angles of the square, and connected by a great central dome 120 feet in diameter and 220 feet in hight, leaving at the center of each façade a recess 82 feet wide, within which are the grand entrances to the building. The general design is in the style of the French renaissance. The first great story is in the Doric order, of heroic proportions, surrounded by a lofty balustrade, and having the great tiers of the angle of each pavilion crowned with sculpture. The second story, with its lofty and spacious colonnade, is of the Ionic order.

The four great entrances, one on each side of the building, are 50 feet wide and 50 feet high, deeply recessed and covered by semicircular arched vaults, richly coffered. In the rear of these arches are the entrance doors, and above them great screens of glass, giving light to the central rotunda. Across the face of these screens, at the level of the office floor, are galleries of communication between the different pavilions.

The interior features of this great building even exceed in beauty and splendor those of the exterior. Between every two of the grand entrances, and connecting the intervening pavilion with the great rotunda, is a hall or loggia 30 feet square, giving access to the offices and provided with broad, circular stairways and swift-running elevators.

Above the balcony is the second story, 50 feet in hight. From the top of the cornice of this story rises the interior dome, 200 feet from the floor, and in the center is an opening 50 feet in diameter, transmitting a flow of light from the exterior dome overhead. The under side of the dome is enriched with deep panelings, richly molded, and the panels are filled with sculpture in low relief and immense paintings representing the arts and sciences. In size this rotunda rivals, if it does not surpass, the most celebrated domes of a similar character in the world.

The principal contractors engaged in the erection of this building were: Steinmetz & Eilenberger, carpenters, Chicago; Mount Vernon Bridge Company, iron and steel constructors, Mount Vernon, Ohio; Smith, Crimp & Eastman Company, staff makers, Chicago; James A. Miller & Bro., roofers, Chicago. The picture of the building which forms our supplement plate is a reproduction from a photograph taken by C. D. Arnold of Chicago. It shows well the method of construction of the great dome.

Kauri Wood.

Kauri is known to be among the most valuable and generally useful of the many excellent timbers produced in the forests of Australia, says a recent issue of the *Engineer*. Trees of large size are not uncommon, but one which has recently been converted is said to surpass in this respect any hitherto reported. The province of Auckland, New Zealand, is that in which this monster has been felled, and its dimensions almost approach those of the famed giants of Yosemite Valley, in California. The trunk rose 84 feet to the lowermost branch, and the log cut from it measured, when trimmed, 51 feet in length, 18 feet 3 inches girth, and over 6 feet in diameter, its cubical content being estimated at between 13,000 and 14,000 feet. None of the appliances erected in the colony were found adequate for its conversion, and special means for doing this had to be devised and erected. Not only was this the case, but the log had to be given the honor of a special train for its sole transport. Several exceedingly fine specimens of this Kauri timber, both in sectional cuttings and in log, formed part of the attractive exhibits of England's Australasian colonies at the Colonial and Indian Exhibition at South Kensington. The specimen now obtained, however, is said considerably to surpass any of those which were sent to England on the occasion named. But it must be doubtful if timbers of this great size can be of use in any special way; their application as timber in any constructive work is, in these days of iron, quite out of the question; and it is further doubtful if the great cost of their transport and conversion would not render the felling of such timber commercially unprofitable.

GERMANY'S BUILDING at the World's Fair will cost about $125,000, and will be a combination of typical styles of German architecture, such as are seen in perfection in Nuremburg. It will be massive in construction, the first story being of great blocks of sandstone, and the second of a combination of brick and cement. At one end will be erected a Gothic cathedral, the windows of which will show artistic effects, being the work of several of the most famous designers in Germany. The interior of the building will be finished throughout with natural woods unpainted. Much of the building material has already been received from Germany, and the construction of the edifice is in progress.

FIRE-PROOF CONSTRUCTION.

IN Fig. 11 is shown a floor and ceiling construction suitable for all classes of buildings, from those requiring only efficient protection against fire to those not only requiring protection, but great of beams. The weight of the rods, wire lathing and concrete forming the floor will be from 23 to 33 pounds per square foot, or from 33 to 43 pounds per square foot represents the whole of the fixed load beams, or attached to them by clips designed for that purpose. The rods are placed 12 inches apart (or more or less as the case may require), and over them are spread sheets of wire lath-

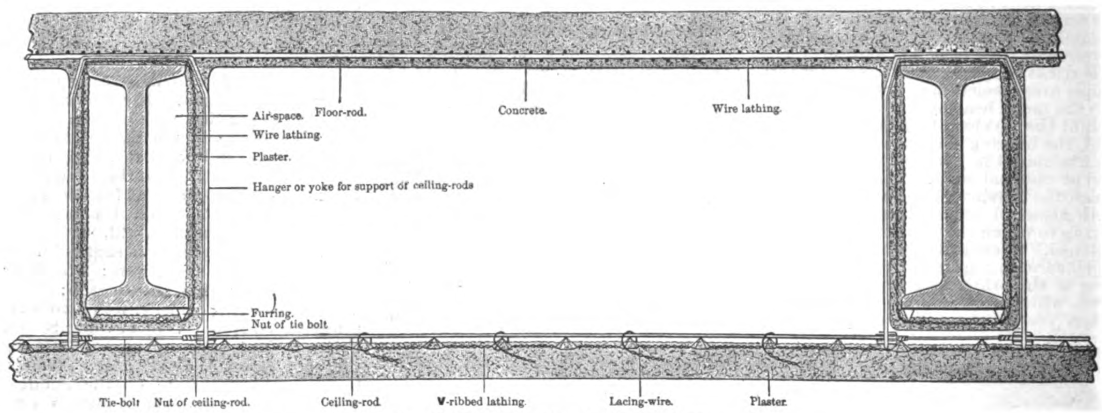


Fig. 11.—Floor and Ceiling Construction.

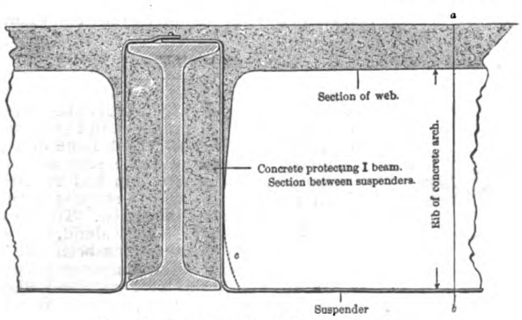


Fig. 12.—Concrete Arch Construction.

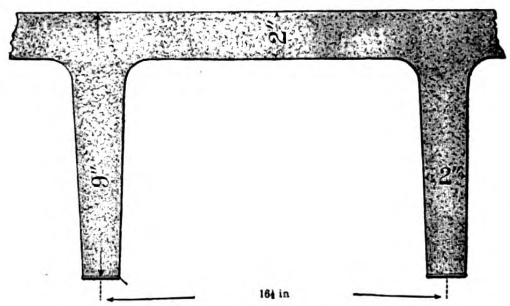


Fig. 13.—Section through *a b* of Fig. 12.

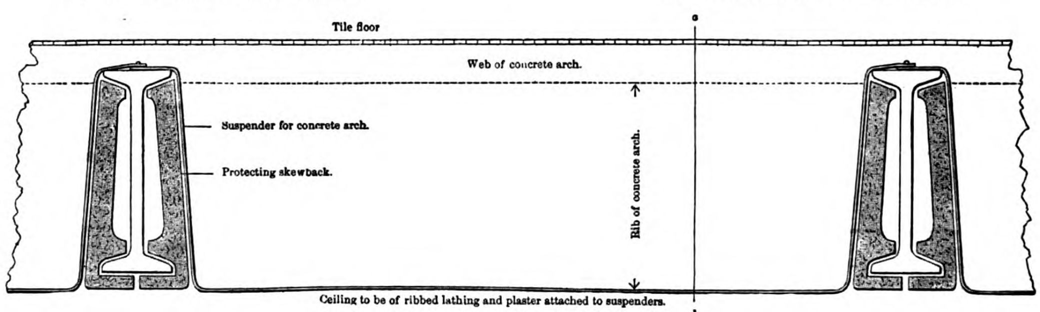


Fig. 14.—I-Beams Protected by Skewbacks.

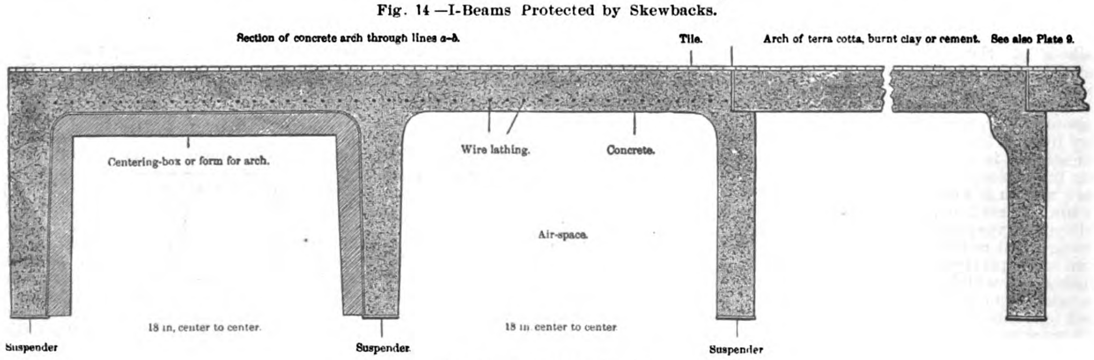


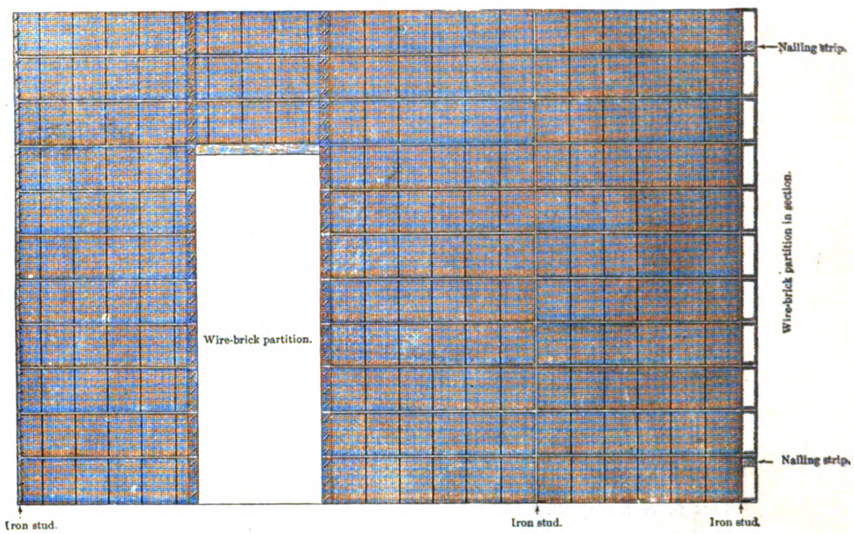
Fig. 15.—Section of Fig. 14.

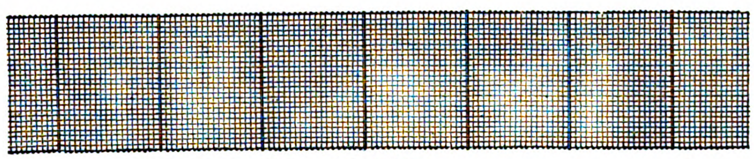
Fire-Proof Construction.

strength of floor construction. A load of from 70 to 140 pounds per square foot, with a factor of safety of 6, can be carried in spans of 6 feet between center with the exception of the wood floor and partitions carried by the beams. The basis of this floor construction is a series of rods hooked over the flanges of the ing, running parallel with them and over the top of the beams. The concrete is then spread on from above to a depth of 2 to 3 inches. No centering will be required, as the cross meshes of the lathing will be so close together that only enough concrete will go through to firmly anchor the wire. After the concrete is set the under side may, if required, be smoothed off and the wires and rods entirely imbedded by applying a single coat of cement or plaster.

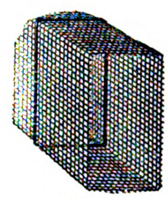
The rods used in spans of $4\frac{1}{2}$ to 6 feet are from $\frac{5}{16}$ to $\frac{7}{16}$ inch in diameter, with tensile strength of from 5000 to 8000 pounds each, and the combined tensile strength of the lateral wires in the lathing would add from 30 to 60 per cent. to this strength. For wider spans than above and for same floor loads it is only necessary to increase the size of rods, to use larger wires in lathing, and to increase slightly the thickness of concrete. In all cases the tensile strength of the rods and wire should be greater than the estimated crushing strength of the concrete at center of arch, for if the former fails the whole will fall, but if the concrete crushes the leverage on the rods and wire will to a great extent be removed, and they would be capable of holding an increased load; so that, although load enough were put on the floor to crush the concrete, it would be held suspended by the rods and lathing without any injury to the ceiling.

Three slabs recently constructed, as shown in Fig. 11, were tested to find their carrying capacity. The I-beams were 6 feet on center, and the concrete 2 feet wide by 3 inches thick at center, and 2 inches thick over the beams, making an an anchorage, the netting answering the double purpose of a centering for the concrete and a bond for the bottom of the slabs. In five days it was begun to weight one of the slabs, and put on a distributed load of 1750 pounds in plates of zinc. This caused a deflection of $\frac{3}{32}$ inch 4200 pounds. This weight crushed the concrete and allowed the slab to deflect $1\frac{1}{2}$ inches at center, at which point the rods and lathing held the mass suspended for 24 hours; 700 pounds were then added, causing a further deflection of $\frac{5}{16}$ inch. The addition of 350 pounds, or a total



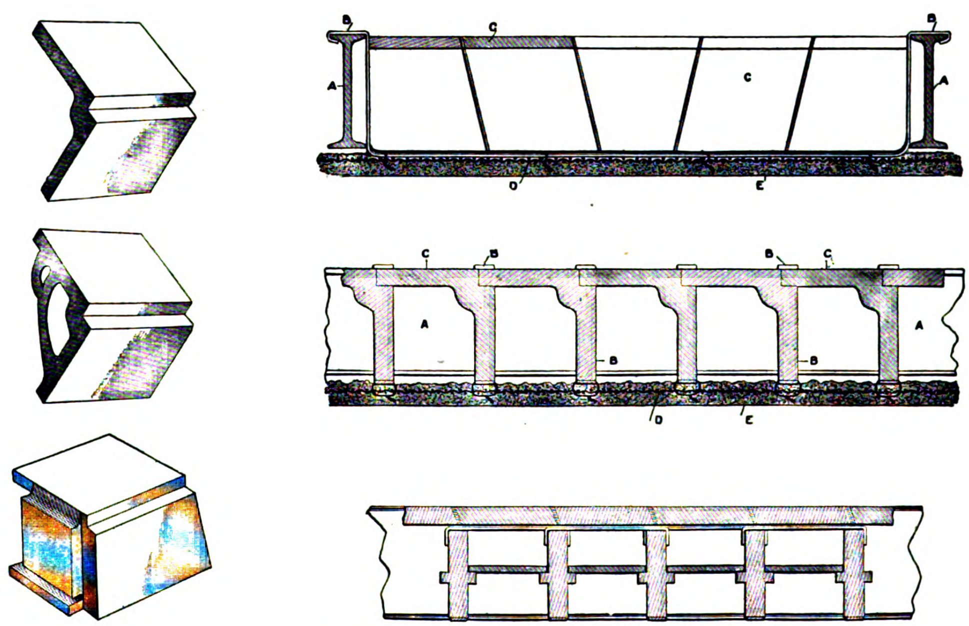


Wire brick ½ size.



End of wire brick

Figs. 16, 17, 18 —Wire Partition Bricks.



Figs. 19 to 24.—Suspended Floor and Ceiling.

Fire-Proof Construction.

average of $2\frac{1}{2}$ inches of thickness for the slabs. The concrete, which was 1 of cement to $2\frac{1}{2}$ of common sand, was supported by three $\frac{5}{16}$-inch rods hooked over the flange of one beam and attached to the other by clips, and by a web of wire lathing attached to the rods and bent around the outer flanges of the beams as at center of slab. In 24 hours 350 pounds were added with no further deflection. After standing 24 hours 350 pounds additional weight was put on, causing a deflection of $\frac{1}{32}$ more, or $\frac{4}{32}$. The next day 350 pounds added weight added $\frac{1}{32}$ more to the deflection. The tenth day we added 1400 pounds, making in all load of 5250 pounds, broke one of the rods at the hook, broke one of the clips, and straightened the hook of the third rod, drew the lathing from its anchorage and dropped the load. The second slab gave very nearly the same results as the first.

Slab three was the same as the others, with the exception of the supporting rods, which were $\frac{7}{16}$ instead of $\frac{5}{16}$. It was expected this would carry about twice the load of the others, not anticipating that the clips would prove the weakest part of the construction, and, as was shown, insufficient in strength even for the light rods. A load of 1750 pounds was placed on this slab in 17 days after being made, causing it to deflect $\frac{1}{32}$ inch at center. In 24 hours the load was increased to 2800 pounds, giving slab a deflection of $\frac{4}{32}$. Twenty-four hours later we increased the load to 4200 pounds, which caused a deflection of $\frac{10}{32}$, after which, on increasing the load to 5250 pounds, the slab settled from $\frac{5}{8}$ inch to $\frac{3}{4}$ inch deflection in 30 minutes, and 10 minutes later the concrete crushed, but was held suspended by the rods till 360 pounds more were added, breaking all the clips. These tests, and others made at various times, with very much the same results, go to show that a load is so well distributed over the wires imbedded in the concrete that from about one half to nearly their full tensile strength can be depended on, according to the width of the span.

In Fig. 11 is also shown a method for the protection of the iron beams. They are covered with wire lathing, which is drawn around them and laced together at the top of the beams. At the bottom of the beams is an offset by ribs of thin steel, which gives the mortar a chance to clinch around the wires, and also leaves an air space between the mortar and the beam. This gives a very efficient protection, as mortar clinched through the meshes of wire lathing will not burn or fall off and an air space is left around the beam where the greatest protection is required. A very heavy coat of mortar will be held safely by the wire lathing.

The system shown in Fig. 11 is also applicable to mill construction. The wood beams can be incased in the wire lathing, which will be offset from the beams at the sides in a manner similar to the offset at the bottom. This will leave an air space around the beams and avoid the very serious risk of dry rot, which would be apt to take place were the beams closely imbedded in the plaster.

CONCRETE ARCH CONSTRUCTION.

Figs. 12 and 13 show concrete arch construction. These arches are built up over formers suspended on the lower flanges of the beams, and placed between the suspender irons upon which the ribs of the concrete arches rest. The cement or concrete is mixed to the proper consistency, and applied and tamped into place, filling all the spaces not taken up by the formers. The ribs and the web may be made of any thickness of section required. As the greatest pressure comes on the lower corners of the ribs, in proportion to the resisting surface, it would be well to have the concrete at those points of a greater crushing strength than the rest.

An arch of this construction, 18 inches wide, built up on two $\frac{3}{16}$ x $1\frac{3}{4}$ inch iron suspenders, which were hung over 9-inch I-beams, placed 6 feet on centers, the rib of the arch reaching the bottom of the beam, and the top of the web reaching the top of the beam, the concrete having a thickness in section of 2 inches, carried a load of 9000 pounds in zinc plates built up in eight piles, each pile having a space between it and the next adjoining, so that no pile received any support from the neighboring one, the entire weight resting on the concrete, none of it being on the I-beams, for 96 hours, and nearly all this time the weight was under vibration from the jar of heavy engines. With this weight, 9000 pounds, the concrete at the lower left-hand corner showed signs of having reached its limit of crushing strength, and when 700 pounds more had been added it failed, crushing the cement to dotted lines at *c*, Fig. 12.

The deflection of the arch with 5000 pounds load was $\frac{1}{4}$ inch, and at this time a few fine cracks began to appear along the bottom of the ribs at and near the center of arch. The cracks opened slightly as the load was increased, the worst one showing about $\frac{1}{16}$ inch open at the bottom when the load was 9000 pounds, and the deflection of arch was $\frac{3}{4}$ inch. A cake of zinc weighing 43 pounds dropped from a hight of 18 inches on the load at center had no visible effect on the arch. When the cement (at *c*) crushed with load of 9700 pounds the arch settled at center till there was a deflection of about 2 inches, in which position it was stopped by blocking below. The weight was now removed, and the concrete, when inspected, showed the ribs very badly cracked in both directions, and the web somewhat cracked, but showing no sign of crushing at the top, where the crushing stress was most severe. Evidently the suspenders and the web of the concrete arch were capable of supporting considerable more load than was applied. The blocking being removed from below, a 43-pound plate of zinc was dropped on center of arch from a hight of $6\frac{1}{2}$ feet 12 times, and 86 pounds from a hight of 5 feet once, the 13 blows adding somewhat to the deflection, and opening a little more some of the cracks.

In this condition a load of 2700 pounds, 300 pounds per square foot, was evenly distributed over the arch, and remained 48 hours, after which a load of 1032 pounds was applied at center of arch, the weight covering a space the width by 8 inches of its length. In 48 hours 520 pounds more were added to the same pile, making it equal to a distributed load of 345 pounds for each square foot of surface. The deflection with this load was nearly 4 inches, and the mass was entirely supported by the suspenders, the concrete adding 30 pounds per foot to the weight, but nothing to the strength. While cutting away from below to allow the suspenders more room for deflection as the weight should be increased, the jar caused one of them to settle before the other was relieved, and the mass of concrete and zinc plates fell sideways out of the suspenders, there being nothing to support the arch in that direction.

Fig. 14 shows the I-beams protected by skewbacks, the suspenders for the floor and ceiling passing over the beams and skewbacks, the concrete arch resting on the suspenders and a tile floor laid on the concrete. The ceiling lathing is the same as in Fig. 11, and applied in the same manner.

Fig. 15 shows the above in section with centering box or former in place in the arch at left of cut; it also shows the suspenders in section and a sheet of wire netting imbedded in the web of the concrete arches to strengthen them between the ribs. The arch at the right of this figure shows how terra cotta, clay or concrete bricks may be applied in this construction. These bricks can be made as shown in section, or in some modification of this form, and they can be made to extend from beam to beam in one piece or in several, as convenient. In spans of 5 feet to 8 feet three, five or more bricks would preferably be used, the central one forming the key to the arch. Tests of arches constructed on this principle showed great strength.

WIRE PARTITION BRICKS.

Figs. 16, 17 and 18 illustrate the wire partition bricks. These are made of No. 20 wire lathing, into which, at intervals of 7 or 8 inches, are woven iron rods about $\frac{3}{16}$ inch diameter. The whole is then galvanized so that all the joints are soldered together, and are then bent into the required form. For a 4-inch partition they are made 4 x 10 or 12 x 48 inches. For a 6-inch or 8-inch partition they are 6 or 8 x 12 inches x 5 feet long. Almost any size or length can be made, but it is well to limit the size, at least in length, on account of getting sufficient stiffness for the wall.

The bricks are built up into sections between iron studding. For a 4-inch wall, $\frac{3}{32}$ to $\frac{1}{8}$ x 4 inches is stiff enough, as the strength edgewise is all that is required. The pieces are cut 3 or 4 inches longer than the distance between floors, and the ends are bent at right angles so as to form lugs, by which they are attached to the beams either by screws or by clamp bolts.

SUSPENDED FLOOR AND CEILING.

Figs. 19 and 20 show very fully the construction of the suspended floor and ceiling when the arches are built of a series of bricks arranged to fill the space between the beams. Fig. 19 is a side elevation of an arch so constructed, A A are the beams, B B the suspenders, C C the concrete, terra cotta, or clay brick of which the arches are constructed, D is the wire lathing imbedded in the plaster E, which makes the ceiling. Ribbed lathing is preferably used on account of its leaving an air space between the plaster and the suspenders, and because the suspenders can be placed further apart than if any other kind of metal lath were used, 24 to 30 inch space being safely carried by it. Fig. 20 is a section of this floor and ceiling at any point between the beams. Like letters indicate like parts as in Fig. 19. Fig. 21 shows one of the bricks in perspective. A groove is made in one of its edges to receive the free edge of the adjoining brick in the next section of arch. The joints should be made in cement to stiffen and solidify the top, or web, of the arches, the better to enable them to carry heavy loads. Fig. 22 is the same as above, except that the bricks are provided with intermediate air spaces between the ceiling and the top of the arches. Fig. 23 shows a method of fire proofing the beams with the end bricks of the arches. The bricks are molded to fit between the flanges of the beams and around and under the bottom flange. In laying, the end bricks are first set and the key brick is pressed into place to complete the arch. The beams are further protected by the ceiling, which is plastered on wire lathing. Fig. 24 shows a construction where the arches are built up of two series of bricks, one resting on the suspenders for the ribs, and another series laid on top of these for the web of the arch. Projections are shown on the upright bricks, upon which rest intermediate sheets or slabs of fire-proofing material. Hoop iron stays are also shown along the top of the rib bricks; these are used to give the top of the ribs the correct spacing; they also serve, when they are bedded in the cement, to unite the whole and to strengthen the top bricks between the ribs. Instead of using two series of bricks, one for the ribs and one for the web or top of the arches, as shown in Fig. 24, the web may be made by placing ribbed lathing over the tops of the rib bricks, the ribs of the lathing resting on the bricks, and then spreading good concrete to a thickness of $1\frac{1}{2}$ to 2 inches over the whole. This would unite the whole very firmly together, and the concrete between the ribs would be so bonded together by the lathing that it would be very difficult to crush it through. A little saving in floor space would be made by this method, as it would not be necessary to go above the top of the beams with the top line of the concrete, unless a tile floor were required, and then only enough to make a bed of cement in which to lay the tile. If a wood floor was to be laid, the sleepers could rest directly on the beams, and could be fastened to the part of the suspenders passing over the beams, so that no bedding would be required; this would leave sufficient room under the floor boards for all the pipe and wires required through the building.

RESULTS AND CLAIMS.

It is claimed for this method of construction that the permanent load on the iron beams is reduced at least 50 per cent.; the strength of arches is increased over 50 per cent.; the fire-proof material is more securely attached to the iron beams, and will not fall off from the effect of heat or from vibration of the floor; air spaces are provided between the fire proofing and iron work. An arch reaching from top to bottom of 15-inch beams will weigh less than 18 per cent. more, the thickness of section being the same, than an arch 10 inches deep, and will not cost over 8 per cent. more; the cost of fire proofing will be greatly reduced, with a saving in weight of about 40 pounds per square foot of floor.

CIRCLE ON CIRCLE.

IN PREVIOUS ISSUES of the paper we presented a communication from a well-known mechanical draftsman treating on one phase of the subject indicated by the above title. What we lay before our readers this month is the reply of a correspondent to numerous inquiries which appeared in a late number of one of our English exchanges. The phase of the subject considered is framing a circular-headed window in a circular wall. Referring to the illustrations, Fig. 1 represents a plan of the window, and Fig. 2 an elevation of the circular headed sash. In that part of the first figure designated No. 1, the letters A A represent the jambs; S the outside linings, B C the upper sash, G G the pulley stiles, H the inside lining, E the parting bead, F the stop bead and M the sill. In the language of the correspondent referred to, in order to find the veneer for the arch bar K L M, lay out the stretchout of the arc K L M of Fig. 1 on the line A B of Fig. 4, and draw lines from the division in the arc to any chord line as N *o* of No. 1. Then make the ordinate C *a* D of Fig. 1 equal to *o z* P, No. 1, 3 *b c* equal to *r t y*, and so on; then G E D F H Fig. 4, will be the veneer for the arch bar.

To find the mold for the radial bars, from P, in No. 1, draw P R a tangent to the curve; and on it draw lines from division *l* in the radial bars F H E G and produce them to cross the plan of the lowest sash; then transfer the ordinates, R *h i j k l*, &c., to H *r s* 3 *t u*, and the ordinates of the bars in No. 2 and the molds L G F *s* of the bars E G F G will be obtained.

To find the face mold for the circular outside lining, the dotted lines *a k l m n o p*, No. 2 of Fig. 1, show the lower edge of the lining, and lines draw through these points perpendicular to A C cut the lines S *g*, No. 1, in *a b c d e f g*; transfer these on the stretchout to the line A B, Fig. 5, and draw ordinates perpendicular to A B, on which set up the corresponding hights from No. 2, as *b k* to *b g*, *e l* to *c h*, *d m* to *d k*, &c.

To obtain the molds for the head of the sash frame, apply the stretchout of the outside of the arch in No. 2 to the base line A B in Fig. 2, and set out the ordinates drawn through the divisions; the corresponding ordinates from the chord I K in No. 1.

To obtain the mold for the underside of sash, Fig. 3, set out the divisions of the underside of the arch in Fig. 1, No. 2, along the base line in Fig. 3, A B, and proceed in the same manner as above, but setting out the ordinates from the chord line L M.

Fig. 1, No. 3, shows the first division of the sash frame A N in No. 2, and the plan No. 1. The thickness of stuff required to work it out of the solid is shown at E N. The joint at N, No. 2, and *k h*, No. 3, is shown at *b c* in Fig. 2 and C F in Fig. 3.

Henry Hudson Holly.

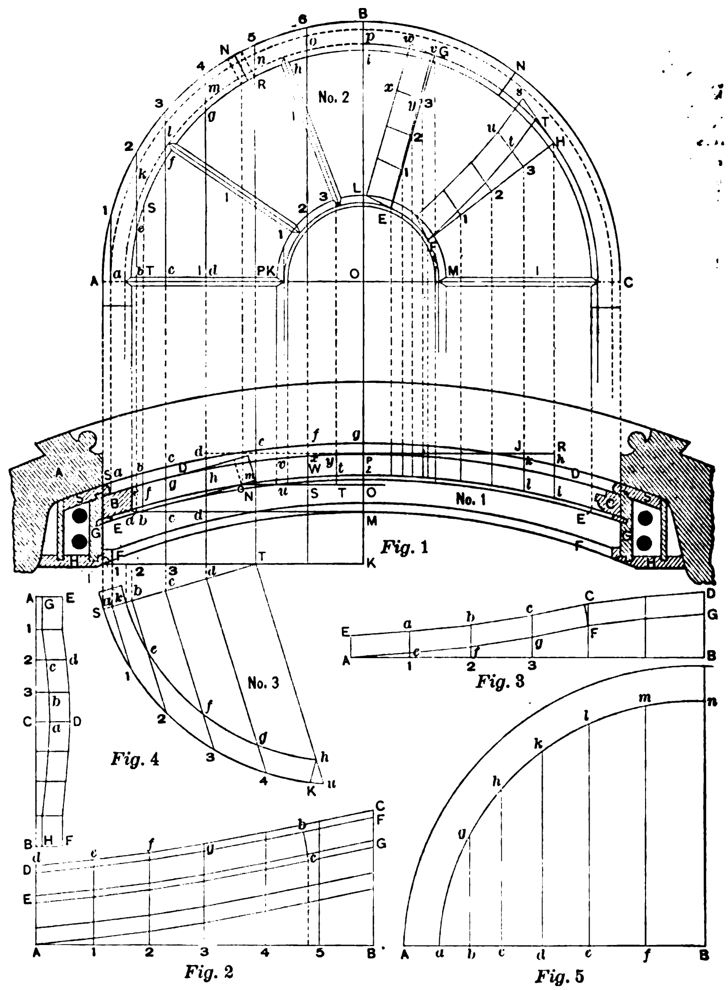
The building trades of the country will learn with regret of the death of Henry Hudson Holly, which occurred on Monday morning, September 5. He belonged to an old and well-known Connecticut family, his ancestors being among the founders of the town of Stamford, Conn. Mr. Holly, however, was born in the city of New York, where, after reaching the proper age, he began the study of architecture, which he pursued for two years. He then went abroad to complete his studies. As an architect he devoted his attention largely to churches and country buildings, both great and small, and was the author of numerous publications well known to the building trades. Mr. Holly was 58 years of age at the time of his death, which resulted from a complication of disorders arising from a fall, some three years ago, in a building the construction of which he was supervising. He was buried at Stamford on Wednesday, September 7.

California at the World's Fair.

California is to be honored by having a section of one of her famous big trees made a prominent feature in the Government Building at the World's Columbian Exposition at Chicago. The project, the accomplishment of which is fully assured, is a unique one. The section of the tree will be 23 feet in diameter and 30 feet long. This will be divided into three parts, and these will be placed in their natural position, one above the other, and so arranged as to form something like a two-story house. The contract for the tree was made by H. A. Taylor of the Department of the Interior in the spring of this year, and the company receiving the award are now at work getting it out in their forest of *sequoia gigantea* in the Converse basin on Kings River in Fresno County.

The contract called for a tree 20 feet 6 inches in diameter, but the tree actually found will be 3 feet greater in diameter. There are, of course, larger trees in the forest, but the requirement was that this section should be perfect in all respects, cylindrical, straight and without a burn in the bark, and this was the largest found to fill all these conditions. The tree selected is one known as the "General Noble." It measures 33 feet in diameter near the ground, but as the object was to have the section of the same diameter at both ends, as nearly as possible, a piece is being taken out of the tree at some distance from the ground. To do this and to preserve the section from harm by falling, as well as to meet other requirements has proved to be a work of considerable magnitude. The idea is not to send a solid section, but rather the rim of the tree hollowed out and cut into segments of a suitable size, and all to be numbered, so that they can be erected at Chicago, so as to look from the exterior like a solid section of a sequoia 30 feet in hight. The three parts into which the section is being cut consist of two parts of 14 feet each, to be hollowed out, and one, two feet thick, which will serve as a floor between the two stories, as it were.

The work of cutting, lowering and boxing the segments is being pushed forward as rapidly as possible, and it is expected that the tree will all be shipped by the end of October. To get the tree to a point where wagons can reach it required the building of a road two miles long. The entire exhibit, including the work, will cost the Government several thousand dollars. The tree, when erected at Chicago, will be surrounded by a glass dome, and will stand directly under the great dome of the Government Building.



Circle on Circle.—Framing an Arched Window in a Circular Wall.

WHAT BUILDERS ARE DOING.

BOSTON building interests are active, and the relation between employers and workmen harmonious. Since the passage of the new building law there have been several references to the new board of appeals, which was one of the new features established by the new ordinance. The working of the board has been very satisfactory thus far, offering as it does a means for the settlement of questions in dispute at the hands of a tribunal of disinterested experts without the necessity of setting the more ponderous and expensive machinery of the law in motion.

Buffalo, N. Y.

The building business in Buffalo is reported as being in excellent condition. The members of the Builders' Association were much occupied during the early part of the month of September with the preparations for the dedication of their new building, a report of which appears on another page.

Cincinnati, Ohio.

Reports from the Builders' Exchange of Cincinnati show that organization and the building interests of the city to be in good condition. The exchange has added over 30 members to its roll so far this year, and there are several names up for action at present. Those who attended the opening of the Builders' Exchange building at Buffalo were loud in the praises of the new home of that exchange and of the hospitality of their Buffalo bretheren.

Chicago, Ill.

Secretary James John of the Builders' and Traders' Exchange of Chicago writes that everything in the building trades is going along quietly, and that there are no labor troubles worthy of mention. The World's Fair buildings are rapidly nearing completion and the incidental building in conjunction therewith is very large. On account of the great quantity of work on hand wages have an upward tendency; plasterers, for instance, have been advanced from $4 to $4.50 per day, and it is predicted that the wages of the laborers will soon take a corresponding rise. An incident recently occurred in Chicago which shows the value of organization. The Board of Education recently advertised in the usual manner for proposals for the erection of a large school building. The lowest bidder to whom the contract was duly awarded, subsequently refused to fulfill the contract, and the board then proposed to advertise for new bids. Upon learning of the intended action of the board, the next lowest bidder, who was a member of the Builders' and Traders' Exchange, objected and appealed to the exchange for support. The matter was immediately taken up by the exchange and the injustice and bad precedence pointed out to the board, which, be it said to its credit, saw the matter in the proper light and at once awarded the contract to the next lowest bidder. This is the third time that such a result has been obtained from that portion of the city government by the exchange. The committee of 27 appointed in August to consider the subject of discounts, and referred to in the last issue of *Carpentry and Building*, appointed a sub-committee of five to formulate a report to be considered by the general committee before presentation to the exchange for action. The following is the report of the sub-committee which was presented to the exchange without alteration, and meetings have been held between the contractors and dealers in several branches of the trade for the purpose of securing the adoption of some plan that will secure the end desired. The brickmakers are the first to perfect a system upon the lines suggested by the report, which is as follows:

REPORT OF SUB-COMMITTEE

TO THE

FULL COMMITTEE OF TWENTY-SEVEN

ON

DISCOUNTS.

Your committee frankly acknowledges at the outset the many difficulties surrounding the effort to harmonize the many interests involved in commercial transactions between the various classes and parties engaged in the manufacture, handling, selling and consuming of building material, the necessary variance in classification, the fluctuation in market values, &c.; but we feel, nevertheless, that justice and equity demand that the general building contractor, the brick-layer or stone mason, the carpenter, painter, plasterer, plumber, roofer or sheet metal worker—in short, the consumer of any class of building material, should obtain, and is in equity entitled (when purchasing) to an advantage in rates over those possible to be obtained by the would-be owner or capitalist, even though such owner be compelled, by the exigencies if his business, quite frequently to cause to be erected factory buildings, warehouses, &c., and who may heretofore have been enabled to purchase material in the open market for less money than his builder, and thus frequently have been enabled to avail himself of the mechanical skill and ability of such builder, without proper remuneration therefor. The justice and equity of the foregoing proposition, being admitted, what practical remedy can be suggested, how can the business methods now obtaining among purveyors of building material and the purchasers and consumers of same among so many different classes, and different methods of rating be brought about? Your committee would suggest, first that in its opinion, we shall find it very difficult to bring about immediately an absolute change in methods heretofore prevailing, that each of the master builders organizations, the Master Masons, the Master Carpenters and Master Painters, &c., of the city of Chicago, should take up and carefully consider at once, and seek to create among its own members first, and through them among the purveyors of material of whom they purchase, correct views and a determination to conduct their business hereafter on such sound business principles as have heretofore and do now obtain in nearly all lines except those connected with the building business; and while neither your committee, nor, is it believed, have the members of the various Master Builders' Associations connected with the Builders' and Traders' Exchange of Chicago, any sympathy with or desire to establish a system of boycotting, it is believed that by the putting forth of vigorous effort and endeavor to inculcate correct business principles the members of the before-mentioned organizations will very soon be enabled to determine who among the manufacturers and dealers in building material are their friends, who of these manufacturers and dealers, in short, prove by their actions, that they value as they should, and seek to retain the patronage of the steady buyer from year to year, rather than to depend upon or cater to the occasional, though possibly for the time being, somewhat large purchaser at reduced rates.

As to the practical method by which a scale of prices may be adopted, more favorable to the contracting builder than to the owner, it is probable that each master traders' association may best be able to judge of this for itself; but your committee would recommend, in view of the frequent changes and fluctuations in classification and price, that a system of percentage discounts would seem to be eminently desirable: and more practicable than an effort to make an arbitrary difference in list price.

By way of suggesting further a plan for the practical application of the foregoing, your committee would offer the following as an example:

The brickmaker may establish and publish as his list price, say $8 per 1000, while he allows the contractor a discount of 10 per cent. from such list price; he may go still further, having sold 100,000 bricks to an owner who pays his contractor in turn a certain price per 1000 for laying those brick he may make, allow and pay to such contractor a sum in cash equal to 10 per cent. on the amount of said bill of brick, always provided that said contractor is generally recognized in the market as such. It may be considered advisable on further reflection to allow an additional discount of 2½ to 3 per cent. for cash, 10 days, but these and other details may well be left to the discretion of the various trades organizations directly affected. The main object being to establish the maintenance and practice of the principle and custom herewith advocated.

Denver, Col.

The members of the Master Builders' Association of Denver, together with their wives and families, recently spent a very pleasant day at Manitu Springs, visiting the cave, caverns, gardens and the springs. The trip was a most delightful one, and every one seemed to thoroughly enjoy themselves. The party went by special train and the details of the trip were most carefully attended to. The committee in charge were J. S. Buell, Chas. Treat, Henry Suess, J. P. Pellenz and J. Gregor. The building business is reported as being in good condition.

Detroit, Mich.

The weekly reports of the contracts let to members of the Builders' and Traders' Exchange of Detroit indicate that the building business of the city is in excellent condition. It is said that the carpenters are preparing for another brush with the employers in the spring, in an effort to secure an eight-hour day. The failure of the last strike rather depleted the strength of the unions, as many members withdrew, but it is now alleged that a new movement for a shorter day is under way.

Louisville, Ky.

The Builders' and Traders' Exchange of Louisville has moved to new quarters in the Board of Trade Building. The change is not intended to be a permanent one, as the project for erecting a building of its own is progressing finely.

New York City.

A great change appears to be coming over the spirit of organized labor in New York City. While the various organizations are trying to come together and act more in unison with the Central Labor Union and its sections, they threaten to become more independent of one another in their every day workings. An instance of this is in the carpenter trade. Already the United Brotherhood of Carpenters and Joiners have decided to withdraw from the Board of Delegates, and the Amalgamated Society of Carpenters and Joiners is expected to follow suit. The idea of the carpenters unions is to form a central body, independent of the other trades.

For a long time the workmen in the roofing trades have been trying to effect some kind of an annual agreement with the employers, and to obtain some advantages which they claimed should be given them by the employers. Early in September the following agreement was formally adopted, and it is claimed affords mutual satisfaction to both sides:

That eight hours shall constitute a day's work, commencing at 8 a. m. and ending at 5 p. m., with one hour for dinner each day.

The day to be distributed as follows: For any work performed before 9 a. m. nothing to be charged; for any work performed between 8 and 11 a. m., one-quarter day only; for any work performed after 11 a. m. will be considered one-half day. In the afternoon any work performed before 2 p. m., nothing to be charged; for any work performed between 1 and 4 p. m., to be one-quarter day only; but any time after 4 p. m. will be considered one-half day.

The wages to be $3.50 a day until September 1, 1893.

That the walking delegate has the privilege to examine the members' cards at all times.

That no employer will sub-contract any work in the roofing line to a journeyman.

That the pay shall be weekly and on Saturday only.

That after September 1 the men to receive their money not later than 5.30 p. m. on Saturday.

That any apprentice going at the business shall not be over the age of 17 years, and must serve four years before becoming a journeyman

That one apprentice be allowed to every five men, and under no considera ion will any employer have more than four apprentices in his employ.

That any apprentice while working in the shop be allowed to work at any branch appertaining to the business, and have ample opportunity of learning the same. Any employer failing to grant such opportunity be reported to the committees, and the employer held responsible for the same.

That any apprentice leaving a shop before his time expires, unless having a sufficient reason, be forced back to his former employer, or forced from the business.

During apprenticeship the employer will have the privilege of paying the apprentice according to his own judgment.

That any one working at the business four years, one year inside and three years outside, be declared a journeyman, and will be looked to as such, unless his employer claims that he is not able to earn journeyman's wages; he to be referred to the committees for investigation, and their decision will be final.

That all applications for apprenticeship be referred to the committee, and at the expiration of their time apply to same for journeyman's card.

That an employer not wishing to retain any employee will pay him at the time his services are dispensed with.

That the slate and metal roofing will be comprised of the following, to be done by tin and slate roofers only: The putting on and repairing slate and metal roofs, making and putting in of flashing, setting and lining gutters, the putting up of leaders, the making of offsets and bends attached to same, and under no consideration will inside hands be sent to do any work appertaining to the above article except in case of emergency to protect property and not to exceed one day.

All differences between men and bosses will be referred to the executive committees on both sides for settlement during that time.

That hereafter all future agreements shall be made during the month of March.

Affairs generally in the building trade are in a better condition at present than they have been at any time before this season, and as a natural result a large amount of work is being done.

Omaha, Neb.

The following editorial from an Omaha daily newspaper is an excellent indication of the position which the Builders' and Traders' Exchange of that city holds before the public, and of the appreciation accorded to its efforts to improve the conditions which surround the building business that need correction:

The Builders and Traders' Exchange sets an example of attention to business which other organizations intending to promote public interests might very well emulate. At the last meeting of the exchange the principal subject of discussion was irresponsible contractors, and a general desire was manifested to find a means of suppressing them. It is to be hoped the matter will not be dismissed with this discussion, but will be steadily pursued until an effective way be found to shut out the "snide" contractors. They constitute a class of rogues who rob both capital and labor.

Building is holding its own in Omaha, and there is quite a large amount of work being done at present.

Philadelphia, Pa.

The mechanical trade schools of the Master Builders' Exchange of Philadelphia began its third year with about 70 new pupils. The largest class is in the bricklaying department, which fact is attributable in a measure to the fact that the Bricklayers' Union gives preference to apprentices from these schools. The schools will be obliged to increase their capacity before very long. The Master Bricklayers' Company has appointed a committee to secure an opinion from City Solicitor Warwick on the question of the right of the district surveyors to measure party walls and excavations. The association wishes to ascertain whether or not the district surveyors are not infringing on the rights of the measurers connected with the Bricklayers' Company by doing this work, and fall back on the act of Assembly which gives them the right to measure party walls. The Bullitt bill directs that the city surveyors must pay their fees into the city treasury, while the measurers retain the fees in lieu of a salary. The question involves the handling of many thousands of dollars in the course of a year, and legal opinion is anxiously looked forward to by interested parties.

Providence, R. I.

The carpenters of Providence are organizing in the interest of a shorter hour day. A building trades council is proposed which shall include plumbers, painters, electric light men and carpenters. The building business is about as active as usual.

San Francisco, Cal.

Organized labor in San Francisco is about to take a new departure. The council of the Federated Trades of the Pacific Coast and the council of the Building Trades are to be dissolved, and in the place of these there will be an organization that will include all the labor unions of the city. There has been some complaint that the council of the Federated Trades did not meet the requirements, and as a result of these complaints there sprang up the council of Building Trades, and there was a certain amount of rivalry between the two bodies.

The parties most interested feel that there ought not to be any clash between unions.

The Builders' Exchange is in good condition, and the amount of building in progress in the city is up to the mark.

St. Louis, Mo.

Reports from St. Louis show that the building business is active, and that builders generally are busy. The season thus far has been a very favorable one, and there has been very little to hinder the prosecution of work. The Builders' Exchange is growing all the time, and the wisdom of the move to better qarters is daily apparent. President Ittner of the National Association of Builders returned from Buffalo, where he had been in attendance upon the dedicatory exercises of the new exchange building in that city, much impressed with the importance of the work accomplished by the Buffalo Exchange.

Worcester, Mass.

An effort is being made in Worcester to establish a mechanical trade school similar to those existing in New York and Philadelphia, and the work is being outlined preparatory to definite action. The subject has been under consideration for some time past, but no decisive action has ever been taken in the matter. The present prospects indicate that something will be accomplished in the near future. The Builders' Exchange is in good condition, and steadily increasing in membership and usefulness. One of its most important adjuncts is the Master Plumbers' Association. It has been organized since 1884, but it is within only a year or so that it has gone thoroughly to work in its own interests. Last February the association made its headquarters at the Builders' Exchange, and appointed George Bouchard, who is also secretary of the Builders' Exchange, its secretary. Out of 35 master plumbers in the city the association has a membership of 21. They meet twice a month, on the first and last Tuesdays, and every member who is absent, no matter what his excuse, is fined $1. The meetings are in consequence always lively and well attended. The president is J. W. Jordan.

One of the most important features of the Master Plumbers' Association is the contract system. Once a month every member is bound to report all jobs on which he has figured, giving his figures. This precludes any chance of cutting rates, and at the same time keeps up a uniformity of prices.

Notes.

The mason builders of Bridgeport, Conn., have recently been agitating the subject of a builders' exchange. Several meetings have been had and a committee of four has been appointed to visit the other branches of the building fraternity. An attempt will be made to establish a scale of prices which will allow a fair margin of profit to the contractors.

The new builders' exchange at Los Angeles, Cal., recently incorporated is attracting public attention in that city by its efforts to promote mechanical and industrial interests; to inculcate just and equitable principles of trade; to establish and maintain uniformity in commercial usages by rules and regulations; to acquire, preserve and disseminate valuable business information; to adjust differences and settle disputes between members; and for other purposes conducive to the interests of its members; and any person whose avocation is connected with the trades or industries of building as a contractor or furnisher, and not a member of a journeyman's trade and labor union, may become a member of the exchange upon the approval of the board of directors, and in a manner as provided for in the constitution. The association starts out under the most favorable auspices, almost every firm engaged in the building trade being on its rolls. Following are the officers for the ensuing year: J. M. Griffith, president; A. Nicholls, first vice-president; John Rebman, second vice-president; J. F. Fosmir, treasurer; John Spiers, secretary. They have also fitted up rooms in the basement of the California Bank Building at the corner of Broadway and Second streets, where daily meetings will be held.

The following agreement has been submitted by the Eight-Hour League of Los Angeles to the workmen for approval, and a committee appointed for the purpose of securing the co-operation of the builders' exchange. "We, the undersigned contractors, builders and mill men, hereby agree to accept eight hours as a day's work for carpenters on and after Monday, October 24, 1892, without any reduction of wages except on work contracted for before September 10.

The building material dealers of Brooklyn are talking of forming an organization for mutual protection. Several meetings have been held for the consideration of details and a permanent organization in the near future is the expected outcome.

The contracting masons and carpenters of Dubuque, Iowa, have been having a controversy regarding the question as to the right of each to take entire contracts, to the exclusion of the other. The discussion of the subject has created much comment on both sides, and at present no definite conclusion has been reached, each side claiming the right to assume the entire contract for the erection of a building.

The New Bedford Builders' Exchange had their third annual clambake and outing at Grimshaw's, Thursday, September 8.

The following quotation from a New York daily paper is interesting as an indication of the equity upon which some of the strikes in that city are based. "Several walking delegates had been refused admission to the Waldorf Hotel, Thirty-third street and Fifth avenue, and this is considered by the delegates a sufficient cause for a strike."

The following is another similar case: "Two walking delegates were sent to argue with nonunion men, and came upon the contractor during working hours while he was engaged in superintending the work on the building. He told them that he was too busy to argue the matter with them just then, whereupon they peremptorily ordered him to dismiss his nonunion men. The contractor showed them out of the still unfinished door. The board is wroth that no apologies have been offered them as yet, and has decided to investigate the segrievances. Strikes may be ordered in consequence."

The master builders of Fitchburg, Mass., are engaged in the preliminary work of forming a builders' exchange. An invitation has been extended to the Secretary of the National Association of Builders to give them an address, which he will do as soon as it is convenient for them.

The St. Joseph, Mo., Exchange is having a hard time collecting dues from members, and is trying the courts as an assistant.

It is to be regretted that the other trades unions of Philadelphia have not followed the example of the Bricklayers' Union, with reference to their attitude toward the apprentices graduated from the Master Builders' Exchange Trade Schools. The preference afforded to these apprentices by the bricklayers has stimulated the education of young American bricklayers, while in some other branches of the trade the antagonism of the unions acts as a damper upon young men who desire to learn any of these trades, as they are in danger of being compelled to seek employment outside of the city when the term of their practical employment begins.

There is a proposition now before the architects and underwriters of the United States to co-operate and make a united exhibit of methods and materials showing the evolution of building construction at the Columbian Exhibition. The Illinois Chapter of the American Institute has led the movement, and through its secretary expresses the opinion that the erection of a suitable building for the purpose named would be advisable. The plan as outlined by W. A. Alexander of the World's Insurance Building Exposition of Chicago is to put up a structure on an allotted space, 75 x 125 feet, at Jackson Park. Beside the exhibition rooms there will be club rooms for social or business meetings. In the first story of the building a model fire department will be placed by the exposition. In a letter addressed to the architects by Mr. Alexander, he says: "We believe that the interests of architects and those of the underwriters are identical, and if the necessary money can be raised by the architects we can go on with this building, combining our interests, making the Underwriters' and Architects Building Exposition one of the most interesting and instructive exhibits at the fair, and also self-supporting. The scope of the work will in this manner be enlarged and the size of the building will also be extended." Blanks have been sent to the architects throughout the country, asking their opinion, and favorable replies are being received, and without doubt the coalition will be effected and the exhibit made.

A Mineral Cottage.

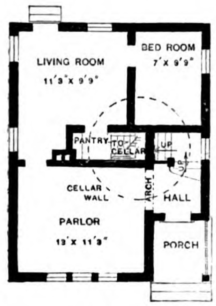
An interesting exhibit is to go to the World's Fair from the Black Hills, S. D., which will display in novel form the minerals found in the hills. The exhibit when arranged will be in the form of a two-story and a half cottage. The framework of the structure is already built, and is in the style of the Renaissance, with towers and numerous gables. It is impossible to decide on all details, of course, until all the material has been collected, but the following plan will be carried into effect as near as possible: The foundation will be made of pure white limestone, headed with a layer of Buffalo Gap "calico" stone. The first story will be veneered with pink quartz. Above that the handsomest rocks obtainable will be used—copper, mica, schist, needle, spar, garnet, &c. The lower part of the tower will be made of rubies and the upper part with some sparkling substance. The windows and shingles are to be of mica and the steps of marble. The cottage will, no doubt, prove an attractive feature of the State exhibit.

THE COMPRESSION of timber is becoming a growing industry, and the material thus treated is being applied to a variety of useful and ornamental purposes, especially in the field of carving, most attractive and artistic designs being thus brought out, pronounced in many cases fully equal, if not superior, to anything ordinarily produced in that line. The wood to be employed in this manner is compressed either in its natural condition or after being steamed, and it is found that the hardest well-seasoned ash timber, say of 4 inches thickness, can be pressed into about 3 inches without injuring the fiber. Moreover, it is also found that wood can be "upset" the same as iron; and the increased tenacity of bent and compressed wood of this sort, as compared with the same in its natural state, is declared to be something surprising. In mechanical operations compression is now applied to spoke tenons, the work being described as very simple and rapid, the tenon properly tapered and ready to drive to its place, an increased strength being thus added to the wheel equal to three additional spokes.

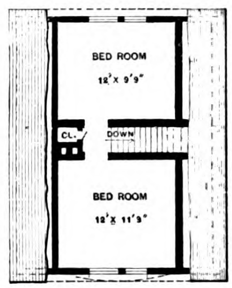
CORRESPONDENCE.

Houses for Workingmen.

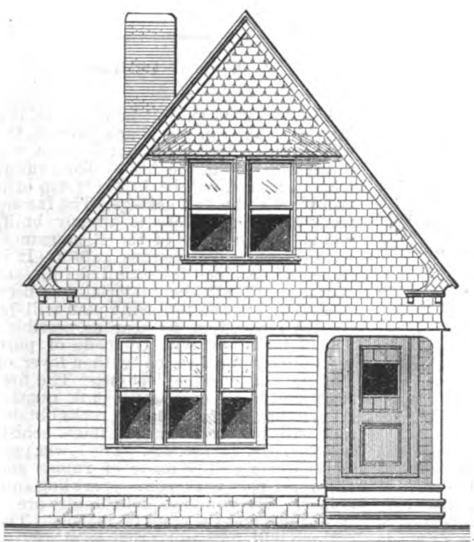
From RALPH M. HULETT, *Cleveland, Ohio.* — In answer to "F. G." of Fort Gratiot, Mich., whose inquiry for plans for comfortable houses adapted to the use of workingmen was printed on page 128 of the May issue of *Carpentry and Building*, I take pleasure in forwarding some drawings which may prove of interest. The house here shown has already been erected in the outskirts of this city for $600, and it is possible that there are among the readers of the paper members of the craft who will find in the design many points of interest and value. The floor plans show three rooms upon the first floor in addition to the hall, while in the attic there are two bedrooms of convenient size. An interesting feature of the arrangement of the first floor is the arched way opening from the parlor into the hall, displaying a neat but cheap open stairway, which contributes in no small degree to the general effect. In the rear of the parlor is the living room, opening from which is a large pantry giving access to the cellar stairs. There is also opening from the living room a small bedroom. All the rooms in the house are plastered. I am glad that the question of workingmen's houses has come up for consideration in the paper, as it would give me pleasure to see our workmen installed in tasteful dwellings—a thing which, it appears to me, could with proper attention be readily accomplished.



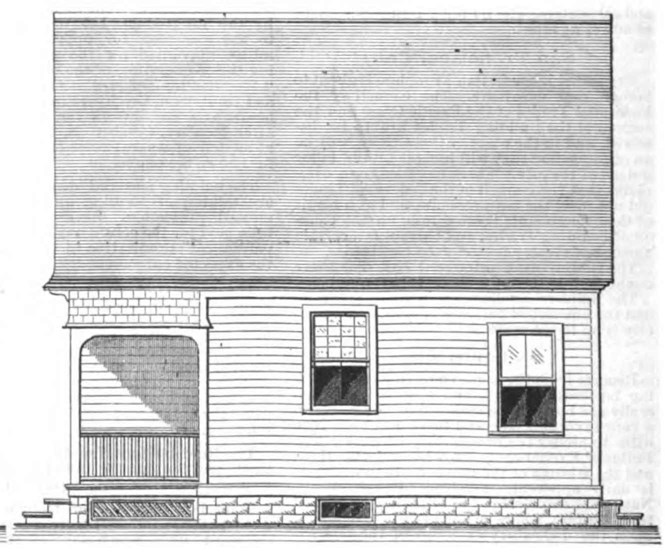
First Floor.



Attic Plan.



Front Elevation.



Side (Right) Elevation.

Houses for Workingmen.—Ralph M. Hulett, Architect, Cleveland, Ohio.—Scale.—Elevations, 1/8 Inch to the Foot. Floor Plans, 1-16 Inch to the Foot.

Fire-Place Construction.

From Will Walter Jackson, New York.—The size of the fire place, unfortunately for those who are to care for the fire, is one of the variables that depends for its magnitude on the notions of the client or the æsthetical conceptions of the architect rather than the practical considerations of the engineer. And how disastrous are the results? The large fire place in the hall, for example, of which so much had been expected in giving warmth and cheer in cold or stormy weather, is found to be a failure; it will not burn without filling the house with smoke, and it will not burn at all unless the fire, when the heat is too intense, is very large. Again, the basket placed in the small study fire place burns well but fills the room with gas, and so it goes. A prominent architect once said: "Of all the uncertainties in building there is nothing to be feared so much as the draft of the fire places." There are two reasons for poor drafts, the main one is the difficulty in drawing air into the room to supply the draft. Of course air must enter a room in volume equal to that which passes up the flue; and this, unless air is supplied, must be pulled through cracks and doors, thus interfering with the current in the flue.

The demand may be supplied by the fire place itself; it may come from the furnace, or it may come from the indirect steam or hot-water heater. With this demand supplied, almost any fire place will give good results.

The second reason is in the shape and size of the fire place and of the flue. In city houses, where it is wished to put a fire place and flue in a 12-inch wall without extra thickness for a chimney breast, only 8 inches is allowed for the depth of the fire place, and, allowing for brick work either side, only 4 inches for the depth of the flue. These depths are by far too small. A fire place only 8 inches in depth is too shallow to contain a large flue. Still worse, a flue only 4 inches in depth and having the broad side toward the exterior loses so much heat through radiation, and having so large a perimeter compared with its area offers so much friction, that a good draft is impossible. So 8 inches should be taken as the depth of the flue, and 8 inches or 12 inches as the breadth. (See page 41 of the issue of February, 1891, for building flues.)

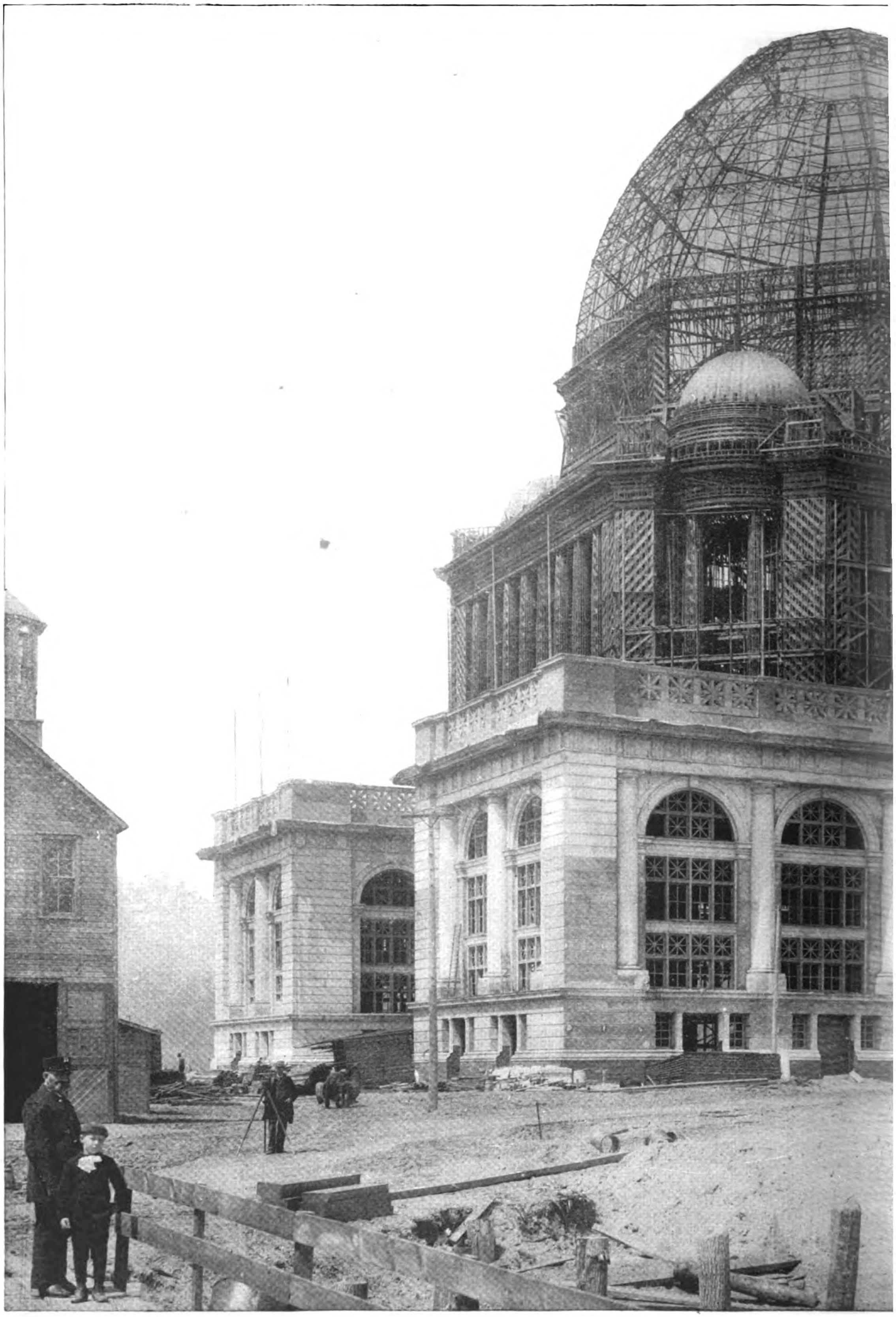
This 8 inches, with 4 inches for the front brick work, gives 12 inches for the depth of the fire place, which is the proper amount. The opening of the fire place should be 28 inches wide and 33 inches high. The width is determined by the chimney breast, which is usually 5 feet wide. With an 8-inch flue on each side of the fire place, allowing for brick work, the fire place comes 28 inches wide.

The hight is determined by practical tests. If the opening is broad and low much of the radiant heat is lost; if the opening is high compared with its width, currents of air playing above the fire cause smoke to come into the room. The proper proportion was found to be 28 inches wide by 33 inches high. Where it is desired to have a larger opening the proportions should be in the same ratio, varying the flue with the fire place.

It should be remembered in designing fire places that a small fire will not burn in a large fire place nor a large fire in a small opening, and that the fire place should be designed to suit the needs of the room rather than the æsthetical requirements.

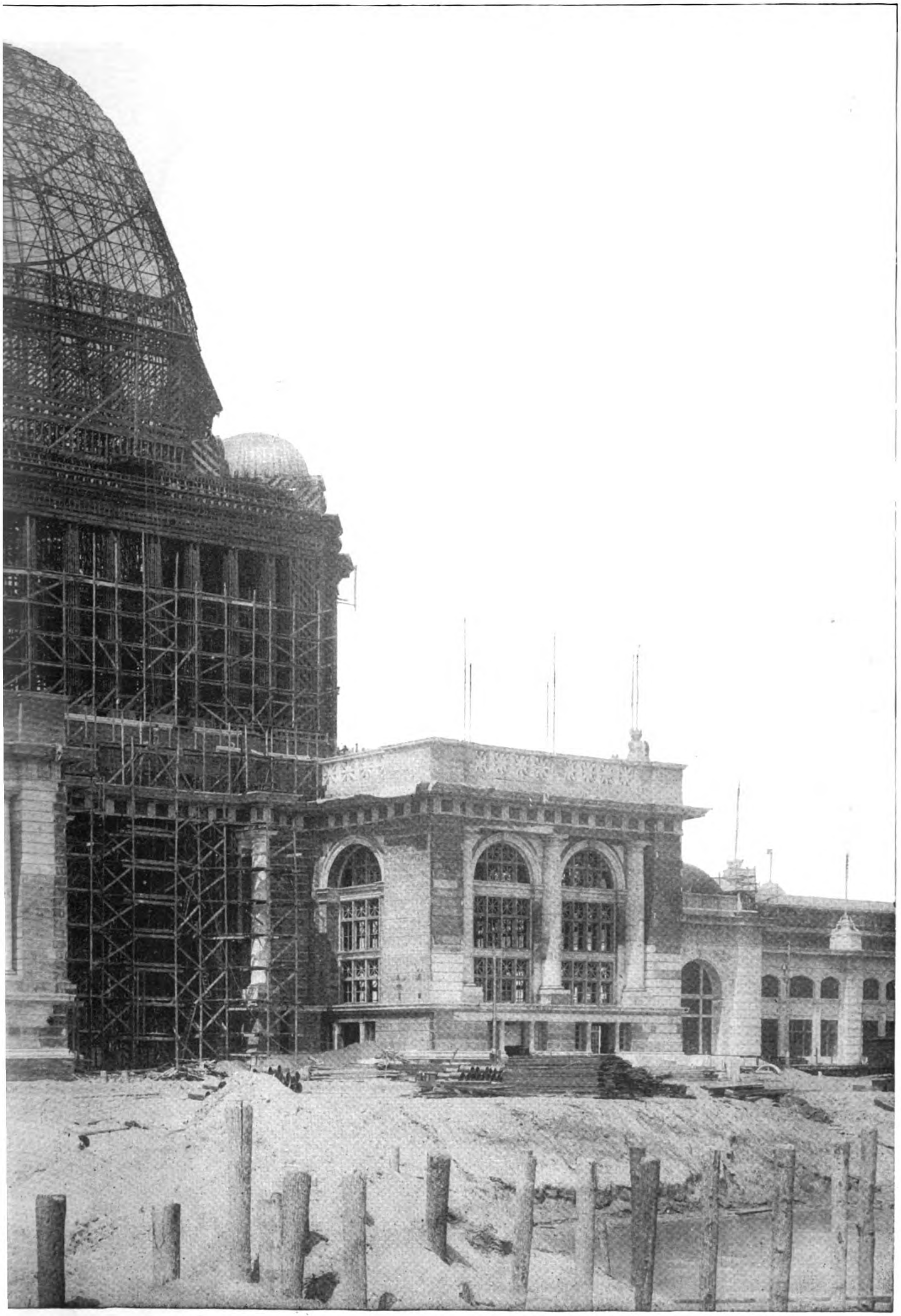
Design for Tool Chest.

From G. H. R., *Delphi, N. Y.*—I enjoy reading correspond-nce in *Carpentry and*



THE ADMINISTRATION BUILD

FROM A PHOTOGRAPH TAKEN



ING AT THE WORLD'S FAIR.

MAY 21, 1892, BY C. D. ARNOLD.

Building, and wish to furnish "J. E. H." through the paper a plan of the tool chest I use. The body of the chest is 34 inches long, 22 inches wide and 23 inches high, inside measurement. An idea of the appearance of the chest may be gathered from Fig. 1 of the drawings. The stiling is cherry, the panels black ash with a band at the top and bottom, and also a band of ash around the cover. There are three panels on the front and back and two on the ends. The ends are fastened to the panels with tire bolts fitted with washers on the inside. The stiles are $1\frac{1}{4}$ inches thick and the panels $\frac{5}{8}$ inch. There are four double-wheel casters under the chest, thus rendering easy its removal from one position to another. There are band iron corners, 4 inches at the bottom, 2 inches at the top and 2 inches on the cover. Fig. 2 of the illustrations represents a sectional view through one end of the chest, showing the position of drawers, tills, &c. At the bottom toward the front is a saw till, while the corresponding space at the rear, under the drawers, is used for adze, miter box, hand axe, mallets, &c. Beneath the center till is the space for molding planes. Fig. 3 represents the cover for the top of the drawers. Each drawer has two brass draw rings, set flush, and there are also rings on the covers of the drawers. Between the drawers and for the purpose of keeping them in place I employ a till arranged to lift out and set beside the chest when in use. A side view of it is represented in Fig. 4 of the sketches. I keep my planes, oiler and brush broom in it. On the till I employ two flush brass handles. Fig. 5 represents the inside cover of the chest. There are three compartments, each about 1 inch deep in the clear. There is one for files and one for sandpaper, while the middle one is a looking-glass. This compartment projects 1 inch into the chest. The doors or covers to these apartments are strips of different kinds of wood, dressed to a uniform thickness and ornamented with brass hinges and locks. Around the frame I place my squares, securing them with two brass buttons, all of which is clearly indicated in the illustration. Figs. 6, 7 and 8 are sectional views of the inside of the chest. I partitioned off one drawer for the level, so that it will lie flat and flush with the top of the drawer. Beneath the level is a place for pencils, keyhole saw blades, &c., but the drawers may be partitioned off to suit the tools it is desired to keep in them. The drawers are $7\frac{1}{4}$ inches and the center till $7\frac{1}{2}$ inches, outside measurement. The two lower drawers are 4 inches, while the others are 3 inches, outside, made of $\frac{1}{2}$-inch dressed stuff. The till under the panel in the cover is $24\frac{1}{2}$ inches long and 13 inches outside. The top stile of the body is 6 inches wide, the bottom stile 7 inches, and those between the panels and at the corners are $3\frac{1}{4}$ inches wide. The cut panels are 12 x $7\frac{1}{4}$ inches. The top band is 3 inches and the lower band 5 inches. The top band is placed $\frac{1}{2}$ inch below the edge of the chest, so as to make a double joint for the cover. The strip around the cover is 2 inches wide, the stiling of the cover is 5 x $1\frac{1}{2}$ inches thick, beveled to 1 inch at the edge. A $\frac{1}{2}$-inch piece is placed on the inside of the cover, on which to rest the top edge of the chest. The band of the cover is double-tongued to the cover stiling. The panel in the cover is 2 feet 3 inches long, 15 inches wide, and double locked to the stiling by plowing both panel and stiles. The panel overlaps the stiling on the top $1\frac{1}{4}$ inches all around. The inlaying in the cover over the mitered corners in the stiling and also along the center of the stiling is clearly indicated in the perspective view.

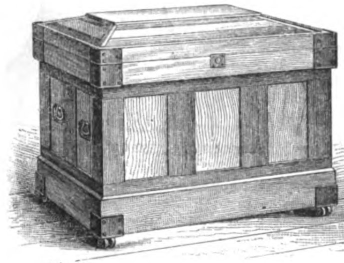


Fig. 1.—Perspective View.

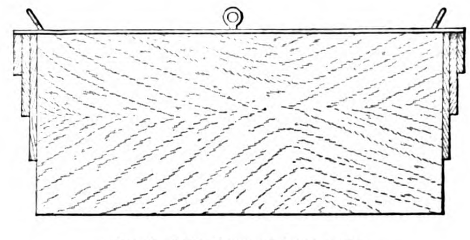


Fig. 4.—Side View of Center Till.

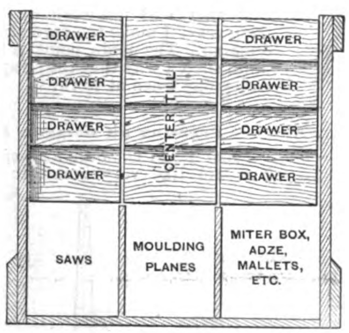


Fig. 2.—Sectional View Through End of Chest.

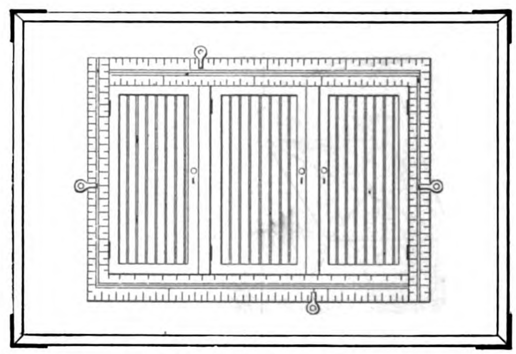


Fig. 5.—Inside Cover of Chest.

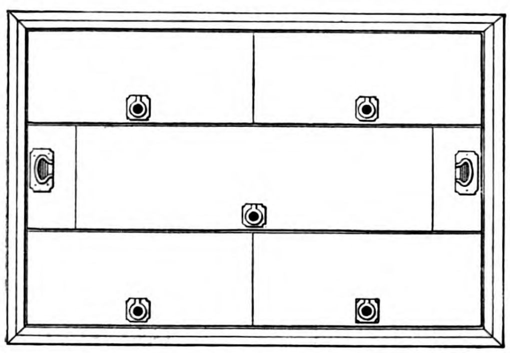
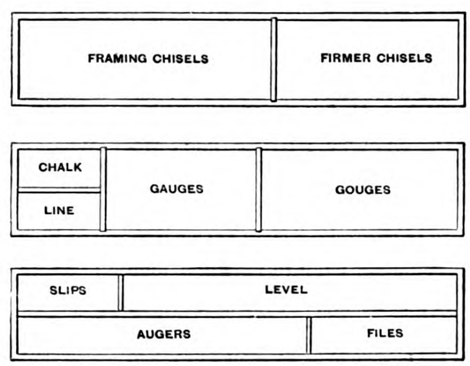


Fig. 3.—Cover for Tops of Drawers.

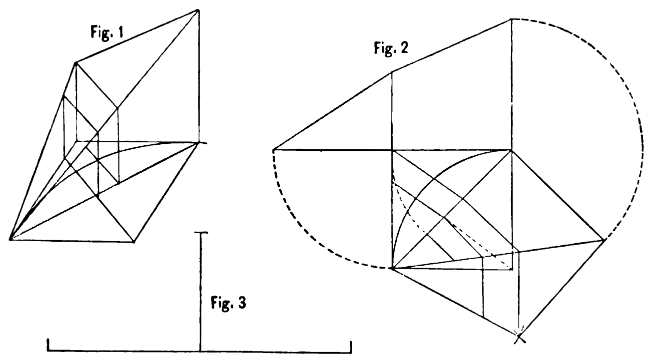


Figs. 6, 7 and 8.—Sectional Views of Interior of Chest.

Design for Tool Chest.—By "G. H. R," Delphi, N. Y.

Face Mold for Falling Line and Tangent Systems.

From W. G. P., *Toronto, Canada.*—In answer to "A. L.," whose letter appeared in a recent issue, I would say that I am not a mind reader, my conclusions being drawn from his letter which appeared in the July number of *Carpentry and Building* for last year. I am glad he is open to conviction, for I will now try to make myself understood. I do not want the balusters all of one length (exactly), as that is impossible if you do not build the stairs. I object to stairs being built to suit the pitch of the tangent in all cases. What I want is the best falling line possible under the circumstances, no matter who built the stairs or whether they are right or wrong as regards position of the risers. To do this it is necessary to obtain the stretchout of the center falling line of the wreath, and on this line locate the intermediate resting point of the joints, thus fixing three points through which the plane or pitch of the plank will pass. No work on handrailing has yet come under my notice showing how to get out a hand rail to a predetermined falling line having true joints to the falling line of area (not to the tangents) and having ramps and wreaths all in one piece, as they ought to be. Now, I am of the opinion that it is impossible by the tangent system; hence my "conundrum," as "A. L." terms it. He can get over it, I will admit, and even a worse case; but that is the best that can be said



Diagrams Illustrating Letter from "W. G. P." Relative to Falling Line and Tangent Systems.

of it. Getting over it is one thing and doing it in the best possible manner is another. I could give drawings as asked for by "A. L.," but this trouble can be saved by referring the correspondent to Mr. Perry's article on page 192 of the October number of *Carpentry and Building* for 1886. This is a case requiring similar treatment and should be adopted if a first-class job is required. I have not seen Mr. Perry's work on handrailing, but if this is a fair sample of what the book contains, I should stamp it as the best on handrailing which has ever come under my notice. The falling line is the same as I would use it and the face mold is the same as I would produce, but by a different method. My plan I consider more simple; but, of course, we do not all see things alike. By referring to the diagrams which I send, I think my method of producing the face mold will be readily understood. It is equally applicable to the tangent and falling line systems. I have shown it in the diagrams applied to the tangent system, Fig. 1, showing plan and tangents with level lines from the corner and a few minor axes of ellipses in perspective. Fig. 2 shows the development of the same, giving lengths of major and minor axes of ellipses and their positions. Strike the ellipse through the points in Fig. 3 and transfer tangents to it from Fig. 2; strike the inside and outside mold, and we have all the lines required to get out any rail one will ever be called upon to put up. Nothing changes except the pitch of the bevels. For the falling line system take the intermediate hight on the center falling line of the wreath, as shown in Mr. Perry's communication mentioned above.

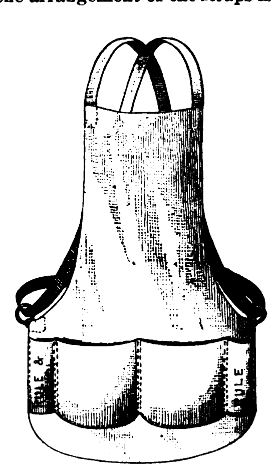
Window Screens and Outside Blinds.

From T., *Ellsworth, Maine.*—In the issue for June, page 143, "H. U." of Talmage, Neb., asks for window screens which admit of the opening and closing of blinds. Now, we have blinds, and also like to put our windows down from the top. We employ screens which allow for both. The frame is made the full size of the window, of strips 1 x 2 inches, there being a piece across the top, middle and the bottom; the last is mortised in 6 inches from the sill. Then a smaller—that is, narrower—frame is made, 8 inches high. On each side of the large frame on the one side are fastened two hooks or bent wires, in which slides the smaller frame. The arrangement is such that it can be moved up or lifted out as readily as a lower window sash. At first these frames were fastened in place by means of screws and remained up all summer, but last year we learned that in Minneapolis they put buttons on the house to hold the frames in place so that they could be easily taken down. The next set we made were furnished with old-fashioned window fastenings that are placed in the side of the window sash and pulled forward when one wishes to raise the window. Now it is but the work of a moment to take down or put up a screen. As I am only a layman I have not attempted to use technical terms, but I think "H. U." will understand my description sufficiently to enable him to make his screens.

From J. H. A., *Rockford, Ill.*—I notice in the June issue a communication from "H. U." of Talmage, Neb., in regard to an outside window screen. I have before me an advertisement of one which is made here, which I think is just what the correspondent desires. I have no interest in the device, but give a few particulars for the benefit of the one who asks the question. The device is what may be termed a fly screen, constructed entirely of metal. It is fastened on the outside of the window and interferes in no way with the blinds, the construction being such that the screen may slide up and down and the blinds be properly adjusted.

Carpenters' Aprons.

From G. H. N., *Bristol, Conn.*—In the February number of the paper I saw a design for a carpenter's apron, and as the pattern of the one I have is that which I have employed for a number of years, I send a sketch of it. The style has proven so popular that many of my brother chips have patterned their aprons after it. An inspection of the drawing which I send will show the construction so clearly as to render very little description necessary. I sew a heavy cord on the top edge of the pockets in order to keep them from wearing. The straps pass over the shoulders, cross on the back and then extend down and through the rings shown at the right and left, tying behind. There is no weight on the neck, and the arrangement of the straps is such

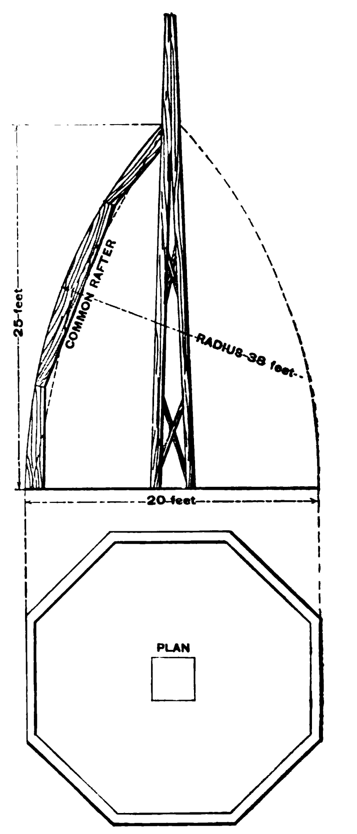


View of Carpenters' Apron, as Submitted by "G. N. H."

that they will not work up, but always hang easy. I make the apron from striped ducking. The main point is to string it up in such a way that the straps will not annoy one when at work.

Framing an Octagon Roof.

From P. A. C., *San Francisco, Cal.*—I would like very much to have some



Framing an Octagon Roof, as Suggested by "P. A. C."

reader of *Carpentry and Building* give me a simple rule for framing such a roof as that indicated in the sketch which I send. I desire a rule for obtaining the length and sweep of the hip and jack rafters, as well as the cuts and bevels for an octagon tower. There are four square timbers which pass through inside the rafters. The sketch will, I think, make my meaning clear.

Framing and Covering a Conical Roof.

From O. B. M., *New York City.*—The roof problem which is here presented is one I have never yet seen illustrated and described and as it has been my fortune to construct a roof of this kind, I will explain how I did it, as it may prove interesting, if not instructive, to many readers of the paper. Referring to Fig. 2 of the illustrations, A B is the diameter, measuring 8 feet 6 inches, and C D the hight, which is fixed by the intersection of the curves of the sides struck from a radius equal in length to the base line A B. This, as stated above, is 8 feet 6 inches, and is also indicated by the line A E. The side A D shows two different methods of framing the rafters. The shaded or inner portions represent two sticks 2 x 4 inches held together at the butt joint by a ⅞ inch cleat nailed across and having 1¾ inch pine sweeps, sawn to the curve, nailed on their outside edges. The dotted lines show the rafters, made of ⅞

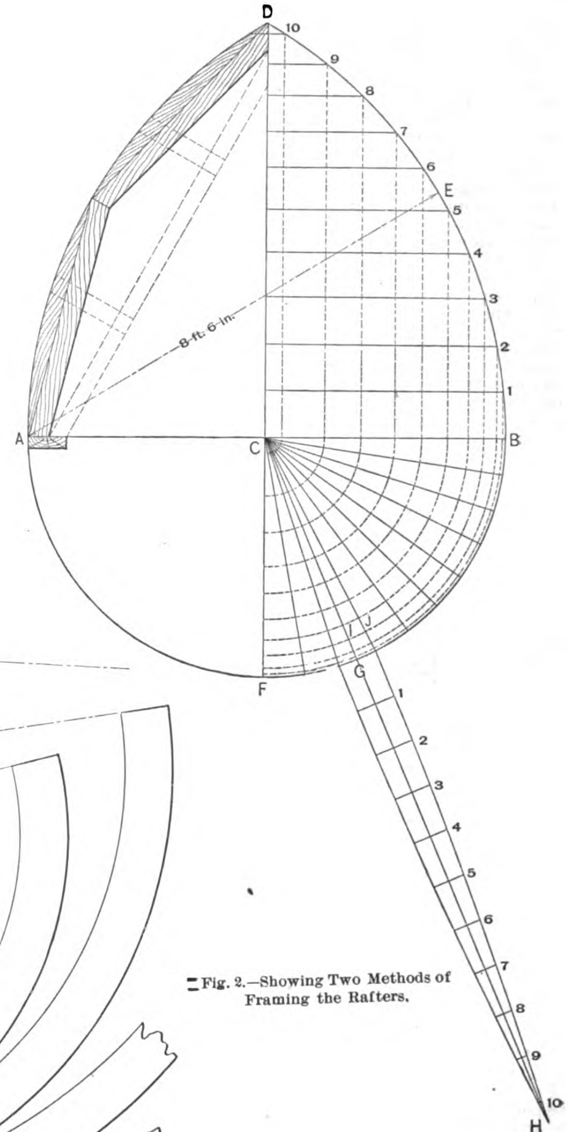


Fig. 2.—Showing Two Methods of Framing the Rafters.

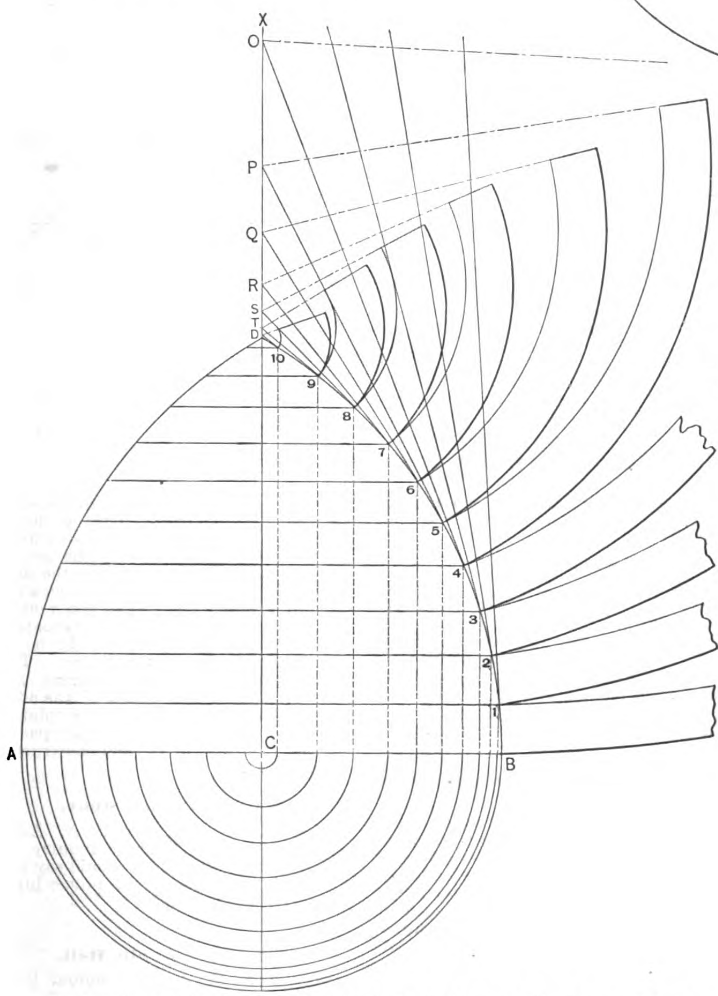


Fig. 1.—Diagram Showing Method of Obtaining the Shapes of the Covering Boards.

Framing and Covering a Conical Roof.

inch or 1⅛ inch stuff sawn to the whole length of the curve and braced to a 2 x 4 inch straight rafter nailed inside. Either method can be employed. With regard to the covering boards, if it is desired to cover the roof horizontally or level, the method illustrated in Fig. 1 of the engravings is the best for the purpose. Divide the curve B D into any number of equal parts, as 1, 2, 3, 4, 5, 6, 7, &c., and draw lines parallel to the plate A B. Produce C D to any length, as C X. Now join B 1, 1 2, 2 3, 3 4, and so on until the top is reached. Produce the joining lines until they reach D X. With the points X, O, P, Q, R, S, T, &c., as centers, and the distances X 3, O 4, P 5, Q 6, R 7, &c., as radii, describe the arcs, as shown. These will represent the covering boards. They can be sawn as long as the stuff will allow, and cut, breaking joints on the rafters. If the pieces are cut in level and the roof is boarded vertically the method is as follows: Produce indefinitely the line C G of Fig. 2, which is the center line of a rafter. Now, take the distances B 1, 1 2, 2 3, &c., and lay them off on G H square across, as indicated. Next take the distances on each line from C G on each side to the joint line of the board, as I J on line 3, and set them off on the line of the same number on each side of G H. Join these points, and the shape of the covering board will be given.

The Science of Handrailing.—VII.

From MORRIS WILLIAMS, *Scranton, Pa.*—My endeavor in this paper will be to make good my previous assertions that the principles therein explained are applicable in all cases and under all conditions. I have selected a plan of stair that will need three different pitches to the tangents over the well, all of which vary from the pitch of the straight rail. It is usually called half-space landing stair; in this particular plan it contains three winders in the lower quadrant, and in the upper quadrant a landing. The tread is 9 inches, the riser 7 inches, and the radius of well 10 inches. Fig. 31 is drawn so complete as to need no more explanation than can be obtained by referring to previous figures. The line 5 8 on the elevation bears the same relation to the upper quadrant as does the line 4 9 to the lower quadrant. They are both the horizontal trace of their respective sectional developments. The length of 5 6 is equal to 5 6 on plan, which is the radius of center line of rail on plan. Fig. 32 represents the bottom quadrant of Fig. 31, the upper tangent having the same pitch as in that figure, while the bottom tangent has a steeper pitch. In Fig. 31 the wreath is located in the plane of the plank and the easement is made on the straight rail, but in Fig. 32 the plane of the wreath deviates from the plane of the bevels have been obtained for all tangents by different methods. The bevels in Fig. 32 are obtained by placing the dividers in point 3, turning over to pitch line of upper tangent, as shown by the arc. Again take point 3 as center and turn over to the line drawn parallel to bottom tangent from point 2. Join the intersection of the arcs with the ground line to point 4 on the plan, as shown.

This method has been previously explained, as has also the method made use of in the bottom quadrant of Fig. 31. To obtain the bevels for the upper face mold, fix the dividers anywhere on both tangents of the section and turn over to their corresponding parallel lines, as shown by the arcs. The length obtained is the hypotenuse of the right angle triangle that contains the bevels, and the base line for same will be the length of tangent on plan. The upper angle will be the bevel. My purpose in varying the methods of obtaining the bevels is to familiarize the reader with the one and the other.

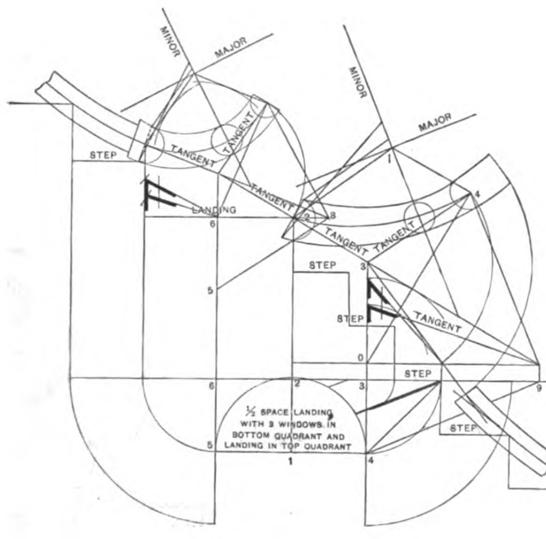


Fig. 31.

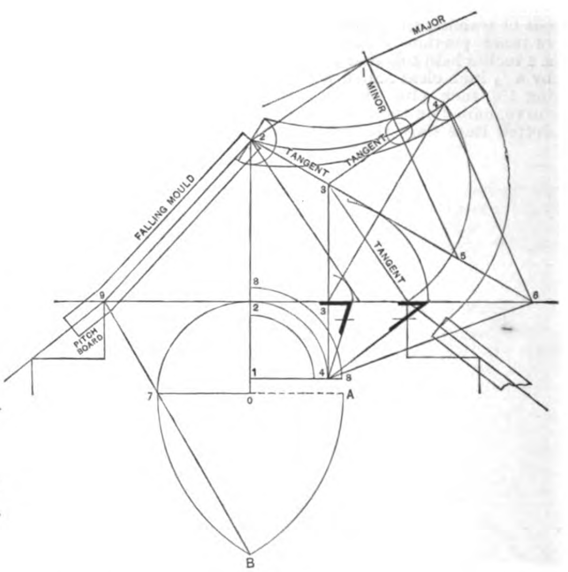


Fig. 32.

The Science of Handrailing—Half-Space Landing Stair.

the plank and the easement is made in the wreath piece. The method of drawing the face mold is the same in both figures, but owing to variation being made in the lower tangent, the face mold will not assume the same form. The bevels will be affected also. When the ramp or easement is made in the wreath-piece it is necessary to use a falling mold, which is shown on the left side of Fig. 32. The falling mold is made of a thin piece of board that will bend around the outside of the wreath, after the latter is squared. The method of drawing it is shown in the diagram. First stretch out the outside curve of the rail on plan, which is marked in Fig. 32 by the figures 8 8, the radius being the length of 1 8. Take 0 as center, and with radius 1 8 describe the curve 7 2. This curve is that of the outside of the rail on the plan, and therefore equal to the curve 8 8, the center having been removed from 1 to 0, just half the width of rail.

Take 7 as center, and with radius 7 A turn over to B. Take A as center, and with radius A 7 turn over to B. From this point of intersection draw a line through 7 to 9 to intersect the ground line. The length of the line 9 2 is the length of the curve 7 2 stretched out. From 9 draw a line to point 2, the hight of three risers. This line is the center line of the falling mold. On both sides of this line draw parallel lines equal to the half thickness of the rail. From point 9 draw the pitch board and form the easing. The falling line is then complete. It will be seen that

Estimating Barn Work.

From A. C. S., *Centerville, Wash.*—I would like to ask some of the readers of *Carpentry and Building* to tell me how to figure barn work. I have been called upon to make estimates on such work and find it a difficult thing to do with accuracy. I am an interested reader of *Carpentry and Building* and learn more from it than from any other source.

Laying Off Degrees With the Steel Square.

From O. L. W., *Dallas, Texas.*—In reply to "L. T. B.," Hamburg, Ohio, permit me to say that if the correspondent has a table of natural tangents he can use it in the following manner in laying off angles with the square. From the table take the tangent of the angle required, using the first three figures from the left and calling them so many 64ths of an inch. Reduce them to inches, and then, with this quantity on one side of the square and $15\frac{5}{8}$ inches on the other side, he will have the figures for laying off the angle. Tables of natural tangents are usually calculated to the radius unit, and are therefore decimal fractions. My method is simply to multiply each by 1000, thereby obtaining whole numbers. For example, let it be required to lay off an angle of 10°, the natural tangent of which is 0.176327. Multiplying this by 1000 makes 176.327. Discarding the decimal we have 176, and calling the figures 64ths of an inch we have $\frac{176}{64}$, or $2\frac{3}{4}$ inches. The radius 1 treated in like manner makes $\frac{1000}{64}$, or $15\frac{5}{8}$ inches. Now, taking $2\frac{3}{4}$ inches on the tongue and $15\frac{5}{8}$ inches on the blade of the square, the blade gives the angle of 10°, and consequently the tongue gives 90° less 10°, or 80°. If the readers desire any further explanation concerning this matter I shall take pleasure in doing my best to accommodate them.

Raising A Roof.

From L. A. W., *Cincinnati, Ohio.*—In a recent issue "W. E. G." Watseka, Ill., asks how to raise the roof of a frame house 16 x 24 feet, in order to add a story to the building, and at the same time perform the work to the best advantage. If I had the job to do I should raise the entire house and build a story under it. Both stories would be 9 feet high. I would take out the door frames from what would then be the second story and put them below. On the sides where the doors come out the weather boarding would have to be taken off to the line of the window sills and reboarded up to this line. Windows should be inserted where the doors come out. This plan will save enough plastering and labor to pay for the lifting of the additional weight, and will, in my opinion, make a much better job than to separate the roof from the house and construct a second story.

Setting Kitchen Sinks.

From W. V. H., *Newark, N. J.*—In answer to "V. S.," whose inquiry appeared in a recent issue, I would say that 2 feet 6 inches is about the proper hight for setting kitchen sinks.

Joists for a Public Hall.

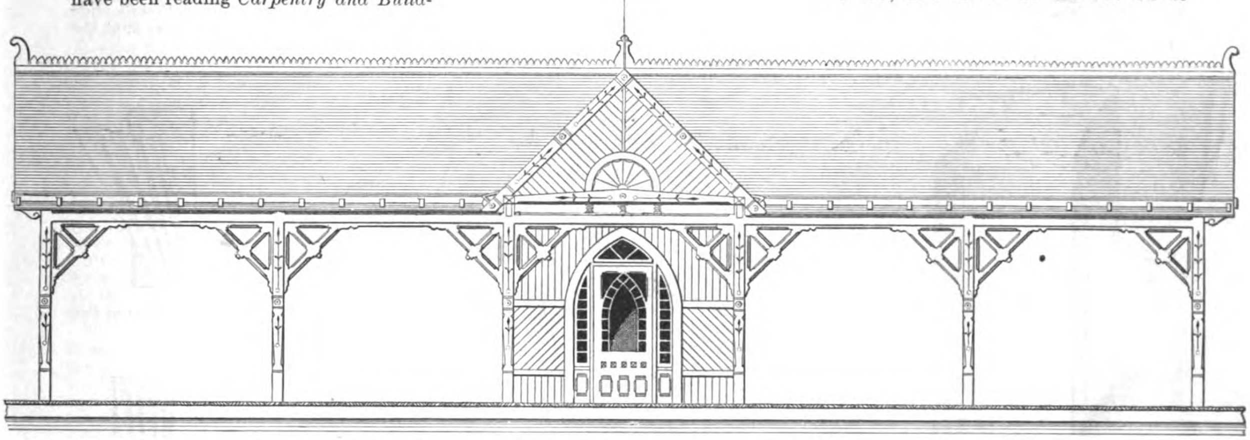
From J. M. B., Jr., *Burlington, Pa.*—I would like to know what size of joists and the number required for a public hall having a span of 24 feet. The building is 84 feet in length.

Rule for Finding an Ogee Curve.

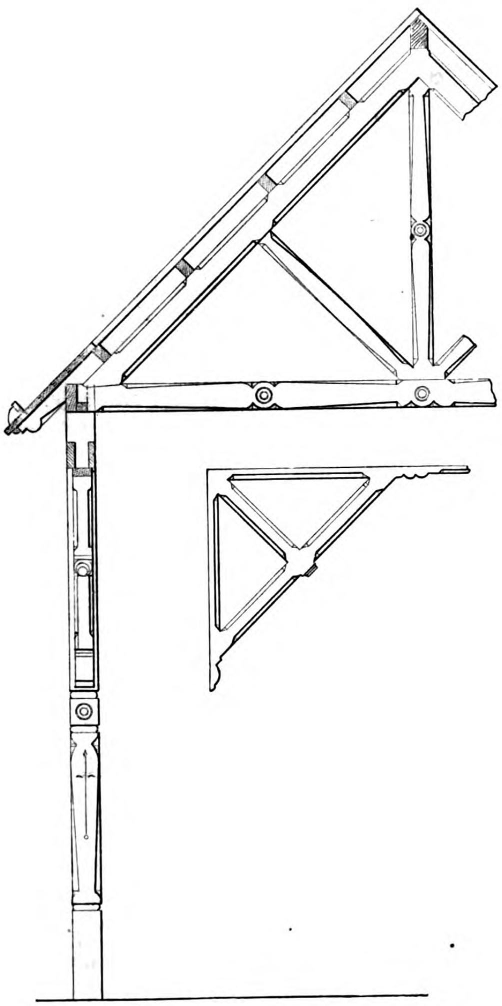
From A. J. B., *Duluth, Minn.*—Will some reader of the paper give me a simple and accurate rule for finding the curve of a hip or angle rafter of a tower, the base of which is 15 feet square? The curve is ogee.

Passenger Station.

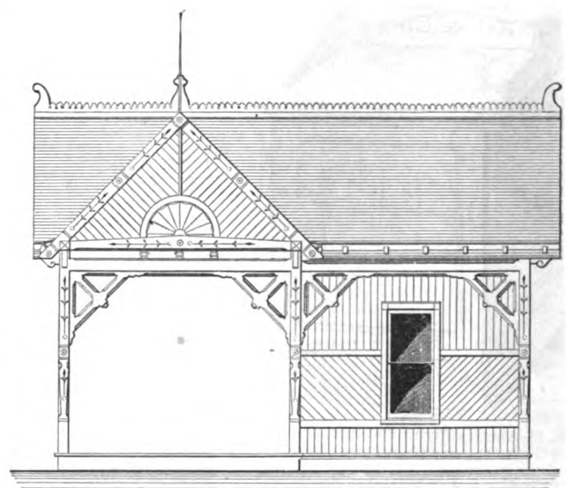
From L. H. HAND, *Sullivan, Ind.*—I have been reading *Carpentry and Building* ever since its second year and find much in its columns that is of interest and value. I have just completed plans for an ornamental passenger station for the Southern Hospital for the Insane at Evansville, Ind. Thinking the subject may be of interest to other readers I send drawings herewith. The building is an open structure 60 feet long, with a room in the rear 12 feet square. It is to be erected on a platform 120 feet in length by 12 feet in width. The front and end elevations, together with the few details, will make the construction so well understood that further particulars are unnecessary.



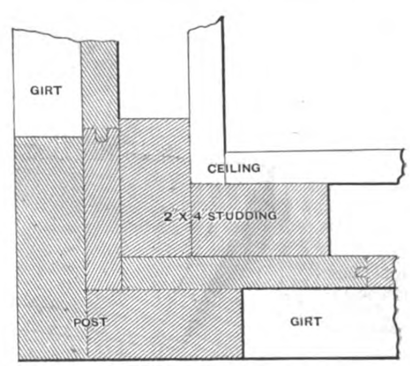
Front Elevation of Passenger Station.—Scale, ⅛ Inch to the Foot.



Section Through Building with Side View of Bracket.—Scale, ¼ Inch to the Foot.



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



Detail of Corner of Foundation.—Scale, 3 Inches to the Foot.

Passenger Station, Designed by L. H. Hand, Sullivan, Ind.

DESIGNS FOR WRITING CABINETS.

WITHIN the past few months we have received numerous inquiries from various correspondents in all parts of the country, asking for designs of writing cabinets, some desiring them combined with a book case while vided with four letter compartments and an adjustable copying desk, a partially opened view of which is shown in Fig. 1 of the illustrations. In order to fully open the case, as indicated in Fig. 2, each front wing is swung around to the sides, reveal- boards and enter a groove 3½ inches long, so that when the flap is in position for writing, as indicated in Fig. 2, the groove will allow it to slide forward, and when the flap is raised in position it will slide upon the pivots in such a way that the

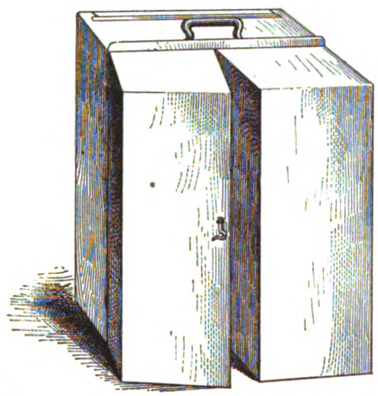


Fig. 1.—View of Writing Cabinet, Partially Open.

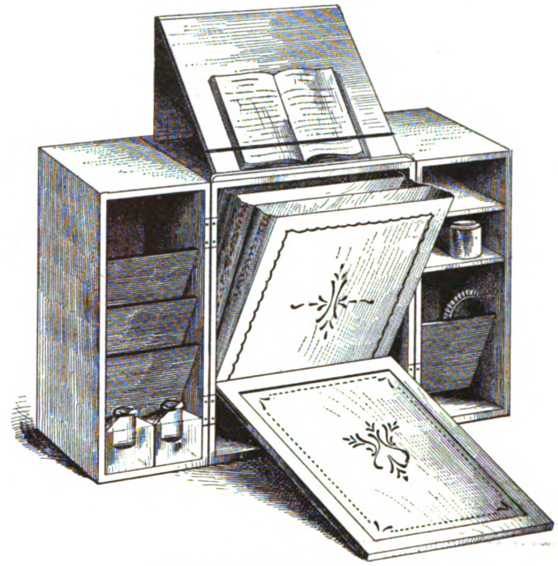


Fig. 2.—Writing Cabinet Wide Open.

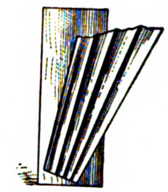


Fig. 3.—Letter Case Open.

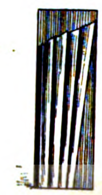


Fig. 4.—Letter Case Closed.

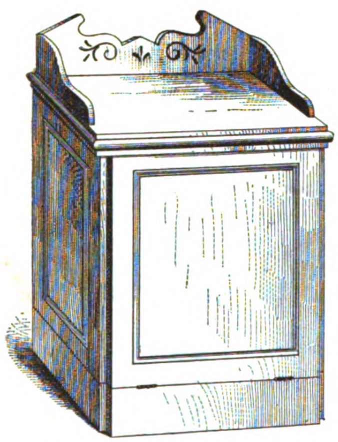


Fig. 7.—Another Style of Writing Desk as it Appears when Closed.

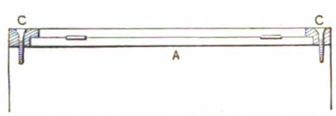


Fig. 5.—Plan View of Rabbeted Rails Screwed to Back of Writing Case.

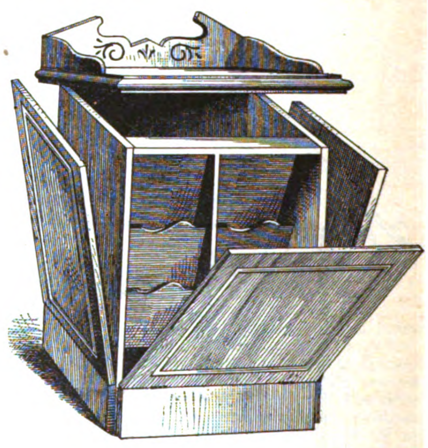


Fig. 8.—Partially Open View of Desk Shown in Fig. 7.

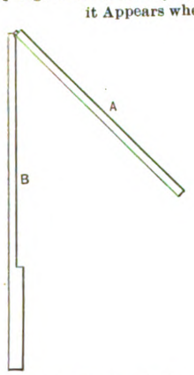


Fig. 6.—Hinged Board Used in Forming Inclined Top of Writing Desk, as Shown in Fig. 2.

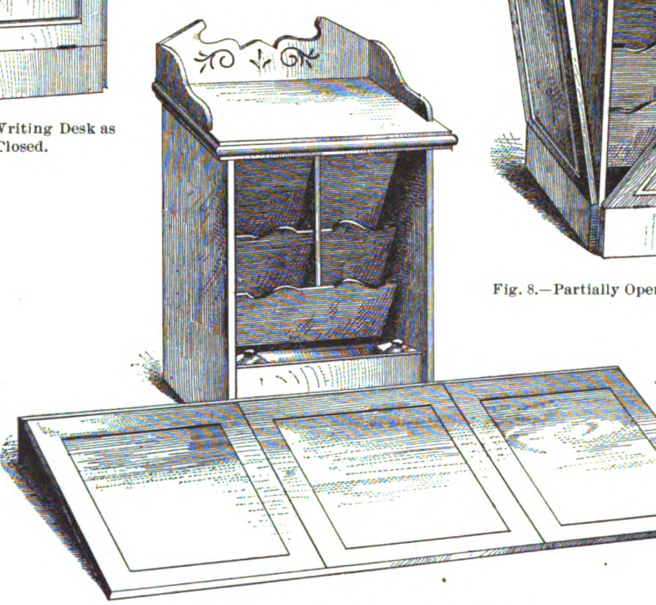


Fig. 9.—Appearance of Desk when Fully Opened.

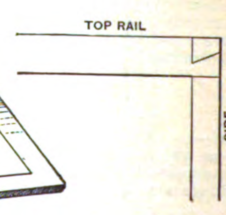


Fig. 10.—Showing Manner of Joining Side and Top Rails.

Designs for Writing Cabinets.

others of our readers wished them without. In the illustrations presented herewith are shown two designs suitable for writing cabinets, which, with the particulars of construction, are taken from one of our foreign exchanges. Attention is first invited to the leatherette case pro- ing in one wing a receptacle for stationery, ink wells, &c., while in the other is provided accommodation for toilet articles. The writing flap, as it is termed, is pivoted between the sides at a distance of about 3 inches from the bottom of the case. The pivots pass through the side upper end, as shown in the engraving, will touch the bottom of the case and entirely close the opening. The opposite side of this flap is provided with a mirror, so that when the flap is raised to close the opening the glass side is exposed.

For the leather cases shown in Figs. 3

and 4 stout sheets of cardboard are united to a bottom piece and the whole inclosed with pleated leatherette so that they may be opened at a greater extent at the top than at the bottom. The copying desk consists of a hinged board ¼-inch thick and 9 inches wide attached to the piece marked B in Fig. 6, the length corresponding with that of the case with the exception of ½ inch. This ½ inch is reserved for the joining of a narrow rail across the bottom of the case to prevent the copying desk from slipping out. The lower portion of the stick or the portion B is thickened in order to make it equal to the combined thickness of its upper portion and the copying desk. This board slides up and down between the two rabbeted rails C C of Fig. 5, which are screwed to the back of the case. A narrow strip of wood across the top of the case retains the copying desk in proper position. The desk is 15 inches high, and the width and depth 12 inches, thus making each smaller portion 6 inches square. The flaps are 11 x 14 inches.

The second design is represented in the succeeding engravings, Fig. 7 showing the article closed, Fig. 8 partially open, while Fig. 9 represents it when ready for use. In opening the desk the front flap is released and allowed to fall, while the sides are brought round facing the front, when both are lowered to meet the front one, where they are temporarily united by means of a pair of sunken hooks and eyes. Both the narrow and large portion on each side are brought forward upon the hinge connecting the narrow piece in front with the side of the case. The ridge is mitered on three sides round the entire surface of the top board, in order to encompass the top edges of the three flaps when closed. By this arrangement a single lock connecting the front flap with the top board is sufficient to secure the desk. The frame consists of two sides, each 16 x 10 inches, dovetailed to a back and bottom board, which are 10 inches wide, while a connecting rail is joined into the top front of the sides, as indicated in Fig. 10 of the cuts. Around the bottom at the front and sides are placed three boards, each 3 inches deep, while their length corresponds to the width of the case each way. The one in front may be screwed or otherwise joined to the edges of the case in such a manner as to allow it to stand in front and not between. Each side flap is exactly as wide as the narrow piece is long to which it is hinged, while the front flap is exactly the width of the case, measuring from outside to outside of the permanent sides.

Buffalo's New Exchange Dedicated.

The recent formal dedication of the new building owned and erected by the Builders' Association Exchange of Buffalo is a most gratifying example of what can be accomplished by the builders in any community, and is the best possible indication of the fact that through organization the builders of the country are becoming better educated as to the needs of their calling. The carrying out of such projects is the best evidence of the fact that builders are coming to more fully recognize the importance and benefit of centralizing their interests and combining their action into greater unity and harmony.

The Buffalo Exchange is particularly to be congratulated upon the result which it has attained in the short period of its active existence. The energetic manner in which the project to erect a home of its own, designed especially for the use of builders, has been carried through to successful completion deserves the highest praise from all who have the welfare of the building fraternity at heart, and who appreciate the value of example.

The dedication was made the occasion of a most enjoyable time by the Buffalo builders. Invitations were issued to a large number from abroad with the request that the recipient be also present on the day preceding the dedication, in order to participate in the annual outing of the exchange, for which a delightful programme had been prepared. The outing included a trip by boat down the Niagara River, with a dinner and other entertainment included. A large number were in attendance, and a thoroughly pleasant time was spent by all. On the following day, that on which the dedication occurred, the guests from abroad were treated to a carriage ride to all the points of interest in the city, and also to a trip about the harbor on the fire tug. Those who were not familiar with the city were much impressed with its many advantages and its fine buildings.

On the morning of September 6 the new building was formally opened by the exchange, and a Reception Committee was appointed to look to the comfort and pleasure of the guests. The hour fixed for the public inspection was 10 o'clock, but long before that time a large number of people had gathered to examine the handsome rooms and offices of the exchange. The building consists of seven floors and a basement. The corner rooms on the first floor are intended for a bank. All the other floors but the second will be used as offices. Although the building has just been finished, two-thirds of the rooms are already rented and occupied. The structure was begun on July 19, 1891. It has its own electric-light plant, and in fact is complete in every way. The rooms are simply and tastily finished, and are well heated and lighted. The floors are of Georgia pine, and the finishing of oak.

On the second floor is located the Builders' Association Exchange. The room was handsomely decorated in honor of the opening. Great masses of potted plants had been placed in the windows and in the corners, the massive pillars had been wreathed with laurel and the chandeliers and pictures with smilax. On the president's desk a beautiful bouquet of cut roses had been placed. The pictures hanging from the walls were those of the Builders' Exchange, the Board of Trade Building, the Christian Association, the Buffalo Library and Music Hall. Besides these were photographs of the officers and directors of the National Association of Builders, and also a souvenir frame of the association. The furniture is of polished oak, and the chairs and settees are upholstered with leather. The secretary's office is directly off from the main room, and a large cloak and wash room is also at one side.

The dedicatory exercises were set for 7.30 o'clock p.m. and at that time President Charles A. Rupp of the Builders' Exchange Association called the 200 assembled guests and members to order for the purpose of formally tendering the building to the Builders' Association Exchange. After suitable words of welcome President Rupp touched upon the history of the exchange and briefly told the story of the new building from the time of inception of the plan to its completion.

After referring to the probabilities of the establishment of a Builders' Bank by the exchange and cordially thanking the Building Committee for the eminent satisfaction which the efficient discharge of their duties had afforded the exchange, President Rupp closed his address by tendering the rooms to Mr. Berrick, as president of the Builders' Association Exchange. Mr. Berrick accepted the suite of rooms on behalf of the exchange, after which Mayor Bishop made a brief address, congratulating the Builders' Exchange and the city of Buffalo on the erection of such a fine building and the existence of such a fine organization.

The National Association of Builders next offered its formal congratulations through its president, Anthony Ittner of St. Louis, who laid particular stress upon the value of the work of the Buffalo Exchange as an example and incentive to the building fraternity of the country as represented by the filial bodies of the National Association. He extended the warmest congratulations from the national body, and expressed his great admiration of the building and of the business-like manner in which it had been secured. W. H. Sayward, the secretary of the National Association, followed with a few remarks in praise of the building and of the energy and courage with which its erection had been undertaken. The Buffalo example, he asserted, would surely be followed in other cities, and by and by he would see in fact the picture which for years he had in his mind—fine buildings like this erected by the builders' exchanges in all the important cities of the country, with their occupants ready to bid welcome to the strangers within their gates, as had been done in Buffalo during the past 48 hours.

Ex-Presidents J. Milton Blair of Cincinnati and Edward E. Scribner, formerly of St. Paul, but now located in Chicago, added the strength of thair testimony to the importance and success of the undertaking.

The company then adjourned to the Hotel Iroquois, where about 260 sat down to an elaborate banquet. The room and tables were lavishly decorated with flowers and plants and presented a most pleasing appearance, and the *menu* was perfect and well served. At the conclusion of the banquet, which was enlivened with delightful music, President Rupp opened the *post-prandial* exercises with a short address, thanking the guests for their attendance, and introducing John N. Scatcherd, president of the Merchants' Exchange, as toastmaster. The toasts were as follows:

City of Buffalo—The Hon. Charles F. Bishop.
National Association of Builders—William H. Sayward.
Buffalo Builders' Association Exchange—A. A. Berrick.
Our Guests—Charles R. Huntley.
Affiliate Exchanges—John S. Stevens, ex-president of the National Association of Builders.
Public Schools—William H. Love.
Architecture—Cyrus K. Porter.
The Press—Edwin Fleming.

A souvenir of the dedication in the form of a bronze badge in the shape of a horseshoe was presented to each of the guests at the banquet. Inclosed in the horseshoe was a representation of the Exchange Building. The inscription on the badge was: "Dedication Buffalo Builders' Exchange, September 6, 1892." The badges given Presidents Rupp and Berrick and the president and secretary of the National Association of Builders were plated with gold.

Letters of regret from ex-Presidents Prussing and Tucker were read during the exercises.

It was late before the last toast was responded to, which marked the close of the dedication of the new building, and it was the unanimous opinion freely expressed that the Buffalo builders had outdone themselves in generous hospitality, and all were earnest in their praises of the complete and unbroken success of the whole affair.

THE NUMBER of building permits issued at Pittsburgh during the month of August exceeds all previous records. During that month 304 permits were issued for 421 buildings, some permits calling for as high as 14 houses. The total value of the permits issued has been estimated at $1,390,488. In August of last year, which was also a very busy month, 299 permits were issued, valued at $1,037,982. The building inspectors of Pittsburgh state that the character of the buildings erected in Pittsburgh during the present year has been of a very high quality. The ordinance requiring 9-inch back walls to be carried through the roofs of dwellings to prevent the spread of fire has been strictly enforced, and the contractors are generally observing the rule.

BLUE PAPER PRINTING.—II.

By JAMES F. HOBART.

BLUE PRINTS which have not been sufficiently printed, and therefore show a tendency to wash out, may sometimes be saved by flowing over the wet surface of the print a very dilute solution of hydrochloric (muriatic) acid, say 1 part of the acid to 25 or 30 parts of water. A weak solution of chlorine may also be used, and either will stop the fading of the print, and it will also give a brilliant, solid appearance to the picture.

To make a blue-line picture on a white ground a blue print can be made, then another print made from the first one, which will give the desired effect. The second print, however, will not be as good as the first, because of the loss of brilliancy occasioned by printing through a pattern with an actinic color. Blue does not prevent actinic rays of light from passing through it as well as do black, yellow or red, therefore the resulting print will not be as perfect as if the first print made and used as a negative had been of a different color. A great improvement in this method of printing is to make the first print on albumen silver paper. If desired, silver paper which is not albumenized may be used, but, as the former gives a little better result and can be obtained at any time from the nearest photographer, its use is preferable. If one desires to prepare the paper let him procure some rather thin, stout paper, which has a firm and even appearance, and as free from spots and blemishes as possible. Dissolve 2 ounces of common salt in a quart of water, and with a brush or fine, soft sponge, cover the surface of the paper with the salt solution until the paper has been dampened entirely through. The paper should be spread on a board during this operation and it will be wet enough when the paper lies out flat and smooth. Instead of coating with a brush the paper may be floated on the surface of the salt solution, which is placed in a broad, shallow tray for that purpose. Care should be taken to keep the paper from rolling up, for as quick as it touches the liquid one side becomes wet and swells, and as the other side cannot stretch, the paper rolls itself up, but unrolls again, and lays flat when the solution has penetrated through to the top side. This operation is termed "salting," and the paper should be hung up and dried after it is completed. The salted paper will keep for years.

BLUE LINE PRINTS.

When it is desired to make a "blue-line print," a piece of the salted paper is selected and floated on a solution of 1 ounce of nitrate of silver in 8 ounces of water. A little soda should be added to neutralize any acidity of the silver solution. The paper should be floated until it lays flat, then it should be hung in a dark place until dry. The paper is now sensitive to light and must be protected therefrom. Albumen paper may be purchased from a dealer in photographic material, and it will also keep indefinitely and may be sensitized when wanted for use in the manner described above.

A print is made on the silver paper in the manner followed for making blue prints; then, instead of finishing the print by a simple washing, it must be passed from the first water into a second containing a little salt, say an ounce to a quart of water. The print will turn red in the salt water, and must then be transferred to another dish containing a little chloride of gold in water enough to cover the print. It will require about 1 grain of gold to a sheet of paper 17 x 22 inches. The silver solution should be thoroughly neutralized by adding some bicarbonate of soda.

The print will lose its reddish color and become a deep purple, or if left too long in the gold, a steel-blue color. The toning should be stopped before the reddish tint has entirely departed, as it will then make a better blue print when used to print from. If the gold be neutralized with chloride of lime instead of soda, the print will tone to a very rich black, which makes an excellent print, and is in itself a fine duplication of the original drawing, in white lines on a black ground.

The silver print, after toning, must be passed into a solution of hyposulphite of soda, 1 ounce to the quart of water. After remaining there for ten minutes, the print is no longer sensitive to the light, and should be well washed for an hour or two, then dried under slight pressure between two pieces of blotting paper. When thoroughly dry blue-line prints can be made from it in the same manner that they were made from the original drawing, and prints may also be made from it on silver paper, which, after toning, will show black lines on a white ground.

KINDS OF PAPER.

Several kinds of paper are in the market which have the power of giving blue lines on a white ground, direct from the black and white tracing. These papers are known by various names, such as "cyanoferric," "gommoferric," "positive image," &c., but they are about all the same in composition and work upon the chemical principle that under the influence of light and of citric acid, perchloride of iron will be reduced to the protochloride, and do not turn blue when treated to a bath of potassium ferrocyanide, while the parts of the paper which were protected from the action of the light by the dark lines of the drawing are turned blue by the potassium ferrocyanide developer. To make a blue positive paper, make up the three following solutions, viz.:

1. 6 ounces gum arabic in 30 ounces water.
2. 4 ounces citrate of iron and ammonia in 8 ounces of water.
3. 2½ ounces iron perchloride in 5 ounces of water.

These solutions are to be mixed when used, and as the mixture will not keep long after mixing, it is evident that the quantities as given are much too large for ordinary work. The three solutions will keep well, so the mixing may be done just before the solutions are to be used, and will be right if mixed in the proportion of

1. 1½ ounces.
2. 8 drams.
3. 5 drams.

Perhaps even one-half of these quantities will be sufficient, but as the paper, unlike the ordinary blue paper, will keep indefinitely after it is coated, as long as it is kept away from light and moisture, there is no objection to making up quite a quantity of the paper at one time. This is best effected by placing the sensitized paper in a tube of zinc, copper or brass.

The paper is printed in the same manner as the ordinary, but this is much more sensitive, and only requires an exposure of a few seconds on a bright sunny day, or a few minutes on a dull day, whereas the ordinary blue print requires 10 to 20 minutes on a sunshiny day, and several hours' exposure on a cloudy day. Even then as good a print cannot be made as when the sun shines direct. It is necessary to have a test strip of paper exposed under the same kind of paper or cloth as that on which the main drawing is made. The test drawing is merely a series of fine lines ruled on the paper and put into a small printing frame, so that small bits may be torn off as the exposure progresses, and tested by immersing them in the developer. If the exposure has been too short the lines will be too light. If the exposure has been carried too far the parts which ought to be white will be streaked with blue.

THE DEVELOPER.

It is therefore necessary to expose the paper about the right length of time, and while the testing is being done the main drawing should be covered from the sun, that it may not be exposed too much while the testing is going on. The developer consists of a solution of potassium ferrocyanide, made as strong as possible—*i. e.*, a saturated solution. If at any time the developer begins to crystallize, it is a sign that a little more water should be added to make up for the loss by evaporation. It will probably require about 1 ounce of the crystals of potassium ferrocyanide to 4 ounces of water, and as this solution will leave a dark stain on the back of the paper, the latter must be floated on the developing solution in the manner that a sheet of paper is floated for sensitizing.

A sheet of paper can be placed smoothly on top of a liquid by holding the sheet in both hands, with the thumb and finger of each; then bend the sheet so that it will touch the liquid diagonally in the middle, after which it may be slowly and steadily lowered on to the surface of the liquid without getting as much as a single drop on the back of the paper,

The development is watched by lifting a corner of the paper. When the lines have become sufficiently dark remove from the developing bath and float on a dish of pure water. If the white parts of the paper have become a little stained the color may be removed by immersing the paper in a solution of 3 parts sulphuric or 8 of hydrochloric acid in 100 parts of water. Then the sheet should be well washed in clean water, and adhering spots of blue may be removed with a brush and the paper hung to dry. If any blue spots remain after drying the paper they may be removed by touching them with a weak solution of soda or carbonate of potash. The developer can be used until it is all done. In the next paper will be told how to make black positives.

NEW PUBLICATIONS.

ELEMENTARY PRINCIPLES OF ARCHITECTURE AND BUILDING. By R. Charles Bates. Size 5½ x 8 inches; 147 pages; bound in stiff board covers with gilt side title. Published by the author. Price, 75 cents.

The matter contained within the covers of this work is substantially the lectures delivered by the author before his classes at Claflin University, at Orangeburg, S. C., during the winter of 1891-92. Those portions of the lectures which were illustrated on the blackboard or explained by extemporaneous remarks have been qualified in the printed volume, and in addition are presented a few thoughts so associated with one department of construction as to make the work incomplete without them. These relate to rules for determining the strength of timber and tables of the weight of iron in its various forms. The volume embraces several chapters devoted to the history and development of architecture, architectural design and ornamentation; chapters on styles and orders of architecture; development of Gothic architecture, building materials, ventilation, superintendence, strength of timber, iron rods in trusses, and tables of iron work. The volume is bound in attractive style and is an interesting addition to the literature of architecture and building.

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

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First Vice-President, IRA G. HERSEY, 166 Devonshire street, Boston, Mass.
Second Vice-President, HUGH SISSON, 19 W. Saratoga street, Baltimore, Md.
Secretary, WILLIAM H. SAYWARD, 166 Devonshire street, Boston, Mass.
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Minneapolis, Minn....GEORGE W. LIBBY.
New York, N. Y......MARC EIDLITZ.
Omaha, Neb..........N. B. HUSSEY.
Peoria, Ill............JOHN L. FLINN
Portland, Maine......N. E. REDLON.
Philadelphia, Pa......STACY REEVES.
Providence, R. I......WM. W. BATCHELDER.
Pueblo, Col......... ...M. T. KEAN.
Rochester, N. Y.......H. H. EDGERTON.
Saginaw, Mich.......MICHAEL WINKLER.
St. Louis, Mo. ....JEREMIAH SHEEHAN.
St. Paul, Minn........GEORGE J. GRANT.
San Antonio, Tex.....
San Francisco, Cal...WILLIAM N. MILLER.
Syracuse, N. Y.......J. E. BAKER.
Wilmington, Del..... A. S. REED.
Worcester, Mass......C. D. MORSE.

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JOHN J. TUCKER, New York, N. Y.
C. W. GINDELE, Chicago, Ill.
J. MILTON BLAIR, Cincinnati, Ohio
C. D. MORSE, Worcester, Mass.
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Exchange Buildings.

The attention of all the filial bodies is called to the successful completion of its own building by the Builders' Association Exchange of Buffalo. Secretary J. C. Almendinger will be glad to furnish all of the filial bodies which so desire with information as to the method of procedure adopted by the Buffalo Exchange in their undertaking. A similar project is now being prosecuted by several of the exchanges, and all would materially enhance the value of membership and the utility of their organization by providing themselves with buildings of their own.

National Association of Builders and the Individual.

The question, "Of what value is the National Association to the individual?" has been answered over and again, but, nevertheless, it is continually being asked from all sorts of sources. The question has been recently asked by a member of an exchange that is not in a very actively beneficial condition, together with the statement that the questioner was discouraged by the lack of interest manifested in its affairs and its inefficiency as a means for bettering the conditions prevailing in the building trades of that locality.

The benefits of the work of the National Association must reach the individual through the medium of the local exchanges; but upon the individual depends to a great extent the amount of the benefit which he shall derive. The work of the National Association is, first and foremost, to seek out the good that exists in its various filial bodies, *i.e.*, the various methods which prevail in each exchange that are calculated to improve the conditions under which the business is transacted, and then to sift out the good again until only the very best remains. Out of this best a form of action is prepared which contains the elements of success by virtue of the fact that it is a composite of the best to be found in each constituent body. This form or plan of action then is recommended for adoption and use to each local exchange. It depends upon the individuals which compose the exchanges how much they shall be benefited by the work of the National body, for with the recommendation the power of the National Association ceases, and the application of the methods it advocates depends upon the local exchanges, or, in other words, the individuals of which they are composed.

Take the case cited in the foregoing, for instance: The questioner wants the advantage of the National Association explained to him, because through the inefficiency of his local exchange he fails to observe any benefit from its existence. The reason why he sees no benefit is because there is not a sufficient number of individuals in his local exchange who appreciate the recommendations of the National Association fully enough to carry them out. The failure to establish the recommendations of the National Association in practical use, by any local exchange, is in no way the fault of the National Association, and in no way affects or lessens the value of its work, the benefit of which is continually being demonstrated by the results obtained in exchanges that have adopted its recommendations. The National Association aims to educate the builder as to the best means for securing more equitable business practices, and in a measure bears the same relationship to the building fraternity that the business college does to commercial pursuits. The business college does not benefit the individual (aside from the general influence of education upon the community) unless he studies and applies its teachings, and it is the same with the National Association of Builders. The intrinsic value of the methods evolved through the National Association are in no way disturbed by failure to apply these methods in any given locality; nor is the great importance of the National Association as the best means yet invented for obtaining a consensus of the opinions of builders of the country, and formulating and promulgating the same in the least affected. While the work of the National Association takes the form of recommendations to the local exchanges, and in formulating plans and methods for improvement of business practices and relationships, and its membership is composed of organizations, it must not be understood that its action does not consider the individual. The entire action of the national body is one of consideration of the individual, for it is the individual that forms the working power in securing the adoption by local exchanges of the methods recommended for the good of the whole. The National Association since its existence has come into beneficial contact with numberless individuals both in and out of its filial bodies through its officers and its publications.

The Mid-Year Meeting.

The date of the mid-year meeting of the directors and members of committees of the National Association of Builders has been fixed for Monday and Tuesday, October 17 and 18, at Indianapolis.

Secretaries and individual members of filial bodies are requested to prepare, as soon as possible, all suggestions for consideration by the directors at the mid-year meeting, and transmit the same to the National Secretary, or see that they are placed in the hands of the local directors for presentation to the meeting.

THE AUSTRIAN wood-carving industry will be specially represented at the Chicago Exposition by 34 expert wood carvers from Vienna, who will exhibit their work in its various branches. Everything is being done to organize a thoroughly representative and interesting collection of exhibits.

THE BUILDERS' GUIDE.*

By I. P. HICKS.

Art of Roof Framing.

PROBABLY no part in the construction of buildings so thoroughly taxes the skill and ingenuity of the builder as the framing of roofs. Many diagrams have been published from time to time showing how to find the lengths and bevels of hips, valleys and jacks on all kinds of roofs. Yet many of the plans heretofore published have been too complicated to satisfy the wants of the inexperienced in the art of roof framing. At this time will be presented a choice of methods, beginning with the simplest form and illustrating the subject step by step, thus showing new and novel plans as they will appear in actual practice.

First will be introduced a plan showing how to obtain the lengths and bevels of common rafters, hips, valleys and jacks in the simplest manner, and with the fewest lines possible. Referring to Fig. 57, draw a horizontal line twice the run of the common rafter, as A B. From the center of this line at C erect a perpendicular, continuing it indefinitely. Next set off on the perpendicular the rise of the common rafter C 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 D the top cut. Next set off on the perpendicular line the length of the common rafter C E, which is the same length as D B. Connect E and A for the length of the hip or valley, as the case may be. Next space the jacks on the line A C and draw perpendicular lines joining the hip or valley. The lines J J will be the lengths of the jacks, and a bevel set in the angle at F, where the jack joins the hip or valley, will give the bevel across the back of the same. The plumb cut or down bevel of a jack is always the same as that of the common rafter. There are now shown all the lines necessary to be drawn, the plan indicating everything but the cuts of the hip or valley rafter, and this, be it remembered, is always 17 for the bottom cut and the rise of the common rafter to the foot run for the top cut. As some may think a system which does not show the cuts of a hip or valley as well as its length is incomplete, we will take the same plan and by the addition of three more lines show everything that can be desired, as in Fig. 58. Draw the lines the same as in Fig. 57, then set off on the perpendicular line the run of the common rafter C F. Connect F and B for run of hip or valley. Next square up the rise from F to G and connect G and B for the length of hip or valley rafter. A bevel set in the angle at B will give the bottom cut, and at G the top cut. It will be noticed in Fig. 58 that the lines A E and G B are of the same length, and in both cases represent the hip or valley, while showing it in different positions. The line A E shows the hip or valley in position for finding the length and bevel of the jacks, while the line G B shows the hip or valley in position to find the length and bevels of the same. This plan will work on roofs of any pitch and has only to be slightly varied to meet the requirements of roofs having hips and valleys of two pitches. On half pitch roofs one less line is required, as shown in Fig. 59. The line D B in Fig. 58 comes in the same position as F B, when applied to half pitch roofs, and is therefore the length of the common rafter and at the same time represents the run of the hip rafter. As two lines cannot be drawn in the same space we drop the line D B, remembering that it is shown by F B.

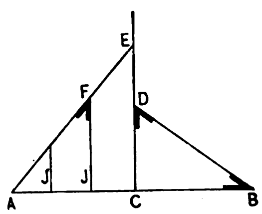

Fig. 57.—Obtaining Lengths and Bevels of Rafters.

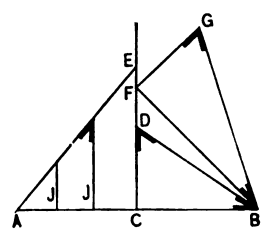

Fig. 58.—Diagram Showing Cuts of Hip or Valley Rafters.

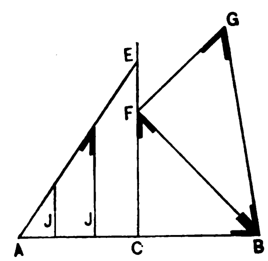

Fig. 59.—Diagram for Half Pitch Roofs.

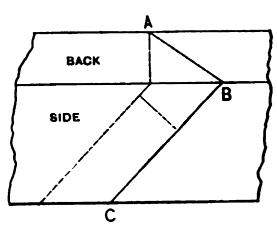

Fig. 60.—Obtaining Bevel Across the Back of Jack Rafters.

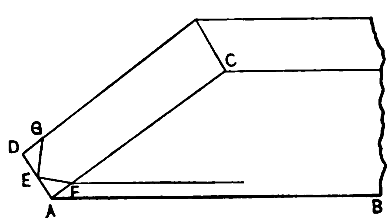

Fig. 61.—Backing a Hip Rafter.

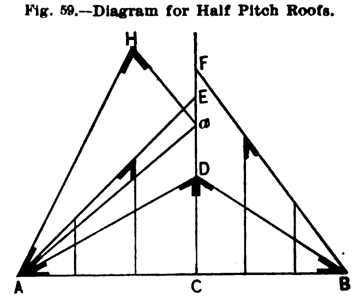

Fig. 62.—Diagram Showing how Method Presented in Fig. 58 may be Varied for Roofs of Unequal Pitches.

The Builders' Guide.—Diagrams Illustrating Art of Roof Framing.

BEVEL OF JACK RAFTERS.

Before proceeding further with the subject of roof framing we will illustrate a very simple method for obtaining the bevel across the back of jack rafters, or any rafter which cuts on a bevel across the back. Referring to Fig. 60, draw the plumb line or pitch of

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the roof on the side of the rafter B C. Next draw another plumb line the thickness of the rafter from the first, and measured square from B C, as shown by the dotted lines. Square across the back of the rafter, from the dotted plumb line to A. Connect A with B, and the lines to follow in cutting are A B C. This plan is worth remembering, as it will work on roofs of any pitch, and, in fact, will cut the bevel across the back of any rafter which cuts on a bevel. It is the plumb cut and the thickness of the rafter applied in the manner described that does the business every

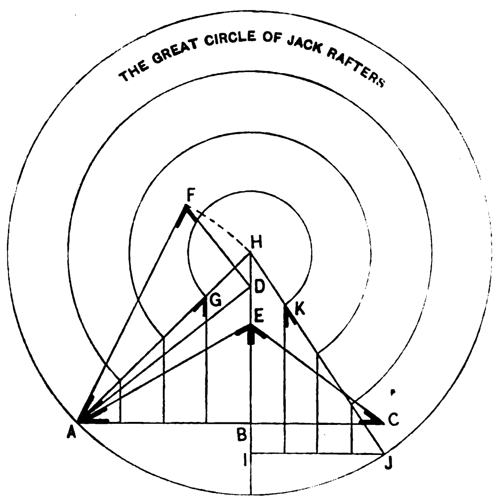

Fig. 63.—Great Circle of Jack Rafters.

As the above table may not be considered a scientific way of doing the work, Fig. 61 is presented. Draw a horizontal line, A B, and from A draw another at an angle representing the bottom cut of the hip rafter, as A C. On the line A C square up the thickness of the rafter to D. Mark the center and draw the line C F at an angle of 45° to A D. On the line E F square up from E to G, and the lines for the backing are G E F. The other lines are merely to show that the piece is off the bottom end of the hip rafter itself.

HIP ROOFS OF UNEQUAL PITCHES.

In Fig. 62 is shown the manner in which the method represented in Fig. 58 may be varied to meet the requirements of roofs of unequal pitches. Draw the line A B, in length equal to the runs of the common rafters on both the long and short sides of the hips. Divide the line A B so that A C will represent the run of the common rafter on the long side of the hip, and C B the run of the common rafter on the short side. From C erect a perpendicular line, extending it indefinitely. Set off on the perpendicular line the rise of the common rafter C D. Connect D with A and with B for the lengths of the common rafters. A bevel set at D on line A D will give the top cut of common rafter on the long side of hip and at A the bottom cut. A bevel set at D on line B D will give the top cut of common rafter on the short side of hip and at B the bottom cut. Next set off on the perpendicular line the length of the common rafter on the short side of the hip C E. Connect E with A for the length of the hip and position

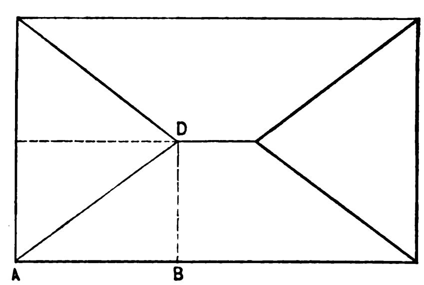

Fig. 65.—Plan of an Irregular Hip Roof.

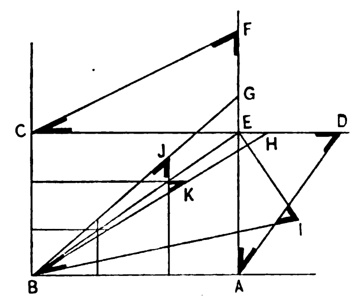

Fig. 64.—Another Method of Obtaining Lengths and Cuts of Rafters in Hip Roofs of Unequal Pitches.

The Builders' Guide.—Diagrams Illustrating Art of Roof Framing.

time. After the cuts have been found bevels can be set for them if desired.

BACKING HIP RAFTERS.

Let us now consider the backing of the hip rafter, an item which on common house and barn framing is of but little importance, yet it is well enough to know how it is done. Almost any roof is as good without as with the hips backed, and when the roof is completed it is impossible to tell which method was pursued. In cases where the hip rafter is doubled or very thick it is advisable to back it, but ordinarily this is unnecessary, being a waste of time. Where backing is necessary, a rule near enough for all practical purposes is as follows: Working from the center of the back of rafter set the bevel to cut off

$\frac{5}{8}$ inch in 1 inch for three-fourth pitch roofs.
$\frac{1}{2}$ inch in 1 inch for one-half pitch roofs.
$\frac{3}{8}$ inch in 1 inch for one-third pich roofs.
$\frac{1}{4}$ inch in 1 inch for one-quarter pitch roofs.

for finding the length and bevel of jacks on the short side of the hip. A bevel set in the angle where they join the hip line A E will give the bevel across the back. The plumb cut or down bevel is the same as that of the common rafter on the short side of the hip shown at D on the line D B. Next set off on perpendicular the length of common rafter on the long side of hip C F; connect F with B for the hip and position for finding the length and bevel of jacks on the long side of the hip. A bevel set in the angle where they join the hip line F B will give the bevel across the back. The plumb cut or down bevel is the same as that of the common rafter on the long side of the hip, shown at D on the line A D. To find the cut of the hip rafter set off on the perpendicular the run of the common rafter on the short side of hip C *a*. Connect *a* with A for the run of the hip. Square up the rise of the hip *a* H and connect H with A for the hip rafter. A bevel set in the angle at H will give the top cut and at A the bottom cut. It will be noticed that the lines, B F, A E and A H show the length of the hip rafters. B F shows hip rafter in position for finding the length and bevel of the jacks on the long side of the hip. A E shows the hip in position for finding the length and bevel of the jacks on the short side of the hip. A H shows the hip in position for finding the length and bevel of the hip rafter. For plain hips and valleys on roofs of equal pitch no one could wish for an easier method than represented in Fig. 58, but Fig. 62, which has been modified to meet the requirements of roofs of unequal pitches, necessarily makes the method more complicated, and with beginners there is much danger of making mistakes by taking measurements and bevels on the wrong side, as the lengths of jacks for the long side of roof appear on the short run of common rafter, and *vice versa* the jacks for the short side of roof. This circumstance may seem somewhat strange, yet it is nevertheless true, and can perhaps be more fully demonstrated by Fig. 63.

GREAT CIRCLE OF JACK RAFTERS.

The great circle of jack rafters is another modification of Fig. 58 for roofs of unequal pitches. Referring to Fig. 63, let A B represent the long run of common rafter, B E the rise and A E the length. A bevel set at E on the line A E will give the down bevel and at A the bottom bevel. B C is the short run of common rafters, B E the rise and C E the length. A bevel set at E on the line C E will give the down bevel and at C the bottom bevel. B D is the short run of the common rafter and the same as B C; then A D is the angle and run of the hip, D F the rise, and A F the length of hip rafter. The bevel at F is the down bevel and at A the bottom bevel. A H shows the hip rafter A F dropped down in position to find the length and bevel of the jacks for the side of roof having the short run of common rafter. Space the jacks on the line A B and draw perpendicular lines joining the hip line A H for the length of jacks. A bevel set in the angle at G will give the bevel across the back. The down bevel is the same as that of the common rafter for the short run and is shown at E on the line C E. H is the apex of the triangle formed on the side of the roof having the short run of common rafter. It is evident that the apex of the triangle formed on the side of the roof having the long run of the common rafter must be at the same point, therefore H is the apex of the hip and of the common rafters from either side of the hip. Now, to find the length and bevel of jacks on the side of roof having the long run of common rafter, measure down from H to I the length of the common rafter on the long run, which is the same as A E. From I set off the short run of common rafter to J; connect J with H, which places the hip rafter in position for finding the length and bevel of jacks on the side of roof having the long run of common rafter. Space the jacks on the line I J and draw perpendicular lines, joining the hip line J H, which gives the length of jacks. A bevel set in the angle at K will give the bevel across the back. The down bevel is the same as that of the common rafter for the long run, and is shown at E on the line A E. The circular lines show that taking H as a center the triangle H I J will swing around opposite the triangle A B H, and bring every jack opposite its mate on the hip line A H, thus proving the correctness of the method, as well as showing how to space the jacks correspondingly.

In Fig. 64 is shown another method for obtaining the lengths and cuts of rafters in hip roofs of unequal pitch. Let A B C represent the wall plate and D E F the deck plate; then A E is the run of the common rafter on the short side of the hip, E D the rise and A D the length.

The bevel at D is the plumb cut at the top and at A the bottom cut. From A set off the length of the common rafter to G, which should be the same length as A D. Connect B G, which places the hip rafter in position to find the length and bevel of jacks on the short side of the hip. Space the jacks on the line B A, and draw perpendicular lines joining the hip line B G for the length of the jacks on the short side of the hip. The bevel at J is the bevel across the back of the same. The plumb cut or down bevel is the same as that of the common rafter shown at D. C E is the run of the common rafter on the long side of the hip, E F being the rise and C F the length. The bevel at F is the plumb cut at the top and at C the bottom cut. From C set off the length of the common rafter to H, which should be the same length as C F. Connect B H, which places the hip rafter in position to find length and bevel of jacks on the long side of the hip. Space the jacks on the line B C and draw the same, joining the hip line B H, which will give the length of jacks on the long side of the hip. The bevel at K is the bevel across the back. The plumb cut or down bevel is the same as that of the common rafter shown at F. B E is the angle and run of the hip, E I the rise and B I the length of the hip rafter. The bevel at I is the plumb cut at the top and at B the bottom cut fitting the plate. Now, the lines B G, B H and B I show the hip rafter in three different positions for finding the length and bevels of the jacks and the hip, and are practically the same as shown in Fig. 62. Of the two plans Fig. 64 is perhaps plainer and more easily understood, yet both have the common difficulty, a confusion of cross lines, which is very bothersome to many who are trying to master the art of roof framing. To make this system of roof framing so plain that even the most inexperienced may readily master it, we will show how the first simple method, Fig. 57, may be further extended to meet the requirements of any roof, showing all the rafters without the usual complications of cross lines. The plan never fails on roofs of any pitch, equal or unequal, and no matter how complicated the roof may be, it will all appear easy by this method.

COMPLICATED ROOF FRAMING MADE EASY.

Let us now take the plan of a hip roof building having a long run of common rafter on one side of the hip and a short run on the opposite side. This kind of a hip is called an irregular hip, because the base line or run of the hip is not on an angle of 45° with the plates, as in the regular hip. In Fig. 65 A B is the run of common rafter on the left side of the hip and the long run. B D is the run of common rafter on the right side of the hip and the short run, A D being the run of the hip rafter. Now, to make everything plain and avoid the confusion of cross lines which are so troublesome to the inexperienced it is better to make separate diagrams showing each succeeding step as the plan progresses until all is made clear; then one can adopt the plan of separate diagrams or he can combine the whole in one if desired. To beginners separate diagrams are recommended, especially in connection with complicated roofs.

(To be continued.)

MASONRY AND STONE CUTTING.*

ST. GILES' SCREW, OR CORKSCREW VAULT.

I HOPE I shall be pardoned the homely English title I give to this vault in favor of its clearness. The surface of this vault is identical in character

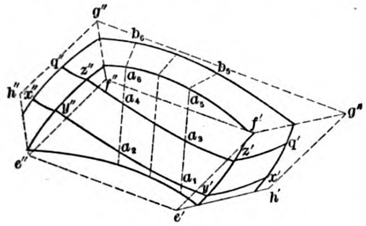

Fig. 240.

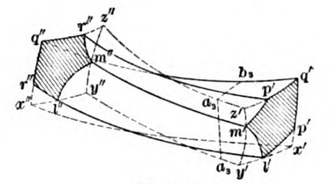

Fig. 241.

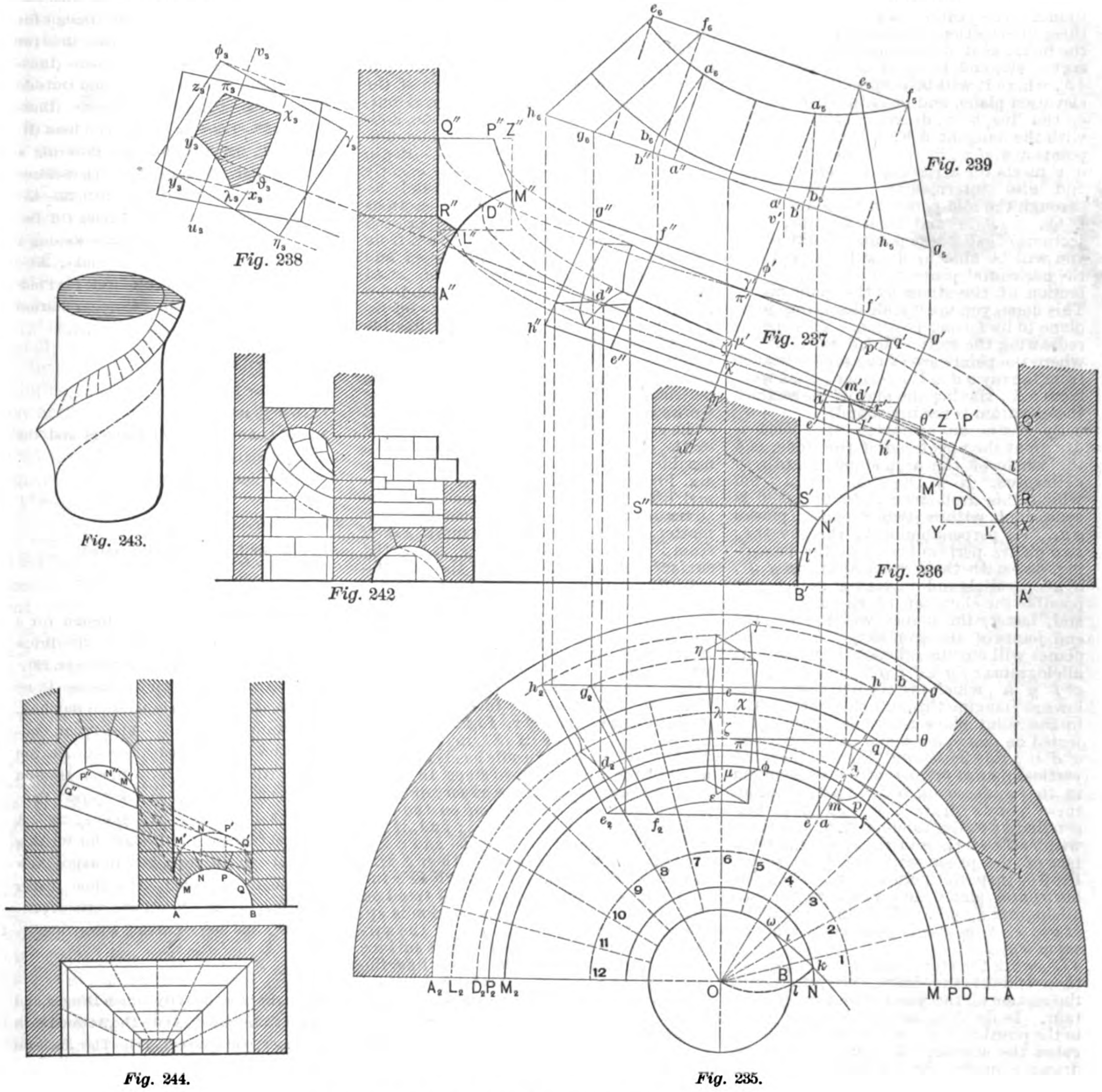

Fig. 238 *Fig. 239* *Fig. 237* *Fig. 236* *Fig. 243.* *Fig. 242* *Fig. 244.* *Fig. 235.*

Masonry and Stone Cutting.—Figs. 235 to 244 Inclusive.

with some of our old corkscrews, the thread of which was of circular section. It is formed by the spiral motion of the semicircular arch A′ M′ B′, Fig. 236. The object of this structure is to form a vault on which the steps of stairs shall rest. This offers the great practical advantage over the dancing and circular stairs referred to in recent issues of the paper, that here the steps being independent of the structure, can be changed whenever required, whereas when the steps form a constructional part of the structure they have to be patched with pieces let in when worn down and remain forever afterward unsightly.

As the vault has to follow the rake of the steps, begin by drawing the steps according to formula given not long since, the treading line 1, 2, 3 . . . . , Fig. 235, being at 1 foot 7 inches from the face of the solid newel. Then every point such as L′ or M′ of the generating face arch will describe in its motion a helix with the same rise as that of the steps above. To draw the elevation of the helix described by the point L′, for instance, mark the hights of 12 risers on a slip of paper and pin the slip on your drawing with its lowest division at the level of L′; the other divisions will give you points of the helix where L′ has come over the lines 0 1, 0 2, 0 3, . . . &c., Fig. 235, of the risers. The plan of the helix is the circle of radius O L, Fig. 235. By placing the lowest division of the slip of paper at the level of every other point of interest in the arch, the joints, the mid points, &c., the helixes described by these points are easily drawn.

Now, the joints L′ R′, M′ P′ of the face arch will describe surfaces similar to those of a screw with triangular thread; these surfaces will be the bed joints of the vault. It is to be noted that the joint lines L′ R′, M′ P′ are not normal to the soffit of the vault, for the normal should be normal to the helix; but they are found to be near enough to the normals for practical purposes.

The back of the vault is the helicoid

* Continued from page 246 September issue.

described by the motion of the horizontal line which forms the upper part of the arch stones on section.

To divide the course engendered by the pentagon $L' M' P' Q' R'$ in a number of arch stones, cut that course by planes normal to the helix described by the mid point D' of the arc $L' M'$.

As all the arch stones of the same course are identical it is sufficient to draw one only. Let the joint planes be taken through the points $d\,d'$, $d_2\,d''$ on the medium helix $D'\,\delta'\,D''$, $D\,\delta\,D_2$, at an equal distance from the ray $O\,\delta$, which is perpendicular to the elevation plane.

To determine the joint plane through the point $d\,d'$, draw the plan and elevation of the tangent to the helix in $d\,d'$; let the subtangent $d\,t$ be equal to three divisions of the circle $D\,d$; then the elevation will be $d'\,t'$, in which t' will be at a level of three steps below d'.

Now, the joint plane is normal to the tangent drawn, and its intersections with the five faces of the arch stone have to be found. The readiest way of delineating these intersections is to slide the plane up the helix, as if it were up the thread of a corkscrew, and bring it up to the point $\delta\,\delta'$, where it will be perpendicular to the elevation plane, and be entirely projected on the line $u'\,v'$, drawn at right angles with the tangent $\delta'\,\theta'$. Then mark the points $\lambda'\,\delta'\,\mu'\,\pi'$, . . . where the trace $u'\,v'$ meets the arrises of the arch stones, and also intermediary helices taken through the mid points of the sides $M'P'$, $P'Q'$, . . .; and then find the projections of all these points on the plan; you will be able to draw through them the horizontal projection $\lambda\,\delta\,\mu\,\pi\,\chi\,\rho$ of the section of the stone by the joint plane. This done, you must slide back the joint plane to its former position. This means redrawing the section in $l, d, m. p,$ . . . where the points are at the same distance from the ray $o\,d$ as the former points were from $o\,\delta$. Having the plan of the section, the elevation is readily found.

By a similar operation the joint is drawn at the upper end of the stone, and the whole of the arch stone is entirely delineated. Now, the stone prism from which this arch stone is to be taken is comprised within two vertical planes $g\,h_2, f\,e_2$, perpendicular to the ray $O\,\delta$; two planes perpendicular to the preceding, and with their vertical traces $g'\,g''$, $h'\,h''$ parallel, and inclosing as near as possible the elevation of the arch stone; and, lastly, the planes which form the end joints of the arch stone. These last planes will cut the others along the parallelograms $e\,f\,g\,h$, $e'\,f'\,g'\,h'$ and $e_2\,f_2\,g_2\,h_2$, $e''\,f''\,g''\,h''$, which are constructed as follows: Imagine through the point d and in the joint plane a horizontal line projected on plan $o\,a\,d\,b$ and on elevation in $a'\,d'\,b'$; this horizontal line will meet the vertical planes $f\,f_2, g\,g_2$ of the stone prism in the points $a\,a'$, $b\,b'$; then, through these points draw $e'\,f'$ and $g'\,h'$ perpendicular to the tangent $d'\,t'$, and these will be the sections of the front and back face of the prism with the joint plane. Project then the points $e'\,f'\,g'\,h'$ on the horizontal plane, and you have the parallelogram $e\,f\,g\,h$. The other parallelogram, $e_2\,f_2\,g_2\,h_2$, is constructed in the same way.

To work the stone, the exact shape of these ends of the prism is required with the section of the joint which they contain. To do this, again slide the joints to the position $u'\,v'$, where we first delineated the section. You may do it by redrawing on plan the end parallelogram in $\epsilon\,\phi\,\gamma\,\eta$, and then projecting these points in the elevation on the line $u'\,v'$. But it will be found that the vertical lines of projection meet the line $u'\,v'$ under too sharp an angle to be able to determine accurately the position of the points on the elevation. It is, therefore, much safer to consider that each point has, in sliding upward, risen the hight of three steps, and place it at that level on $u'\,v'$ above its former position. The same operation should be repeated for the other joint plane, which will be slid down to $u'\,v'$.

Now, to find the real shape of both these joint planes, twist the plane round ($u'\,v'$, $\delta\,\theta$) so as to bring it parallel to the elevation. This drawing has been produced in Fig. 238 by transporting $u'\,v'$ parallel to itself in $u_3\,v_3$. After twisting the plane, the points will be on lines starting from λ', δ', μ', . . . and at right angles with $u'\,v'$; their distances from $u'\,v'$ will be equal to their distances from $\delta\,\theta$ on the plan. It is to be noted that in Fig. 238 we have one section of the arch stone only, for the section is the same everywhere for the same course of stones; but, on the other hand, the two sections of the containing prism differ, and, therefore, Fig. 238 gives us two molds.

To get the arch stone it is necessary to work out of the operation prism an operation helicoid generated by the rectangle $Q'\,X'\,Y'\,Z'$, Fig. 236, like the string of an ordinary circular stairs with open well hole. The intersection of that solid by the joint plane is the curvilinear quadrilaterial $x_3\,y_3\,z_3\,\chi_3$, Fig. 238, of which the two sides $y_3\,z_3$ and $x_3\,\chi_3$ are arcs of ellipses. It is to be noted that the upper and lower planes of the operation prism must be selected so as to comprise within them the operation helicoid. Then the intersections of the upper and lower face of the operation prism with the cylindrical outside and inner side of the operation helicoid have to be found as shown, Fig 239.

Working of the Stone, Fig. 240.—Begin by working the operation prism exactly as drawn in Figs. 235 and 237, and delienate on the joint planes the sections both of the arch stone and the operation helicoid by means of molds taken from Fig. 238. Then apply on the upper and lower faces of the prism of the mold taken from Fig. 239, and work from these lines the cylindrical surfaces of the operation helicoid. By placing a flexible straightedge on the cylindrical sides the helices which guide the upper and lower planes of the operation helicoid will be delienated, and these surfaces can be worked. Then every arris of the arch stone can be delineated—those which are on the cylindrical surfaces by means of a flexible straightedge; those on the upper and lower surfaces by means of a trammel. The working of the surfaces of the stone between these lines is then an easy matter, provided the guiding marks taken from Fig. 239 have been preserved on the surfaces of operation until the completion of the stone.

The springers belong on the one side to the wall, and on the other to the newel, Fig. 242. The newel will, therefore, bear the thread of a screw, Fig. 243, which will be cut by the planes of the horizontal joints along two curves, $B\,K$ and $K\,i''\,w$, Fig. 235, constructed as follows: Profile $S'\,N'\,B'$ of the springer, Fig. 286, is met by the joint plane $S'\,S''$ in the point (S', B); but when the profile has been slided upward the hight of two steps, the point i of the profile will have risen up to the joint plane, and its position on the plan will be on arris of step 2 in i''; and, if the difference of level between N' and S' be, say, three-quarters of a riser, then N will have reached on plan K, the arc $N\,K$ being equal to three-quarters of the tread on that line. The same construction is applicable to finding the section of the surface of the bed joint. As this last surface might be continued to the center line, the curve of intersection, if prolonged, would pass through the center as shown.

The Square St. Giles Screw, Fig. 244.—After drawing the plan of the steps as shown, a semi-ellipse is placed on the diagonals forming the angles, and at the level given by the steps. The jointing is then drawn on plan as shown, and the points where the joints meet the diagonals are projected on the groins above; the joints and all the generators of the vault are straight and form a skew surface. The bed joints may be planes through the arrises of the joint lines on the soffit and the joint lines of the section $A'\,M'\,N'\,P'\,Q'\,B'$.

A CHIMNEY PIECE carved from wood over 6000 years old is said to have been recently erected in a house in Edinburgh. The wood, an oak tree, was found in a sand pit at Musselburg, 13 feet below the surface.

CONTENTS.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
The Builders' Exchange.

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NOVEMBER, 1892.

Successful Methods.

The policy pursued by the carpenters of Los Angeles, Cal., in their effort to secure an eight-hour day is one that recommends itself to all as being rational and effective. The question of reducing the hours of labor has been presented to the employers and the public from the carpenters' standpoint, together with such arguments in favor of the reduction as the workmen consider would advance their cause. Appeals have been made to all carpenters to join in the movement irrespective of the fact that they did or did not belong to any union, together with the statement that a perfectly open and friendly movement for the end in view is all that is contemplated. Already a majority of the employers in the city have agreed to work eight hours, but the carpenters want a unanimous agreement from all workmen as well as all employers before the shorter day shall be adopted, in order that the new arrangement shall work no detriment to any; also that the interested ones shall start out, at least, on an equal footing. There seems to be no doubt that the movement will be successful, not only because the action of the carpenters appeals to the good sense of the employers, but because their conservative action has enlisted the sympathy of the public. Such methods as these deserve success, and many other beneficial changes could be secured by the workmen if such means were used instead of the "demands" which excite the antagonism of the employer as well as that of the public.

The Contractor and Supply Dealer.

The action of the Brickmakers' Association of Chicago in taking up the recommendation of the Builders' and Traders' Exchange in regard to discounts from list prices in favor of recognized contractors by dealers in building material is the first attempt of the kind that has been made at the official request of any of the exchanges belonging to the National Association of Builders. The plumbers have for some time had in operation rigid rules in regard to the sale of plumbers' supplies, but probably never before has a direct effort been made to protect the general contractor in the matter of prices. It is a fact that in almost any city in the country the owner of a prospective building can buy material for that structure cheaper than the man who has the contract to erect it. The supply dealers recognize the fact that this owner may never put up another building in his life, yet they want to sell him his material, and in order to make sure of the sale will quote a lower price than they would to the regular contractor, whom they are aware is obliged to buy supplies every day, and of whose business they trust to be able to secure a share.

Injustice to the Contractor.

This condition of things is unfair to the contractor and cuts off a portion of his legitimate profit. The contractor is in the market to purchase building material to sell again; he buys building material for use in his business, which is the sale of completed buildings, and he should be protected by the dealers, just as the retailers in any other line of business are protected by the wholesalers and jobbers. In mercantile business the common practice is against the wholesaler or manufacturer selling to the consumer; at least it is not a notorious fact that the consumer can get a better price from the wholesaler than can the retailer. In the building business the contractor depends for his profit as much on the labor and material he sells in the form of a building as the retailer in the clothing line does on a bill of goods. If the dealer in building material sells his goods to the consumer (the owner) at a less or even the same price he would sell the same material to the contractor, he is depriving a steady customer of his fair profit for the sake of selling a bill to a consumer who may never buy another dollar's worth in his life. The contractor is then compelled to assume the responsibility of handling supplies thus sold without any just proft therefor.

The Supply Dealer.

The supply dealer has made nothing by the transaction, for the contractor would have paid as much as the owner if the material had been sold at the market price. If it has been sold for less, the dealer has lost the difference between the price at which he sold and that at which the contractor would have bought. The basis of the plan adopted by the brickmakers of Chicago appeared in the October issue of *Carpentry and Building* in the report of the committee appointed by the Builders' and Traders' Exchange to consider the subject. Some general plan will doubtless prevail before long in this regard, for it is only fair to presume that the material dealers would rather protect their regular customers than the man who wants to buy once or twice in a lifetime. When the building material supply men in each city become organized so that all may act alike on the subject the contractor may cease to urge his claims for protection.

Tall Buildings of Chicago.

The tall buildings of Chicago and some of the other cities of the United States continue to be a source of wonder and surprise to the builders of Great Britain and the Continent. The architectural and technical papers of Europe abound with allusions to the mammoth structures which characterize the architecture of the period in this country, and not a few reproductions of drawings and photographs enliven their columns. All eyes are at present turned to Chicago. The approaching World's Fair gives that city a prominence that it has never before attained, and anything that is in it, accordingly, becomes of special interest. The London *Builder*, in a recent issue, commenting on the new business buildings of Chicago, says: "Chicago is the one American city that can claim a distinctive architecture. It is a business architecture, modern in every sense of the word, and the outcome of narrow limitations. It is an architecture characteristic of American cities, but which in Chicago has received fuller, freer and more satisfactory treatment than elsewhere in America. Chicago architecture, however much talked of, is not appreciated. The public hears more of its hight than of any architectural merits it may have, and even the successful manner in which it meets existing conditions has scarcely been done justice to.

Business Architecture.

"Chicago architecture," our contemporary goes on to say, "is an attempt to meet the rigid limitations which surround buildings in that city, and which quite preclude the possibility of following established methods of procedure." The writer then points out how Chicago is hemmed in by the river and Lake Michigan, resulting in the business part of the city being of unusual small area and making high office buildings a prime necessity. These are made successful by the invention of swift-running elevators, thus solving the question of area by multiplying it indefinitely. Allusion is then made to features of construction, and it is pointed out that under ordinary systems the walls of high structures would be enormously thick, and much valuable space would thus be lost from the renting value of the building. This difficulty is obviated in Chicago and other American cities by the introduction of steel construction, the skeleton of steel surrounded with a light stone or brick wall being the predominating plan. "The problem before the architect," says the writer we are quoting, addressing himself to English readers, "was to prepare a building which would have the greatest possible floor space, which would not extend beyond the building line or recede from it, and one that would be as high as the funds at hand permitted, and which should be a structure as ornamental as possible. Accordingly high buildings, eight and twelve stories in hight, are a feature of all American cities, but nowhere have the architects so freely put precedent to one side and followed the programme so closely as in Chicago."

New York and Chicago Buildings Contrasted.

Contrasting the high buildings of Chicago and New York, our contemporary says: "New York, although it has many high buildings, has none as lofty as those of Chicago, yet they are high enough to render their general architectural treatment of basement, superstructure and cornice or attic altogether unpleasant because these features become monotonous spread over too great a space. The Chicago architects have followed a very different course. They have recognized the utter impossibility of making façades, have superseded all unnecessary ornamentation and architectural features, leaving their buildings simply walls relieved only by windows or perhaps by bay windows." Then follows a description with front elevation and floor plans of several of the more important buildings recently erected in Chicago. Among these specially singled out for comment are the "Monadnock," the "Masonic Temple," the "Title & Trust Company" building, the "Manhattan" office building and the "Auditorium" builing. The latter, it is pointed out, is in design not what has been termed a typical Chicago structure, but it is declared it impresses by mass, not only because of its size, but because notwithstanding its utilitarian business uses it has an ornamental aspect depending not only upon the sobriety of the design, but upon the dark gray granite of which it is built. Summing up, our contemporary presents the following:

Buildings as Sources of Revenue.

"The great office buildings of Chicago are looked upon by their owners simply as sources of revenue, not as architectural monuments. Such, indeed, an office building cannot properly be; but it is to the credit of Chicago architects that they should have produced not only a characteristic group of buildings, but buildings well worth studying as examples of the most modern tendencies in architecture and their expression in architectural form. Chicago architecture must be estimated by the Chicago standard. Whatever opinion may be held as to the characteristics of Chicago life, its rush and turmoil and business proclivities, it should be remembered that these elements are as much part of the city as a more staid and regular existence is of older communities. These are the conditions that Chicago architecture is concerned with, and if it fulfills them it must be pronounced as successful as other forms of architecture and methods of treatment may be for other communities. One does not find fault with a warehouse because it does not resemble a church; there is nothing in a church that would make its architectural form of any utility or sense in a warehouse. So if Chicago architecture, while differing from that of the other cities, fulfills Chicago's requirements and is satisfactory to those who have to use it, it ill becomes visitors to criticise it because it may differ from their preconceived notion of what architecture should be. The buildings may be preposterously high, but they are so from business conditions, not from architectural choice. The Chicago architect does not build high because he likes it, but because the problem presented to him forces him to do so. and his success lies in his frank and business-like treatment of the buildings. Just as a church is the more successful the more completely it answers the requirements of a church, so the success of the Chicago building must be measured by the completeness with which it answers to Chicago requirements. And this position, perhaps fortunately enough, entails no approval of whatever boisterousness may be characteristic of the city."

Boland Trade School.

Some time ago we called attention in these columns to the new Boland Trade School now in process of erection at the corner of Madison avenue and Fifty-second street, New York City. On September 29 the cornerstone of the building was laid with interesting ceremonies. This school is the result of a plan long contemplated by Archbishop Corrigan, and dates back something like 35 years. A dry goods merchant named William Boland left in 1857 a sum of money which he desired to be employed in the useful training and education of Catholic orphan children. It was invested in 1872 in a farm near Peekskill, where many boys were cared for, some of whom afterward were sent West, where, at one time, there was a demand for trained farmers. As all could not follow this calling, the idea of establishing a trade school was suggested by Archbishop Corrigan. It is stated that nearly $60,000 was obtained from the sale of the Boland farm at Peekskill, and this amount, with voluntary offerings, together with the sum to be hereafter provided for by the Annual Orphan Benefit Entertainment, will go far toward providing the amount necessary to defray the expenses of the Boland Trade School.

Benefits of Organization.

W. H. SAYWARD.

The employers in the building business might do well to follow the example that has been set them by the workmen. Long ago the latter recognized the importance of acting in concert, and for years they have been reaping the benefits of organization. The occasional misuse of the powers that are inherent in numbers and unity of purpose does not alter the fact that through organization the greatest good for the greatest number can be accomplished. The employer hampers his own power of action by neglecting to consider that individually he can do but little, either in the direction of controlling the labor market or in the establishment of conditions that would be beneficial to the trade generally. It has been the custom of years for employers, in the building line especially, to take no cognizance of the needs of the business as a business, but to consider only such peculiar conditions as affected each one individually. The result has been that when the workmen have used the weight of combination to secure certain concessions, the employers have joined together for the sole purpose of combatting their demands. In some cases the employers have had the welfare of the whole body politic at heart and have used their combined effort to secure the establishment of practices and relationships between themselves and the workmen that would insure the prevalence of just and honorable conditions.

BUILDING SITUATION.

The peculiar situation in the building business—the majority of contracts being secured by competition — makes united action by employers difficult to secure, for the reason that there are always certain builders who will not identify themselves with any movement that might place their business in temporary jeopardy. When a disturbance in the labor market arises over a question of hours or wages these builders are the ones who yield and take advantage of the situation to secure work for which others are prevented from competing by existing conditions. They ignore the principles involved in the contest, but ready to profit by the result, whichever is successful. If the workmen succeed in their demands, they have not incurred their enmity and have had the benefit of unbroken work; if the employers win their cause then they are the first to take advantage of the improved conditions that have been established. Of course there are exceptions, for in some cases individual employers are so surrounded by restrictions of time and peculiar conditions of contract that cessation of work would mean serious loss, if not ruin. The time for employers to organize is when everything connected with the business is at its best, for then a careful and wise policy can be mapped out and calm and conservative councils will prevail. Every employer owes it to his business to assist at securing improvement in the existing conditions in the building trades, just as much as he owes it a duty to the commonwealth to pay his taxes and vote. If he fails in either of these duties he is receiving benefits at the expense of others, for in either case some one has been obliged to do the work, the results of which are general, and the benefits of which are participated in equally by all.

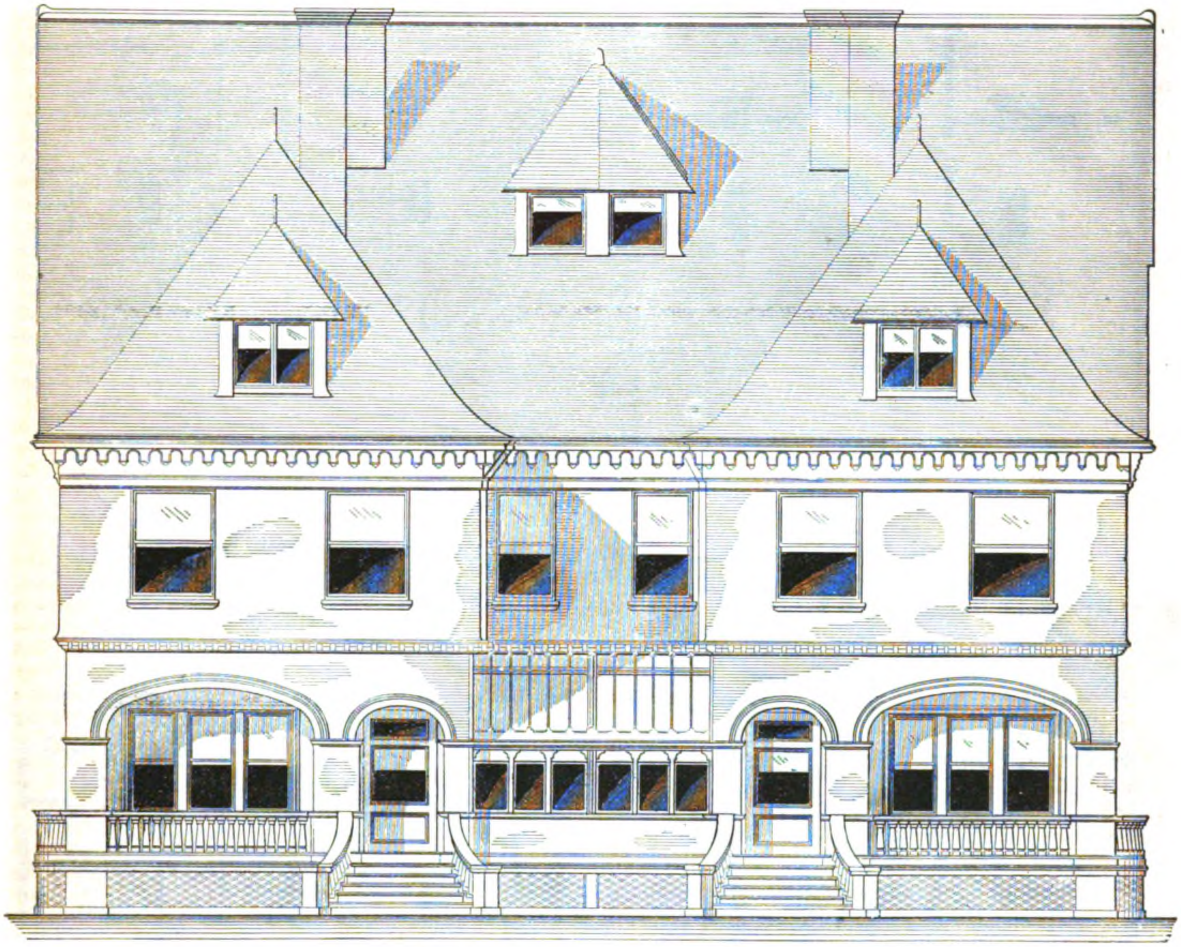
ASSOCIATION OF EMPLOYERS.

One of the strongest tributes paid to organization among employers is the statement of a builder doing business in a city where a well-conducted builders' exchange exists, who says "he finds the exchange very convenient," and that "he can save time by running in occasionally." He finds all the benefits that careful organization can provide always ready to his hand; but while he recognizes its value he fails to see that it is his duty to help support an institution which is an advantage to the community, and out of which he finds means to facilitate the transaction of his own business affairs. The organization of employers in any one trade is as equally beneficial to that trade as is the Builders' Exchange to all the building trades. A unity of action

(*Continued on page 282.*)

METAL LATH AND CEMENT CONSTRUCTION.

THE USE OF PLASTIC MATERIAL for exterior finish in modern building construction is not, strictly speaking, a novelty, although its employment in this country is by no means general. Examples of work of this kind, which are to be found in various parts of the land, having been erected many years ago, are in many cases unsatisfactory, in evidences of durability, and for this reason architects and builders have been loth to repeat the experiment. It should be explained, however, that such buildings have been for the most part inadequately constructed, and that to a certain finish of gables where also cement has been used. The peculiar nature of cement requires a strong and serviceable foundation, and when used upon good construction, as for example, with metallic lath, there is no reason why it should not give most excellent results. Metal lath covered with cement forms a construction which adds in a very large degree to the fireproof qualities of wooden buildings. The cement also lends itself readily to moldings, and to other architectural features, and if intelligently applied, goes to ornament the house as well as to make it serviceable and durable.



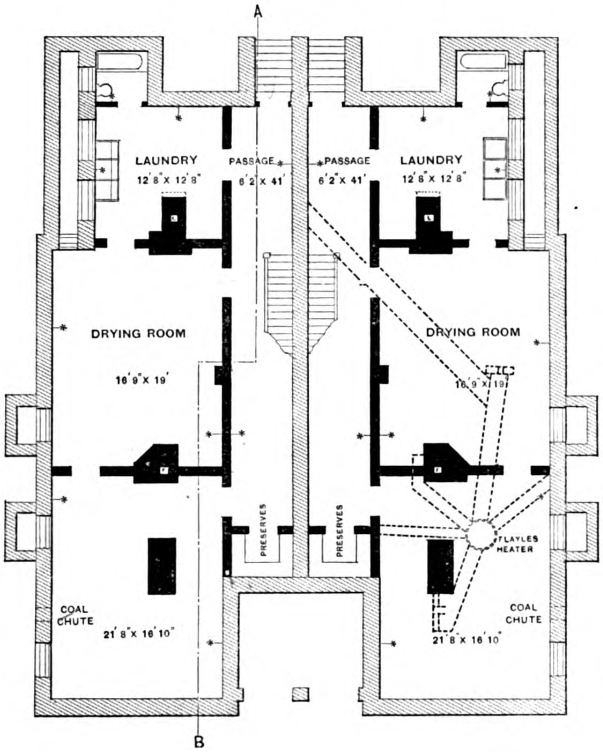
Front Elevation.—Scale, ⅛ Inch to the Foot.

Metal Lath and Cement Construction.—Double Residence at Pittsburgh, Pa.—Frank Irving Cooper, Architect.

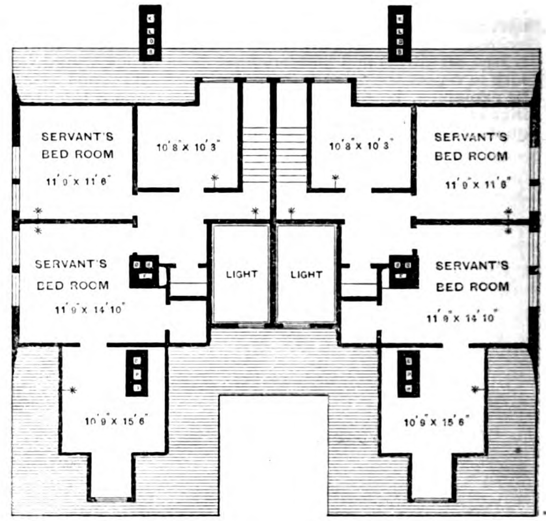
extent the lack of durability of the exterior finish has been due to weakness in the building itself. Again, the plastic material has been applied to ordinary wooden lath, in itself not strong enough to resist any thrust or jar; and last, but not least, the material of the covering has been ordinary lime and sand mortar, with too little cohesion of particles to be adequate for the purpose. The idea of using cement is, in some respects, quite recent, but the material has not been more generally employed on account of excessive cost. With cheaper material of this kind and better foundation in place of wooden lath, there is no reason why cement construction should not become very popular. That it has been growing in favor the past few years is evidenced by belt courses frequently found in buildings, made entirely from cement, and in the occasional

A notable example of metal lath and cement construction is found in the double residence illustrated in this number. A general view of the building is given in one of our supplemental plates, while the elevations, floor plans and details are presented upon this and the following pages. The building shown, in addition to exterior work of cement, has been largely constructed of cement work in the walls and ceilings. Moldings have been run in the plastic material and there is a notable absence of wood for finish throughout, all of which will appear by the description which follows and the sketches illustrating the same. Portland cement has been used, placed upon expanded metallic lath as a foundation. This work has been designed and executed for H. B. Chess of the Central Expanded Metal Company, with offices at 531 Wood street, Pittsburgh, Pa., and 67 Reade street, New York City. The designs were supplied by Frank Irving Cooper, architect, of Pittsburgh, who also worked out various details suggested by the owner. The construction shown—namely, metallic lath in combination with cement—has been given the name of "Cementine" a term intended to distinguish it from work executed in common plaster on a foundation of wooden lath.

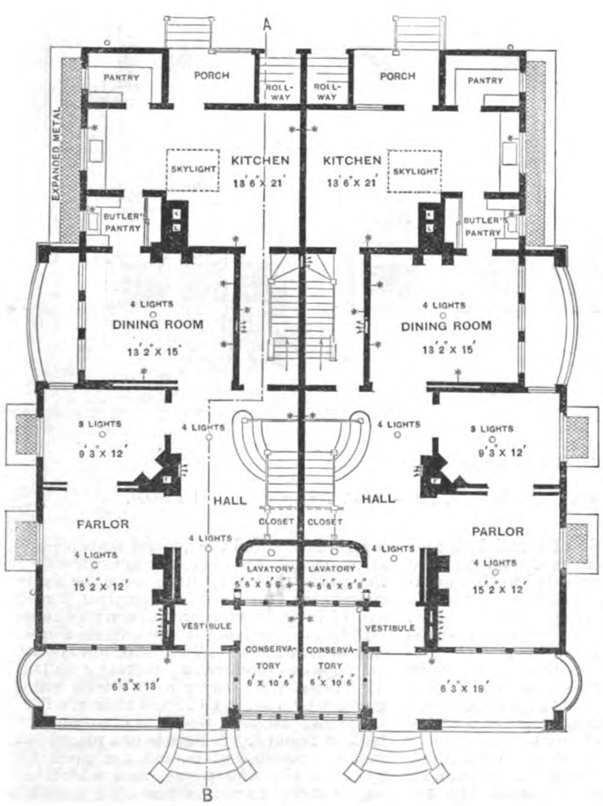
The subject of our illustrations is located in that portion of the residence section of Pittsburgh known as the "East End." The position of the rooms on the several floors, and the general features of arrangement, are so clearly indicated by the plans that very little need be said concerning them. The principal feature of interest in connection with these buildings is the manner in which the Portland cement and metallic lathing have been employed to produce satisfactory results. The cellar walls carry a 6 x 8 inch sill, above which are 2 x 6 inch studding, with joists and rafters of the usual dimensions, balloon framed. The studs are placed 16 inches between centers, and are covered by good sheeting paper, over which is nailed light furring strips $\frac{3}{16}$ x 1 inch for the purpose of receiving the metallic lathing, which is fastened in place by staples. The overhangs are provided with sufficient "lookout" work to sustain the lathing and cement, of which several coatings or layers are employed over the en-



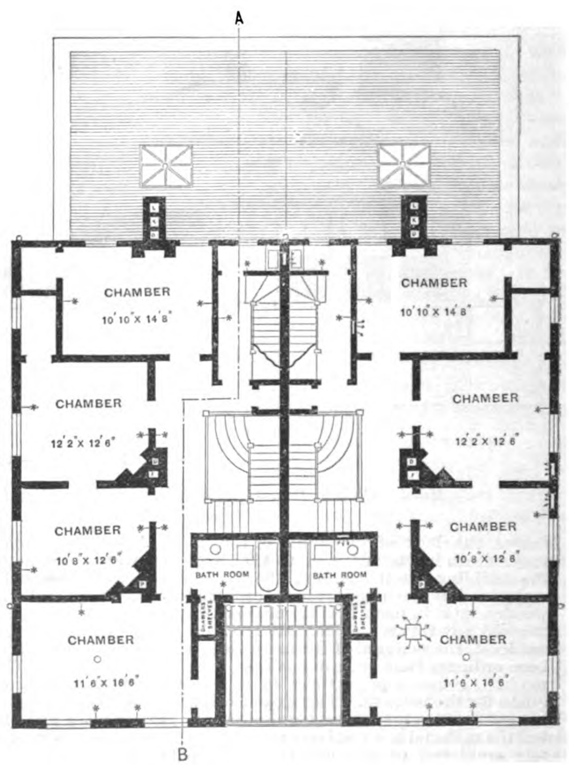
Plan of Basement.



Attic Plan.



First Floor.



Second Floor.

Metal Lath and Cement Construction.—Floor Plans.—Scale, 1-16 Inch to the Foot.

tire structure. The plastic material used is German Portland cement, in the proportion of one of cement to two of sharp clean sand. Great care was taken in the execution of the work that the consecutive coats followed each other as rapidly as possible. The heavy water-proof paper prevents waste on the back of the lathing, while also checking too rapid drying and setting of the cement. The brackets on the gables, the overhangs and lower the case under consideration, is tinted slightly gray by the use of common lampblack, although the color may be varied to suit the taste of the owner. The surfaces of the walls of the buildings here illustrated are left in sand cork floated surface, with a change of texture in the second story belt by the direct application of a stiff brush, something after the manner in which one would apply a stamp. Relief from large, flat surfaces it is practically impossible to tear it from the strong steel lath netting to which it is applied without the use of tools. This combination, as stated at the outset, adds materially to the durability and fire-proof qualities of the structure in connection with which it is employed, while permitting of such decorative treatment as the taste may suggest.

Lightness of framing is one of the features of this form of construction, nad

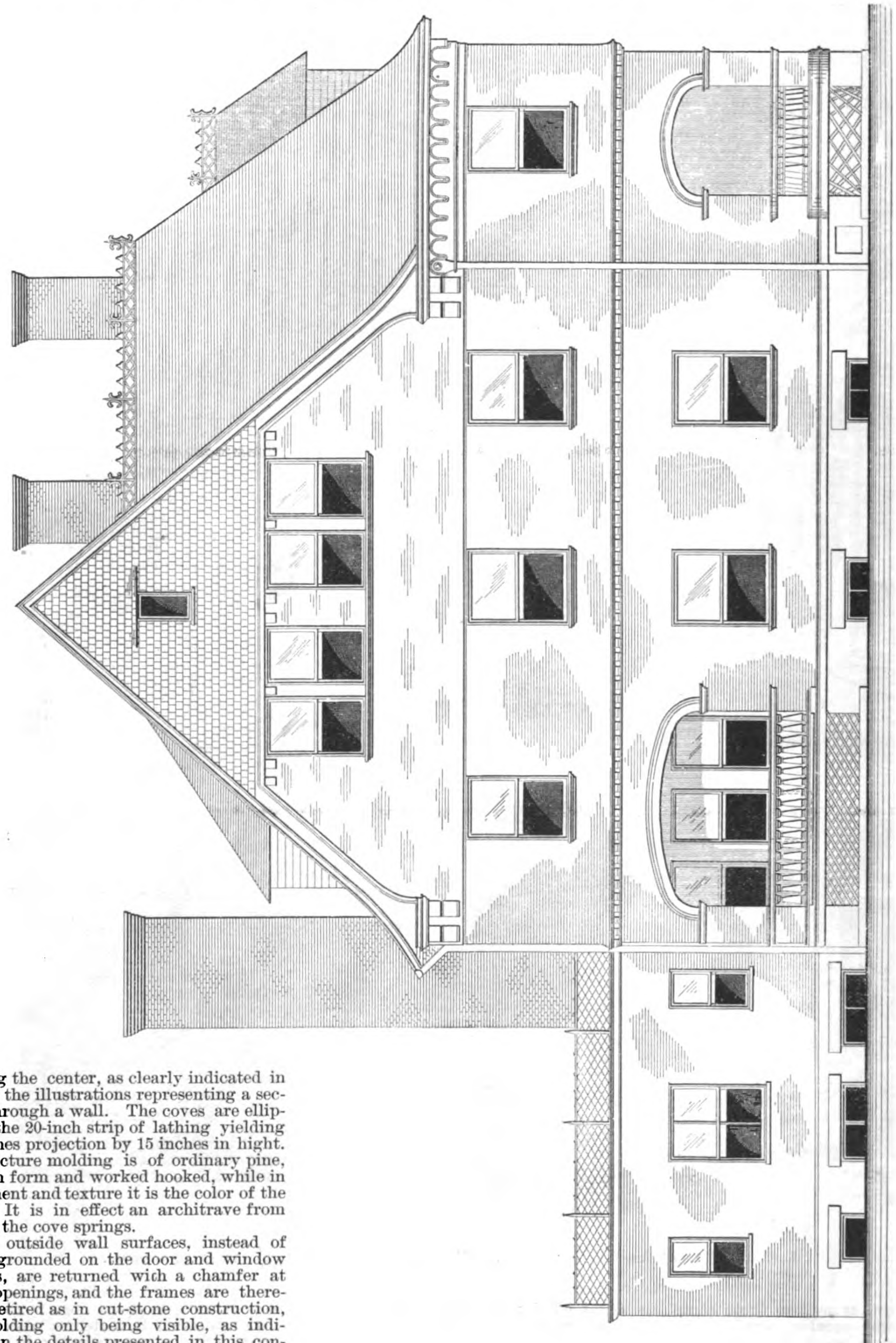
Metal Lath and Cement Construction.—General View of Building at one of the Front Corners.

course moldings, as well as those about the arches of the porches, were "run," while the fascia work at the eaves, dentils and capital moldings were applied. The window sills and heads where they occur were also "run" in place, care being taken that the grain of the wood in the false work at the window sills and elsewhere should not have a disrupting effect beyond the ability of the lath to withstand in case of dampness reaching it. The cement in is obtained by the judicious employment of ornamental details.

The exterior of the buildings was completed something over a year ago, and up to the present time is said to have withstood the vicissitudes of a severe winter and an unusually torrid summer without appreciable deterioration. It is a well-known fact that in the course of time Portland cement becomes hard and durable, like artificial stone, and that where employed in the manner indicated above the work may be largely done by the ordinary carpenter, followed by plasterers of average ability. A great deal of decorative work in moldings, &c., may be easily produced through the simple medium of a board profile cut to detail.

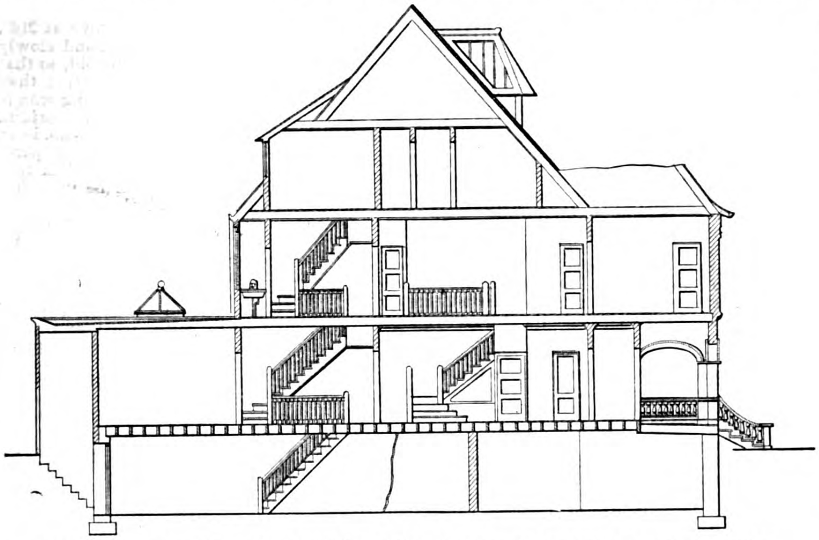
Referring now to the interior of the buildings here illustrated, the work is executed on the same general plan as that followed in connection with the exterior. The walls are in sand finish, covered in tints which, rising solid to the picture molding, gradually diminish in tone as they sweep up the elliptical cove and over to the center of the ceiling, where the color fades away, almost to a white. This form of constructing the coves is general throughout the house, the coves being made by springing a sheet of lathing 20 inches wide into the corner, with a bridging strip arranged brace fashion for supporting the center, as clearly indicated in one of the illustrations representing a section through a wall. The coves are elliptical, the 20-inch strip of lathing yielding 10 inches projection by 15 inches in hight. The picture molding is of ordinary pine, ogee in form and worked hooked, while in treatment and texture it is the color of the wall. It is in effect an architrave from which the cove springs.

The outside wall surfaces, instead of being grounded on the door and window frames, are returned with a chamfer at these openings, and the frames are therefore retired as in cut-stone construction, the molding only being visible, as indicated in the details presented in this connection. The same treatment is observed in the interior, the metal lath and plastering being carried up to the edges of the opening, the latter dying away with a ½-inch chamfer. The edges are fully protected by the usual window strip, thus permitting the color of all of the walls to be carried, without interference or break, clear up to the openings. The door openings are treated in a similar manner, except that the usual facing is dispensed with, as may be seen from an inspection of the details presented herewith. The plaster dies out in the ½-inch chamfer, as is the case at the windows. The baseboard is what may be designated as an exaggerated carpet strip 4 inches high, made of oak, with a deep sloping bevel in lieu of a molding. This members to the door framing with plinths, arranged as shown in the details, and affords due protection to the wall and door frame.

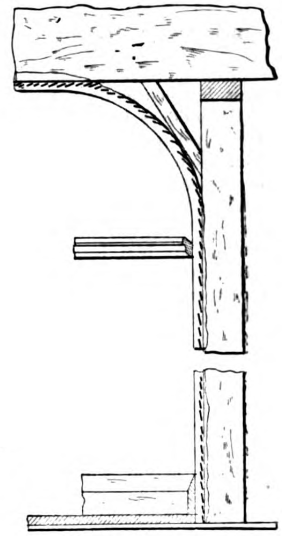


Metal Lath and Cement Construction.—Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.

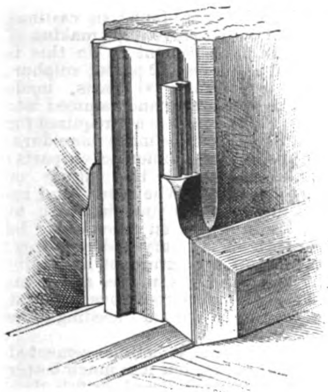
In the bathroom, lavatories, slop closets, &c., the floors, as well as wainscoting, are in high grade Portland cement treated in color and arranged in such a way as to be impervious to water. The metal lathing in these rooms is carried across and embedded in the floor, so that in case there should result cracks or fissures from uneven settling they will remain as such and allow of being readily made tight. This floor treatment also occurs in the conservatories. In the kitchen the wood lining or wainscoting is dispensed with. The plumbing fixtures are also exposed after the manner now so much in vogue. The details of heating, laundry, lighting, &c., are those usual in houses of this class, and call for no special mention in this connection. The wood work of the first and



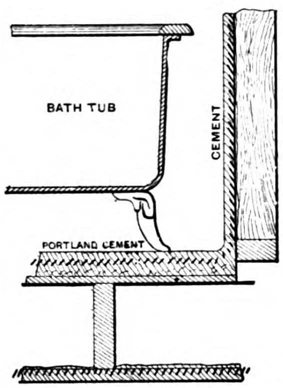
Section through Building taken on the Line A B of the Floor Plans.—Scale, 1-16 Inch to the Foot.



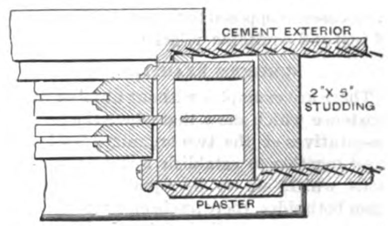
Section through Wall.—Scale, ¾ Inch to the Foot.



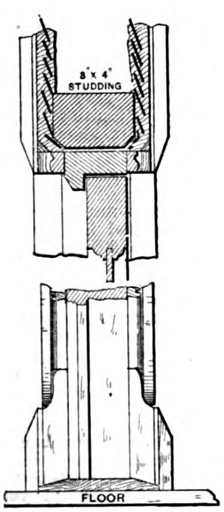
Door Frame and Baseboard.



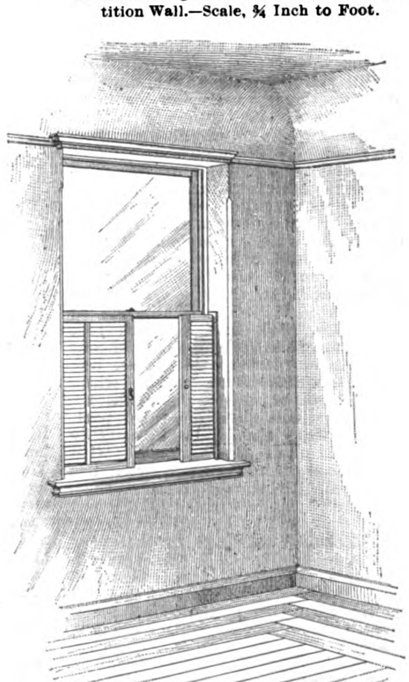
Section through Bathroom Floor and Partition Wall.—Scale, ¾ Inch to Foot.



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



Elevation and Section of Door Frame.—Scale, 1½ Inches to the Foot.



Interior View Showing Window Construction on Second Floor.

Miscellaneous Details Illustrating Metal Lath and Cement Construction.

second stories is painted in flat color to match the adjoining walls, and in the third story it is left natural. The central dormer is roofed with glass, affording ample light to both stairs, as well as upper and lower halls, making these portions of the house bright and cheerful even on the darkest day.

The projection or overhang of the second story gives a 12-inch wall, and consequently a deep jamb to the windows, affording ample opportunity for the use of inside shutters or screens, which part in the middle and slide into pockets at the right or left, as indicated in the view representing window construction. The fire places are of the plain open style, adapted for either gas burning appliances or basket grate. They are sufficiently roomy to receive the ordinary type of gas stove, if such a method of heating is desired. The fire places have the general appearance of a beveled or flaring brick framing to the fire, made up of three pieces of cement castings. These consist of two jambs and an architrave in solid color, harmonizing with the color effects of the room in which the fire place is situated. The plainness of the beveled face is relieved with incised carved work, while a molding under the projected arch head terminates at either side in a spray of foliated decoration. Rising from the table of each voussoir are brackets carrying, on the first floor, a plain mantel shelf in natural oak, but on the other floors they are colored to harmonize with the rooms in which they are situated.

The effort in this work has been to provide in houses of moderate cost, interiors in which the non-essential trimming is reduced as much as possible, both as a matter of first and subsequent cost, and with full regard to the final adornment by draperies and other appointments constituting the finished domicile, at the same time maintaining a level of good construction throughout fully in line with the advanced standards of builders and fire underwriters on the one hand and proper æsthetic home-making canons on the other.

Benefits of Organization.

(*Continued from page 276.*)

can best be secured by association, and although builders have for years been able to "get along" without organization, the immense benefits that accrue from its proper use clearly demonstrate that they "get along" very much better with its assistance. Dealings with the workmen particularly are best facilitated through organization, and the settlement of differences that are bound to occur is best secured through united action on both sides, for then the action of either is representative of a majority opinion. The permanent existence of an association of employers and a union of workmen in any community is one of the best safeguards that can exist. They provide the means of securing action which affects the whole, and therefore means something. The fact that organizations existing on both sides has been prolific of trouble does not affect the principle involved, but demonstrates that one side or the other, in such cases, is opposed to the establishment of just and equitable relationships.

NUMEROUS EXAMPLES.

There are examples without number in existence which show that where the representatives of the two organized bodies meet together to establish formal conditions which are to be equally binding upon both sides, there has been no trouble, and comparatively little labor, necessary to reach satisfactory conclusions. The great fault with unsatisfactory action by such representatives is the fact that in many cases they meet for the purpose of settling some long-standing dispute, and each side is determined not to yield in the slightest degree. Such a frame of mind is not conducive to harmony, and unfortunately many men form their opinion of organization and its working from such cases as are made public through the daily press. The cases where such meetings have been productive of benefit to both employers and workmen are seldom reported, as they are free from the sensational elements of attempts to settle strikes or end any trouble between the two. The best relationships and the most satisfactory conditions between employers and workmen that exist in this country to-day are in cities where both sides are carefully organized, and where each side has learned, perhaps through bitter experience, that each has some "rights" at the hands of the other.

The Electricity Building.

One of the pictures forming a supplement plate this month is from a photograph taken by C. D. Arnold of the Electricity Building of the World's Fair. The building covers a space of 700 x 350 feet, or more than 5½ acres. It was designed by Van Brunt & Howe of Kansas City. Like most of the other buildings, the style of architecture is Italian Renaissance. It is 60 feet high and ornamented with designs suggestive of the department. It is one of the handsomest of the grand central group, and will cost $650.000. There will be four entrances to the building, the main one on the south. Its staff covering will cause it to resemble granite in color. A statue of Franklin will rise conspicuously before the south entrance.

The Use of Cements.

A great number of valuable cements are in the market at the present time, and nearly all of them are built pretty much upon the same plan, and instructions for their use must be much alike. The first thing to look after is the manner in which the cement is applied, for the best kind is valueless if wrongly applied. First, the cement should be brought into close contact with the surfaces to be united. This is usually effected by heating the cement. In case, however, that a solution is used, the cement should be well rubbed into the surfaces by rubbing the parts together when their shape admits of it, or by rubbing in the cement with a brush when the surfaces are irregular, as is the case when glass or earthenware is to be mended.

The same rule, says the *Northwestern Mechanic*, holds good with cement as with glue—that is, to get as little cement as possible into the joint. In order to do this, the cement should be either as thin as possible or the surfaces should be heated to liquefy the cement, and then pressed closely and firmly together and held in that position until the cement has hardened. With articles of glass, porcelain or earthenware, this can be done by winding the parts with string, and trusting to the elasticity of the binding material to do the necessary clamping. With wooden articles, clamping should be resorted to, or the work may be placed under heavy weights until the cement becomes hardened.

TIME TO HARDEN.

A certain amount of time must be allowed for all cements to harden, and the time varies with the nature of the cement used. For instance, if an oil cement is used, a great deal of time will be necessary, but if one that is liquefied by heat is used, the object will be ready for use as soon as the joint becomes cold. There is, however, the objection to such cements that they are liable to come apart when the finished job is again exposed to heat. On the other hand, the cements composed of oils and metals, like white or red lead and boiled oil, become hardened by oxidization and cannot again be softened by any usual means. A great deal of time is needed for such cements to set; but once this is thoroughly done, they will stand almost any climate or treatment. Copal varnish or ordinary shellac make excellent cements, but require from two to six days to set thoroughly.

Marine glue sets in one hour, but common glue requires from three to 24 hours to become secure. The oil cements require two or three years to set. The best cement of this kind is composed of pure white lead ground in linseed oil varnish and kept from the air in close-stopped bottles or packages. A fine cement for stone work is made of equal parts of rosin, yellow wax and venetian red, mixed up together while in a melted condition. A cement for wet places, like aquariums, is made of litharge, fine white sand and plaster of paris (calcined plaster), each one part, and rosin one-third part. The ingredients should be thoroughly mixed and made into a paste with boiled linseed oil to which a drier has been added. It should then be thoroughly mixed by beating, and allowed to stand four or five hours before being used. It should not stand much longer than this, as the cement becomes worthless after it has been mixed 12 or 15 hours. Glass may be cemented to wood or metal with this preparation, and it will resist the action of both fresh and salt water.

FASTENING GLASS TO BRASS.

For fastening glass to brass, especially for dry work, such as electrical apparatus, it is better to use a cement made of rosin, 5 ounces; beeswax, 1 ounce; red ocher or venetian red in powder, 1 ounce. Dry each thoroughly on a stove at 212°, melt wax and rosin together, and slowly stir in the powder. Stir until cold, so that the earthy matter need not settle; then use in the same manner as sealing wax is used. A good cement of Chinese origin, and one that is water proof, is made of three parts fresh beaten blood, four parts slaked lime, and a little alum. Mix into a thin pasty mass that can be used immediately. Two or at the most three coats of this substance will render almost any kind of cloth water proof. The mixture should be applied with a brush in the same manner as paint is put on.

Another "china" cement, but for china, instead of from China, consists of 10 ounces curd of milk, dried and powdered; quicklime, 1 ounce; and camphor, 2 drams. The ingredients are to be mixed and kept well air tight. When used, a portion is to be mixed with a little water into a paste. A good substance for making both air and water tight the leaks in water casks and cisterns consists of eight parts of melted glue and four parts of linseed oil boiled into a varnish with litharge. This cement will harden in about 48 hours.

CEMENTING CASTINGS.

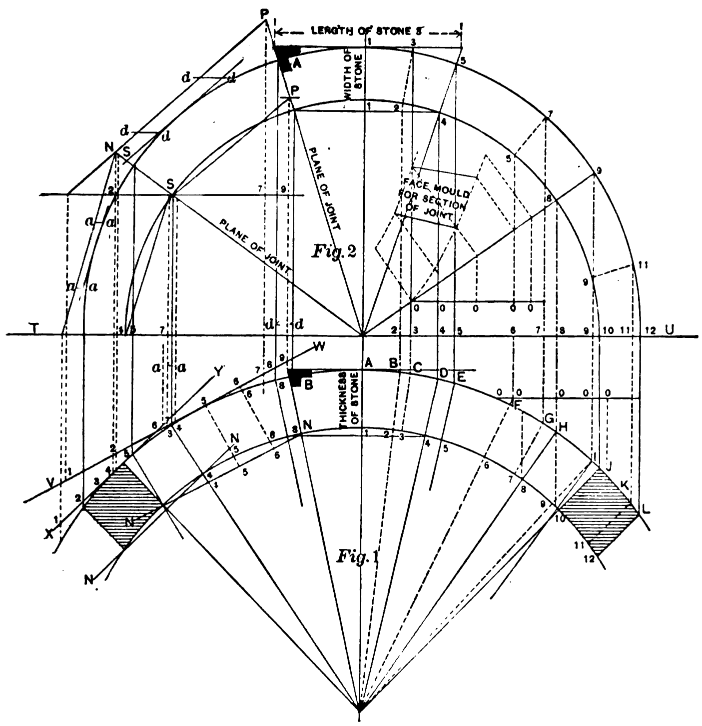
Sometimes holes are found in castings that if filled would prevent the making of a new casting. A cement to do this is made of sal ammoniac, 2 parts; sulphur, 1 part; iron filings, 80 parts, made into a paste with water and jammed into the holes. If the joint is not required for immediate use, it can be made more durable by using sal ammoniac, 2 parts; sulphur, 1 part, and iron filings or turnings 200 parts. The latter kind requires a much greater time in which to set. Holes in thin iron (sheet) may be mended with an ordinary soldering iron, by making up a mixture of hydraulic cement and oil. This makes an incombustible and water-proof covering that lasts a long time without needing to be renewed.

Leather belting is sometimes cemented with ordinary glue, but it is much better to mix one-half "isinglass," or fish glue; then the joint is stronger and more water proof for so doing. If, however, leather is to be fastened to iron or steel, 1 quart of glue may be dissolved in 1 quart of vinegar, to which has been added 1 ounce of venice turpentine, and boiled or simmered for ten or twelve hours; or equal parts of common and fish glue may be soaked ten hours in cold water, then boiled, and tannin added until the mixture becomes "ropy." Apply when warm, and clamp the parts together until set. Still another way is to steep the leather in an infusion of nutgall, then spread a layer of glue on surface of metal, and clamp together for a few hours until dry enough to stay in place, then let the job stay idle a few hours more before putting to work. The flesh side of the leather should in this case be put to the iron.

A MANUAL TRAINING HIGH SCHOOL has recently been completed in Providence, R. I., at a cost of $70,000, the building being four stories and basement in hight. The workshops, as well as the engine and boiler, are in the basement. The entire structure will be heated by the Sturtevant system, while power will be furnished by a 60 horse-power horizontal Corliss engine. The pupils will be arranged into divisions of 25 scholars each, thus conducing to both convenience and effectiveness in work. The plan of the school "is to train the brain, hand and eye together, to make a well-rounded man of the pupil, to develop his taste and to so train him that he may discover his bent and apply his talent in the right direction." The course includes both free hand and mechanical drawing, wood working, pattern making, blacksmithing, machine shop work, wood carving, wood turning and carpentry.

CIRCLE ON CIRCLE.

IN A RECENT ISSUE of one of our English contemporaries we find an interesting article by W. G. Wood, of Victoria, Australia, on the subject of "Circle on Circle Stone Arch." The theory of his communication is answering a question which a correspondent of that paper had presented. What he submits is a method of working stones for arches of set up a line to cut level line through plane of joint at S. Draw S 5. On outside draw *a a* parallel and make *a a*, *a a* equal *a a*, seen at Fig. 1. Make 1 2 3 4 5 6 7 on X Y, Fig. 3, equal 1 2 3 4 5 6 7 on X Y, Fig. 1. Make 4 S and 7 S equal 4 S and 7 S, Fig. 2. Draw S S and 1 S, and 5 S. For top and bottom of stones, square up from 6; draw C C parallel to S for joint P P is got in same way. In working keep straight edge in the direction of 4 S, on inside and out, at Fig. 3; and 7 P, Fig. 4. Fig. 5 shows falling molds. Make B C D E F, &c., equal same letters, Fig. 1, and 1 2 3 4, &c., equal same figures, Fig. 1; and make hights equal hights, Fig. 2. These molds are to mark around, inside and out, after the inside and outside have been worked. Bevel A is down cut for crown stone; bevel B, cross cut crown stone; C, cross cut; D, down cut for top end of stones 1 and 5; E, side cut, bottom end of stones 1 and 5; F, side cut; G, cross cut bottom end of stones 2 and 4; H, cross cut; I, side cut for top ends of stones 2 and 4. Fig. 6 shows how the center should be made. The best way is to draw the plan on floor; then on outside



Figs. 1 and 2.—Plan and Elevation.

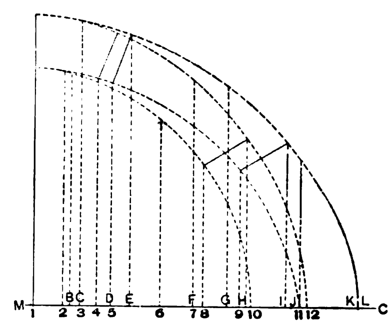


Fig. 5.—Showing Falling Molds.

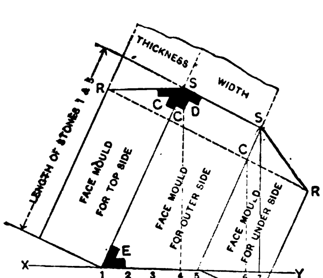


Fig. 3.—Diagram for Working Stones 1 and 5.

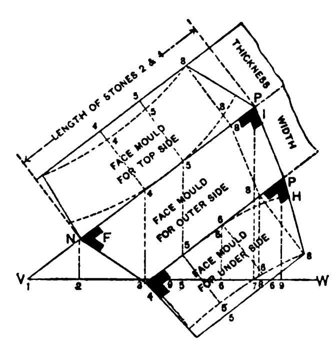


Fig. 4.—Diagram for Working Stones 2 and 4.

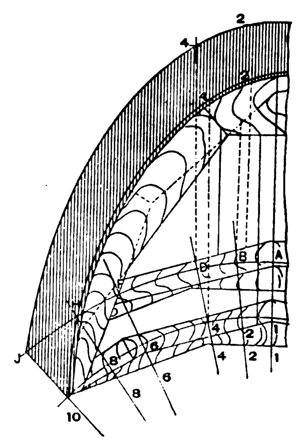


Fig. 6.—Showing How Center Should be Made.

Circle on Circle.—Diagrams Showing Method of Constructing Stone Arch in Circular Wall.

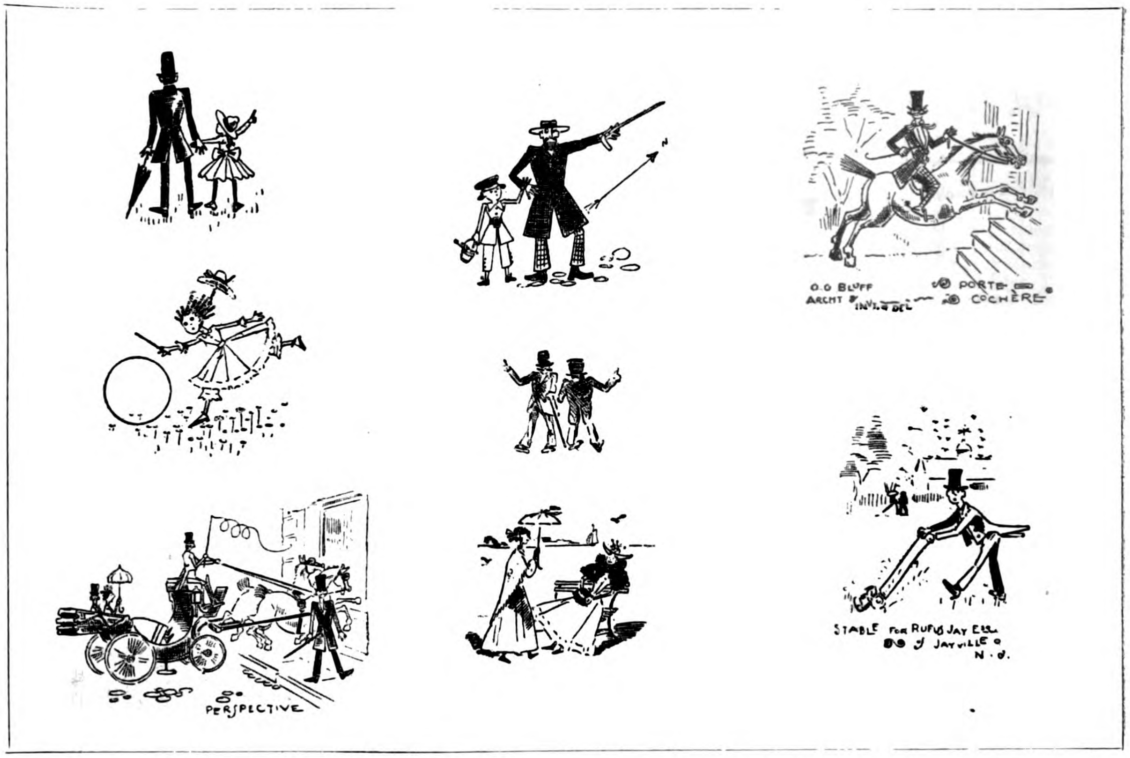
double curvature. We present herewith a reproduction of the drawings and the following explanation from the source named: Fig. 1 shows the plan, and Fig. 2 the elevation. Divide the inside circle at Fig. 2 into as many parts as there are stones, say five. Draw plane of joints, and from top and bottom of joints on the two circles, Fig. 2, square down lines to cut outer circle, Fig. 1; draw bottom joint line to center and top parallel to it. At Fig. 1 draw lines N N, and the lines X Y and Y W parallel to them. For stones 1 and 5, at 7, on X Y, S; make C R equal width between X Y and N N, Fig. 1. For stones 2 and 4 make 7 P equal 7 P, Fig. 2, 9 P equal 9 P, and 2 N equal 2 N, Fig. 2. Face molds for top and bottom of stones 2 and 4 are seen by dotted lines. Square up from 5, 6 and 8, and make 4 4 4, 5 5 5, &c., equal same figures, Fig. 1. The molds for Fig. 3 are got in the same way. In working stones get them to shape first, as shown at Figs. 3 and 4; then mark molds on top and underside, and on joint with face mold, seen at Fig. 2, mark face mold for joint. Face mold curve make A B D F H J equal A B D F H J at Fig. 1, and draw radial lines to center. Having this marked on floor, build center. The top of center over these radial lines must be level, and the lagging must be put on and in same direction as radial lines. The hight over radial line B 2 will equal 2 2, Fig. 2, and over D 4 equal 4 4, Fig. 2; and F 6 equals 6 6, Fig. 2. Any number of radial lines can be drawn. The stones, when shaped, will want to be reduced slightly in length to allow for joint, as they will be close jointed.

EMBELLISHMENTS OF ARCHITECTS' DRAWINGS.

THIS IS THE AGE of specialists. The all-round man has disappeared, and it is more than ever true that a jack-of-all-trades is good at none. To succeed, a man must particularize—he must confine himself to the one thing of his choice, and persevere. The drafting room presents no exceptions to the rule. The man who makes elevations is seldom good at perspective. The engineer is seldom a designer. The designer is not always good at details. The constructor is frequently deficient in designing, and so we might go through a long list. Many architects arrange their office help so that they have at call specialists of various kinds. One is an adept at perspective, another does trees, foliage and other features of landscape, a third takes charge of elevations and plans, and a fourth gives attention to details and features of construction. When the drawings of a building leave an office of this kind it is to be expected that they are not only complete in all essential features, but that they are also artistically good in the little embellishments which go to make them presentable to the general public. Offices of other architects, not so well equipped, and perhaps presided over by men not so æsthetically careful as to minor points, send out drawings less satisfactorily finished. Among them we find woefully drawn perspectives, actual monstrosities in trees and landscapes, impossible fountains and pavements which break every rule of perspective and construction; and yet in planning, in details and in elevations these houses are frequently very good, indeed, and when completed they show their authors to be experts in design and construction. The drawings were correct mechanically, but were deficient in matters of embellishment and finish.

If there is any one thing over which the architect stumbles more frequently than any other, it is the representation of life about his building. His figure drawings are frequently something less than works of art. There is the awful woman sitting on the porch, the sorrowful man propelling a lawn mower and the crazy child trundling a hoop. Sometimes the malady manifests itself in animals, and we have even seen it in the form of birds soaring high in the air, as though gazing in amazement at the creation of the architect. The weakness of architects in life sketches has afforded William Barclay Dunham an inspiration for some verses, and an artist the suggestion of some sketches, which we reproduce herewith from a recent issue of *Puck*. The poet sings of "The Architect's Man" as follows:

You have read of the African small,
  Whom Stanley discovered one year.
You have heard of the Patagons tall,
  Whom slave-catching traders all fear;
Then the Icelander, greasy and fat,
  And the people who live in Thibet;
The races we cannot get at
  In Mexican islands as yet.
You're familiar with heathen Chinese,
  And Turks are not new to you now.
You can see all the Indians you please,
  And "Bushmen," if you but know how.
But defiance I valiantly fling!
  You can't find by ethnology's laws
The man that I purpose to sing—
  Viz., the man whom the architect draws.
He is seen near the edge of a "plan,"
  Made, heaven alone can tell how.
He belongs not to fossilized man,
  For he wears clothes, as we wear them now.
He has never of motion a trace;
  He appears to be carved out of stone.
He possesses the funniest face,
  And he always is standing alone.
Not mentioned in history, you find
  Philologists know not his speech.
The earth hoards no trace of his kind,
  His past no professor can teach.
So baffled, we gaze, and aghast,
  Confess that our knowledge has flaws.
Still we trust that we may place at last
  The man whom the architect draws.



Sketches Illustrating Embellishments of Architects' Drawings.

Removing Paint.

The ordinary process of scraping old paint, or burning it off, is hardly expeditious enough for general purposes, and is also laborious. Soda and quicklime are far more thorough, says an exchange, and the paint is more quickly removed. The solution of half soda and half quicklime is thus made: The soda is dissolved in water, the lime is then added, and the solution can be applied with a brush to the old paint. A few minutes is sufficient to remove the coats of paint, which may be washed off with hot water. Many preparations are sold for the removal of paint, all of them having some basis of alkali. A paste of potash and strong lime is far more effectual in operation, and the oldest paint can be removed by it. Afterward a coating of vinegar or acid should be used to cleanse the surface before repainting. One authority on the subject recommends the gasoline lamp, a quart of oil being sufficient to last $3\frac{1}{2}$ hours. The method is considered superior to gas, as the flame is stonger and the cost less, besides which the lamp can be carried to any part, which cannot be done conveniently with a gas jet. For removing varnish, spirits of ammonia is used, but it is a slow process, and several applications are necessary. Scraping and sandpapering can be employed; but it must be done carefully, by experienced hands, or the surface of the wood will be injured. The chemical process of removal has the advantage of leaving the surface in a better condition than burning off or scraping, and for large surfaces of paint work is to be preferred.

BAMBOO CONSTRUCTION.

ONE OF THE MATERIALS largely employed in the manufacture of numerous useful and ornamental household articles, such as tables, screens, brackets, easels, frames, &c., is bamboo, and any mechanic who is handy with his tools, and possessing a little taste, is in a position to produce almost any number of articles for the decoration of a dwelling, or for use in its various apartments. The articles may be formed by joining horizontal or diagonal rails to uprights, the joints being made, according to a writer in a foreign exchange, from which these particulars and the accompanying engravings are taken, in the following manner: Hollow the end of the horizontal rail till it fits the upright, after which fill the hole in the end with a plug of dry wood, gluing it in. The next step is to glue the joint and fix the pieces together with a fine screw. In Fig. 1 of the illustrations is shown a joint made in accordance with the directions given above, the dotted lines indicating the plug. When the horizontal rails pass beyond the vertical uprights, a dowel may be made to fit the ends of the horizontal rails, which is passed through holes bored in the uprights. The ends are hollowed and the joints glued as before. A small wire nail may be driven through the ends of the dowel, if desired, but this is unnecessary if the dowel is well fitted. Fig. 2 of the engravings represents a joint of this description, while Fig. 3 shows a method of joining employed for margins of screens, &c., where two rails are fixed about 3 inches apart by means of small uprights, holes being bored in the horizontal rails and the cross pieces glued in. In doing this work, care should be taken to keep the rails parallel with each other, and also with the uprights. Another method of joining is illustrated in Fig. 4, where the smaller pieces are slightly reduced at the ends and glued into holes bored in the larger pieces. In Fig. 5 is represented a stool, the top of which is made of wood, and painted with a decorative design. The projecting ends of the stays underneath are covered with circular disks of wood stained the color of the bamboo, and then polished. What is known as a "Canterbury," for holding music, is shown in general view in Fig. 6. The top and the panels at the sides are covered with strong mill board, which in turn is covered with Japanese leather paper or paintings. The legs, it will be noticed, are curved outward. This may be done by heating the bamboo over the flame of a bunsen burner or spirit lamp. The bamboo should be kept moving until properly heated, and then bent round a curved block fixed around a bench with a stop behind. When cold the bamboo will remain curved. The bottom ends of the feet should be plugged to prevent dust and dirt from entering. In Fig. 7 is illustrated a newspaper rack, which is made in a manner similar to that described above.

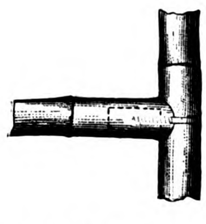


Fig. 1.—One Form of Joint.

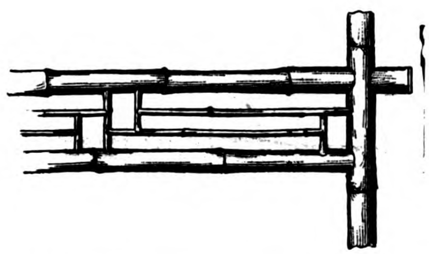


Fig. 4.—Another Method of Joining Parallel Rails to Uprights.

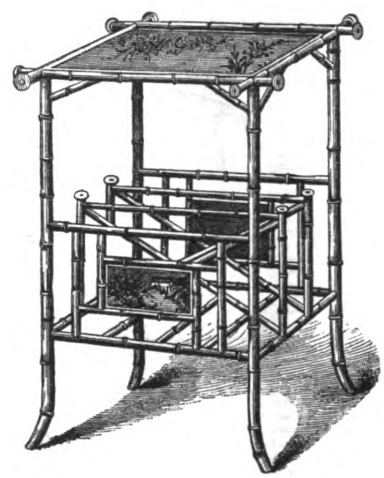


Fig. 6.—A Music Holder and Table.

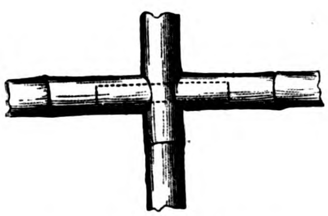


Fig. 2.—Another Form of Joint.

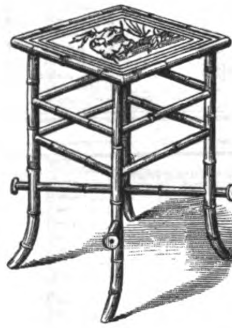


Fig. 5.—Stool Made of Bamboo.

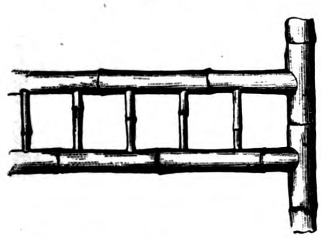


Fig. 3.—Two Rails Joining Uprights

Fig. 7.—Newspaper Rack.

Bamboo Construction.

SPEAKING OF MASONRY laid in very cold weather, the *Deutsche Bauzeitung* says that at Christiana, in Norway, building operations are successfully carried on at temperatures as low as 2° F., and that the work executed under these conditions compares favorably with summer heat. In fact, the Christiana builders maintain that it is superior. The secret of successful work under these conditions is said to be in the use of unslacked lime and in mixing the mortar in small quantities at a time, being made up immediately before use. The mortar must be put in place before it loses the heat due to the slacking of the lime. The lower the temperature the larger the quantity of lime required, so that below 12° F. the work cannot be carried on profitably.

Tools of the Pyramid Builders.

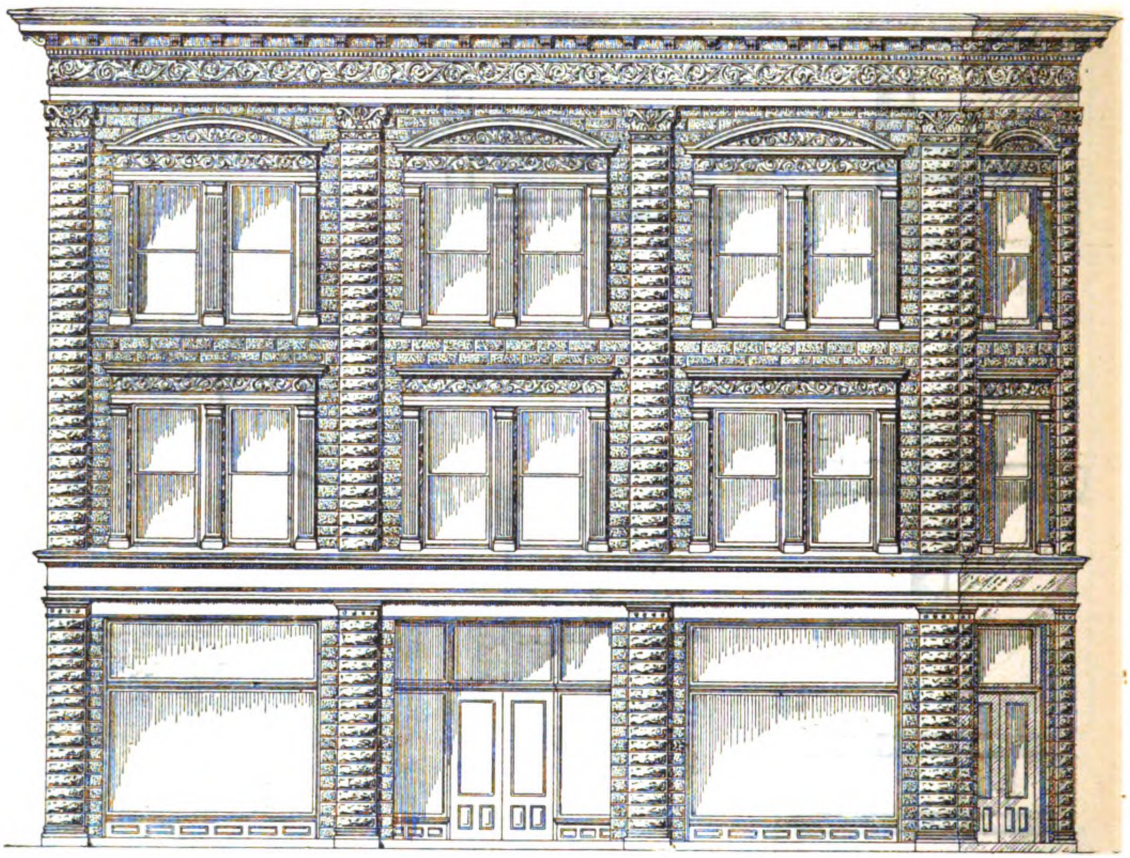
A two years' study at Gizeh has convinced Flinders Petrie, says an exchange, that the Egyptian stone-workers of 4000 years ago had a surprising acquaintance with what had been considered modern tools. Among the many tools used by the pyramid builders were both solid and tubular drills and straight and circular saws. The drills, like those of to-day, were set with jewels (probably corundum, as the diamond was very scarce) and even lathe tools had such cutting edges. So remarkable was the quality of the tubular drils and the skill of the workmen that the cutting marks in hard granite give no indication of wear of the tool, while a cut of $\frac{1}{10}$ of an inch was made in the hardest rock at each revolution, and a hole through both the hardest and softest material was bored perfectly smooth and uniform throughout. Of the material and method of making the tools nothing is known.

SHEET-METAL HOUSE FRONTS.

IMPROVED construction in sheet-metal house fronts is the subj ct of certain patents recently granted to C. D. Pruden, manager of the St. Paul Roofing & Cornice Works, St Paul, Minn. Various features of the work referred to, together with an illustration of one of the buildings to which it has been applied, are shown in the accompanying engravings. The construction named has been before the public for only a few months past, but has become so popular in that time that numerous large contracts have been made for it, and the establishment has been very busy in preparing the material. A glance at the elevation of the building here shown, Fig. 1, will indicate that the surface of sheet metal is indicated in the details presented herewith, is the back plastering that is employed, an additional improvement and one made by P. A. Deslauriers, one of the proprietors of the establishment named. Back plastering gives a character and stability to the work not to be obtained by any other plan.

The sheet metal work here illustrated, we are informed by the manufacturers, may be made of any suitable material, and in the work already put up copper as well as galvanized iron has been extensively employed, the former giving a character and quality to the building not to be obtained where cheaper and less satisfactory material is used. The manner of erecting groove at the lower edge to receive the upper edge of the next lower course. The side casing of the pilasters also have similar grooves for receiving the metal plates, as shown in the details. When erected on wrought-iron construction this work can also be put in position, commencing at the top and working down, as indicated by the details. Figs. 2, 3 and 4 show the manner of fastening plates to the wrought-iron frame.

The back plastering feature already referred to and shown in two forms herewith is highly commended by those who are familiar with this work, inasmuch as it overcomes a difficulty heretofore considered insurmountable—namely, that of

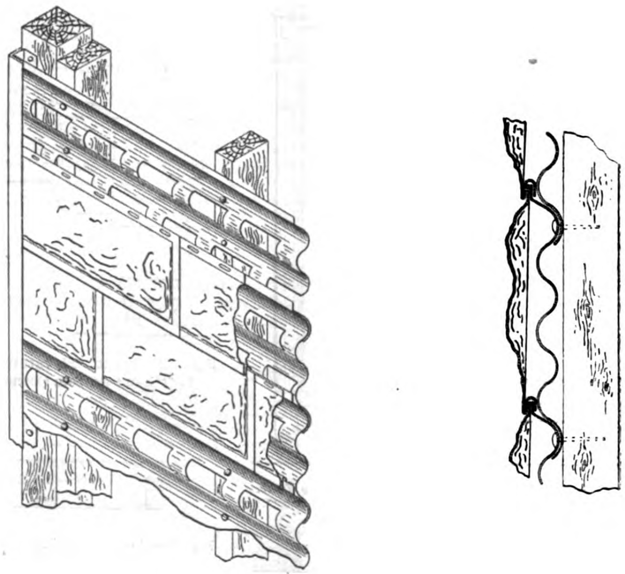


Sheet-Metal House Fronts.—Fig. 1.—Business Block Finished with Rock-Faced Steel Siding Plates.

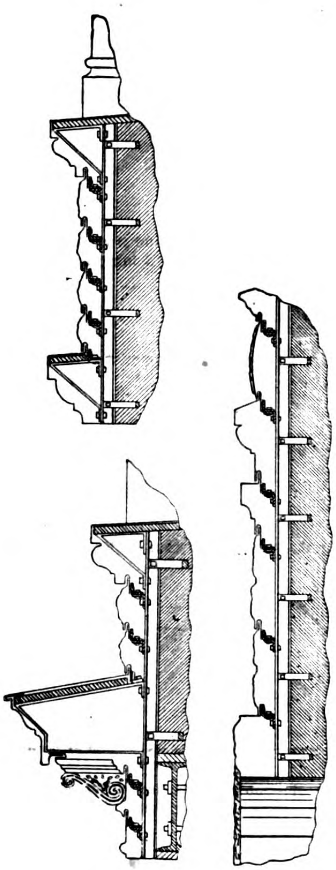
so struck up as to be rock faced. When in position the work in many respects resembles rough masonry. The object of the rock face, or the uneven surface of the plates, we are informed, however, is not simply to imitate stone, but rather to put the metal in such form that it will be pleasing to the eye and less liable to damage in use. A leading feature of the construction is a slip joint, clearly shown in several of the details presented herewith, which provides for expansion and contraction, that peculiar action of metal under changes of temperature which must always be taken into consideration whatever the construction may be. The slip joint is so arranged that no nails are exposed and the construction is such that no soldering is necessary to make the work water tight. Another feature of the construction, also these fronts is novel, as well as the general design. The construction is such that in putting up, the work is commenced at the top and proceeds downwardly, the water-tight joints already referred to being made as it goes along. In putting up this work on an average building the following course would be pursued: The modillion course of the cornice is first placed in position, the outer edge of the planceer being provided with a groove or slip joint to receive the crown molding. Next the pilaster casings are put in place and afterward the pressed scroll frieze. The upper edge of the latter is slipped into the groove in the modillion molding, which holds the upper edge of the frieze in position while it is nailed on the lower edge. In the same way the work proceeds downwardly, course by course, each molding or course of rock faced work having its making a sheet metal front solid and warm and at the same time fire resisting. In one form of this construction, Fig 7, the metal plates are put on double diagonal lathing and are then plastered from the inside with cement mortar, the space between the lath being large enough to easily force the mortar through and against the face of the plates, thus making them solid at a minimum cost. After this the inside lathing is put on and plaster applied in a way to leave a dead air space between the two walls. This successfully prevents frost and cold, and the metal facing is sufficient to prevent the plastering from absorbing dampness from the atmosphere. Where strictly fire proof construction is desired metal lath are employed, as shown in the details, Figs. 5 and 6, presented herewith, the latter being applied either to wood or iron studding. Metal laths are preferably put on in sheets the same width as the rock-faced plates to be used. The upper edge of each sheet projects and to this the upper edge of the plate is fastened, as shown in the details.

The care with which the galvanized plates used in this finish are manufactured is a feature to which the St. Paul Roofing & Cornice Works direct special attention. We are informed that they are the best quality of steel, that they are first stamped or pressed, next trimmed to the proper sizes, and all edges bent in proper form, and then finally they are galvanized. The result is that there are no raw edges left to rust and no galvanizing to crack and peel off by bending. Each plate is perfectly galvanized and consequently has a lease of life far in excess of the ordinary galvanized iron work of the day. When galvanized material is used the work, after in place, is painted. When copper is used, of course no paint is necessary. The makers direct attention to the ease with which this construction adapts itself to special sizes and places and the convenience with which minor adjustments are made. The St. Paul Roofing & Cornice Works have issued a very handsome catalogue, from which some of the cuts used herewith are taken.

THE DEVELOPMENT of a system of pile foundations, especially suited to the peculiar conditions met with in Chicago, was the subject not long since of a lecture by Gen. William Sooy Smith, of the American Society of Civil Engineers. It was of interest to learn from the daily press of Chicago that General Smith's plans are being followed in preparing the foundations for the new public library building to be erected in Dearborn Park. At the site of the building the clay stratum is said to be 50 feet deep. Trenches 15 feet deep are dug, in which the piles are driven to bed rock. The piles will be sawed off 12 feet below city datum, and the transverse rows will be capped with timber. The spaces between the tops of the piles and between the caps will be filled with hydraulic cement concrete for a depth of 3 feet below the top of the caps. A course of 12 x 12 inch timbers, laid longitudinally, will form a platform on which rubble masonry or concrete walls will be built. The estimated weight of the building is 23 to 25 tons per linear foot of the walls.



Figs. 5 and 6.—Details of Back Plastering Construction on Metallic Lath



Figs. 2, 3 and 4.—Details of Work put up on Wrought Iron.

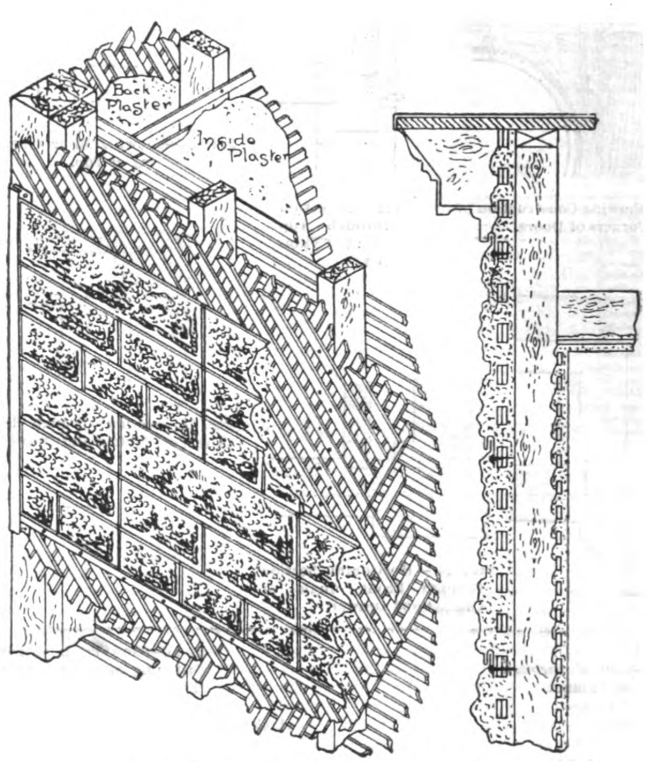


Fig. 7.—Details of Back Plastering, Using Wood Lath.

Sheet-Metal House Fronts.—Details of Construction.

A CONVENIENT CABINET.

THE MECHANIC who is handy with carpenter's tools very often finds time during the year to turn his hand to the making of articles of household use, either in the way of furniture or bric-à-brac, provided he has a few suggestions as to design and construction. What we present in the accompanying illustrations is a suggestion for a cabinet, while the description contains sufficient particulars to render the manner in which the work is done readily understood. In Fig. 1 is represented a front elevation of the article, drawn to a scale of 1½ inches to the foot. This cabinet is constructed with four angle posts, which when finished measure 1¾ inches square. These are held together near the bottom by means of four supports, framed in between the posts. The internal angles formed by the supports are strengthened by wrought-iron angle straps ¾ inch in size attached to the supports with screws. The front support is 2¼ inches deep and 1⅜ inches wide, being cut in the form indicated in Fig. 2 of the illustrations, which represents a front elevation of the left-hand bottom corner of the cabinet. It will be observed that this sketch is drawn to a scale of 6 inches to the foot, or one-half full size, as are the majority of the details presented in this connection. The front angle posts are ornamentally turned, and the rear ones may be so treated or left plain, according to taste. In Fig. 3 of the sketches is shown a section through the lower portion of the front. The bottom of the cabinet is made of 1-inch stuff, wrought on the upper surface and at the edges. The front molding shown in the cut is tongued to the front edge of the bottom, thus forming a rebate, into which the bottom rails of the glazed doors shut. The molding rests upon the front support and is attached to it by means of screws. The bottom of the cabinet rests upon all four supports, but it is screwed down to the side ones as indicated in Fig

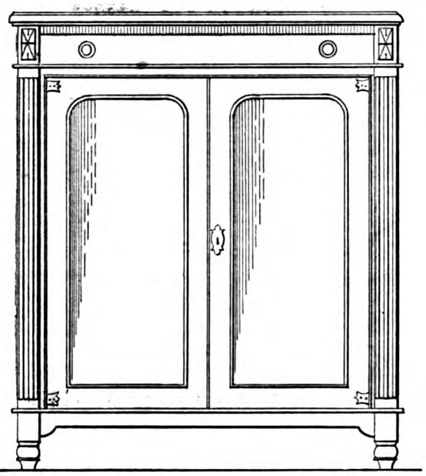


Fig. 1.—Front Elevation.—Scale, 1½ Inches to the Foot.

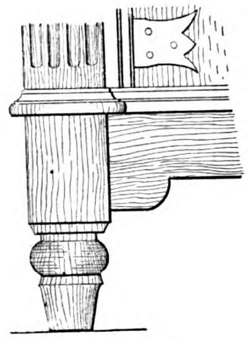


Fig. 2.—Front Elevation of Left-hand Bottom Corner.

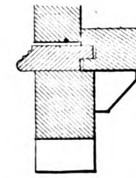


Fig. 3.—Section through Lower Part of Front.

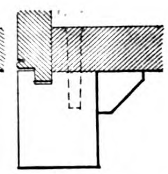


Fig. 4.—Section through Lower Portion of Side of the Cabinet.

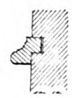


Fig. 6.—Section Showing Manner of Putting on the Molding.

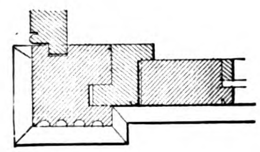


Fig. 5.—Plan View of a Front Angle of the Cabinet.

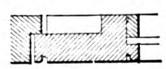


Fig. 7.—Plan of Meeting Stiles of Doors.

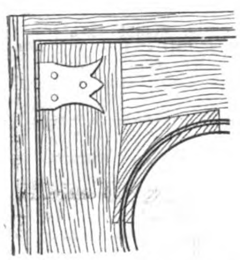


Fig. 8.—Showing Construction of Corners of Doors.

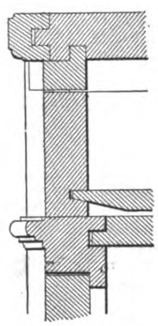


Fig. 9.—Section through Top Front of Cabinet.

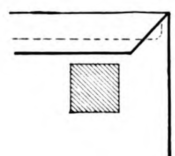


Fig. 10.—Showing Miter Clamping at Top.

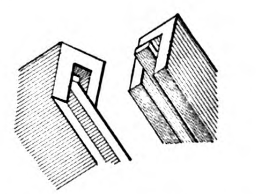


Fig. 11.—Cutting Grooves and Mortises, Portions of the Top and Clamp Being Shown in Perspective.

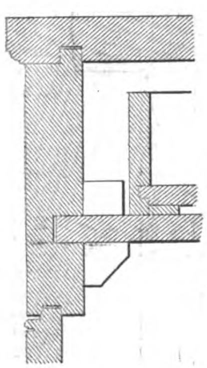


Fig. 12.—Section through Side of Cabinet.

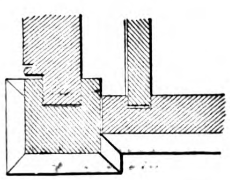


Fig. 13.—Horizontal Section through Front Angle of Cabinet and Drawer.

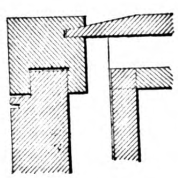


Fig. 14.—Section through Rear Angle of Cabinet and Drawer.

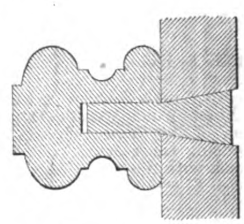


Fig. 16.—Full Size Section of Knob, Showing Manner of Fastening.

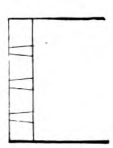


Fig. 15.—Showing Dovetails Fastening Sides and Back of Cabinet.

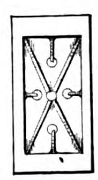


Fig. 17.—Showing Ornamentation of Front Angle Posts.

A Convenient Cabinet, with Details.

4 of the engravings, which represents a section through the lower portion of the side of the cabinet. The sides are formed with bead-flush paneling ⅝ inch thick, tongued to the angle posts and side supports. In Fig. 5 is shown a plan of one front angle of the cabinet. The front molding shown in section in Fig. 3 is continued around the angle post, returning upon the latter at the side. Fig. 6 is a sectional view showing the manner of putting on the molding. The glazed doors, which finish ⅞ inch thick, are hung in a rebated frame tongued to the front angle posts, the glass being fixed in place by means of a bead on the inside of each door. Fig. 7 represents a plan of the meeting-stiles of these doors, the position of the lock being indicated. The quadrant corners to the doors are made with specially shaped pieces let in as shown in Fig. 8. The head of the frame in which the doors are hung has a projecting molding in front as shown in Fig. 9, which represents a section through the front of the cabinet at the top. The molding formed in the solid in this section is mitered around the angle post and returned in a similar manner to that shown in Fig. 5. The top of the cupboard, which finishes ⅞ inch thick, is tongued to the head of the frame of the doors. Upon this top rests a drawer, the front of which is ⅞ inch and the bottom ½ inch thick, the latter being tongued into the front, sides and end. The top of the cabinet is 1 inch thick and has a front fillet tongued into it of the same thickness as the front of the drawer and flush with the latter when closed. Upon the front fillet are glued small wood dentils, which are also glued to the projecting portion of the top. These are ⅝ inch deep, ⅝ inch wide and about $\frac{5}{16}$ inch apart. The front edge of the top of the cabinet has a molded piece clamped on as shown in Fig. 10, where the dotted lines indicate the mortises. The method of cutting the grooves and mortises is shown in Fig. 11, which represents a portion of the top and clamp in perspective. The angle posts are mortised into the underside of the top with 1 inch square tenons ⅝ inch deep. The front angle posts have their tenons at the inner corners, as indicated by the hatched square in Fig. 10, so as to keep them from the clamped front edge of the top.

A section through the side of the cabinet showing the top rail of the side paneling tongued to the underside of the top is represented in Fig. 12 of the illustrations. The top rail is 1½ inches thick, so as to afford a good housing for the top of the cupboard below, upon which rests the drawer. Fillets ⅝ inch wide are glued to the bottom of the drawer close against each side, being thick enough, however, to come flush with the under edge of each side. These fillets give the drawer a greater width of surface to run upon than would be afforded by the thickness of the sides alone. There are also fillets ⅞ inch thick glued to the top of the cupboard at each side of the drawer to serve as guides. The ends of the fillets project beyond the angle posts in front so as to stop the drawer from being pushed in too far. This will be understood from Fig. 13, which represents a horizontal section through the front angle of the cabinet and drawer, while Fig. 14 represents a section through the rear angle. The back of the cabinet, which is grooved into the bottom support, as well as into the angle post and also the top, is ½ inch thick, and has the grain running horizontally, being cross-tongued where necessary. The sides and back of the drawer finish ½ inch thick, and are dovetailed at the corners, Fig. 15 showing the dovetails in elevation. These dovetails are ¾ inch from center to center, their narrowest portions being from ⅛ to $\frac{3}{16}$ inch wide, and the bevels being cut to a slope of about 1 in 8. Fig. 16 represents a full-size section of one of the turned knobs to the drawer, and indicates the manner of fastening. The two front angle posts are fluted on the face, while the simple character of the carving in their upper portions is indicated in Fig. 17 of the illustrations. The depth of the cabinet may be 2 feet or a trifle more, according to requirements. The bottom, shelves and other portions are cross-tongued where necessary.

Forms of Organization.

W. H. SAYWARD.

The secretary of the National Association of Builders is frequently in receipt of letters from builders doing business in the smaller cities of the country asking for information as to the advisability of establishing organizations in which both employers and workmen shall be members. The question is also asked, Is it advisable for members of an association of employers, or a builders' exchange, to belong to a labor union? In the few cases which have been tried of establishing associations in the building trades in which both employers and workmen are admitted to membership, the result has been unsatisfactory. These organizations have started with the very best of intentions, but when the first difference occurred between the two elements, the employers were so greatly in the minority that dissatisfaction and withdrawal generally followed. It is almost impossible to secure harmonious organization under such a form, for the two interests are almost sure to clash. The national secretary has invariably advised against it. In the smaller cities, where no builders' exchange exists, and it does not seem advisable to establish one, the most practical plan is to form associations of employers in the same branches of trade in which there are unions of workmen. A joint committee between the two organizations can be appointed to consider and dispose of all points at issue. This joint committee should consist of equal numbers from each side, and should have the power to elect an umpire to decide tie votes. The umpire should be some disinterested person of ability and standing, and should be selected as the first duty of the joint committee, in order to avoid a possible deadlock when his services are necessary to decide a tie vote. The umpire should only be called upon in case of ties, and the decision of the majority as indicated by his vote should be equally binding upon both sides. By this means each side has fair representation. The action of the sub-committee of the employers in conference with the sub-committee of the workmen, called for convenience the joint committee, would be binding upon all members of the employers' association, and *vice versa*. The fairness of such a plan is apparent to all, for the interests of both parties would be represented by an equal number from each side and justice would prevail. This plan has been recommended in every case where information on the subject has been sought from the national secretary, and wherever it has been adopted the most satisfactory results have followed. Where both the employers and workmen have recognized the fact that they can best protect their own interests and adjust questions of difference together instead of apart, and have established a committee of equal representation for that purpose at a time when the relations between them were usually harmonious, the greatest benefit has been obtained. The establishment of a joint committee at a time when no particular disturbance is agitating the building trades permits the adoption of favorable rules of operation and allows the functions of the committee to become familiar to all, and as a natural result all questions are referred to it in an amicable spirit, for the purpose of preventing the complications which would arise under other circumstances.

The question that is asked concerning the advisability of a member of an employers' association belonging to a workmen's union has always been answered in the negative. It does not seem wise for an employer to belong to a union of workmen, for the reasons cited in the foregoing. In most cases it is a bid for favor by the workmen, and the accomplishment of good for either employer or workmen is not facilitated by such individual or single-handed action as could be taken by such a membership. What is needed is full representation on both sides, in order that the welfare of the whole may be considered rather than that of the individual.

Protection of Piles.

Some recent experiences of William Kennish, engineer, at Wilmington, N. C., with regard to the treatment of piles that are to be driven in waters infested by the teredo or limnoria, have led him to emphasize his reasons for charring the piles before treating them with creosote. Previous experience had demonstrated that an armor of charcoal would repel boring insects by offering them no nutriment, and that the surface being more permeable would more readily absorb the antiseptic fluid. "Lately," he says in a communication to the *Engineering News* "having to shorten some piles that had been treated without charring, it was discovered that the transverse sections sometimes exhibited wedge-shaped portions extending from the center to the outside which had not received the antiseptic fluid. An examination to discover the cause of this failure demonstrated that pieces of the thin interior epidermis, which had escaped the axes when the pile was stripped of its bark, had prevented the passage of the oil to the outside of these untreated sections; it was also shown that the creosote when injected from the side of the log pursues the lines of the medullary rays toward the pith, and that there is no passage of the fluid across them. Thus the sections shielded by the inner skin of the bark which had not been removed in peeling had been entirely deprived of oil. It is self evident that if these piles had been charred this evil would have been removed.

"The cost of charring is so slight and the advantage is so great that I would strongly advise engineers to specify that piles for marine waters shall always be charred. If only that portion of the pile which comes in contact with the water be charred, omitting that which is driven into the bottom, the advantage is additional in the respect that the part exposed to attack receives a greater portion of the preservative."

Charring alone seems to be of little value, as experiment with submerged logs, one charred and the other both charred and creosoted, shows that the teredo had bored through the charcoal and eaten the wood, while the log treated with creosote was untouched.

A NEW SAW for lumber is described as an upright instrument, thin like a band saw, and having direct steam attachment. At each end is a steam cylinder, which has but a single steam port. The upper piston head draws up the saw and the lower piston, while the lower piston draws the saw and the upper piston down, each piston drawing the saw, but neither of them pushing it. This, it is claimed, causes the saw at all times to be rigid, permitting the use of a very thin one if desired. Below the lower cylinder is a pair of heavy balance wheels, for the purpose of giving a steady as well as uniform motion to the saw; and to these balance wheels are connected a pair of rods, the upper ends of which connect with a knuckle joint at the lower end of the saw, thus throwing the lower end of the saw out as it is going up and against the log as it is coming down. The log carriage is operated by the same engine that runs the saw.

THE BUILDERS' GUIDE.*

By I. P. HICKS.

Complicated Roof Framing Made Easy.

(Continued)

REFERRING now to Fig. 66, A B is the run of common rafter on the left side of the hip, B E the rise of roof and A E the length of common rafter for the long run. A bevel set in the angle at E will be the plumb cut or down bevel at the top, and a bevel set at A will give the bottom cut fitting the plate. Next set off the run of common rafter on the right side of the hip, B C, and connect E with C for the length of the common rafter for the short run. A bevel set in the angle at E will give the down bevel at the top and at C the bottom cut. We will now proceed to find the hip rafter and bevels for cutting the same. A B is the run of the common the line A B and draw perpendicular lines joining the hip line. This will give the lengths of jacks, and a bevel set in the angle at G will give the bevel across the back of the same The plumb cut or down bevel will be the same as that of the common rafter on the short run. F D shows the length of ridge and the space which the common rafters occupy. C E D shows a space for jacks similar to A B F. It is unnecessary to draw the jacks in this space, and it is therefore left blank. The next step will be to find the lengths and bevels of the jacks on the end of the building having the long run of the common rafter. Referring to Fig. 68, let A C represent the width of the building, A B the run of the common rafter on short run, B F the length of com-

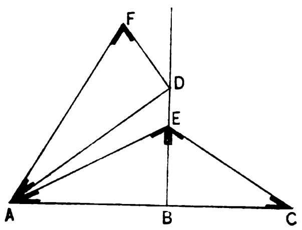


Fig. 66.—Diagram for Finding the Lengths and Bevels of Rafters for Irregular Hip Roof.

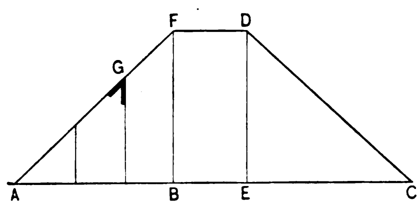


Fig. 67.—Lengths and Bevels of Jack Rafters.

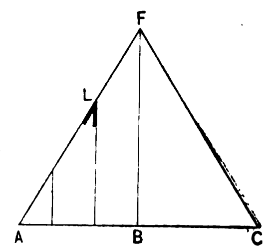


Fig. 68.—Finding Lengths and Bevels of Jack Rafters on the End of Building Having the long run of the Common Rafter.

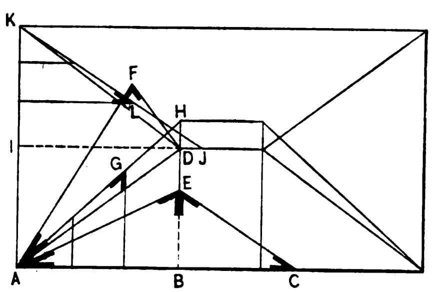


Fig. 69.—Showing how several Diagrams may be combined to indicate directly from the Plan the different Length and Cuts of all the Rafters.

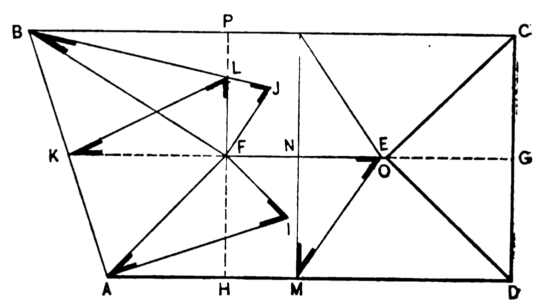


Fig. 70.—Plan of Hip Roof with One End out of Square.

The Builders' Guide.—Diagrams Illustrating Methods of Finding Lengths and Bevels of Rafters.

rafter on the left side of the hip, B D the run of common rafter on right side of hip, while A D is the run and angle the hip makes with the plates. From D square up the rise of the roof to F; connect F with A, and we have the length of hip rafter. A bevel set in the angle at F will give the down bevel at the top and at A the bottom bevel fitting the plate.

The next step will be to show the length and bevels of the jack rafters. Referring now to Fig. 67, draw a horizontal line, as A C, representing the length of plate in the plan. From A set off the run of the common rafter on the left or long run to B. From B erect a perpendicular to F, which is the length of common rafter on the short run and shown by E C in Fig. 66. Connect F with A, and the hip line is in position for finding the lengths and bevels of the jacks on the side of the building having the short run of common rafter. Space the jacks on mon rafter on long run and the same as shown by A E in Fig. 66. Space the line A B for the jacks and draw perpendicular lines joining the hips. A bevel set in the angle at L will give the bevel across the back. The plumb cut or down bevel will be the same as that of the common rafter on the long run. Now everything desired has been shown, and without the confusion of cross-lines. By this method all complications in roof framing are made easy. And the most difficult roofs will show the superiority of this plan, as it is rarely ever necessary to cross a line, and if necessary every rafter may be shown. For roofs having hips and gables of varying pitches this plan has no equal. In Fig. 69 is shown how Figs. 66, 67 and 68 may be combined to indicate the different lengths and cuts of all the rafters directly from the plan.

This method is attended with many cross lines and is not recommended even to the most experienced, for, in connection with complicated roofs, there is

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danger of making mistakes. Referring to the plan, Fig. 69, A B is the run of the common rafter on the left side of the hip, and the long run B E is the rise, A E being the length. A bevel set at E on the line A E will give the plumb cut or down bevel, and at A the bottom bevel. B C is the run of the common rafter on the right side of the hip, and the short run, B E, the rise and E C the length. A bevel set at E, on the line A E, will give the plumb cut or down bevel, and at A the bottom bevel. B C is the run of the common rafter on the right side of the hip, and the short run, B E, the rise and E C the length. A bevel set at E, on the line C E, will give the down bevel and at C the bottom bevel. A B is the long run of the common rafter, B D the short run of the common rafter, It is shown at E on line E A.¶ In Fig. 69 all the work is shown in one diagram very plainly, yet to many it may appear somewhat complicated. Two pitches in one roof always make a complication of bevels, often requiring many lines to illustrate. As a proof of the correctness of this method observe the following point: A F, A H and J K each represent the hip rafter, showing it in different positions, and if the work is right these lines must be of the same length. A F is the position of the hip for finding the cuts, while A H is the position of the hip for finding the bevel for the back of the jack on the short run. J K is the position for finding the bevel for back of jack on the long run. Having shown the most practical system of hip roof framing, let us now consider its

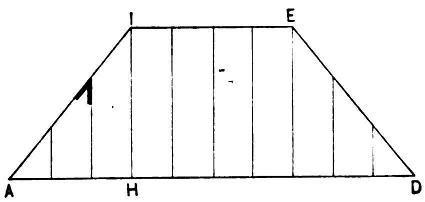


Fig. 71.—Diagram for Finding Lengths and Bevels of Jacks on Front Side of Plan.

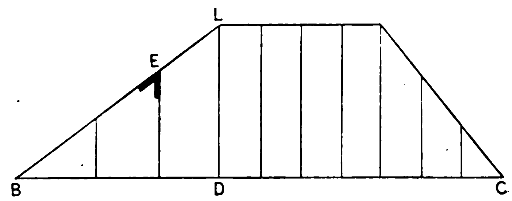


Fig. 73.—Diagram for Finding the Lengths and Bevels of the Jacks on the Rear Side of the Long Hip.

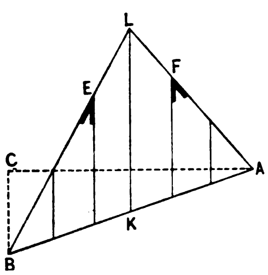


Fig. 72.- Diagram of End of Plan Out of Square.

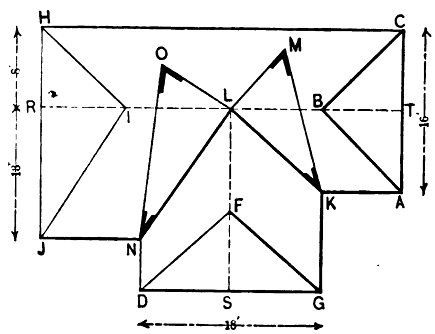


Fig. 74.—Plan of Roof having Three Gables of Varying Pitches.

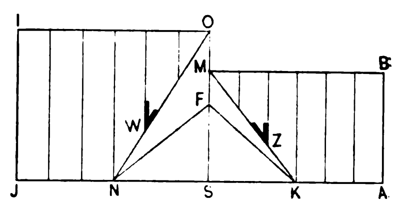


Fig. 75.—Finding Lengths and Bevels of Jack Rafters on the Front Side of Right and Left Gables Shown in Fig. 74.

The Builders' Guide.—Finding Lengths and Bevels of Rafters on Roofs of Varying Pitches.

A D the angle and run of the hip, D F the rise of the hip and A F the length of hip rafter. The bevel at F is the down bevel and at A the bottom bevel. B H is the length of the common rafter for the short run and the same as C E, while A H is the hip dropped down in position for finding lengths and bevel for jacks on the side of the roof having the short run of the common rafter. The jacks are spaced on the line A B and drawn perpendicular, joining the hip line A H. A bevel set in the angle at G will give the bevel across the back.

The plumb cut or down bevel is the same as that of the common rafter on the short run, and is shown at E on the line E. C. The letters I J represent the length of the common rafter for the long run, which is the same as A E; then J K is the length and position of the hip for finding lengths and bevel for the back of the jacks on the side having the long run of the common rafter. Space the jacks on the line I K and draw them at right angles joining the hip line K J. A bevel set in the angle at L will give the bevel across the back of the same, the down bevel being the same as that of the common rafter on the long run.

application to some of the most complicated plans which frequently come up in actual practice.

HIPS ON END OF BUILDING OUT OF SQUARE.

A plan of a hip roof with one end out of square is shown in Fig. 70. Let A B C D represent the plates in the plan; D E C the angle and run of hips on the square end of the plan, and A F B the angle and run of hips on the end which is out of square. In order to determine the point F so that the ridge of the roof will be level, make A F H equal to D E G in the plan. From F on line A F square up the rise of hip to I, which connect with A for the hip rafter. Then I is the down and A the bottom bevels. The hip rafters on the square end of the plan will be the same length as A I and will have the same bevels. From F, on the line B F, square up the rise of roof to J, which connect with B for the length of the hip on the long corner. Then J is the down and B the bottom bevel. K F is the run, F L the rise and K L the length of the common rafter on the end of plan which is out of square. L is the down bevel and K the bottom bevel. M N O shows the rise, run and length of the common rafter on the main plan, O being the down bevel and M the bottom bevel.

To avoid the great confusion of cross lines which would now follow if the work was further developed in Fig. 70, we will dispense with this plan, only taking from it measurements to develop the new lines and bevels of the rafters. Referring now to Fig. 71, let A D represent the plate, A H the run of the common rafter and H I the length of the common rafter on the main roof, which is the same as M O of Fig. 70. Connect I with A for the position of the hip for finding the lengths and bevels of jacks on the front side of plan. Space the rafters on the line A D and draw them perpendicular to the hip.

A bevel set in the angle where they join the hip line will give the bevel across the back of the jacks, the down bevel being the same as that of the common rafter on the main part. It is shown at O in Fig. 70. The lengths and bevels of the jacks on the square end of the plan will be the same as the part of the roof already illustrated. The hip rafter D E is the same as A I. We will now consider the end of the plan which is out of square. Referring to Fig. 72, the lines B C A show how much the plan is out of square. A B is the plate, K L the length of the common rafter on the end of plan, being the same as K L of Fig. 70; B L the hip on the long corner, being the same as B J of Fig. 70, while A L is the hip on the short corner, and is the same as A I of Fig. 70. Space the jacks on the line B A and draw them perpendicular, joining B A with the hip lines B L A, which gives the lengths of jacks on this end of the plan. The bevel at E is the bevel across the back joining the long hip. The bevel at F is the bevel across the back joining the short hip. The down bevel is the same as that of the common rafter shown at L in Fig. 70. We have now to find the lengths and bevels of the jacks on the rear side of the long hip. Referring to Fig. 73, B C represents the rear plate, B D is the square of the hip, being the same as B P of Fig 70; D L the length of the common rafter, being the same as O M of Fig. 70, while B L is the position of the hip for finding the lengths and bevels of jacks on the rear side of the long hip, and is of the same length as B L of Fig. 72. The jacks are spaced wider on B D, Fig. 73, than on B K, Fig. 72, in order that they may meet opposite on the hip B L. Draw the jacks perpendicular from B D, Fig. 73, joining the hip B L, which will give their lengths. A bevel set in the angle at E where they join the hip will give the bevel across the back. The down bevel will be the same as that of the common rafter on the main part or this side of the roof.

GABLES OF DIFFERENT PITCHES.

In Fig. 74 is represented 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 last gable J I H is 21 feet wide and has a rise of 8 feet. It will be noticed that the left gable has two different pitches. This plan shows as much irregularity as can be desired and as much as is generally encountered in actual practice. We 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 diagram 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 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 the angle at N the bottom cut fitting the plate. Now, if we were to draw all the lines in Fig. 74 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 cause confusion. 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 we will make separate diagrams.

Referring now to Fig. 75, to find the lengths and bevels of jacks on the front side of right and left gables, draw a horizontal line, J A, representing the entire length of front plate line. Next set off the exact location of the front gable N K. From the center of the front gable draw a perpendicular line, S O, the length of the common rafter on the front side of the left gable, the same as J I in Fig. 74. Connect O with N for the position of the valley rafter for finding the lengths and bevels of jacks on the front side of the left gable. Square up the length of the common rafter on the front side of the left gable J I and connect I O for the ridge line. Space the rafters on the ridge line and draw perpendicular lines to the plate and valley, which will give the lengths of the jacks on the front side of the left gable. A bevel set in the angle at W where they join the valley will give the bevel across the back. The plumb cut or down bevel will be same as that of the common rafter on the front side of the left gable. To find the lengths and bevels of jacks on the front side of right gable, set off the length of common rafter from the center of the front gable S M, which is the same as A B of Fig. 74. Connect M with K for the position of the valley rafter for finding the lengths and bevels of the jacks on the front side of the right gable. Square up the length of the common rafter on the right gable A B and connect B M for the ridge line. Space the jacks on the ridge line and draw perpendicular lines to the plate and valley, which will give the lengths of the jacks on the front side of the right gable. A bevel set in the angle at Z where they join the valley will give the bevel across the back. The plumb cut or down bevel will be the same as that of the common rafter on the right gable. The lines N F K show the length of the common rafter on the front gable.

(*To be continued.*)

WHAT BUILDERS ARE DOING.

THE BUILDING INTERESTS of the country, according to reports from various localities, appear to be generally in excellent condition. In but few cities is the complaint of lack of work made, and many are looking forward to employment through the winter. There have been no serious disturbances between employers and workmen in the building trades, and none seem to be in immediate prospect.

The granite manufacturers of New England have adopted another agreement which, it is hoped, will finally settle the strike and lockout which has been such a serious setback to this industry. On October 1 the representatives of the Granite Manufacturers' Association of New England and the Granite Cutters' National Union met in Boston for a conference, which proved fruitless, but on the 6th the manufacturers made the following agreement, which is practically the same as that under which the Quincy quarries resumed work:

It is hereby agreed by and between the Granite Manufacturers' Association of Boston and the Boston branch of the Granite Cutters' National Union that the granite cutters and tool sharpeners return to work for a term of years terminating March 1, 1895, under the old bill of prices as agreed on May 4, 1891, which were in operation at the time of suspension of business, with such slight changes as specified that may be agreed upon by these committees.

Should either party desire a change at the expiration of said period, three months' notice shall be given previous to March 11, 1895.

If no notice of change is given by either party as above stated, then the agreement in force at that time shall continue for three years from and after March 1, 1895.

It is also agreed that any contention which may arise during said period, as to the performance and good faith of said agreement by either party, shall be referred to a committee consisting of three members each, to be selected from the Executive Committee of the Boston branch of the Granite Cutters' National Union and the Granite Manufacturers' Association of Boston, which committee shall act as a board of arbitration, and, failing to agree by a two-thirds vote, said board by a five-sixth vote shall agree upon and select a disinterested person to act as umpire; and the board thus constituted shall hear the parties and make an award within 30 days by a majority vote; such award shall be final. The committee losing the case shall pay the expenses of the umpire.

Pending such arbitration in reference to the above bill of prices, it is mutually agreed that there shall be no strike, lockout or suspension of work.

It is further agreed that the number of apprentices employed shall be discretionary with the employers.

It is hereby mutually agreed between the Granite Manufacturers' Association of Boston and vicinity and the Boston branch of the Granite Cutters' National Union that no discrimination be made between union and non-union men on the part of the granite cutters of Boston and vicinity, provided that the Granite Manufacturers' Association of Boston and vicinity on their part agree not to discriminate against any member of the Granite Cutters' National Union, or against any of their members who have served in any capacity on any committee of the branch, or any members who have made themselves prominent during the present suspension of business.

By discriminating between union and non-union men it is understood and agreed that the interpretation of the word is that the union men shall not interfere with the non-union men to prevent the free pursuit of their work, and will work with and give such men any assistance necessary in the performance of their work.

It is hereby agreed that, in case a manufacturer fails to pay his workmen on the regular pay day the granite cutters will not waive the right of suspending work unless a satisfactory excuse is given to them or their representatives.

Out of nearly 1000 cutters employed at Barre, Vt., who were thrown out of work by the strike and lockout, there were only about 100 idle on October 1. It is reported that both employers and workmen in this vicinity are anxious to bury the hatchet.

Boston, Mass.

The building business is unusually active for this season of the year, and the majority of the builders are busy.

The carpenters are feeling very much elated over the outlook in their trade. Good mechanics are scarce and command more than the usual pay.

Union No. 33 is very particular about the qualifications for membership, and has adopted a law fining a member $10 who vouches for an incompetent man being a good mechanic. In consequence of this rule many employers who have been opposed to the union in days gone by are now very friendly, and hire all their men through the union employment bureau. First class men are scarce just at present, and so the union determined to make an advance in wages. The regular scale hereafter is to be $2.75 a day. Extra good men, who have been receiving $2.75 when the average rate was $2.50, will now receive $3 and $3.25 and as much more as they are worth.

Buffalo, N. Y.

Favorable reports are received from Buffalo regarding the building business, and there is no trouble between the employers and workmen at present. The Builders' Exchange proposes on election day, November 8, to give its members the opportunity of receiving the returns in their own rooms. Arrangements have been made for the introduction of a special wire into the Exchange Room, and the waiting hours between whiles will be devoted to the refreshments which will be provided. The Buffalo builders are such excellent entertainers that it has been suggested that the memorable quotation by the Governor of North Carolina will not be heard on the evening in question.

Chicago, Ill.

The Chicago builders followed the example of all the good citizens of that city last month, and helped to dedicate the World's Fair buildings and helped to entertain visitors from abroad who were in attendance. A number of the directors of the National Association went to Chicago from Indianapolis immediately on the adjournment of the Mid-Year Meeting, and were cordially entertained by the members of the Builders' and Traders' Exchange. The exchange is just now considering, among other things, the advisability of changing the location of its rooms.

The present lease in the National Life Building expires next May, and a committee was appointed some time ago to look for new quarters. It is probable, however, that the exchange will remain in its present quarters, as the owners of the building have made several offers that are now under consideration.

Cincinnati, Ohio.

The secretary of the Builders' Exchange of Cincinnati writes that building interests are in a satisfactory condition. No boom, but a steady, legitimate increase in the amount of work being done. There is no trouble between employers and workmen, nor has there been since early in the season. At the semi-annual meeting of the exchange held recently, the organization was shown to be in excellent condition—gradually increasing in membership and with a good balance in the treasury.

Indianapolis, Ind.

The members of the Builders' Exchange of Indianapolis were occupied early in October in preparing for the reception of the officers and directors of the National Association during the Mid-Year meeting of that association, and a very enjoyable programme was laid out. On the 16th there were to be carriage rides about the city, and on the evening of the 17th a banquet was planned. The exchange was anxious that the opportunity of increasing the fraternal feeling between builders should be taken advantage of, and had prepared such hospitalities as were compatible with the occasion.

Milwaukee, Wis.

The Builders' and Traders' Exchange of Milwaukee was saddened by the death of its secretary, A. J. Erdman, on Sunday, October 9. Mr. Erdman had been ailing for some time, and had but recently returned from a trip to Colorado for his health. He was one of the successful young builders of the city, and was a member of several local organizations of a social and military character. His death is sincerely regretted by all who knew him. The new building being erected by the exchange is rapidly nearing completion, and it is expected to be ready for occupancy by the beginning of the new year. When finished the new home of the exchange will be one of the finest office buildings in the city. The new secretary, P. L. Petersen, reports business among the builders as being in good condition.

New York City.

The building business in New York City has been disturbed by no more than the usual amount of friction between employers, and no serious trouble, such as the recent strikes, has been experienced. A rather novel protest was made by the workmen employed along the lines of the great Columbian parades against the action of the contractors in stopping work in order that seats might be sold, in unfinished buildings, to spectators who wished to see the processions.

At a recent meeting of the Board of Walking Delegates, nearly every delegate present denounced the method of the Italian Marble Mosaic Workers' Union in recruiting members. It is the custom of this union, it is said, to accept as members only natives of a certain province in Italy, to the exclusion of other workmen in this trade. There is also a union called the Italian Marble Mosaic Workers' Helpers' Union, but the Layers' Union will not admit any of its members into their organization. At present there is a dearth of competent union mosaic workers or layers, and consequently Delegate Wilson of the Mosaic Workers' Union put two helpers to work as layers in the new Criminal Court Building. This the members of the Mosaic Workers' Union objected to, and instructed Delegate Wilson to order a strike on the Criminal Court Building. The Helpers' Union appealed to the Board of Delegates, with the result that it was unanimously resolved to send a letter to the Mosaic Workers' Union that the board placed itself on record against the importation of workmen from foreign countries, and that the Italian Marble Mosaic Workers' Union be requested to recruit its ranks from the Mosaic Helpers' Union, with those who are competent workmen, and so adopt the views of the organized building trades.

Omaha, Neb.

Secretary W. S. Wedge of the Builders' & Traders' Exchange of Omaha writes that the building business of the city is rapidly picking up, and is more active at present than for some time past. Everything is harmonious between employers and workmen, and no trouble of any kind is anticipated this fall. There is at present a scarcity of carpenters and masons, but there are plenty of workmen in other branches of the trade. The exchange, which has been steadily growing in importance and membership, has lately been considering the question of interlineations in specifications by architects. The interlining of specifications has been productive of confusion and misunderstandings, and the members of the exchange have made a formal protest against the practice in the following resolutions:

Whereas, It has come to the knowledge of the Builders' & Traders' Exchange of Omaha that certain architects are in the habit of interlining their specifications for building; and

Whereas, There frequently occur doubts and misunderstandings as to whether these interlinings are in all the specifications sent out at the time they are first issued to the different contractors;

Resolved, That we, the members of the Builders' & Traders' Exchange of Omaha, most respectfully request all the architects of Omaha that in the future they avoid making any interlinings whatever in any of their specifications;

Resolved, That when such additions or interlineations must be made, the architect will make a note at the back of specification stating that these changes were made before any contractor figured on the work;

Resolved, That a copy of these resolutions b sent to each architect in the city.

Philadelphia, Pa.

The first fall corporation meeting of the Builders' Exchange of Philadelphia was on the evening of September 27, President Dobbins occupying the chair. Before the regular business was commenced a collation was served, followed by a smoker. The most important question considered was an amendment to the by-laws relative to the expulsion of any individual or member of a firm, while a member of the exchange, acting contrary to the provisions of the charter or in any way which may tend to the injury or destruction of the corporation or its property, to neglect of duty as a member, or being convicted of any crime in a court of justice, or of dishonorable or unbusiness-like methods, or upon failure in business. The matter was finally referred back to the committee, who will report at the next meeting.

The relationship between sub-contractors and general contractors elicited considerable argument, and the report of the National Association on the subject was ordered to be printed and distributed prior to a final consideration. The more general use of the uniform contract was urged as being the most effective one known.

The reports of the several committees showed that the membership had increased, and that the trade schools and exhibition department were in a flourishing condition.

The report of Treasurer C. H. Reeves

showed a balance on hand of $2,642.79, over $11,500 having been expended since May 24.

At a meeting of the Board of Directors of the Builders' Exchange held October 11, a very important document was presented for the consideration of the members by John S. Stevens, received from the National Association of Master Builders of Great Britain. The document in question was a comparative statement of the rate of wages paid per hour and the number of hours worked per week in the various branches of the building trades in 100 towns of the British isles.

According to statement as read, 5¾ pence per hour was the lowest price paid, while 10 pence per hour was the maximum. This was for London, where the highest wages are paid. In a number of the small towns the minimum is 3½ pence per hour. Mechanics also vary in the number of hours they work each week, some working from daylight until dark, others 61 hours a week, the minimum number being 49—this being in only rare cases.

	Philadelphia. Price paid per hour.	London. Price paid per hour.
Bricklayers	$0.45	$0.18
Carpenters	.30	.18
Plasterers	.40	.18
Plumbers	.40	.20
Painters	.30	.15

That important adjunct to the building trade in Philadelphia, the Master Bricklayers' Company, has decided to appropriate $100 to the Mechanical Trades School of the Master Builders' Exchange. It has also concluded to attend the Columbian Exposition next year in a body.

Portland, Maine.

The members of the Builders' Exchange of Portland have undertaken a new departure in the way of meetings which they call social sessions. The first of these sessions was held in the rooms of the exchange on the evening of October 12th. The affair was a thorough success, there being a large number in attendance. A supper was served and music was provided to assist at the entertainment of the guests. These meetings are expected to be the means of bringing the builders into closer social relationship and to assist in extending the fraternal feelings established by the exchange.

Wilmington, Del.

The Builders' Exchange of Wilmington reports business as promising to be better this fall than it has been during the summer, though prices are very low. The exchange is progressing favorably and has begun an active effort to secure a building of its own. The subject has been thoroughly canvassed, and it is expected that a building will be begun before another year has passed.

Notes.

The following clipping from the New York *Evening Post* of October 17 briefly states a case which has occasioned considerable interest among builders generally throughout the country. It is impossible to secure the judge's charge in time for publication in this issue. The following, however, gives a concise statement of the facts: A novel suit against three members of the Pittsburgh Builders' Exchange terminated to day in favor of the plaintiff, Thomas Buchanan, an independent contractor, for the sum of $350. The suit grew out of the great building trades strike of a year ago. The men demanded increased wages and the eight-hour day, and finally lost after three months' idleness, virtually killing building operations for the entire season. In the meantime independent contractors, most of them former journeymen, sprang up and hired labor at the terms of the union. When they came to buy material they found that planing-mill men, stone-quarry owners, brick manufacturers, in fact, all firms selling materials, were members of the Builders' Exchange, and bound to sell only to exchange members, and many odd situations resulted; half-finished contracts were abandoned, and the suit decided to-day was the outcome. An appeal will be taken to the Supreme Court, as many similar suits are threatened. Buchanan was a contracting bricklayer, but was not a member of the exchange. He alleged that in April, 1891, he obtained the contract for building seven brick houses and the chimneys for four frame houses for J. C. Dick. The defendants, he charged, conspiring to injure him, refused to sell him materials, brick, frames, &c., notwithstanding their agreements, unless he would become a member of the exchange. They then refused to let him join, rejecting his application for membership. In consequence he lost the job, another contractor getting the contract to finish the work.

The following is an excellent indication of the spirit which prevails among the builders of Buffalo. Mr. Byrne has been an active and valuable member of the Builders' Exchange of that city for years:

The Operative Plasterers' Union of Buffalo held a meeting last night and adopted the following resolutions:

Whereas, Michael J. Byrne has received the Republican nomination for the office of member of the Board of Councilmen; and

Whereas, Mr. Byrne has been prominently connected with this union and is a past president; and

Whereas, He has ever been pre-eminently identified with all movements tending to advance the interest of the working-class and has in many ways expressed and shown his sympathy with the motives and aims of the union; and

Whereas, We believe it good policy, irrespective of party affiliations, for the workingmen to lend their aid and approval to such a candidacy; be it

Resolved, That this union indorse the candidacy of M. J. Byrne and formally urge all union men to rally to his support.

WILLIAM TURNER, President.
WILLIAM T. HARRIS, Secretary.

The members of the Builders' Exchange of Pittsburgh are working to increase the sphere of operation of that organization. An invitation has been extended to business men in all classes of trade to become members for the purpose of joining together in the work of pushing the city forward on lines of progression. It is stated that the invitation is meeting with favorable consideration.

The builders of Columbus, Ohio, organized an exchange early in October with the following officers: President, S. W. Nichols; first vice-president, William H. Fish; second vice-president, Louis Fink. The secretary and treasurer will be appointed at a later date. The declaration of principles of the National Association of Builders was used as the basis upon which the organization is founded.

The mason builders of Bridgeport, Conn., formed a permanent organization October 3 to elevate the trade in that city. The following officers were elected: President, H. M. Purdy; first vice-president, E. J. Phillips; second vice-president, B. King; secretary and treasurer, Robert E. Hurley. All the prominent masons in the city are identified with the movement, and a builders' exchange will, it is expected, be the outgrowth of this organization.

The builders of Springfield, Ill., have formed an association, of which S. J. Hanes is secretary, and are taking active steps to correct some of the radical evils which exist in that city. The subject of securing some method whereby unity can be obtained in the matter of bids and prices is at present under active consideration.

The Fitchburg, Mass., builders have established a builders' exchange on the lines advocated by the National Association of Builders. The national secretary paid them a visit recently and helped to start the new exchange in the right way. There is plenty of good material for an exchange in Fitchburg, and it is stated that the new organization is progressing favorably. The presence of the secretary of the National Association at the formation was of great assistance to the new association, as it prevented the members from falling into errors which are frequently made from lack of experience.

Cost of the London Carpenters' Strike.

The balance sheet of the carpenters' and joiners' strike in London, says *Engineering*, which lasted 26 weeks during last year, has been issued. The total sum collected was £26,959. 18/; the expenditure was £26,761. 3/4—leaving a balance in hand of £198. 14/8. Of the total amount expended, £23,571 were expended as strike-pay, but this amount does not include the payments to the men on strike from their own unions. The sums paid by the strike committee was in addition to, not in substitution of, the ordinary strike-pay by the several unions. Of the total subscriptions the Amalgamated Society of Engineers sent £700; the bricklayers, £752; the dockers, £400; the iron founders, £440; the plasterers, £124; the Durham miners £105; the compositors, £110; and smaller contributions, amounting to nearly £4,000, from various societies and clubs. Trade meetings and demonstrations only realized £81. 17/3. The expenditure includes £1255. 10/ for salaries and expenses of the committee; legal expenses, £275. 5/4; sending men back from the places from which they were induced to come, £127.5/. The report gives some details of the prolonged struggle, and also of previous efforts of the carpenters and joiners to better their condition. The strike ended without any immediate advantage to the men, but in June of the present year an agreement was entered into by which the men obtained nearly all they fought for last year by mutual concession and arrangement. The working hours are now about 8 hours and 10 minutes per day the year round, with an increase of wages of one-half penny per hour all round, for all mechanics and laborers alike.

Scarfed Beams.

Where neatness is more essential than strength, scarfed joints are preferred to any arrangement of "fishing," because a beam united by scarfs and bolts is of the same breadth and depth at the joints as at other points. In order that the bolts may not be screwed through the timber and to increase the clamping surface, says the *Architect*, it is advisable to add a plate of iron on the faces of the beam where the heads and nuts of the bolts pass through. The ends of these plates may be turned into the wood to give greater grip. But it is desirable to avoid depending solely upon bolts for the strength of a scarf, owing to the effect of the shrinking of the timber and the liability of the bolts to be, in consequence of their small dimensions, pressed into the wood. Keys or wedges can be often used to keep the upper and lower parts in their places. Varieties may be almost infinitely multiplied by increasing the number of the faces, whether oblique or square, and uniting the parts either by tabling, keying or a combination of the two; but in most cases the greatest simplicity should be aimed at, in order that the parts may the more readily be made to fit each other with accuracy. Very complicated scarfs have been used by some old carpenters, respecting which Robison observes that "many seem to aim at making the beam stronger than if it were of one piece," an absurdity too manifest to need refutation. Where a scarfed beam is exposed to transverse strains the joint should be varied from the ordinary form. When a piece of timber, subject to compression in the direction of its length, has to be scarfed, oblique faces should be avoided, because of their tendency to slide upon each other. Though bolts are commonly used to secure scarfed joints, iron hoops or straps, driven on tightly, have been recommended in their stead, and possess the advantage of not weakening the timber. In joints that depend wholly on bolts, Tredgold recommends that the sum of their areas should never be less than two-tenths of the area of the section of the beam. He has also given the following rules for the length of scarfs: In oak, ash or elm the whole length of the scarf should be six times the depth or thickness of the beam, where there are no bolts. In fir, without bolts, twelve times the depth. The whole length of a scarf dependent wholly upon bolts should be in oak, ash or elm about three and in fir six times the depth of the beam. When bolts and indents are used together, the length of the scarf may be in hard woods twice and in soft woods four times the depth.

CORRESPONDENCE.

Tool-Chest Construction.

From C. J. G., *Pittsfield, Mass.*—A practical tool chest is about the first requisite of a carpenter or joiner, as his tools should be kept in a safe receptacle occupying but small space and protected from injury by contact with each other. The principle of "a place for everything and everything in its place" holds as good with a carpenter as with the member of any other trade or profession. Not only should he be able to place his hand upon any desired tool without rummaging over the entire kit, but he wants to find it free from unnecessary scratches or marks, and if it be an edged tool, as sharp at least, if not sharper, as he left it. If he be a sharp man he will keep sharp tools, sharpened very sharp. The chest should be strong and the space utilized to the best advantage, in order that it may not be needlessly large. It should be so constructed that the drawers, slides, &c., may be easily removed without a screw driver or wrench for the purpose of cleaning or lightening the chest when it is to be loaded on to a wagon, and it frequently happens that this must be done with but little help.

For the benefit of "J. E. H.," who presented a request in a recent issue of *Carpentry and Building* for a tool chest, as well as for the benefit of other readers similarly interested, I send sketches and description of a chest which I made some time ago. Although not elaborate, I consider it practical, and have yet to see the one for which I would exchange it. Fig. 1 represents the chest with cover and top drawer cover slightly raised. The size of this chest, inside measurement, is 36 x 22 x 18 inches, the panels being sunken all around. The top panel, however, should be raised to prevent holding water in case any should get on it; besides, this form of construction is more easily dusted. The handles are fastened on the ends with round-headed bolts, while the cover is secured by a combination lock. In Fig. 2 is represented a section of a corner of the chest, rabbeted, cross-nailed, and then covered with wrought angle iron, well screwed on, over which hardwood stiles are placed, making an exceedingly strong corner. Fig. 3 is a vertical cross section of the tool chest, showing the various divisions, A A A A being drawers, *a* a slide under the drawers, B a receptacle for odd tools, including saw filer, roof brackets, &c., also for extra garments or whatever may be desired, as plans, drawings, &c., C the saw till, which slides to allow excess to the molding planes, which occupy a space across the front of the chest under the saw till. By the way, I have a conveniently arranged partition which fits snugly against the last molding plane, whether there be 5 or 15 in the chest, preserving their upright position. The space D is used for level or bench planes, framing mallets, hammers, &c. Fig. 4 is a perspective view of the saw till or tray as it appears when taken out of the chest. I carry four or five sizes, but more can be accommodated by putting them with handles to the left between the others, one put each way.

The bottom of the tray beyond the saw handles is raised to make a space for the handled molding planes underneath; also to provide a more convenient apartment for oil cans and scratch awl. The front of the tray is made low to give room for the blades of framing squares, which are hung to supports screwed to the front of the chest, as shown in Fig. 5. The squares

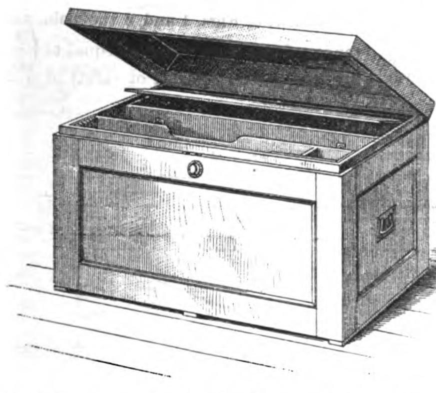


Fig. 1.—Perspective View of Tool Chest with Cover Partially Raised.

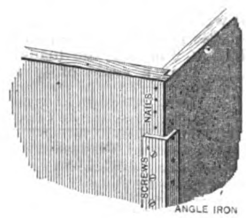


Fig. 2.—View of One of the Corners.

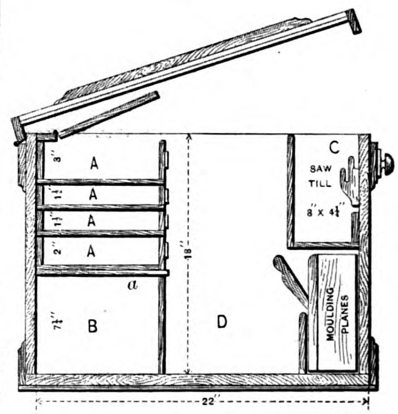


Fig. 3.—Vertical Cross Section of Tool Chest, Showing its Various Divisions.

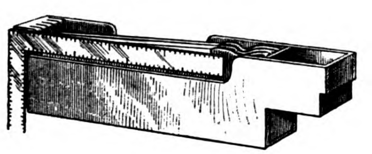


Fig. 4 —View of Saw Till.

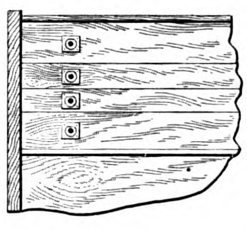


Fig. 6.—Front View of a Section of the Drawers at End of Chest.

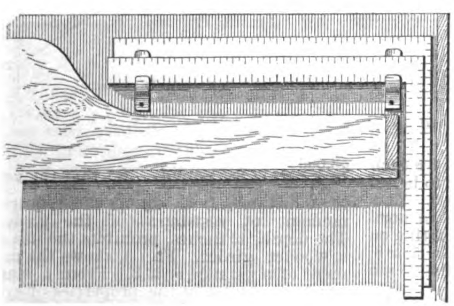


Fig. 5.—Showing Manner of Disposing the Steel Squares, the Front of the Saw Till Being Cut Away to Give Room for the Blades.

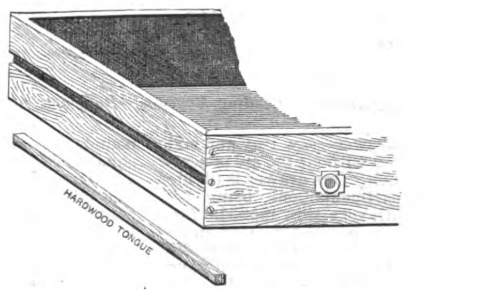


Fig. 7.—View of Front and Side of a Drawer, Showing Tongue and Groove.

Tool-Chest Construction, as Recommended by "C. J. G."

are carried here, one with 18-inch tongue, which just fits in, while the other, a 16 inch tongue, and the one generally used, is dropped 1½ inches, so that either square may be removed without disturbing the other. Their position is such as to occupy but little space, and their tongues are not wobbling about to trouble their neighbors. Fig. 6 explains the sliding arrangement of the drawers, the ends of which are ⅞ inch thick measuring from the grooves cut from the front panel to the back side, as shown in Fig. 7, on which are nicely fitted cherry tongues or strips. At one end of the drawers these tongues are held in place by friction only, and easily removed when it is desired to take out the drawers. Hardwood cleats ½ inch thick are secured to the ends of the chest to receive these tongues. It will be observed that every drawer except the top one is of the same length. The drawers, saw tray and slide may be removed without the aid of screw driver or wrench. One drawer is divided into three apartments, one being partitioned off with very thin material for a set of light chisels, one for German and diamond bits, countersinks, reamers, &c., and the third for screw drivers, dividers, calipers, try and bevel squares, &c. The other drawers are equally well utilized. By pulling out the slide *a* over the space D, another surface is made for carrying extra tools, &c., when moving the chest from place to place. If the above description of what I call "a practical tool chest" is of service to the many readers of *Carpentry and Building*, my object in presenting it will have been attained.

A Question of Bending Moments.

From J. D. W., *Paterson, N. J.*—I would like to have some one show the application of stresses obtained graphically or otherwise, in order to secure the proper size of timber and iron to resist the stresses. Take for example a girder, or a floor, having a partition 24 feet in the clear between supports with a clear store space under the partition, the store ceiling being on one continuous line with no girder projecting below. The partition is 24 feet wide and 24 feet high, lathed and plastered. The weight of the partition is, say, 23 pounds to the square foot, equaling 13,248 pounds, the factor of safety being 3. The total equals 39,744 pounds. The greatest bending moment at the center equals 119,232 foot-pounds. Of what use is this moment in getting the size of supporting timber not over 12 inches deep and not to bend more that $\frac{1}{30}$ inch to the foot in length?

Note.—We referred the question of our correspondent to C. Powell Karr, a well-known engineer, who furnishes the following reply in detail:

To determine the amount and location of bending moment graphically, we will divide the load into six equal parts, as shown in Fig. 1. As the load is evenly distributed, the reactions will be equal and will each be half of the load = half of 13,248 pounds = 6624 pounds.

In Fig. 2 lay off the loads in order on line 1 8 at a scale of ¼ inch = 2208 pounds; lay off reactions 1 9 and 9 8 each equal to 6624 pounds, the pole x to be on a horizontal line drawn through 9. This line x 9 will be equal by scale to horizontal components of the forces acting on the beam. Lines x 2, x 3, x 4, x 5, x 6, x 7 represent the strains on the beam caused by the loads.

In Fig. 1 draw lines A B′, B′ C′, C′ D′, D′ E′, E′ F′, F′ G′ parallel to lines x 7, x 6, &c. To find the bending moment at any loaded point, as at B, multiply the vertical distance B B′ by the horizontal distance x 9. Therefore, the point of greatest bending moment will be where the line A B′, C′ D′, E′ F′ G′ is furthest away from line A G′. This will be at point D, and the greatest bending moment in girder will be equal to (D — D′) = 33.3 inches × (x 9) = 14,333 pounds = 477,288 pounds inch.

To find the same result by method of moments we obtain 476,928 inch-pounds, or slightly less than our previous result.

The moment of the forces produced by the action of the fibers about a certain point is called the moment of resistance of the beam. To maintain equilibrium the moment of resistance of the fibers at a certain point multiplied by their unit of strength must equal the bending moment at that point. By finding the bending moment of any girder or beam at a given point we are able to equate this bending moment with the moment of resistance of the section under consideration, thus:

$$B\,M = r \times \left(\frac{k}{f}\right) \text{ or } r = \frac{B\,M}{\left(\frac{k}{f}\right)}$$

in which B M = bending moment, r = moment of resistance in inches, $\left(\frac{k}{f}\right)$ = safe modulus of rupture of the material.

Having obtained the moment of resistance in inches, the cross section of girder in question can be determined, for the strength of various timbers and materials per square inch of sectional area has been determined by experiment, and the results are readily accessible.

In drawing Figs. 1 and 2 the pole distance x 9 has been taken as equal to $\left(\frac{k}{f}\right)$ for iron, using a factor of safety of 3 = $\frac{43{,}000}{3}$ = 14,333 pounds. So that the vertical distance D D equals the required moment of resistance of the girder. The depth, 12 inches, prohibits the use of a wooden girder. Fig. 1 shows the moment of resistance is 33.3. From a manufacturers' table of the properties of eye-beams we find a 10½-inch 105 pound beam will answer, having a moment of resistance of 35.3.

To use a beam so that it will not deflect over $\frac{1}{400}$ of the span, we should use $d = L + 2\frac{1}{4}$, where L = span in feet, d = depth in inches.

For deflection of beam use formula

$$\text{Def.} = \frac{5}{384} \times \frac{vl^3}{E \times i},$$

where v = uniform load, l = span in inches, E = modulus of elasticity of iron = 27,000,000, i = moment of inertia of section = 229.2, hence

$$\text{def.} = \frac{5}{384} \times \frac{13{,}248 \times 23{,}887{,}872}{27{,}000{,}000 \times 229.2} = 0.66$$

inch.

By what has been stated the deflection is limited to $\frac{1}{400}$ of 288 inches = 0.72 inch, so we select a 10½-inch heavy beam whose moment of resistance is 38.3 and whose allowed deflection is 0.76.

To determine the deflection graphically: In Fig. 1 divide A G into parts A 9 11 13 15 17 19 G; draw verticals through these points intersecting the line A B′ C′.

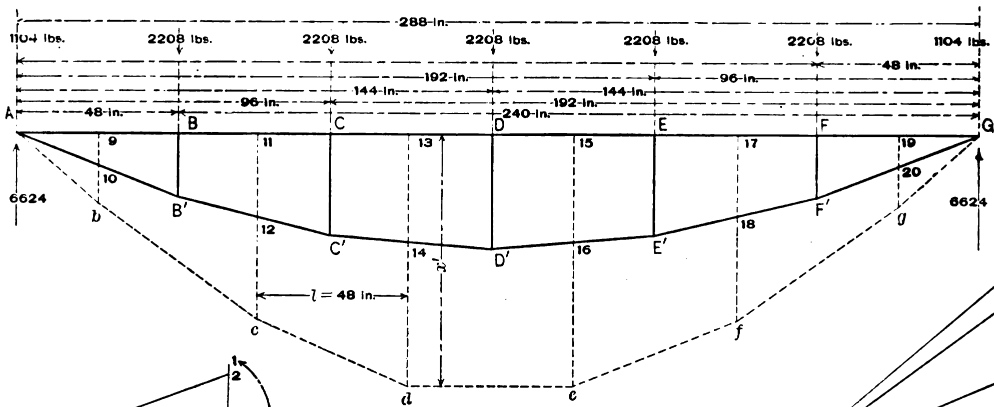


Fig. 1.—Showing Division of Load.—Scale, ¼ Inch to the Foot.—Dotted Lines Show Deflection Diagram.

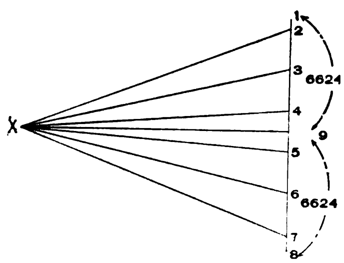


Fig. 2.—Strain Diagram.—Scale, ¼ Inch Equals 2208 lbs. $X - 9 = \left(\frac{X}{8}\right)$ for Iron (wrought) $= \frac{43{,}000}{3}$ = 14,333 lbs.

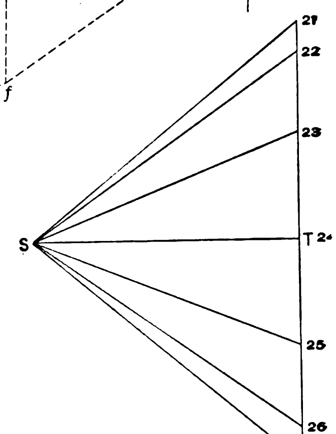


Fig. 3.—Deflection Diagram.

A Question of Bending Moments.—Diagrams Illustrating Communication from "J. D. W.," Paterson, N. J.

&c., at points 10 12 14 16, &c. Then in Fig. 3 lay off on load line, 21 27, the vertical distances 9 10, 11 12, 13 14, &c. From pole S draw S 21, S 22, S 23, &c. From A draw A *b* parallel to S 27, *b c* parallel to S 26, *c d* parallel to S 25, *d e* parallel to S 27, *e f* parallel to S 23, *f i g* parallel to S 22, and *g* G parallel to S 21. These lines 9 *b*, 11 *c*, &c., represent proportionally the amount of deflection at point of beam through which they are drawn.

As the line 13 *d* or 15 *e* (X') is the longest the greatest deflection will take place at this point, and can be read off by scale, and can also be checked by well-known formulæ.

The Science of Handrailing.—VIII.

From MORRIS WILLIAMS, *Scranton, Pa.*—From intimations received through the mail I understand that the article on the bevels which appeared in the July issue needs further elucidation.

In explaining Fig. 19, it is there said that: "The base of the bevel must be the length of a square horizontal line across the section, and the hight or perpendicular of the bevel must be the length of hight from the lowest side of the section to the upper hight of the section, which will be a line forming a right angle with the line of the base."

The base line of the triangle that contains the bevel is not shown in the upper section of Fig. 19 to be a square horizontal line across the section. This want of coincidence between the line and the explanation causes the difficulty in comprehending the principle of the bevels. Fig. 33 makes good this want of coincidence, the line herein being a square horizontal line across the section. Fig. 34 contains the plan, elevation and section. In relation to the bevels the three plans must be considered. Fig. 35 is the triangle that contains the bevels. The base of the triangle is taken from the square horizontal line across the section marked 4 5. The hight 5 9 is taken from 5 5, a square line to the pitch of the section and equal in length to the hight between the lowest side and the upper side of the section. The hypotenuse is taken from a square line across the section marked in Fig. 34 by the figures 6 8 or 5.9. This line is square across the section, but not horizontal, as it runs on the face of the section, and consequently it is contained in the oblique plane of the section. I hope this additional explanation will suffice to make the bevels clear.

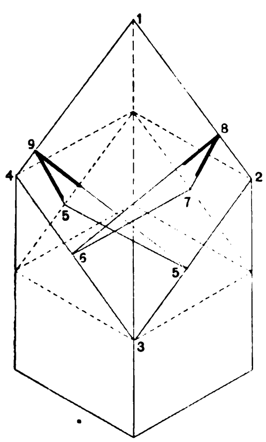


Fig. 33.

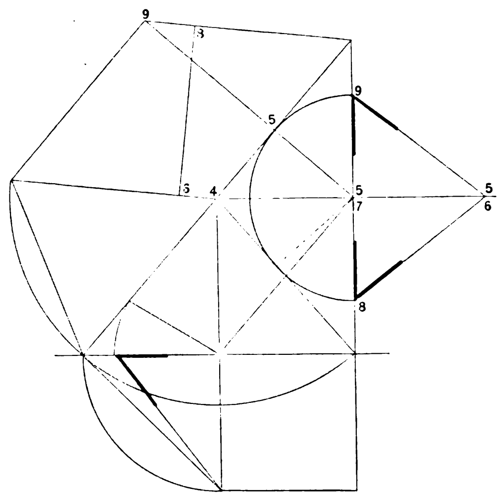


Fig. 34.

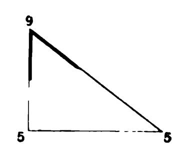


Fig. 35.

The Science of Handrailing.—Diagrams Explaining More Fully Fig. 19.

Molding for Circular Rooms or Towers.

From W. T. H., *Marquette, Mich.*—Will some kind reader of the paper give me a method for finding the radius for striking a molding to go around circular rooms or towers? I find that a straight piece of mold bent around inside on the base always lays off at the top.

Shelf Designs.

From O. G. C., *Grand Junction, Col.*—Will some of the readers of *Carpentry and Building* furnish me with a design for shelf and brackets suitable to be put up in a well-furnished room?

Falling-Line System of Handrailing.

From M. L., *Warren, Ohio.*—I notice in *Carpentry and Building* for July, 1890, a discussion of problems on handrailing by "W. J. B.," of London, England, in which the falling-line system is referred to as being in advance of the tangent system. Now, if "W. J. B." will be kind enough to tell me through the columns of the paper how I can gain some knowledge of the falling-line system, I shall esteem it a favor, as I have used the tangent system to a limited extent, but am anxious to obtain the best.

Pitch of Door and Window Sills.

From M. E. L., *Stryker, Ohio.*—Will some correspondent of *Carpentry and Building* kindly tell me what pitch should be given to door and window sills?

Hanging Portieres.

From H. W. B., *Lawrence, Kan.*—I would like to ask through the columns of *Carpentry and Building* the best method of hanging a curtain over a doorway. I wish to place a curtain across a front door for the purpose of keeping the draft out of the hall, and to do the work in such a manner as will not interfere with the opening of the door and yet will allow the curtain to be slid back in position when the door is closed.

Note.—The subject of hanging *portières* was discussed in a very general way in the June number for last year, and while giving no specific directions covering the special case to which our correspondent above refers, it is possible that he may derive some suggestions from a perusal of the article which appeared in the issue named. The problem which he presents is not a difficult one of solution, and we have no doubt that there are many practical readers of the paper who will take pleasure in furnishing the information desired.

Problem in Stairbuilding.

From G. T. H., *Berryville, Ark.*—Will same of the readers of the paper kindly give me through its columns a rule for cutting back the header for the landing of a stairway?

House Framing.

From S. C., *Fort Worth, Texas.*—Permit me to call attention to the communication of "H. T. B.," Sardis, Ky., with regard to house framing, which appeared in the August issue of the paper, and in making this criticism I do it because I think it is in the interest of the readers. The method of framing employed is such as I would not recommend any reader to follow who desires to bridge studding. My way of doing the work would be to so place the bridging that the ends would come in contact with studding opposite each other, thereby providing something to resist the strain which might be exerted on them. It will be seen from an inspection of the sketch submitted by "H. T. B." in the August number that any strain exerted at a certain point will cause the studs to twist, which, in my estimation, is a serious objection.

Drawing an Ellipse.

From C. L. M., *Madera, Cal.*—I would like to hear opinions regarding the ellipse. I think the one given by "L. S. F.," in the July issue, is not regular, and it does not stand the test of the well-known property of the ellipse that the sum of any two lines drawn from the foci to any points in the circumference is the same. In Hodgson's work on "Practical Carpentry," on pages 32 and 33, is given a way to draw with the compasses a figure resembling an ellipse. The method amounts to the same as that of "L. S. F.," but is not a perfect ellipse, even though "well proportioned."

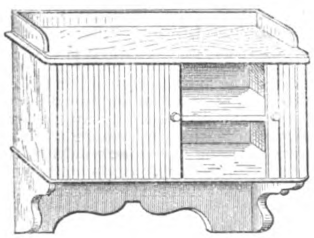
Carriage Houses and Stables.

From E. F., *Glendale, Cal.*—I like *Carpentry and Building* very much indeed. However, I would say that we good builders would like to see in its columns occasional designs for carriage houses and ornamental stables. In looking over back numbers it seems to me there has been comparatively little of this sort of work published.

Note.—Here is a suggestion upon which our contributors can work to advantage. We shall be glad to have photographs, plans, details, &c., of such buildings as this correspondent describes. Who speaks first?

Sliding Flexible Doors.

From MECHANIC.—In answer to some of the correspondents who have been asking about the construction of furniture,



Sliding Flexible Doors.—Fig. 1.—Showing One Application.

household articles, bric-a-brac and the like, I send two sketches of a method of making sliding doors for small cupboards, wall cabinets and the like, thinking the matter may prove interesting to the readers. The doors are flexible, and are made by gluing to a piece of cloth or canvas a series of narrow strips of wood, or threading them together in a continuous string by passing through their thickness two lengths of cord or wire in such a way that the latter will be concealed from sight. The application of this form of door is shown in Fig. 1, while in Fig. 2 is represented a plan view of a corner of a cabinet, clearly indicating the construction. The upper and lower ends of the strips of wood travel in grooves. The number of strips need not exceed a quantity sufficient to close the opening, although it is well to allow a few to remain hidden at the sides. It is necessary, of course, to provide at the sides of the cabinet a double wall or recess, into which the doors may slide when pushed open. Doors of this kind are applicable to various articles of furniture, more especially those having a curved front.

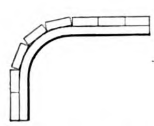


Fig. 2.—Plan View of One Corner.

A Large Center.

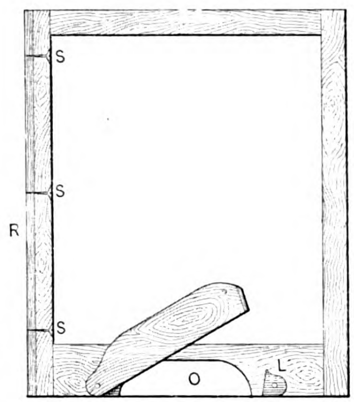
From CENTER, *Little Falls, N. Y.*—I would like to have some of the practical readers of *Carpentry and Building* present for the attention of your subscribers a center for an arch having a span of 84 feet, spring 15 feet and roadway 24 feet or 36 feet wide, voussoirs 3 feet and roadway to be 5 feet from intrados.

Details of Inside Finish.

From M. D. C., *Dixon, Ill.*—I would like to ask some of the readers of the paper to submit details of inside finish for doors and windows which do not have head and plinth blocks, as "they are getting too previous in this neck of the woods." Carpenters in this section desire a change and are looking for something new under the sun.

Window Screen and Outside Blinds.

From J. C. M., *Oregon, Ill.*—The sketch which I send of a window screen is in answer to an inquiry from "H. U.," Talmadge, Neb., whose letter appeared in the June issue of the paper. The screen is placed directly under the outside or top sash, and is put in from the outside by ripping off one of the stiles, the thickness of the blind stop, as indicated by the line R of the sketch. It is fastened in place from the outside by inserting screws represented by S S S. When the screen is in it does not show. The space O is taken out of the bottom rail, in order to give room for the bottom arm when opening and closing the blind, and is covered by a ½-inch piece screwed to the screen at the end, as indicated in the sketch. A

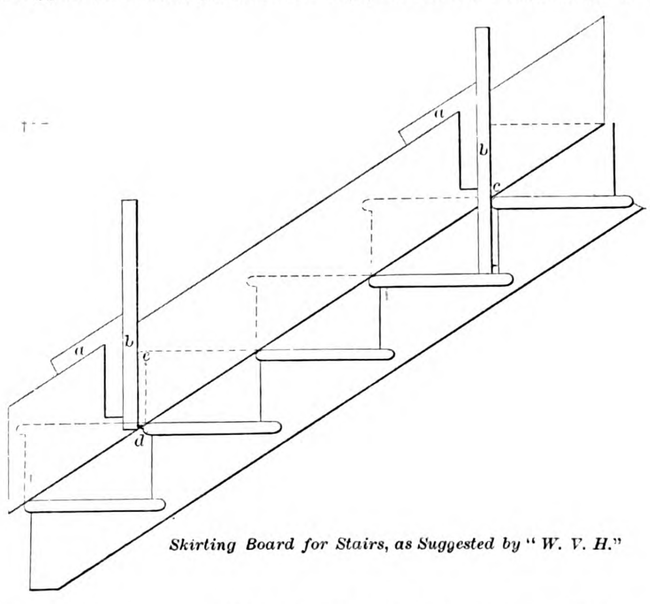


Window Screen and Outside Blinds.

small piece is cut off, beveling on the line L, and fastened in position; then when the part shown raised in the sketch is closed, it is held firmly to the frame. A screw or small nail could be placed in the loose end of the cover by which to open and close it.

Skirting Board for Stairs.

From W. V. H., *Newark, N. J.*—In reply to "H. L.," Moorestown, N. J., I would suggest the following method for fitting skirting board on straight or winding stairs. Referring to the sketch which I send, *a* is a bevel made to the rake of the skirting and perpendicular to the stairs; *b* is a sliding piece applied to the bevel and has a wire nail driven in the side for the purpose of making it stand away from the bottom of the riser, so that the rising piece will clear the nosing of the tread. In doing the work, the first thing is to lay the skirting over the tops of the stairs as indicated in the sketch, and make a very fine notch on the front edge of the sliding piece at the hight of one of the steps. Then apply the point of the sliding piece to the internal corner of a step and mark the skirting in the notch at *c*, the bevel being brought close to the sliding piece. Suppose it is desired to take a point at the nosing, it is only necessary to apply the point of the sliding piece to the nosing, as at *d*; then mark the skirting by the notch at *e*, which will give the point in the skirting corresponding to the nosing of the stair at *d*. In this manner as many points as desired to complete the work may be made. If the steps are very true, two marks from each tread and riser will be sufficient, and by connecting these marks by lines will give the form of the riser and tread of each step, while three marks in each will give a good outline of the nosing. By following this plan the correspondent will secure a tight job every time.



Skirting Board for Stairs, as Suggested by "W. V. H."

Question of Party Wall.

From J. D., *Knoxville, Tenn.*—I have a four-story brick store to build and the parties owning the lot on one side refuse to allow me to put the footings of the brick wall on their side—that is, they will not allow me to project the wall at all on their property. Will you please tell me how to get over this so as to get a solid and firm foundation?

Note.—The question of party wall is a question of law, and in this respect the laws are not identical in the different States. We are not acquainted with the laws of Tennessee in this regard and therefore are disposed to refer our correspondent to some competent lawyer. In many of the large cities, especially where business blocks are built, the party wall is disregarded, and each owner puts up on his own property a complete wall, including foundations necessary for supporting the structure that he proposes to erect. Accordingly, it is not unusual to see two walls side by side, either of which would presumably be thick enough and heavy enough for the common use of two buildings, carried from foundation to roof. This plan makes each owner independent of his neighbor and has the advantage of making buildings very strong and substantial, and giving them a fire-resisting character which would otherwise be lacking. We presume, under the circumstances, referring to the case mentioned by this correspondent, that this rule does not prevail, and therefore he is anxious to make a wall which will give him the largest possible amount of space on his own ground. As to his legal rights in the premises, as mentioned in the first case, we must refer him to a good lawyer.

Obtaining the Shape of Molding Cutters.

From A. H. L., *Dayton, Ky.*—In reply to " W. H. H.," Seelyville, Pa., asking for a correct method of making molding knives, I send herewith a sketch, Fig. 1, which may prove of interest. First, draw the full size of the cutter head with the knife set to the shortest cutting point, as indicated in the engraving. Then draw the line *a* through the center of the head, touching the knife at the shortest cutting point. Draw the line *b* at right angles to the line *a* and draw the line *h* parallel to the line *b*, giving the thickness of the molding. After this has been done make a full size drawing of the mold to be made on the line *h*, and then draw the lines *c, d, e, f, g* to the line *a*. Now with a pair of compasses, with *r* as center, continue the lines *c, d, e, f, g, h* until they cut the line board even with one of the square edges and fasten it in place. Now revolve the cardboard, and wherever the straight edge of the paper intersects the lines from the molding and the perpendicular B, make a mark. After all the points are marked they will give the depth that each member requires to be cut in relation to each other in order to produce a molding of any given shape or depth.

Note.—To those of our readers who are interested in the question of making molding knives, we would suggest that they refer to the correspondence bearing on the subject published in the April and June issues of *Carpentry and Building* for 1882. The problem is there treated at considerable length, and illustrated in a way which is likely to prove instructive and valuable in this connection.

Preventing Tools from Rusting.

From C. H. C., *Monterey, Ala.*—In reply to "C. I. A.," Galva, Ill., whose letter of inquiry appeared in the March number of *Carpentry and Building* for this year, I take the liberty of giving Professor Olmstead's method for the preservation of scientific apparatus, which he long ago published for the general good, declining to have it patented. The process consists of slowly melting together 6 or 8 parts of pure hog's lard and 1 part resin, stirring until cool. This remains in a semi-fluid condition and always ready for use, the resin preventing rancidity and supplying an air-tight film. If this is rubbed ever so lightly on a bright surface it will effectually protect and preserve the polish.

From M. E. L., *Stryker, Ohio.*—In reply to correspondents who have inquired with regard to the preservation of tools, permit me to say that I know of nothing better than kerosene to keep tools from rusting.

Finding the Radius of a Circle when the Chord and Spring are Given.

From L. S. F., *Beatrice, Neb.*—I have a nut to crack, which I desire to submit to the readers of *Carpentry and Building.* I would like to have the process explained whereby I can figure out the radius of an arc when the chord and spring are given. Take, for example, a window or door frame head for a brick arch, the chord of which is 5 feet 11 inches and the spring 7 inches. What is the radius?

Note.—This question was very fully discussed and numerous illustrations presented in the issue of *Carpentry and Building* for April, 1891, and we have no doubt if our correspondent will refer to the letters there given he will obtain all the information necessary. As it is possible, however, he may not have a file of the paper for last year, we present a rule which will enable him to solve the problem in question. The square of one-half the chord plus the square of the rise or spring divided by twice the rise or spring gives the radius.

Length of Jack Rafters.

From H. A. B., *Moreno, Cal.*—I would like to ask some of the readers of *Carpentry and Building* to explain in its columns how much shorter each jack rafter for a hip roof must be cut in order that the rafters may be two feet apart, the roof being a $\frac{1}{3}$ or $\frac{1}{2}$ pitch.

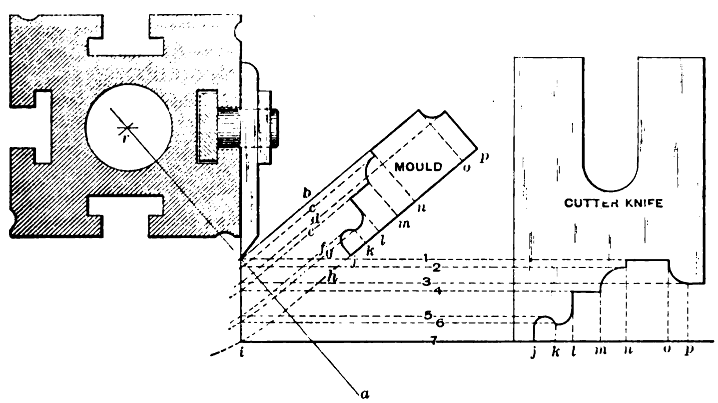
Cheap Brick Houses.

We have a letter on the subject of cheap brick houses, which we reproduce below *verbatim et literatim*, supressing, however, the address and signature for obvious reasons. It presents the question in such a peculiar form that we have no doubt our readers will be interested in it. The letter is as follows:

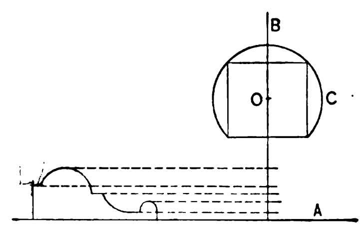
"Will take the liberty of asking you in what number I can receive any information of building the cheapest kind of brick houses to oblige me?"

It has been impossible for us to answer this letter satisfactorily. We have never published articles relating to the building of the cheapest kind of brick houses. Cheapest is superlative, and whatever we may have said about cheap brick houses would not necessarily include the cheapest. Further, we have not presented information of the sort asked for by this reader to "oblige him," but rather to instruct our readers in general. However, this is taking a mean advantage of a correspondent, and we need not enlarge upon this phase of the question. A brick house may be built cheap, and in making it cheap it may be made poor, just as other articles which are very generally deteriorated in quality whenever they are lowered in cost. To build the "cheapest" brick house, we suppose, would require materials that are never paid for and labor that receives no wages.

We advise this correspondent and all others to consider the question of building the "best brick houses rather than the "cheapest," to give attention to methods of securing the very best work, whatever the kind may be, at a little less cost than the average, by reason of superior management and skill. Cheap buildings, as a rule, are poor buildings, and are not worth building at all, but a good building at a fair cost is always a good investment.



Method Suggested by "A. H. L."



Plan Adopted by "C. W J."

Obtaining the Shape of Molding Cutters.

i. The next step is to draw, from the points of intersection, the lines 1, 2, 3, 4, 5, 6, 7. Now take the lines *j, k, l, m, n, o, p* of the mold on the line 7, giving the width of the mold. Extend the lines *j, k, l, m, n, o, p* in an upward direction until they intersect the lines 1, 2, 3, 4, 5, 6, 7. Take a pencil, and draw through the points thus obtained, producing the mold, as indicated in the sketch. I have used this method for six years in Cincinnati planing mills and find it accurate in every particular.

From C. W. J., *Norfolk, Va.*—In the April number of CARPENTRY AND BUILDING " W. H. H." of Seelyville, Pa., asks for a correct method of obtaining the shape of molding cutters. I think he will find the accompanying sketch Fig. 2 a satisfactory answer to his inquiry. Referring to the drawing A is the base line, B the perpendicular, C the cylinder and O the center of the cylinder. The base line A represents the body of the machine. Now, square up perpendicularly and draw the molding. From each member draw lines parallel to A, cutting B. Take a piece of thick paper or thin cardboard the exact size of the cylinder and put a pin through the center, O, into the line B, taking care that when the cardboard is revolved the corners shall be from $\frac{1}{4}$ to $\frac{3}{8}$ inch above the highest part of the molding. Now take a strip of stiff writing paper having a straight edge and place this straight edge upon the card-

A FIRE-PROOF ROOFING, and one unaffected by the heat of the sun's rays and that will not melt or run, says *Fire and Water*, is made by adding burned lime (not slaked) to coal tar. Boil together in the proportion of 15 pounds of lime to 100 pounds of tar. The lime must be pulverized, and to avoid the tar boiling over stir the lime slowly in the boiling tar. The mixture must be put on while hot.

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

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First Vice-President, IRA G. HERSEY, 166 Devonshire street, Boston, Mass.
Second Vice-President, HUGH SISSON, 19 W. Saratoga street, Baltimore, Md.
Secretary, WILLIAM H. SAYWARD, 166 Devonshire street, Boston, Mass.
Treasurer, GEORGE TAPPER, 159 La Salle street, Chicago, Ill.

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San Francisco, Cal	WILLIAM N. MILLER.
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Midyear Meeting of National Association of Builders.

The mid-year meeting of the National Association of Builders which comprised a meeting of the officers, directors and members of committees, was held in Indianapolis during the past month, too late to admit of a report being printed in this issue. From the programme which appears elsewhere it will be seen that much important work was laid out affecting the various subjects which the National Association of Builders has taken up and acted upon. The main purpose of these mid-year meetings is to formulate matters to be considered at the succeeding convention in order that they may be presented to the filial bodies for action before that time. By this means each local exchange has ample time to fully consider such subjects as are presented, and are able to make a comprehensive and definite statement at the convention, through their delegates, of the position taken. These meetings obviate the necessity of considering subjects in convention which had not been previously referred to the local exchanges for action. It was the intention of nearly all the officers and directors to be present at the meeting, and it is expected that a large amount of important business was transacted.

A Builders' Exchange.

A builders' exchange, as advocated by the National Association, is the name that has generally been adopted by associations of business men engaged in the various branches of building, but it only becomes a factor in the community when the purposes which actuated its formation are carried out. In almost every city nowadays the various branches of mercantile business have some form of organization formed for the purpose of establishing uniform practices, and for participating in movements for the welfare of the general public. The bankers, the dry goods dealers, the coal dealers, &c., all have associations of some form, and in matters demanding public consideration and action these bodies are usually the first to act. Until recently the building interests, which are quite as important as any other, have had no form of representation, and have in no way been identified with public action, and all because there has been no form of organization among them which would give adequate representation to the various departments of the business. Under the impetus given to the establishment of builders' exchanges by the National Association, nearly every city of importance in the country has now some form of organization among the builders, and in many of the larger cities the exchanges are recognized by the public as being the headquarters for everything pertaining to building. By this means it has been possible for the builder to add his united opinion to that of others who are acting for the benefit of the city, and has become identified with progress, the same as chambers of commerce or real estate exchanges. Where a builders' exchange exists in name only, and is significant of no active interest, the builders are unidentified, and lose half the satisfaction that comes from active participation in passing events. At all times a properly conducted exchange is a benefit to its members, and becomes a useless name only when the individuals of which it is composed fail to take sufficient interest in the general customs and conditions which prevail in their business, to seek their improvement and correction. It is freely stated by the members of every exchange that has established a well-attended 'change hour that they wonder how they transacted business so long without its assistance. Out of the daily gatherings for business purposes the needs of the trade are evolved and becoming apparent to all; it is easy to secure united action on the subject. Uniform practices are adopted, and the trade is greatly benefited thereby. No greater evidence of the benefits that follow a properly organized exchange is needed than the many examples now in existence throughout the country.

Duty of Members.

One of the most important phases of the work necessary to bring the recommendations of the National Association of Builders into actual practical use is a kind of pioneering. The builder who recognizes the value of the methods advocated must not be content with the simple recognition, but must make an effort to put such methods into operation in his business, and must try to induce others to do the same. There are plenty of builders all over the country who say they fully appreciate the value of the plan of arbitration, the apprenticeship system, the importance of adopting the code of practice and other recommendations, and admit that their adoption would doubtless prove as beneficial in their case as has been demonstrated in others, but who always wait for some one else to take the initial steps. There is no question but that business can be carried on without any of these improvements, but there is also no question but that the transaction of the builders' business would be very much facilitated by their adoption. Business was successfully conducted without the aid of the telegraph and the telephone, but the man who does not avail himself of these improvements to-day is behind in the race, even though he may continue to carry on business. It is the same with an exchange as it is with these improvements; the individual may not want them every day, but when he does want them they are of inestimable service to him and he is obliged to pay for that service. Just so with the exchange; the individual may not need it every day, but when he does need it, it is indispensable, and as he cannot pay for its service as he can pay for the transmission of a message by telegraph he should pay for its support by becoming a member and adding the weight of his effort as well as his dues toward its success. The benefit which is afforded the business in which he is engaged is shown in the establishment of uniform and recognized customs that have been prepared by representatives from similar bodies located in various sections of the country, and which have been subjected to rigid scrutiny and full consideration before being recommended to the local exchanges for adoption. The builder must adopt these suggestions and help others to adopt them before they can be of benefit to his business, and his support must be given to the institution which is the medium through which these improvements and corrections are formulated and made public.

Programme of Mid-Year Meeting.

Programme of Mid-Year Meeting of officers, directors and committees of the National Association of Builders, held at Indianapolis, Ind., on Monday and Tuesday, October 17 and 18, 1892.

The meeting called to order at 10 o'clock a.m. of Monday.

The business of the meeting:

1. Secretary's report.
2. Treasurer's report.
3. Reports of progress of standing and special committees.
4. Reports from directors touching conditions existing in their several local bodies, and suggestions for the consideration and work of the National Association at its next convention.
5. Consideration of new methods of work for secretary's department for the balance of current year; to enlarge the interest of local bodies and secure greater benefits through the National Association.
6. Consideration of bearing of new eight-hour law passed at last session of Congress, and advisability of securing official opinion from United States Attorney-General before the next convention.
7. Consideration of advisability of securing congress of builders in connection with the World's Fair Auxiliary, at Chicago.
8. Consideration of advisability of preparing standard form of organization for local bodies, and issuance of charters to local bodies from the National Association.
9. Consideration of advisability of suggesting a revision of constitution at next convention. If so, what?
10. Such other matters as may be presented.

The Uniform Contract.

The use of the Uniform Contract is becoming more general every day, and the secretaries of filial bodies should keep a supply on hand at all times, and its adoption should be urged upon the architects as well as the contractors.

The form is also mentioned as the Standard Form of Contract, and bears upon its face the statement that it was adopted as such by the American Institute of Architects, the Western Association of Architects (now merged into the American Institute) and the National Association of Builders. Other forms, by whatever name advertised, should not be confused with the one above referred to

BLUE PAPER PRINTING.—III.

By JAMES F. HOBART.

THE PRINT having black lines on a white ground has been the subject of a good deal of experiment, and many draftsmen have decided that the process did not yield resul s good enough to pay for the extra time, trouble and "nastiness" of the process. Still, if black line prints are called for, the engineer has no alternative than to supply, and charge for them accordingly.

Perhaps the easiest way of making the black-line print is to make the blue line described in the last paper, and then change to black lines on a white ground by chemically creating ordinary black writing ink in the blue lines of the print. This is effected by dipping the blue-line print into a solution of common potash, made in the proportion of 1 ounce of potash to 25 ounces of water.

This treatment turns loose the iron oxide, and the print becomes of a dull rusty color due to that oxide, and if the print then be immersed for a few moments in a solution of tannin, in the proportion of 1 ounce to 20 ounces of water, the rusty lines will become of a rich black color, permanent and handsome.

The great objection to the above method lies in the number of processes and solutions the print has to be carried through. It has, however, the advantage that either a blue or a black print can be made at will, even after the process has been half completed.

To make black-line prints direct from the tracing requires the application of three solutions, the first being the sensitizing bath, which is made up of :

Gum arabic, 25 parts.
Sodium chloride (common salt), 3 parts.
Iron perchloride (spec. grav. 45 B), 10 parts.
Iron sulphate, 5 parts.
Tartaric acid, 4 parts.
Water, 47 parts.

The paper is floated on this solution in the manner already described, and after drying is ready for use. The developer consists of prussiate of potash, either the red or the yellow, and the solution may be either acid, neutral or alkaline, and the print can be dipped bodily into the bath, there being no need of protecting the reverse side of the print as there was with the blue-line developer. In the prussiate developer the parts which did not receive the light turn a light green color, while the rest of the print remains unchanged.

After this treatment the print only requires washing with water to remove the prussiate which has been taken up by the paper. Any remaining stains are removed by dipping the print into water containing a little acid, either acetic, muriatic or sulphuric. This bath discharges all color from the print except from the lines which have received protection from the sunlight. They will be found to be a deep blue black color. The print now needs only to be thoroughly washed in clear water, then to be dried.

A modification of the above process may be used for making copies of drawings, designs or engravings directly upon cloth. It can also be used on paper or almost any other flexible material. A solution of sensitive nature is made, consisting of:

Gum arabic, 217 grains.
Citric acid, 70 grains
Iron chloride, 135 grains.
Water, ¼ pint.

The mixture is applied with a brush, and two coats should be given, after which the printing is done in the sunlight in the usual manner and developed in a bath of yellow prussiate of potash or in nitrate of silver. Then the print must be "cleared" in dilute sulphuric or muriatic acid, as in the last process described.

A summary of the various methods may be useful, and is as follows:

Ordinary blue print:
a. Red prussiate potash, 10 drams.
Water, 4 ounces.
b. Ammonia citrate of iron, 15 drams.
Water, 4 ounces.
Silver print:
a. Common salt, 2 ounces.
Water, 1 quart.
b. Nitrate silver (crystallized), 1 ounce.
Water, 8 ounces
Soda, q. s (sufficient quantity).
c. Clear water.
d. Common salt, 1 ounce.
Water, 1 quart.
e. Chloride of gold, 1 grain.
Water, 1 quart.
Bicarb. soda, q s.
f. Hyposulphite of soda, 1 ounce.
Water, 1 quart.
g. Soak in water several hours.
Wash between each solution.
Blue positive paper:
a. Gum arabic, 6 ounces.
Water, 30 ounces.
b. Citrate of iron and ammonia, 4 ounces.
Water, 8 ounces.
c. Iron perchloride, 2¼ ounces.
Water, 5 ounces.
Mix for use:
a, 1½ ounces.
b, 8 drams.
c, 5 drams.
Developer:
Potassium ferrocyanide, saturated solution.
Clearing solution:
Sulphuric acid, 3 parts.
Water, 100 parts.
Or.
Muriatic acid, 8 parts.
Water, 100 parts.
Black positive prints from blue positives:
a. Potash, 1 ounce.
Water, 25 ounces.
b. Tannin, 1 ounce.
Water, 20 ounces.
Black positives, direct:
a. Gum arabic, 25 parts.
Commoh salt, 3 parts.
Iron perchloride, 10 parts.
Iron sulphate, 5 parts.
Tartaric acid, 4 parts.
Water, 47 parts.
Developer:
b. Prussiate of potash, either red or yellow, acid or alkaline.
Clearing solution:
c. Dilute acetic, muriatic or sulphuric acid.
Black positive, for cloth:
a. Gum arabic, 217 grains.
Citric acid, 70 grains.
Iron chloride, 135 grains.
Water, ¼ pint.
Developer:
b. Yellow prussiate of potash.
Water.
Or,
Nitrate of silver.
Water.

There is a method of copying drawings on thick paper, and even on cardboard, which is deserving of being better known among draftsmen. It consists of using a kind of sensitive paper known as "gelatine" or "bromide" sensitive paper, which is covered with a sensitizing compound made chiefly from the bromide of silver put on in a layer of gelatine, almost the same as the coating is put on a dry plate used for taking negatives for the purpose of making photographs.

An exact non-reversed copy can be made by taking a large printing frame, putting in a pane of glass, and then the drawing, face side away from the glass ; then the sensitive paper is put in with the coated side away from the drawing. This position is necessary in order to get a copy which is not reversed, consequently the sensitive paper used should be the thinnest that can be procured. It is sold in three kinds, the letter "A," the "B," and the "C." The "A" is the kind best suited for this purpose, as it is the thinnest and is very smooth.

After all is ready, as described above, the printing frame should be closed, and exposed either to the sun, to diffused light, or to the light of a common kerosene lamp. With direct sunlight, unless the drawing is on very thick cardboard, the exposure should be hardly more than a fraction of a second. With diffused light, and an ordinary ink drawing on drawing paper, the exposure need not be more than three or four seconds. With lamplight, an exposure of 10 to 20 minutes may be necessary, but probably one-half of this time will be sufficient. With large drawings, it is best to expose small test pieces, at least until some idea of the relative lengths of time required for the operation has been acquired. The small test pieces can be developed and the required time calculated from them pretty closely.

The developing is the worst part of handling this kind of paper. The first requisite is that the fingers be kept off the paper wholly and entirely. Everywhere the paper is touched on its face side there will be a spot on the finished work. If the hands are perfectly clean and free from perspiration they will not soil, but where can the hands be found that are as clean as that?

After printing as many copies as needed, taking great care to keep the paper away from every vestige of white light (a dark room is an absolute necessity with this kind of paper), soak in clear water for a few minutes, or just long enough to soften the paper, and while the paper is soaking make ready the developer by mixing together two solutions, which must be prepared in advance, say the day before. The solutions are :

(*a*) Oxalate of potash.
Water to make saturated solution.

(*b*) Sulphate of iron.
Water to make saturated solution.

Take of *a* 8 parts, of *b* 1 part, and add about an equal part of water; then if the lines do not develop dark enough some more solution in the same ratio may be added. Never put more than 1 part iron to 7 parts of the oxalate, or there will form a dirty deposit which will adhere to the surface of the paper and spoil it. In mixing the two solutions never pour the oxalate into the iron, as when the first few drops touched there would be an excess of iron in a little oxalate, and that would cause the deposit alluded to. If the iron is poured into the oxalate there will be no trouble, as the latter quantity will always be in excess.

After soaking the paper as mentioned place in the developer, and keep constantly in motion by rocking the dish back and forth. This is necessary to prevent any part of the paper from becoming developed while some other part remains undeveloped. Watch closely as the lines begin to appear, and if they flash quickly into view it is an indication that the developer is too strong. In that case pour in some water to weaken it. If the dark ground does not come up in a few minutes the developer is probably too weak, and needs to be strengthened by a little undiluted solution.

When the ground has become sufficiently dark, leaving the lines white, the developer should be turned off, or the prints removed to another dish and well washed with plenty of clear water. Then they should go to the "fixing solution," which is the same as for the silver prints already described, viz.:

Soda hyposulphite, 1 ounce.
Water, 1 quart.

After the prints have been in this bath for ten minutes they may be examined, and if not yellow, or otherwise stained, they are ready for the final washing and soaking, which should be continued for an hour at least, or until it is certain that all traces of the "hypo" have been removed. If, however, there be any yellow tinge or stain visible, place the prints in a dish containing water made slightly sour with sulphuric acid. In a few minutes the yellow stain will have disappeared, and the final washing may be proceeded with.

As before stated, the great point with this method is to keep things clean. No dirt will be tolerated by the paper without resulting in some ugly stains. Again, the dishes must be perfectly clean. Other chemicals will not work well with the developer used with the gelatine paper, and if even a trace of the pyrogallic acid commonly used for developing gets in with the iron and oxalate developer, then will the paper developed in the mixture be filled with black spots that look like ink, and ink they are, for the iron of the one solution combines with the gallic acid of the other and true ink, and black ink at that, is the immediate result.

The print made as above, and called a "bromide print" by photographers, is harder to make than the silver print, and is no better except when a large number have to be made in a limited time, as the time of exposure being very short allows a large number of copies to be made in a limited time. This point is also of value when thick paper or cardboard has to be printed from. For making negatives for blue-positive printing, the drawing and the sensitive paper should be put face to face, in order that a reversed copy, or a "negative," should be made.

Statue of Columbus.

The accompanying engraving is a reproduction from a photograph of a statue of Christopher Columbus, several of which have recently been made in sheet copper by W. H. Mullins of Salem, Ohio. A figure of this kind was sent to New Haven, Conn., another one to New York City, and a third to Columbus, Ohio. The maker, in describing this figure, says that on account of the fidelity of the engraving very little is necessary to be said with respect to the character of the work or the position that it will hold in comparison with other articles of its kind which have been made in the past in the same line of manufacture. This statue, we are informed, has been pronounced by those who have examined it, and who are competent to form an opinion, to be the finest piece of work of its kind that has yet been produced. The work has been executed with special care as to details, for the reason that the statue has been intended for use on park monuments and in other positions where it would have inspection from a near point of view. The joints are all countersunk and riveted, and so cunningly have the features of construction been concealed that an expert would discover them only as the result of very close inspection. The manufacturer claims, further, that in every way the statue compares very favorably with the finest bronze work from the foundries. Among the numerous surprising things that Columbus might have seen had he been on hand during the recent celebration in New York in his honor, not the least notable would have been this specimen of metal handicraft representing the bold navigator of four centuries ago in a most characteristic and suggestive pose.

Statue of Christopher Columbus, Executed in Sheet Copper by W. H. Mullins, Salem, Ohio.

CONTENTS.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
The Builders' Exchange.
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DECEMBER, 1892.

New York Trades School.

The different classes of the New York Trades School are at the present time under full headway, and the results being accomplished by the pupils are very gratifying to the instructors. Among the various shops in the school probably the most attractive is that devoted to carpentry. During the past few weeks the pupils in this class have been put through a variety of exercises, the objects in view being the teaching of the use of planes commonly employed by carpenters, including match, dado, bead, hollow, rabbet and round planes. The class in bricklaying numbers 45 pupils, and since the opening of the term practice has been given in building straight 8-inch walls and 12-inch piers. These, it may be well to remark, are the preliminary exercises of the course in this trade. The house-painting class is the largest in this particular branch that has attended the school, and among the first things taught are priming, applying second and third coats, mixing colors and glazing. The class in fresco painting, which numbers 17 pupils, is giving attention to lining in distemper colors. Although the term is comparatively young, the students in all departments have already acquired creditable proficiency in handling their tools, a fact which speaks well for their intelligence and aptitude in learning. The day classes at the school will commence on January 3 of next year, a number of entries from various States, East and West, having already been received. The General Society of Mechanics and Tradesmen of New York City shows a great deal of interest in the school and has appointed this year ten scholarships, two in the class in carpentry, five in the plumbing class, and one each in the bricklaying, house-painting and fresco classes.

The Mid-Year Meeting.

The mid-year meeting of the National Association of Builders, held in Indianapolis on October 17 and 18, was one of the most satisfactory the association has held. The officers and directors were imbued with the spirit of the work, and fully appreciated the amount of earnest endeavor yet necessary to secure comprehensive recognition of the effort being made in the interest of builders which will enable them to see the importance of profiting by the results produced. The work assigned to the committees was fully discussed, and a new departure made in their being instructed to present reports to the secretary in time to print and distribute among the filial bodies prior to the convention. During the course of the meeting a touching tribute was paid to the memory of Marc Eidlitz of New York City, and a telegram expressing condolence and sympathy was sent to President Harrison. From the work planned the St. Louis convention in February is likely to be an important one.

Severe Test of Fire-Proof Construction.

An interesting and at the same time somewhat severe test of the fire-proof qualities of what is known as Chicago construction occurred in the city named on the last day of October. Chicago construction, as our readers generally are aware, consists of an iron or steel frame work, so put together as to remain standing even though the brick and stone work are entirely removed. The test of this form of construction occurred in the burning of the ten-story building of the Chicago Athletic Club, which at the time the conflagration started was so far advanced toward completion that the plastering was finished and the carpentry work in progress. Owing to the large quantities of lumber, barrels, shavings, varnish and loose material scattered through the lower floors, the heat was intense, melting the glass in some of the windows and fusing the bricks in many places. The stone work of the upper six stories was so badly damaged as to necessitate rebuilding, but there is nothing surprising in this, as it is a well-known fact that stone will not stand the combination of fire and water. An idea of the extent of the damage resulting may be gathered from the statement of an official of the insurance patrol, who after the fire said that, so far as he could judge, the building itself was all right. "The big girders are not bent, the brick floors are not broken and nothing has gone up but the slight brick partitions and the brick casing around the pillars. A few unimportant scantlings that held the partitions are bent and must be replaced. On the whole, the building is as sound as ever."

Architectural League of New York.

The Eighth Annual Exhibition of Architectural and Decorative Drawings of the Architectural League of New York City will be opened to the public on January 2 of the new year, and will remain open for the three weeks following. The exhibition will be held in the building of the American Fine Arts Society, 215 West Fifty-seventh street, where will be shown architectural designs embodied in plans, elevations and sections, photographs of executed work, designs for decoration, furniture, &c.; cartoons for stained glass, full-size drawings for ornament, models of executed or prospective work, examples of carving in stone or wood, wrought iron, mosaic, glass, &c., together with sketches, drawings and paintings of architectural or decorative subjects. In connection with this exhibition will be the sixth annual competition for the gold and silver medals of the Architectural League, competitors in which must be residents of the United States and under the age of 25.

Philadelphia Trades School.

The action of the Master Builders' Exchange of Philadelphia and the position it takes in the building world of that city are deserving of praise. The latest move in the direction of public benefit is the addition of a class in sheet-metal work in the trades school which it conducts. The trades school has been organized in such a manner that tuition is within the reach of any boy desiring to become a skilled mechanic. After the establishment of the institution the Exchange opened negotiations with the Bricklayers' Union, convincing the union that graduates from the school were not intended to menace the welfare of the journeymen by lowering wages or anything of the kind, and secured admission for the pupils into the union as apprentices with due allowance for the period of study. The exchange is now holding conferences with the Journeymen Plasterers' Protective Association for the purpose of securing the adoption of a similar system of apprenticeship to that which prevails in the bricklaying trade.

Houses for Workingmen.

According to one of our foreign contemporaries, Herr Krupp of Essen, has recently invited some of the German architects to compete for designs for a large number of dwellings to be occupied by workingmen and erected near his extensive industrial establishment. The houses are intended for invalid workmen and pensioners, and not only are the dwellings to be practical in plan, but it is required that they also be pleasing in design and architectural effects. The statistics of a few years since show that Herr Krupp gave employment in and about his works to a staff of 20,960 men, who, together with their families, formed a colony of 73,769 persons. Of this number, it is stated 12,723 lived in houses owned by the heads of their respective families, while 24,193 occupied tenements rented from the great iron master. It is probable that the latter has erected every class of home for the different grades of members on his staff, ranging from the villas situated in a fashionable thoroughfare, for the senior officials, down to simple barracks for the unskilled bachelor laborers. In connection with this great industrial establishment will be found every kind of philanthropical institution, technical and elementary schools, co-operative stores, fire department, &c., while the enjoyment of the workmen is provided for in a casino for the officials and in a subsidized theater, which has recently been opened. On all sides there are to be seen abundant proofs of systematic attempts to beautify the homes of the workmen so far as practicable by means of simple architectural decoration.

Fourteen Volumes.

The present issue completes the fourteenth volume of *Carpentry and Building,* and accordingly a brief retrospective view may not be out of place. When this journal was started it was thought that there was a large field for it to occupy and a useful work for it to do. It was believed that, by bridging the gulf between the man who knows on the one side and the man who does not know but who wants to know on the other, a patronage could be found which would amply support the effort. In this estimation of the situation, as time has proved, we were not wrong, and as the enterprise has developed we have found our constituency of subscribers constantly increasing and our range of work constantly widening. Nor has the paper itself been without advancement, as our readers at large will testify. There have been constant progress and continual improvement in all departments. Those of our readers who have all of the 14 volumes for reference will perhaps be interested in making comparisons of the issues for the first two or three years with what has been done latterly, but the changes in our work have no more than reflected the advancement of the craft at large. We have great pleasure in being able to say that carpenters and builders to-day throughout the land stand upon a much higher plane in the business and social scale than they did 14 years ago. Better business methods prevail among them, they have a larger measure of information, and they exercise a better spirit of co-operation and mutual self-help than has ever before been displayed, and there are more of them making financial successes of their enterprises than formerly. We do not for one moment take to ourselves the credit for all this improvement, but that this journal has contributed its fair quota to the gain that has been made we think our readers will admit. In any event this journal has advanced as the building trades have advanced, and it has at all times kept in touch with what has been current.

Prize Competitions.

However, it is not our purpose to praise ourselves, and no doubt we can direct the attention of our readers to what we have in store for them for the near future to much better advantage than dwelling upon what has already been done. There will be found in another part of this issue a portion of the programme for 1893. In it we have described in brief terms some of the work we hope to do, and have outlined several plans that have been formulated for supplying our subscribers with interesting articles and useful information on a variety of topics. Cheap houses have ever been a subject of interest to our readers. The competition referring to moderate-priced dwellings and presenting all that the builder requires to finish the structures, and also the one relating to floor plans only, we think will be specially welcome. Nor have we forgotten the wants of those who have written us about school houses, and about fronts for business buildings in the smaller towns throughout the land. Competitions are features which have ever been popular among the readers of this journal, and those now announced are among the most interesting, we think, that have ever been brought to the attention of practical men. If they attract the same amount of attention as others in the past, what we publish coming from them will have much about it to interest and instruct. We shall be glad to have every one who reads this paragraph constitute himself a committee of one to bring to the attention of some other architect, designer, builder or mechanic the journal which we are publishing, and also the special programme which we have arranged for another year. By so doing he may confer a very important favor upon a friend —in any event his kindness will be appreciated in this office.

BUILDING WAYS AND MEANS.

A RATHER UNIQUE method of laying foundations in swampy soil has, according to one of the American railway papers, recently been employed by an American engineer. The structure to be supported was a low wooden one, and it was proposed to use it for the storage of machinery. The foundations were prepared by first setting casks in holes in the ground along the line of posts and filling them in to about the depth of 1 foot with iron turnings. The posts were set into the casks, which were then filled with iron turnings compactly rammed in place. A solution of salt and water was then slowly poured over the turnings, under the action of which they solidified into a hard mass. It is stated that the heat of the oxidation of the iron was so great as to char the posts. This served also to act as a preservative, and the opinion is advanced that to this extent iron turnings may be superior to concrete under similar conditions.

* * *

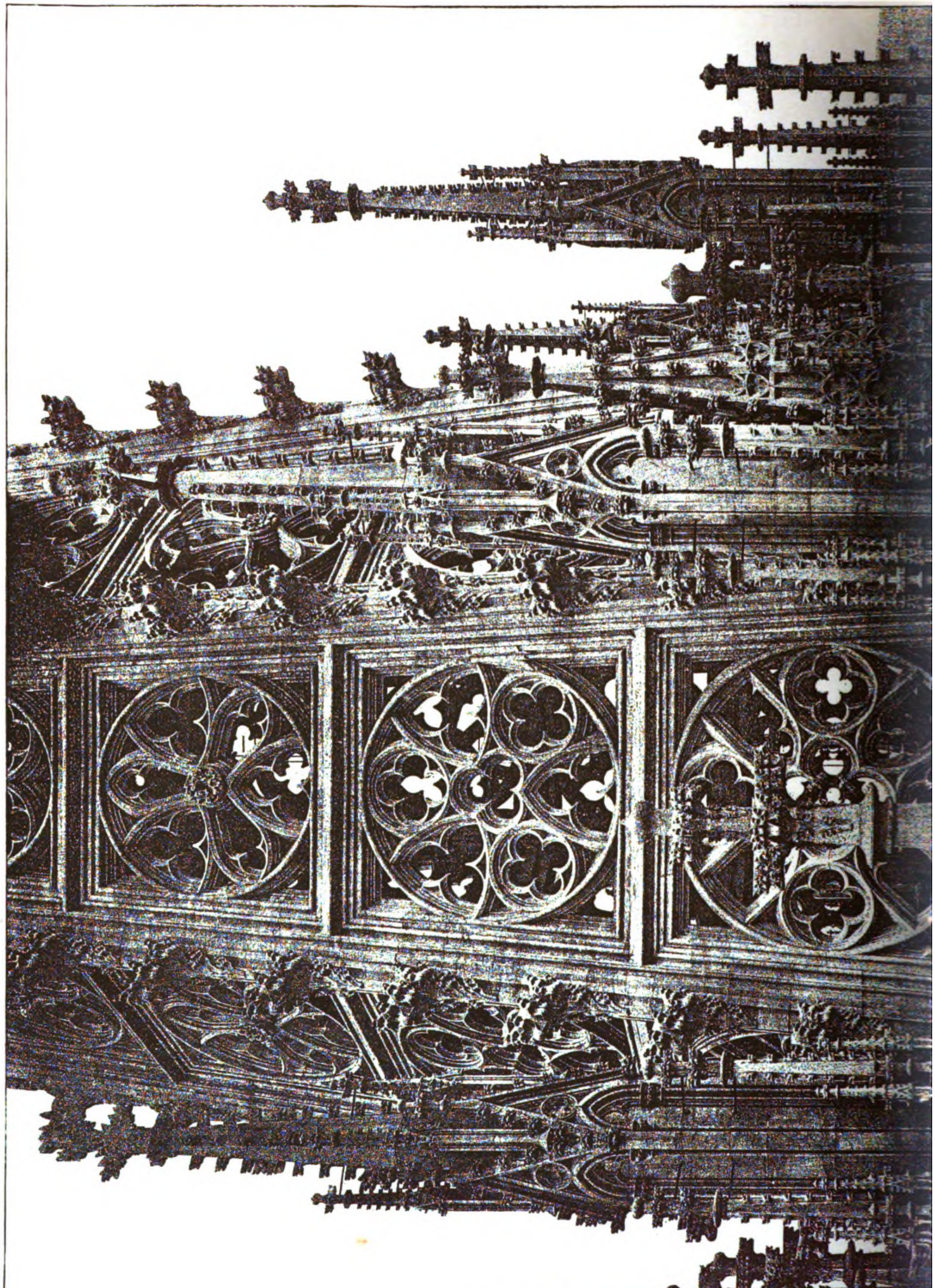
A SOMEWHAT novel and at the same time very interesting method of construction is employed in connection with the building being erected on William street near the Brooklyn Bridge approach in this city. It is designed to accommodate manufacturing establishments using power, and is regarded as a decided advance in its line. The structure is to be 14 stories high, each story to be a loft 210 feet long and from 50 to 55 feet wide. It fronts 50 feet on William and Rose streets, and will tower nearly 200 feet in the air. In this building the main consideration being strength, both steel and brick are utilized. While the steel skeleton work is somewhat similar to that designated as "Chicago construction," W. Wheeler Smith, the architect, has made use of massive brick walls, so combining them with the interior steel as to give the greatest solidity and utilize both sources of support to the fullest extent. The steel uprights on the outer edges of the building are inclosed at intervals by solid brick piers 8 x 4 feet in size, while the girders and flooring are so contrived as to receive this masonry support as well as the support of the steel uprights. Another advantage of this combined construction is that no interior brick walls appear, thus giving an open span of 210 feet. It is stated that with the heaviest machinery in motion on every floor at the same time, no tremor will be perceptible, even in the top story. It will be made as nearly fire proof as possible, only brick, cement and steel being used in the construction. One of the interesting features is the number of windows, which are close together on every floor, so that the façade toward the bridge exhibits a greater surface of glass than brick. The projectors regard this building as marking a new era in construction for manufacturing purposes.

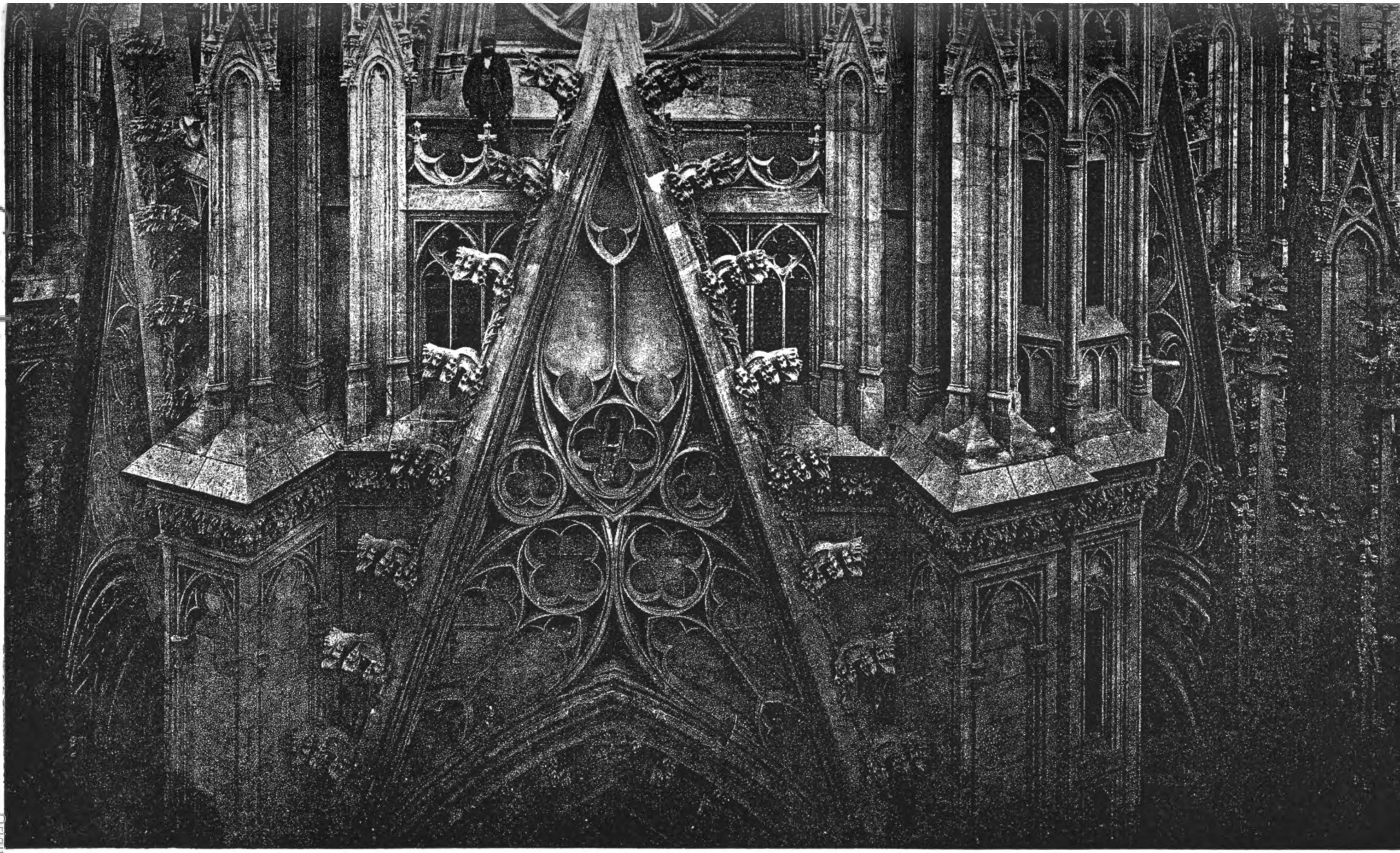
* * *

ANOTHER remarkable building, but of a somewhat different sort, is the new storage warehouse recently put up on Seventh avenue between Fifty-second and Fifty-third streets, in this city. It is considered one of the best examples of absolute fire-proof buildings in this country. The structure is ten stories high and made rather attractive by the clever adaptation of the Spanish renaissance style of architecture. The material used is light Perth Amboy brick on a foundation of massive North River bluestone. It has a frontage of 200 feet on Seventh avenue and 100 feet on each of the side streets, it being intended at some future time to double the capacity with an additional frontage of 200 feet on Fifty-second street. The main front presents a rather odd appearance, owing to the fact that with the exception of a triple row running from the ground to the roof there are no windows. The ninth-story colonnade is made of round columns and pilasters, jutting outward with deep arched recesses. The towers at each corner are square belvederes roofed with black tiles. Shooting boxes, similarly roofed, stand out from the two street corners at the eighth story, the whole effect suggesting a military rather than a mercantile purpose. The outside walls are 3 feet thick at the foundation, gradually decreasing toward the roof, where the thickness is 18 inches. The interior court is separated from the storage rooms on each side by continuous walls of equal thickness, and the subdivisions of the rooms are by thick brick walls perpendicular from cellar to roof. Steel is employed only in the floors, the latter being of terra cotta, brick and cement. The building is divided into two portions by an interior court, which is floored at every story and connected vertically by two enormous elevators capable of lifting the largest furniture van. Each floor, except the first and top ones, is divided upon each side of this court into three large rooms, walled, floored and roofed with solid masonry. These rooms in turn are subdivided by steel partitions into compartments of many sizes, each compartment being steel barred and securely locked. The top floor is divided into three large rooms with high ceilings and well lighted from above. One of these rooms is for the storage of paintings, while the other is for sleighs, carriages and other bulky articles. The room for storage of silver and other ware is surrounded by walls 3 feet thick and lined with steel ⅛ inch thick. The arrangement of the building is such that a large van may be driven in from the street and upon an elevator, which will lift it to any floor, where it can be loaded or unloaded as circumstances require. The building was designed by James E. Ware of this city.

* * *

SOMETHING of a departure in building construction is found in connection with the edifice about to be erected in Chicago at the northwest corner of State and Madison streets. Perhaps the most interesting feature in connection with the building will be the use of thin plates of aluminum for the street fronts, the material being called "aluminum bronze," from the fact that the metal will have a slight alloy, which will give it a pleasing gold color. The site has a frontage of 62⅛ feet on State street and 106 feet on Madison street, and the building to be put up will be 16 stories in hight. The first or ground floor will be of ordinary store hight, while those above will be 12 feet, 10 feet 6 inches and 11 feet in the clear. The windows will occupy the entire distance between the stories except a small space required for the mullions, and each window will have two plates of glass 11 feet long, joined at the center with a line of aluminum, making practically one large plate of glass 22 feet long. On each side will be a smaller window for the purpose of ventilation. The mullions between the two windows will be covered with a plate of aluminum. The aluminum on the street fronts is intended simply for the purpose of exterior protection and ornamentation, taking the place of fine terra cotta, which would ordinarily be employed in such a structure. The floors of the building will be of Roman mosaic throughout, both fire and water proof. Each floor will have an invisible slope toward the exterior walls of the building, through which there will be constructed scuppers with automatic valves, designed to carry water out into the street after it has performed its function in case of fire. The building is being put up by the Chicago Leasehold Trustees, and is intended to be a distinct advance in architecture.





DETAIL OF WESTERN SPIRES OF COLOGNE CATHEDRAL.

REPRODUCED FROM A PHOTOGRAPH BY ANSELM SCHMITZ.

SUPPLEMENT CARPENTRY AND BUILDING, SEPTEMBER, 1892.

BUILDING IN POMPEII.

BY A. O. KITTREDGE.

HOWEVER INTERESTING our own building construction may be, we are always ready to give ear to accounts of how building is done in foreign lands and how building was managed in ancient times. Studying the building of our own day makes us severely practical and qualifies us for various business pursuits, but studying the building of other nations and of other ages affords an education in a different direction equally valuable in a general way, although not so immediately profitable in a business sense. Building styles are influenced by the civilization and taste of a people, and also by the materials available for use. At different dates in history, buildings in the same neighborhood and composed of substantially the same materials vary in style, in arrangement, in appearance, in color, in conveniences and in many other particulars, due to differences in the habits and the tastes of the people. On the other hand, buildings in different countries, sometimes only a little way apart, and erected at about the same date for people of very similar tastes and wants, differ greatly by reason of the differences in the materials available for building purposes.

In our own country the buildings of the present day differ from those of a century ago, whether we consider the average dwelling or the pretentious city block, by reason of both sets of causes outlined above. As a nation, our tastes and ideas have advanced, and that which met all requirements a short time ago is now no longer acceptable. Again, the development of our natural resources and more especially of our manufactures, has brought many materials into use in building of which nothing was known a short time since. Further, we are learning to adapt to our own use the arts of other nations, both ancient and modern, and to borrow from them various features of building construction and embellishment, as well as peculiar uses of materials, which still further modify our buildings.

COMMON USE OF CHOICE MATERIALS.

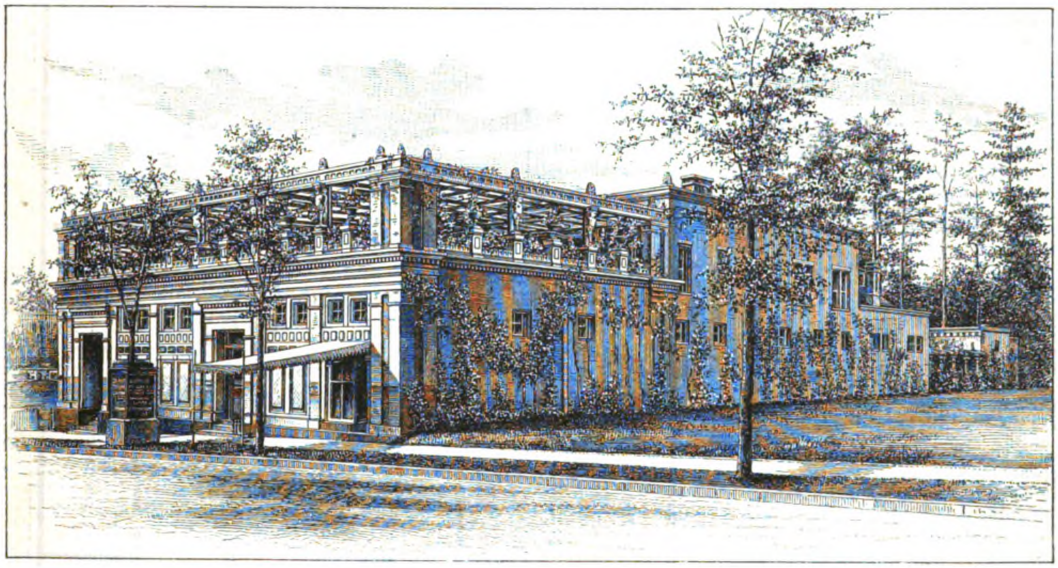
A nation where marble abounds will build of that material most freely, but what is comparatively common there comes in time to be borrowed and used as an embellishment in remote countries where marble is not found. A people in a wooded country will build, at first, at least, almost exclusively of wood, and will use lavishly woods which in other and less favored parts of the world are greatly prized. A people in a volcanic or lava district will learn to make artificial stone and to produce structures therefrom more enduring than those built of quarried material, while a people in a treeless country, where neither stone nor yet the material to make artificial stone abounds, will learn to make and use brick to a degree of proficiency that commands the admiration of the world.

RESOURCES OF THE MODERN BUILDER.

The tendency of modern building construction is to disregard local conditions and to combine the materials of a dozen lands in a single structure. Distance is annihilated; for, thanks to modern transportation, choice stone from a far-off land costs no more than the product of a local quarry of uncertain quality. Time is discounted, for modern mechanical processes produce in short order what formerly in ordinary course required a long period to accomplish. Man has pried into the secrets of nature's laboratory until he knows how even the rocks are made, and substituting for chance or accident an intelligent choice in the selection of the materials to be combined, he improves upon nature's building materials. Never in the history of the world have builders had so much at their command, nor yet materials of so excellent quality, as at present.

To contrast the most ancient building our own country affords with the structure representing the most recent ideas of building construction would only be bringing together the extremes of a very brief period of time, but to go back to the days of Pompeii and contrast a building of that city before its destruction with those of the present day is to span a much longer period of time and to institute parallels of the most instructive character. Not only did the building materials of Pompeii differ from what we use at present, but their civilization and their culture differed from ours. Climatic conditions were also different.

To reproduce a house of ancient Pompeii at the present day, it is found convenient to use building materials which in one sense are modern, because in their present form they are the product of modern machinery and processes, but which in another, and we might say original form, were used in many of the cities of Rome. All this is suggestive to the modern builder and lends special interest to the "Pompeia" or "House of Pansa," the subject of the accompanying illustrations, a structure which now stands in Saratoga, N. Y. In the official announcements it is described as a "Roman house illustrating the art, architecture, mythology, manners and customs of the Roman Empire." It is of interest to builders for all these reasons. Pompeii was buried by Vesuvius A. D. 79, and therefore more than 1800 years have transpired since the building methods which this structure represents were current.



Building in Pompeii.—Reproduction of the "House of Pansa," at Saratoga, N. Y.—General View of Exterior.—(For Plan and Interior Views, see Succeeding Pages and Supplement Plates.)

THE "HOUSE OF PANSA."

The general appearance of the reproduction of the House of Pansa as it stands in Saratoga is afforded by the cut on this page, which was made from a recent photograph. The plan on page 306 shows the arrangement of the complete structure, embracing not only the ancient house, but also at the side a corridor, used as a gallery for the display of examples and models of art and architecture, leading to the back part of the building and communicating through the *Hortus* with the larger gallery, containing also a collection of paintings and models. The views in the supplement plates and on pages 307 and 308 afford an excellent idea of the interior arrangement and details.

Writing upon the subject of the material used in this structure, Franklin W. Smith, to whom the world is indebted for this reproduction, as well also as for the design for a national art gallery, already referred to in these columns, says:

THE MATERIALS EMPLOYED,

"The Pompeia is built (the exterior) of brick, which with concrete was the principal material of the Romans. The front is coated about 1 inch with Portland cement and painted. It has stood perfectly (not one crack!) during four winters with cold to 25° below zero. The roof is of horizontal wood-beam construction as with the Greeks and Romans, paneled and decorated beneath. The walls within are of plaster (partly on brick as in Pompeii). The door jambs are of massive concrete, precisely like those in Pompeii, of 12-inch with 4-inch reveal. The columns are of molded fine Portland cement and sand concrete. Those in Pompeii were frequently of brick covered with plaster. The *Impluvium* and *Viridarium* are in pavement of concrete with marble sides and broad marble copings. These are surrounded as usual in Pompeii with black and white tiles. The pavement of the halls is generally, as in Pompeii, of white marble tiles with panels of tiles and mosaic in the *Cubicula* and other apartments. The garden (*Hortus*) and banquet hall (*Œcus*) are floored in gray concrete with a wide border of red concrete to bases of marble 1 foot high around the walls. The square columns are of brick, plastered as in Pompeii. The garden beds are bordered with concrete edging, paneled in Roman forms as in Pompeii. Its walls are faced with cement plaster, and decorated. The above details prove the adaptation of concrete to all uses of masonry in modern as in ancient times."

CEMENT CONSTRUCTION.

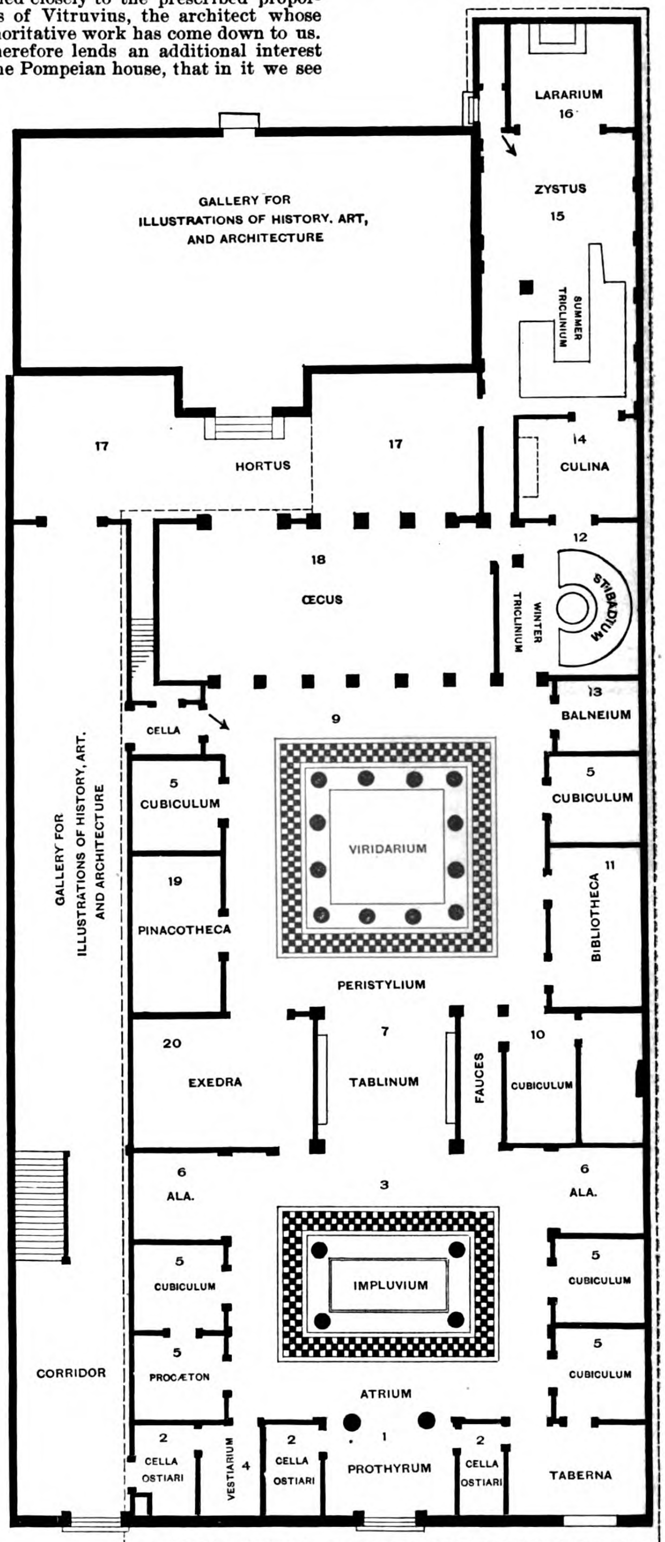
Speaking further of the use of cement construction, Mr. Smith says: "Modern cements are equal in quality and endurance to the ancient, the latter never being submitted to the severe tests of temperature prevailing in our Northern States. This fact is obtaining recognition in the general use of cement for pavements, the severest test possible for material against changes of temperature by proximity to moisture beneath, and sun warmth above, and recently also for foundation walls and partitions of buildings, as for a long time in Europe. Its reinforcement by iron as demonstrated by Mr. Ward in his concrete residence in Portchester, N. Y., by myself in the Villa Zaayda, St. Augustine, was extensively illustrated in the foundations of the Hotel Metropole, London, which, it was stated, received 65 miles of band iron. The principle is now successfully applied in England and Germany in strengthening cement, sewer and conduit pipe by wire netting cast within it.

"In California concrete construction, thus reinforced by twisted iron, has obtained substantial acceptance in various large constructions throughout, not only as in the house of Mr. Ward for floors and partitions, but in columns and domes. Thus modern construction repeats ancient examples, for the dome of the Pantheon at Rome is but a bell of solid concrete. The Museum of the Stanford University, the Science and Art Building, Mills College, Academy of Sciences, San Francisco; United States Torpedo Magazine, and other structures are recent specimens. The announcement that the New York *Herald* building is to be of artificial stone is presumably that it is to be of concrete with marble inlaid, *i.e.*, imbedded, as in the sidewalks of Pompeii, copied by myself in the pavement before the Pompeia, of concrete, containing a marble mosaic of the letters "HAVE." It is with these convictions of practical advantages that I propose concrete as an economical and durable material for my design for a National Gallery."

The dimensions of the House of Pansa, as reproduced at Saratoga, are 200 x 75 feet. It is visited by thousands of people annually, by some as builders to contrast ancient and modern methods and materials, and by others in the sense of studying the art of ancient Rome and the customs of the people of the first century of the Christian era. Those who enter its portals are handed a little book which contains many particulars of interest to all classes of visitors. Some of the paragraphs are of interest in this connection.

ARRANGEMENT OF ROMAN HOUSES.

The arrangement of the houses of Pompeii was generally upon the plan of all Roman houses of the period and conformed closely to the prescribed proportions of Vitruvius, the architect whose authoritative work has come down to us. It therefore lends an additional interest to the Pompeian house, that in it we see the usual Roman habitations in the time of Christ. The homes of the citizens differed only in size and grandeur, according to the wealth of the owner; the ornaments, wall decorations, &c., varied by individual taste. To understand clearly the construction of a Pompeian house, it should be remembered that it was divided into two parts—one for family use, the other for the public. This remarkable feature sprang from the "Constitution of Rome," which permitted each patrician to draw about him as large a number of plebeians as his rank



Building in Pompeii.—Plan of the House of Pansa, Reproduced at Saratoga.

or influence could attract. These clients, as they were called, had free access to the houses of their patrons, for political conference or advice, and they were cordially welcomed, as their votes and influence were of importance. Early in the day they assembled under his roof, awaiting his presence to ask favors or seek his aid. It was, therefore, indispensable that family privacy should be secured by special construction.

Thus the *Atrium* and *Alæ* were quite freely appropriated by the dependents or retainers. The private rooms, called the *Penetralia*, consisted of the *Tablinum*, in the center of the house; the *Peristylium* (court), the *Cubicula* (bedrooms), *Triclinia* (dining rooms), *Bibliotheca* (library), *Exedra* (conversation-room), *Pinacotheca* (picture room), *Culina* (kitchen), *Lararium* (private altar), *Balneum* (bathroom), and the *Zystus*, or small garden.

THE REPRODUCTION A COUNTERPART OF POMPEIAN DOMESTIC ARCHITECTURE.

The *façade* is as precisely as possible a counterpart of Pompeian domestic architecture. The doors are an accurate reproduction from casts in the museum at Pompeii. These casts were made by pouring plaster into cavities left in the *scoriæ*, where the doors had left their imprint before decay.

An able writer says: "The exterior of the Roman *domus*, the ornaments of the interior notwithstanding, was somewhat paltry; partly owing to its lowness and partly to the absence of windows.

"The interior, on the contrary, was magnificent. What a magic effect must have been produced when all the doors and curtains were thrown back and the eye could reach from the *Ostium* (entrance) through the three courts; . . . all grouped in the most charming perspective, and overhead the deep blue of an Italian heaven."

We will take the rooms in order as they are numbered, and thus, without confusion, the reader may understand the use and details of each.

THE ROOMS AND THEIR USES.

No. 1. *The Vestibule*—Opens outwardly upon the street and inwardly upon the *Atrium*, or hall. The first object which greets the eye is a fierce dog in the act of springing upon the visitor. This device, in mosaic, was common to the larger houses, and indicates that it was a reminder of a dangerous dog within; quite necessary where houses stood so invitingly open. Beneath it was written the warning "*Cave Canem*" (beware of the dog).

In the vestibule are brackets with four busts called "The Great and Good." This was a custom, not only in Pompeii, but Rome, by which Socrates, Plato, Cicero, Homer and others were installed as exemplars. *Salve* (welcome) greets the visitor from the pavement as he enters the dwelling.

No. 2, 2. The small rooms at the side of the vestibule were occupied by porters who not infrequently were chained slaves.

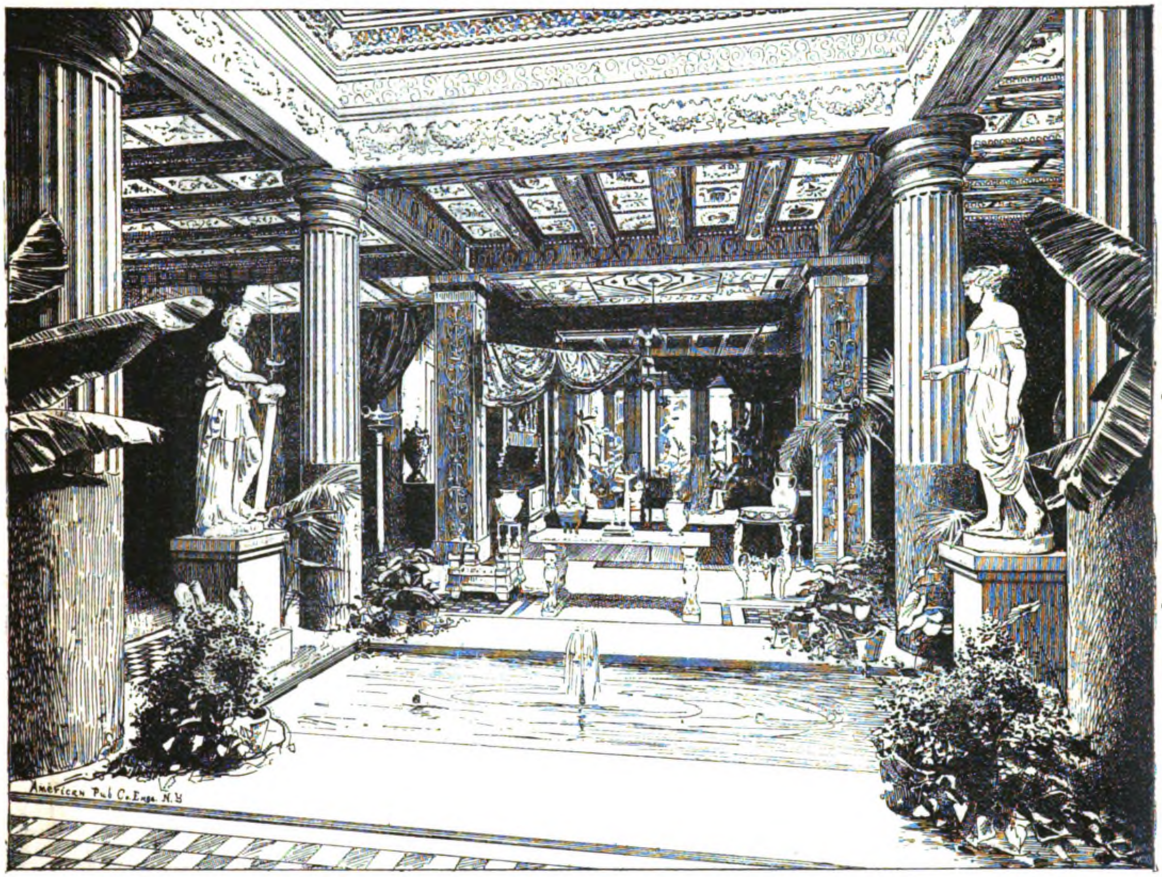
No. 3. *The Atrium* was an imposing hall, where the master of the house received all who were not admitted to the inner apartments. In the center of the roof is seen the *Compluvium* (with a sacrificial cornice of festoons and skulls of bulls), toward which the roof sloped in order to throw rainwater into the *Impluvium*, a marble pool in the floor, where a fountain throws its cooling spray into the air—the bottom painted as a reflection of the sky above, and with seaweed also as growing there. At the corners of the *Compluvium* roof are the lions' heads, through which spouts carried the water into the pool, whence they passed into other cisterns, to be used for household purposes. The ceiling of this *Atrium* is decorated with copies of the famous mosaics from the Villa of Diomede, exhibited in the National Museum at Naples. A general view suggests a collection of orchids.

The "Muses" upon pedestals are: Terpsichore, Dancing; Polyhymnia, Religion; Erato, Poetry; Clio, History; Euterpe, Lyric Poetry; Calliope, Science. Tables, chairs, couches, musical instruments, tripods, candelabra, and all other furniture have been reproduced from originals preserved in the Naples Museum or from wall pictures found in Pompeii and Herculaneum and models in the Naples Museum. The lamps also are modeled from one of the richest patterns in the great work on antiquities of Herculaneum. Every household article, from the most elaborate furniture to the most ordinary kitchen utensil, was executed with an artistic grace which reaches the acme of elegance. Even colanders were perforated with graceful designs. The taste in these details proves a study of Greek art by the artists—whereas, in our mechanical age, the skill of the artisan rather than the artist is set forth in household chattels.

CLOAK AND ANTE ROOMS.

No. 4. *The Vestiarium*, or cloak room, where clients were required to leave all superfluities before entering the *Atrium*.

Nos. 5, 5, 5, 5. Are the anteroom and three *Cubicula* (bedrooms) ranged on sides of the *Atrium*—so named from their cubical form. These were invariably small and dimly lighted. Their inconvenience to modern view is explained only by the custom of the Romans to sleep in their



Building in Pompeii.—View in Atrium or Hall, looking through the Tablinum and Peristylium.

apparel, and on awakening to resort to their magnificent public baths for warm and cold ablutions, and an elaborate toilet, with oils, perfumes, the friction of the strigil and all the appurtenances of those vast and luxurious establishments. These *Cubicula* are the exact size of those in the stately House of Pansa. Specially noticeable is the bed made after the bronze original exhumed in Pompeii, with its exquisite modeling. The chair of the Muses will be recognized as familiar in ancient Greek bas-relief.

Nos. 6. 6. *Alæ*, or wings, on either side of the *Tablinum*, were recesses used for rest or conversation. The ceilings are precise in size and color from the richest specimen published by Nicollini, in the most superb work yet issued upon Pompeian relics and art.

THE MASTER'S ROOM.

No. 7. *The Tablinum*, a central apartment, entered from the center of the *Atrium*. This was the private retreat of the master of the house; his *Sanctum*, where, in cabinets, were kept busts of ancestors, family archives and genealogical tables, the latter giving the name to the room. The ceiling of this room is from a remarkably well-preserved house excavated in 1865. The cabinets are supplied with *facsimiles* of ancient papyrus manuscripts and rolls of Latin, simulating accurately the books of the Pompeians. The busts are in part to illustrate kindred; and therefore are not all contemporaneous.

The "Strong Box" is a precise copy of one in the museum at Naples.

It will be seen from the various copies of mural paintings found in Pompeii that draperies were used, both at doors and windows, although no such textiles could, of course, have survived the destruction, even in carbonization.

From the *Atrium* again, we turn to the right into No. 8, the *Fauces* (the jaws), a narrow passage which obviated passing through the *Tablinum* to inner apartments. The principal of these is

THE PLACE OF ENTERTAINMENTS.

No. 9. *The Peristylium*—a court or hall still larger than the *Atrium*, with twelve columns inclosing a space called the *Viridarium*, with Pan and Satyr among the verdure. Above was another opening admitting air and sunlight. Here were given private entertainments, when the colonnade was festooned with garlands of roses and was gay with gorgeous plumage. Here beneath subdued lights moved those stately Roman men and women, in their classic robes, while music from flute and lyre stole upon the ear from slaves concealed above. It is here that Sir Bulwer Lytton depicts the meetings of the beautiful Ione with Glaucus and Arbaces in the "Last Days of Pompeii."

The ceiling of the *Peristyle* is copied from the Baths of Titus. Few ceilings escaped destruction in the falling of burning rafters during the catastrophe. On the right of the *Peristyle* at the end of the *Fauces* is

No. 10. *A Cubiculum* larger than those upon the *Atrium*. The mural decoration of this room is from the "House of Castor and Pollux."

No. 11. *Bibliotheca*, or library, was never necessarily very large, as literature in those days was not voluminous. The rolls or manuscripts, however, were not compact, like modern books. They were made of papyrus or parchment, and written in ink, intended to be easily washed off. There was a small ticket fastened at one end, designating the subject, and the books were frequently kept rolled up in boxes (*Scrinia*) with tickets uppermost. These books when found were at first supposed to be charred sticks of wood, but some have been successfully unrolled by the most painstaking efforts.

THE DINING ROOM.

No 12. The winter *Triclinium* (dining room), named from the couches surrounding the table, as Romans always reclined during meals. The size of the couch was in accordance with the rule that the number at dinner should never be less than the Graces (three), or more than the Muses (nine), excepting, of course, in large banquets. Grand houses had two *Triclinia*, for winter or summer use, but the ancients were much addicted to the pleasures of the table, and called frequently into requisition the *Œcus*, or large hall. At such times the floor was strewn thickly with sawdust stained in bright colors, and at one end of the hall slaves danced during the meal. A silver hoop suspended above the table held chaplets of flowers, or even of silver, for distribution among the guests. Each person reclined upon his side with his elbow resting upon a cushion.

No. 13. *Balneum*, or bathroom. As all Pompeians used the great public baths, the private ones were limited, as only for emergency. The wall of this room is from the unique decoration of the bathroom in Diomede's villa—a representation of deep sea water, with fishes—and pomegranate trees on the side walls in full bearing. The marble tub is below the level of the floor, like a tank, as was the custom, and the ceiling represents an open sky, with birds, dragon-flies, &c.

No. 14. *Culina* (kitchen). This was between the two *Triclinia*, and the brick stove of this room is a model of that found in the House of Pansa. Spits for roasting were laid across the embrasures of the stone. Chimneys were not used, charcoal not requiring them.

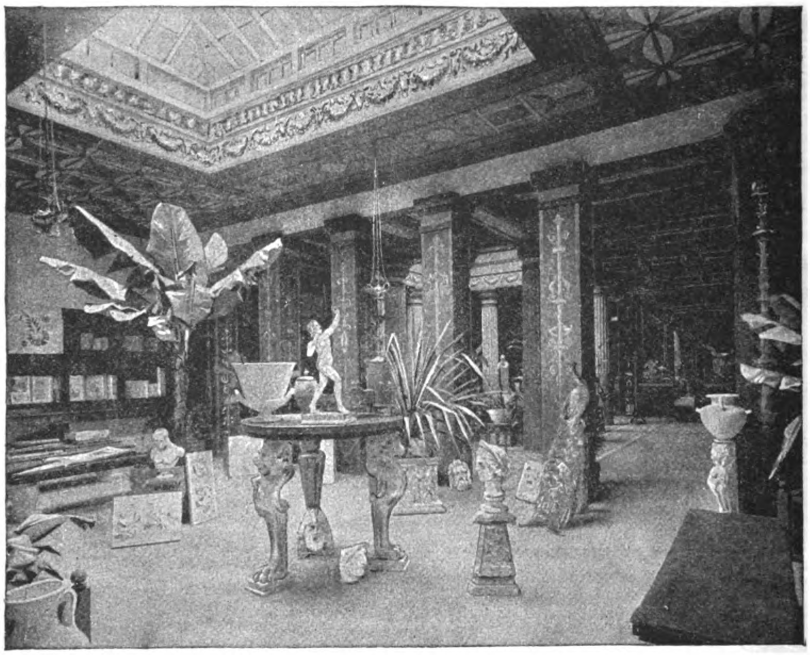
No. 15. Summer *Triclinium*. Here in the summer the Pompeian families took their meals, beneath the shade of trellised grape vines as screen from sun rays. Flowers lined the walls, on which were paneled pictures making vistas—loopholes for the imagination to range beyond the narrow inclosure. The dining couch is an exact reproduction of one remaining in Pompeii, and at its precise distance from the garden walls. The panels are painted in oil from originals in Herculaneum.

The *Amphoræ* were made either to stand in the ground or to be set in other vessels, and held wine, oil, &c. The vases were used for holding water, wheat and other articles of food.

No. 16. *The Lararium*, or household temple, has above it a sacrificial picture taken from a temple in Herculaneum. The altar within has bas-reliefs of a sacrificial procession of the Gods of Olympus, and others, adjacent, are of special celebrity: "Bacchus Visiting Icarus." "Consultation of the Oracle of Apollo." "Apollo Receiving Libation from Victory." "Bacchanalian Figures." It was here that the family propitiated their "Lares and Penates" with flowers, fruits and the blood of animals.

THE GARDEN.

No. 17. *The Hortus* (garden), with walls painted in oil in the fantastic style always



Building in Pompeii.—View in the Œcus or Banquet Hall.

followed in their outside work. The first in order represents a disciple of Bacchus after a revel; the second, a more noble Roman, recumbent in thoughtful mood; and adjoining this pair is "Orpheus Charming the Animals" with his music.

No. 18. *The Œcus*, or large hall, was an innovation borrowed by Pompeians from the Greeks. It was used for a banquet hall. The proportions were so regulated as to accommodate two *Triclinia*, their respective couches facing each other, with space for servants to pass between and around them.

No. 19. *Pinacotheca* (picture room) contains oil paintings by Pascal and Zurcher.

No 20. *The Exedra*, or conversation room, is supposed to supply the place of the modern drawing room, though the *Peristyle* rivaled it in attractions. Here, however, were placed some of the choicest of the adornments of a rich Pompeian house. The ceiling, as also that of the *Œcus*, is from the Baths of Titus.

THE ROOF.

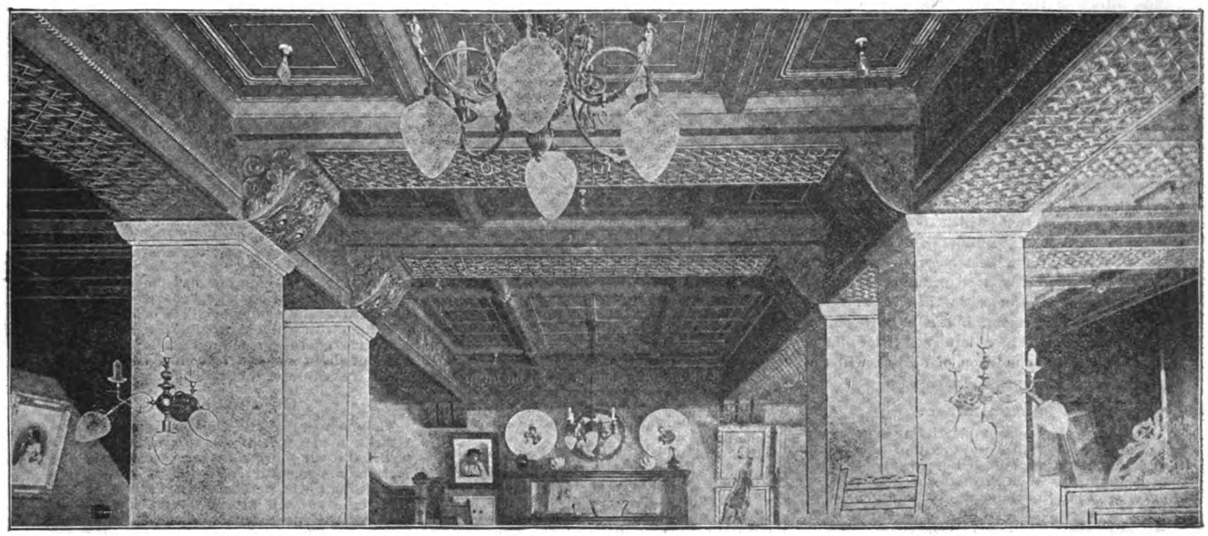
No. 21. *The Solarium* (sun terrace). Generally the houses consisted of but one story, but in some were extra sleeping rooms over a part of the structure, as is shown by remaining staircases. The *Solarium* was thus left on the roof of the front part of the building, and was the most delightful portion of the house. Shaded by vines from the street, and ornamented with growing flowers, it was the resort in warm evenings for air, and in cooler weather for "sun baths." Caryatides support the trellises, and vases alternate with them, holding vines which grow in trained festoons around the roof garden.

Houses in Ancient Rome.

From the earliest times the private houses in Rome had been very simple in structure; but after the conquest of Greece, and more especially of Asia, individuals began to build their dwellings in a magnificent style, says an exchange, and the taste for splendid mansions and palaces increased so rapidly that a house like that of Crassus, which at first was universally admired for its splendor and magnificence, in the course of a few years was lost among superior buildings. All Roman houses were very high. Augustus fixed 70 and Trajan 60 feet as the hight above which none were allowed to be built, and the upper story was generally of wood. It was the law of the Twelve Tables, which also occurs in the Roman legislation of later times, that no two houses, whether *domus* (habitations of the wealthy) or *insulæ* (habitations of the middle and lower classes), should be built closely together, but that an open space of 5 feet should be left between them.

New Designs in Metallic Ceiling

The use of sheet metal in building construction is constantly growing in favor with contractors, architects and builders, and this condition of affairs is due, no doubt, to a variety of causes. It is well known that sheet metal constitutes an excellent covering for roofs, is adapted for sidings of buildings and for interior decoration, while adding in no small degree to the fire-proof qualities of structures in connection with which the material is employed. Its peculiar character renders it especially serviceable for the interior decoration of buildings, owing to the fact that sheet-metal panels may be stamped or wrought into a variety of designs, and these in turn combine in a way to produce when painted rich and artistic effects. Many buildings at the present day have ceilings made of this material, the decorative treatment being of a character to greatly enhance the beauty of the various apartments in which the work is executed. Some new designs in metallic ceiling have just been brought to the notice of the building trades by the Kinnear & Gager Company of Columbus, Ohio, in connection with work they have executed. Fig. 1 of the accompanying illustrations represents an interior view of an art gallery, the ceiling of which is covered with some of the company's latest designs. This concern employ what is known as the tongue and groove or end lock method for combining the different panels which go to make up the whole design. The ceiling is made of No. 27 soft steel, the depth of the molding in the deep panels being 1⅜ inches. The joints and nail heads are concealed by reason of the construction employed and the work is executed, we are informed, in such a way that the ceiling will not curl or twist when exposed to fire. The intermediate panels, the construction of which is shown in Fig. 2, are of a high grade of steel and may be combined in a way to produce, when properly decorated, very pleasing results. The company named have devoted no little time and money to the production of this form of ceiling, and operate a plant which is fully equipped with the latest improved machinery.



New Designs in Metallic Ceiling.—Fig. 1.—Interior View of an Art Gallery having Metallic Ceiling.

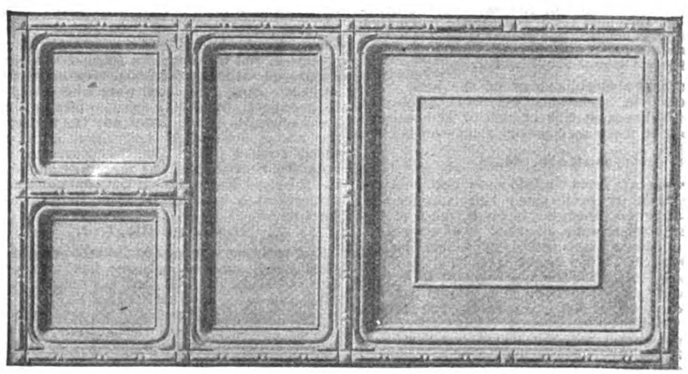


Fig. 2.—Showing Construction of Intermediate Panels.

ACCORDING to official records, building operations in the city of Washington during the month of October of the present year involved an outlay of a sum greater than for any previous corresponding period. During that month there were 243 new buildings erected at a cost of $1,106,625. There were also additions and repairs made during the period named which brought the total number of buildings up to 426 and the outlay to $1,164,575.

WHAT BUILDERS ARE DOING.

THE BUILDING INTERESTS generally throughout the country are in good condition this fall, and during the past month the builders have been engaged in putting their work under cover for winter. Reports from various localities show that the contractors in a large majority of cases are well satisfied with the season's business. During November there have been no labor disturbances of any magnitude affecting the building trades, and aside from the electric wiremen's strike in New York City the trade at large has been free from troubles with workmen. There have been about the usual number of differences with individual contractors by the unions, but nothing serious enough to involve extended interests. The portion of the West which has suffered for some time with inactivity among the builders seems to be recovering from a period of dullness, and the amount of building being done and that which is projected is steadily increasing. Builders in these localities are looking for a better season next year and with apparently good ground for hope. In some of the Western cities there is a scarcity of workmen at present, but it is anticipated that workmen who have left such cities on account of the dull condition of affairs will return now that business is picking up.

Boston, Mass.

In Boston the amount of building in progress is large for November and many of the more important buildings are being prepared for the continuance of work through the winter. The general situation between employers and workmen is free from any present position that would indicate liability to disturbance in the near future. On November 1 that part of the agreement made between the Mason Builders' Association and the bricklayers, the stonemasons and the building laborers' unions regarding the working of eight hours during November and December went went into effect. The working rules involving this change were adopted by the Mason Builders' Association on one side and the unions mentioned on the other, through the action of joint committees of arbitration, on February 1, 1892. The rule under which the eight hours during November are worked is as follows:

2. During the months of March, April, May, June, July, August, September and October of 1892, not more than nine hours' labor shall be required, in the limits of the day (except overtime as provided for); and during November and December, 1892, not more than eight hours' labor shall be required in the limits of a day, except overtime as provided for.

Since the establishment of the joint committees the relations between employers and workmen in this branch of the business have been more satisfactory than ever before.

Buffalo, N. Y.

The reports from Buffalo show that builders have been unusually busy this summer and that at present business is brisk, most of the contractors having all they can attend to. The Builders' Association Exchange has recently received a request from the Building Trades Council for the appointment of a committee to meet one from the council for the purpose of discussing several matters which they think need attention. What subjects are to be discussed were not stated, but President Berrick of the exchange appointed a committee consisting of one member from each trade represented in the council, and the workmen will be met half way in any effort to bring about needed legitimate reforms.

On the night of election day the exchange provided a special wire and a bulletin board, by which means the members were provided with election returns at the earliest possible moment. An elaborate lunch was spread and admission was only obtainable by card. Everything went off in splendid style, and the whole event was a credit to the Builders' Exchange and the men who furnished the refreshments.

Chicago, Ill.

The excessive amount of building in Chicago continues without any immediate prospect of falling off, and builders are correspondingly busy and happy. During the dedication of the World's Fair Buildings the members of the Builders' and Traders' Exchange had the pleasure of entertaining a number of the directors of the National Association of Builders who participated in the event before returning to their homes from the mid-year meeting of the National Association at Indianapolis.

The Building Trades Council appointed a committee on October 11, to begin the work of raising funds for the erection of the proposed "labor temple." The building is to cost $250,000, and the shares will cost $5 each. Quarters will be secured at once for a free labor library. Nothing of a serious nature has disturbed the amicable relationship between employers and workmen, and aside from a few unimportant cases the amount of work being done in Chicago is going forward with an unusually small amount of labor disturbances.

Cincinnati, Ohio.

The reports of the condition of building in Cincinnati are indicative of the fact that there is plenty of work on hand, and the business has been up to the mark throughout the season. The Builders' Exchange held its regular meeting on October 15, at which time the semi-annual report of the treasurer was presented, and showed the exchange to be in good financial condition.

A communication was received from the Board of Trade of Columbus, Ohio, requesting the exchange to approve a circular which asked the directors of the Columbian Exposition to regulate the price of hotels, restaurants, &c., in Chicago. The communication was approved.

Leo. P. Kaufman, secretary of the Builders' and Traders' Exchange of Louisville, paid the exchange a visit and reported his exchange in a flourishing condition, stating that $25,000 had been subscribed toward erecting a building of their own. A delegation from the exchange attended the opening of the new water works at Madisonville, and were pleasantly entertained.

There will evidently be united action on the part of the Builders' Congress and the Building Trades Council on the matter of reform in the apprenticeship system. The employers earnestly desire legislative action and have the promised co-operation of the journeymen organizations. The apprenticeship term for most trades is three years, and the number is generally limited, but there is no law by which employees can hold apprentices if they leave the shops or factories. If there was the right sort of a law the employers could hold the apprentices for the time they are learning the trade, and they would not be admitted to the unions as expert workmen until they could prove that they had served the legal time as apprentices and were entitled to membership.

On Friday, October 28, the Real Estate Exchange held a special meeting, called for the purpose of listening to remarks from ex-President John S. Stevens and Secretary W. H. Sayward of the National Association of Builders, who had been invited to talk upon the subject of organizations of such character owning their own buildings. The meeting was well attended, and the members seemed favorably impressed with the practical presentation of the subject. Both gentlemen were able to speak from experience, as both are members of builders' exchanges which have put the matter to test and demonstrated the wisdom and benefits of such a plan. On the preceding day both Mr. Stevens and the secretary addressed the Builders' Exchange on the same and other subjects at a well attended and enthusiastic meeting.

Indianapolis, Ind.

The building interests of Indianapolis are in good condition and nothing has transpired during the past month that has tended to disturb the labor market. The Builders' Exchange had the pleasure of entertaining the officers and directors of the National Association of Builders in mid-year meeting, a report of which appears in the Builders' Exchange department of this issue, and a thoroughly fraternal and enjoyable time was had by both visitors and hosts.

Lowell, Mass.

The Central Labor Union met October 30, and the principal topic of discussion was the formation of a local arbitration board, to consist of an equal number of representatives from the employers and the Central Labor Union. This board could settle all disputes that might arise between employers and employees. The sentiment of the union was in favor of such a board, and a committee of five was appointed to appear before the Board of Trade and explain the project to that body and ask its co-operation. The plan under discussion is practically that advocated by the National Association of Builders.

Milwaukee, Wis.

The builders of Milwaukee have had plenty of work during the last few months and the rebuilding of the district destroyed by the recent terrible fire will make business more active for some time to come. The Builders' Exchange is in excellent condition, although there is room for improvement in the attendance at meetings. The new building is progressing rapidly, and it is confidently expected that it will be finished in time for dedication by the beginning of the new year; the plastering is nearly all completed and only the interior finishing is yet to be done. There has been little trouble with the workmen of late, and there are no present indications of any change in existing relationship.

New York City.

The only thing that has occurred during the past month in New York City to seriously disturb the labor market in the building trades was the strike of electric wiremen. The trouble began a few weeks ago, when about 20 of the most prominent contracting firms, finding that the union could not supply all the men required, formed themselves into the Electrical Contractors' Association, and put up a notice in their workshops to the effect that on and after October 15 they would make no discrimination between union and non-union men. The men didn't like the notice, but trade was brisk, and the contractors carried out their programme. Several small strikes were begun, and at a special meeting of the union a general strike was ordered against the contractors' association. Work, however, is going on steadily on all buildings for which members of the association held contracts, and but slight inconvenience has been experienced by reason of the strike.

Omaha, Neb.

The members of the Builders' Exchange of Omaha held a special meeting on October 25 to listen to an address by the secretary of the National Association of Builders on subjects pertaining to the welfare of the exchange. The meeting was well attended and the speech-making was preceded by a most enjoyable banquet. The exchange has recently requested the council of the city to appoint a committee to confer with the exchange in regard to the revision of the building law of Omaha. The request has been complied with, and a committee has been appointed. It is expected that the work of revision, which has been going on in the exchange for some time, will now take on a more official character.

Philadelphia, Pa.

At a conference meeting, held October 25, the Master Builders' Exchange of Philadelphia adopted the code of practice advocated by the National Association, which will now be submitted to the full corporation for approval and incorporation into the rules of the exchange. The conference also recommended that a sheet-metal workers' class be added to the Mechanical Trade School managed by the exchange, and it was agreed to have a meeting with representatives of the Journeymen Plasterers' Protective Association, with a view to having that organization co-operate with the master plasterers in framing rules governing apprentices in the plastering trade.

San Francisco, Cal.

The Builders' Exchange of San Francisco, i conjunction with the Builders' Association, an organization of similar nature, and the Oakland Exchange, is striving to bring about certain amendments to the California lien law. At a special meeting called to consider the subject, the Builders' Exchange was represented by C. C. Terril, W. M. Miller and M. J. Donovan; the Builders' Association by M. C. Lynch, J. T. Hayes, E. Williams and R. Smiley, and the Oakland Builders' Exchange by J. C. Bassett, J. S. White and A. Kendall. After a great deal of discussion a committee was appointed to formulate and draft an amendment to the present lien law. The committee consists of O. Lewis, chairman, M. J. Donovan, J. C. Bassett, C. C. Terril and M. C. Lynch.

St. Louis, Mo.

At a special meeting of the Builders' Exchange of St. Louis, Mo., at noon, October 27, the members listened to an address by W. H. Sayward, secretary of the National Association of Builders. Anthony Ittner, president of the National Association of Builders, and Jeremiah Sheehan, president of the National Association of Plumbers, also made addresses.

The building business of the city is in good condition, the builders having all that can be comfortably attended to.

Syracuse, N. Y.

The Builders' and Traders' Exchange of Syracuse is looking about for new quarters. Those occupied at present were taken as the only ones available after the exchange was burned out about a year ago. The attendance of the members at the meetings is not as large as is desired, but it is hoped that a change of location may create a greater interest than now exists. Building is just fairly active and the workmen are showing no intention of making any change in the present relationship between themselves and the employers.

Worcester, Mass.

The Builders' Exchange held a meeting in its hall in the Knowles Building, November 15, at which the resignation of Jasper T. Darling, as vice-president, was accepted, Mr. Darling intending to reside in Chicago for the next 12 months. B. D. Morse of Milbury, present Director of the National Association, was elected to fill the vacancy, secretary George Bouchard casting the ballot of the association for him. After routine business it was decided that at subsequent meetings, after adjournment is reached, a social entertainment will be provided.

Notes.

The Fitchburg Master Builders' Association has finally completed its organization by electing the following officers: J. Dudley Littlehale, president; W. H. Hayes, vice-president; John Starr, secretary; trustees, F. A. Macauliffe, A. Dunkason, H. B. Dyer, A. Wellington, H. E. Gennison, A. M. Buckley. The trustees represent six building trades.

The members of the Toledo Builders' Exchange held their first social session November 10. Nearly 200 gathered in the rooms in the *Blade* building and enjoyed a feast of dainty food. There were toasts and responses. The exchange will give a grand banquet December 20 in Pythian Castle, to which builders from all parts of the country will be bidden. A ball will succeed the banquet. Since the Builders' Exchange was organized it has been very successful and a great help to contractors and those wishing to let contracts for work. The treasury contains over $7,000. The dues and assessments amount to over $200 monthly.

The Pittsburgh *Dispatch* of October 28 printed a notice of another damage suit growing out of the great strike of 1891, based upon the decision in the case of Buchanan against certain members of the Builders' Exchange. It said: "George M. Cote, through his attorneys, entered suit October 27 for $10,000 damages against Hugh Murphy *et al.* The defendants, it is stated, are members of the Planing Mill Association of Allegheny County and of the Builders' Exchange of Pittsburgh. The plaintiff states that he was engaged in the lumber business in Pittsburgh and had built up a good trade. In May, 1891, he charges, the defendants conspired to injure him, damage him in his business and deprive him of his source of buying and of customers, &c. They refused to sell him material or supplies, and by threats, intimidations and other unlawful means prevented others from selling lumber, &c., to him. They sent out circulars to persons in the trade and to customers and persons with whom he was dealing, interviewed representatives of companies and firms personally, and by means of promises, intimidations, &c., prevented their dealing with the plaintiff."

Another attempt to organize a Builders' Exchange is being made in Butte City, Mont. The builders are awake to the necessity of establishing some form of organization that will insure the adoption of more equitable and universal practices in the transaction of business, and have addressed the National Association with the purpose in view of being started correctly in the undertaking. Identification with the National Association is also contemplated.

The National Real Estate Association, whose recent convention in Buffalo was so successful, intends to bring its purposes to the notice of builders through the medium of the local exchanges.

NEW PUBLICATIONS.

THE HARDWOOD FINISHER. Compiled and edited by Fred. T. Hodgson. Several illustrations; 94 pages; 5 x 7½ inches in size; bound in board covers. Published by the Industrial Publication Company. Price, $1.

The subject of hardwood finish is one in which every carpenter and builder is more or less interested, and it is to meet the requirements of these trades that this little work has been issued. In order to make it as complete as possible, a variety of authorities on the subject have been consulted, and every effort put forth to make the work practical in all respects. Within its covers are rules and directions for finishing in natural colors and in antique, mahogany, cherry, birch, walnut, ash, redwood, sycamore and other domestic woods. Attention is also given to finishing, filling staining, varnishing and polishing, together with miscellaneous rules for dyeing, gilding and bronzing.

THE ORNAMENTAL DRAFTSMAN AND DESIGNER. By several practical draftsmen and designers. Arranged by Robert Scott Burn. Illustrated with 19 folding plates and 75 engravings; 142 pages. Bound in stiff board covers. Published by Ward, Lock, Bowden & Co. Price, 75 cents.

This work consists of a series of practical instructions in free-hand drawing in outline and from the round, together with a number of papers on form and color as applied to industrial decoration and art manufactures. In treating of the various branches of the subject, attention is first given to the simpler lines and combinations of lines, each example being designed in such a way as to lead up to the lesson next succeeding, so that the pupil is taken by a regular gradation of lessons or examples from the simplest to the most complicated subjects. This principle is carried out in the series of lessons presented, and is rigidly insisted upon as essential to be followed if satisfactory progress is desired. In addition to numerous illustrations presented in connection with the text, a series of plates containing a wide range of examples of ornamental drawing is given. Although the work is written from an English standpoint and represents essentially English practice, it is likely to be found to contain much that is of interest and value to American readers.

MANUAL OF INDUSTRIAL DRAWING. By W. F. Decker. Second edition revised. Illustrated with numerous plates and diagrams; 133 pages, 6 x 9 inches in size. Bound in stiff board covers. Published by William T. Comstock. Price, $1.50, postpaid.

This volume is intended for the use of the carpenter and others having to do with wood work, and in its preparation some of the material contained in the first edition has been omitted and new matter added. The work is comprised in nine chapters, the first of which presents examples of rough sketches, with hints on making them. The second chapter treats of drawing instruments and materials, while the third gives attention to lettering of different styles, with directions for making titles. Definitions in geometrical problems is the subject of the next chapter, followed by some remarks on elementary projections; and then chapters on the applications of projections, isometrical and cabinet projections, house plans and methods of laying out rafters. An appendix is made up of specifications of materials to be furnished and labor performed in the erection and entire completion of a wooden double tenement house in the city of Minneapolis. The specifications were copied verbatim from those furnished by the architects from which a contract for building was let. The volume is neatly printed, the engravings show evidence of careful preparation, and the second edition, considered as a whole, is calculated to prove as popular as its predecessor.

THE BUILDING BUDGET AND EVERYBODY'S ASSISTANT. Illustrated with numerous diagrams and sectional views; 160 pages, 4¾ x 6½ inches in size. Bound in paper covers. Published by I. P. Hicks. Price 50 cents.

The contents of this little volume are suggested by the title, and have been brought out for the benefit of those seeking practical information on the various subjects pertaining to the building business. While not intended to cover the entire field of carpentry, it gives various mechanical problems and methods of building construction, together with the experience of those who have practically solved the problems and executed the work. Attention is given to estimating, roofing, framing, backing hip rafters, construction of gutters, day's work in hanging and trimming doors, drawing figures of various forms, &c. One of the interesting features of the little work is a short chapter on shingling hips and valleys, a subject which has received more or less attention during the past year in the columns of *Carpentry and Building*. Another topic discussed is the art of saw filing, while a chapter on "Common Sense in Architecture" is likely to be found entertaining.

AN INTERESTING PLANT for sawing stone is said to be in operation at Clarens, Switzerland, the largest machine there being capable of dealing with blocks 3 feet 1 inch high by 8 feet 3 inches long, and 6 feet 6 inches wide. The saw of this machine is 7 feet 3 inches in diameter, and is a steel plate mounted on a screwed spindle, along which it can be shifted by means of large nuts, so as to vary its position for a cut in any desired place. The rim of the saw is studded with diamonds, which are held in small disks of steel fitted into recesses drilled into the saw near its periphery alternately on either side. These little disks are secured in place by tin solder. The cut is ⅜ inch wide, and about 1 square foot of Carra white marble is sawn per minute.

New Congressional Library.

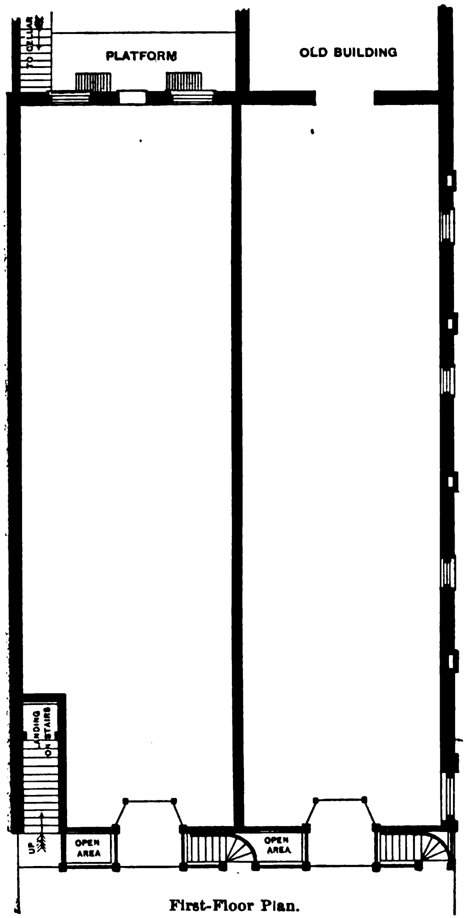
The new library building, commenced some four and a half years since, and which will probably occupy nearly three years more to complete, will, when finished, be the largest structure in Washington, with the exception of the Capitol. It is 470 feet in length, 340 feet in width, and when completed will be 140 feet in hight, measuring from the ground to the top of the dome. In the laying of the foundation every foot of ground supporting the walls was severely tested by means of scientific appliances, and then cement and concrete was employed upon which to erect the edifice. The structure will be almost wholly of granite, brick and iron, and in architectural design will resemble somewhat the Italian Renaissance, adapted in all its parts to the purposes of an ideal public library. Probably before the structure is finished 25,000,000 brick will have been employed. The capacity of the building is said to be 3,000,000 volumes. There is a sub-basement, or cellar, or rusticated high basement and a main story, while the center and corner pavilions have an attic. Over the central pavilion is to be a magnificent skylight for the purpose of giving light to the double stairways below. The basement story (that is, the first above the ground level) will be used for office purposes, public and private reading rooms, packing and receiving rooms, copyright room, bindery, map room, an art gallery, &c. The main floor, to be occupied in part by the large reading room, is octagonal in form and opens up to the vaulted ceiling at the roof. The main entrance, or vestibule, will open up from the main floor to the skylight. It will be a large white marble room, with heavy groined arches and columns, in which will be niches for busts and statuary. The keystones of 33 window arches on the exterior will be adorned with carved heads, representing various types and races of mankind. The work on the superstructure has been advanced to the second story. Most of the court walls are up and the central dome rotunda is ready for the skylight roof. It is expected that the structure will have cost by the time it is completed $6,000,000.

AN INDIANA BUSINESS BUILDING.

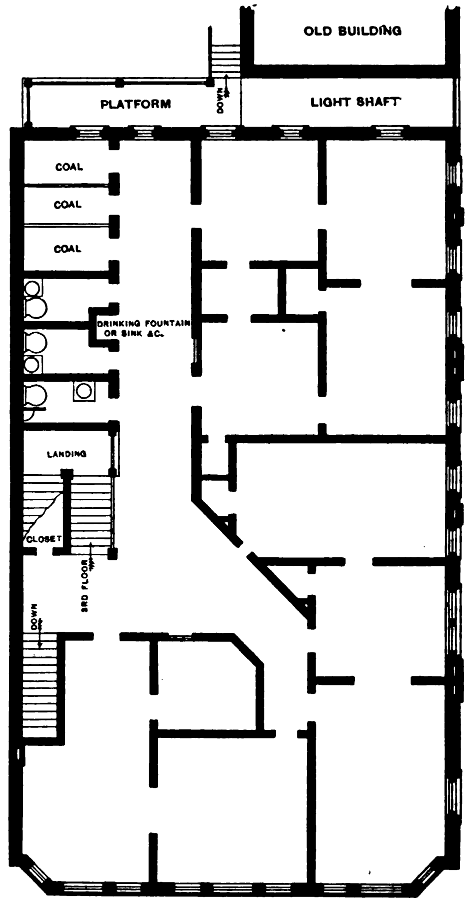
THE MANY correspondents who have recently made inquiry concerning designs of buildings containing present herewith. The structure illustrated is three stories in hight, the photographic reproduction showing the general ing has been completed within a comparatively few months for Aaron Jones of South Bend, Ind., from plans prepared

An Indiana Business Building.—General View Reproduced from Photograph.—O. H. Dirham, Architect, South Bend, Ind.

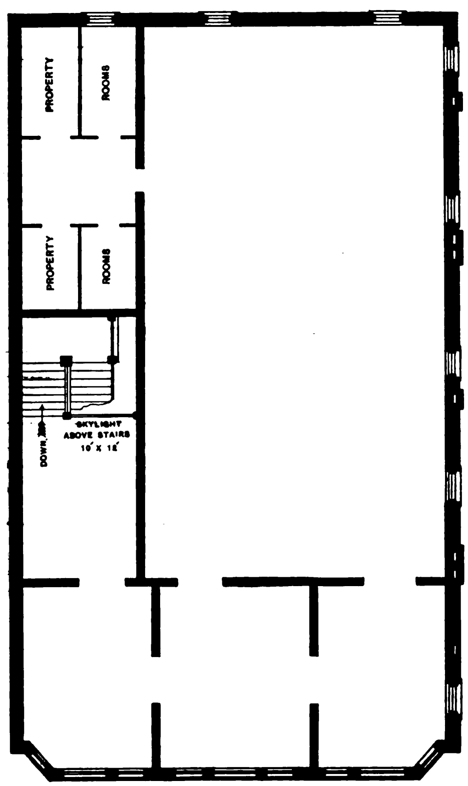
stores for business purposes, and with a hall or society rooms above, are likely to be interested in the engravings which we appearance of the front of the building, while the floor plans indicate the manner in which the space is divided. This build- by O. H. Dirham, architect, of that place. The building has stone foundations, brick walls and the entire front above the first



First-Floor Plan.



Second-Floor Plan.



Third-Floor Plan.

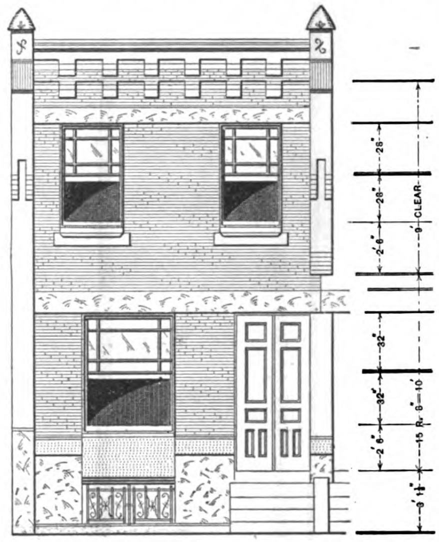
An Indiana Business Building.—Floor Plans.—Scale, 1-16 *Inch to the Foot.*

story is made of galvanized iron, carrying sufficient ornamental features to give to the exterior an attractive appearance. Cast-iron columns and girders are employed through the central partition of the first story to allow of making one room of that floor if necessary. The floor plans here presented, however, show the first floor arranged for two stores. The lower sash in the store fronts are balanced with weights running in pilasters. The interior is of Georgia pine throughout, in oil finish. The third floor, it will be observed from an inspection of the floor plans, is fitted for society rooms, and is occupied, we understand, by two organizations. The stairs to the basement are of wrought and cast iron, their position being indicated on the floor plans. Light is given to the stairs running to the third floor by means of a skylight directly overhead, the roof being covered with tin.

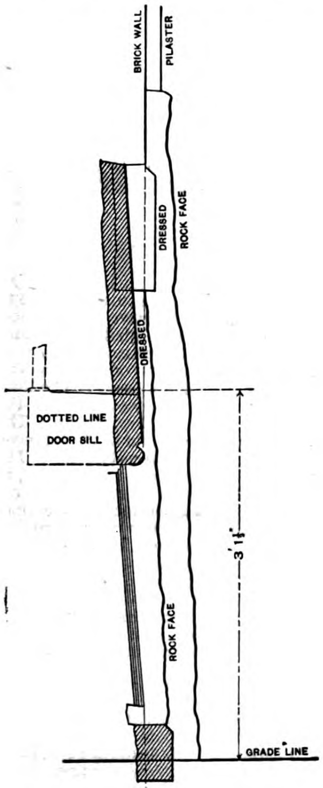
AS INDICATING the favor in which many of the evening schools of this city are held by those who are desirous of improving their minds and preparing themselves for the work of life, it may be interesting to present some statistics in connection with the Cooper Union night schools. In this institution, we are informed, there are 200 scholars in the department of architectural drawing, 100 in the elementary architectural drawing class, 200 in mechanical drawing, 50 in elementary mechanical drawing, 200 in ornamental drawing, the same number in rudimental drawing, 180 in decorative designing, 75 drawing from cast, 100 drawing from form, 80 studying perspective and 120 modeling in clay. In addition to these there are something like 800 who take one or more of the various studies taught at the institution named.

A PHILADELPHIA DWELLING AT THE WORLD'S FAIR.

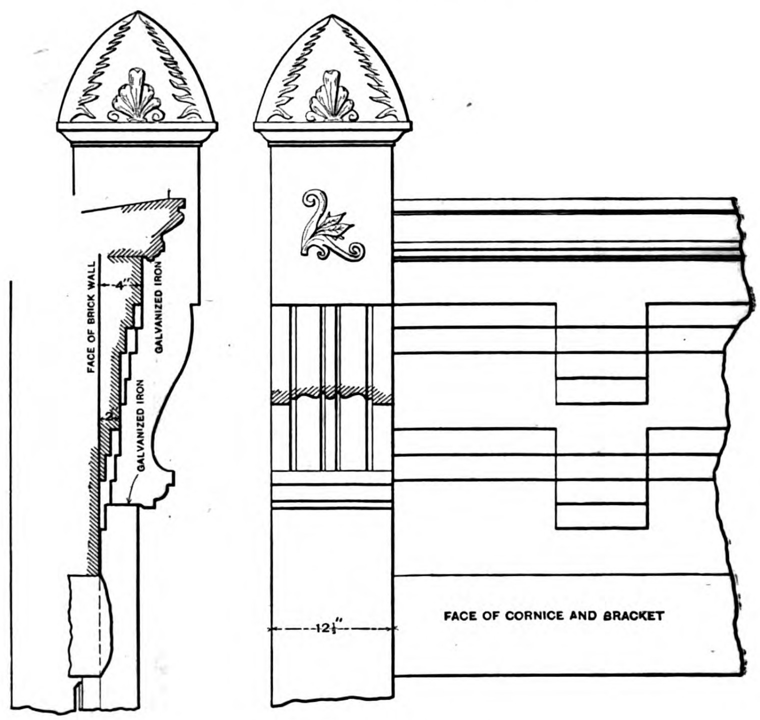
ONE OF THE MANY FEATURES of the World's Columbian Exposition in which every visiting carpenter and builder will be interested is a dwelling to be erected in *fac-simile* of a typical Philadelphia residence. This feature, we are informed, originated with the Committee on Social and Economic Science of the Pennsylvania Women's Auxiliary of the Columbian World's Fair, who conceived the idea that the most distinctive and characteristic exhibit of the social life of Philadelphia would be a reproduction of a small two-story brick dwelling house of a Philadelphian. The building to be put up on the fair grounds is not a model of what a home in the Quaker City might be, but is a *fac-simile* of one of the 66 houses which have recently been erected in the city of Philadelphia by William T. B. Roberts of that place. In the illustrations which we present herewith are shown an elevation, floor plans and a selection of details, which will enable our readers to obtain a good idea of the arrangement of the various rooms and the principal features of construction. On the first floor, it will be noticed, there are three rooms, the one in front being the parlor, while the kitchen is in the rear and the dining room between it and the parlor. On the second floor are three rooms and a bath, the rear room having a bay window, and designated on the plan as a sitting room. The position of this apartment is a characteristic feature of Philadelphia dwellings, and the "model home" at Chicago is likely to be in many respects an object of no little curiosity on the part of visiting carpenters and builders, especially those coming from the Western sections of the country. Everything used in the construction and furnishing of the house will, we understand, be made in Philadelphia so far as practicable. Mr. Roberts, the well-known builder, has donated the architect's plans for the house, and the furniture and interior finishing will be reproduced in *fac-simile* of the dwellings already erected in Philadelphia. The World's Fair Commissioners, we are informed, have directed that there shall be hung in a conspicuous place in the "model dwelling," a framed chart showing the success of the building association plan, the number of similar houses in Philadelphia, how many are owned by workingmen and what proportion of capital invested was contributed by artisans.



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



Details of Stone Work.—Scale, ¾ Inch to the Foot.



Details of Galvanized Iron and Brick Cornice.—Scale, ¾ Inch to the Foot.

A Philadelphia Dwelling at the World's Fair.—William T. B. Roberts, Architect.—Elevation and Details.

New York Trades School.

The twelfth season of the New York Trades School was inaugurated on Monday, October 17, when evening classes in plumbing, bricklaying, carpentry, house painting, fresco painting and blacksmithing commenced work. The number in each department is as follows: Plumbing, 130; bricklaying, 45; carpentry, 28; house painting, 28; fresco, 16; blacksmithing, 9; total, 251. This attendance is equal to former years, and the number will be greatly augmented when other evening and the day classes open. The evening course in plastering starts on December 14; and on January 3, 1893, the day classes in plumbing, bricklaying and plastering, carpentry, house and fresco painting, sign painting and stonecutting will begin their annual session. During the present term instruction in printing will be given for the first time. A large two-story extension has just been completed for this branch. It is fitted up with new presses, type and machinery. The courses have been prepared with great care, and include course No. 1 in newspaper work, which commences November 14, and course No. 2 in book and job work, commencing February 13, each course extending over 12 weeks. The newspaper work comprises instruction in plain composition, tabular work, setting advertisements and making up, while the book and job work includes instruction in commercial job composition, such as cards, circulars, bill heads, pamphlets, &c., likewise making ready for the press and presswork. Only those who have taken the first course or have some previous knowledge of the trade will be admitted to course No. 2.

The school is now included in the university system of the State. It has been incorporated and recently received a charter. The trustees are Richard T. Auchmuty, J. Pierpont Morgan, William E. Dodge, R. Fulton Cutting, F. Augustus Schermerhorn, J. Roosevelt Roosevelt and J. Pierpont Morgan, Jr. In addition to the $500,000 donated by Mr. Morgan, the school has been given, by Colonel Auchmuty, the land and buildings it now occupies, valued at $225,000, and a building fund of $100,000.

Following are lists of the instructors in the different departments:

Carpentry department: D. Vanderbeeh, superintendent; Jas. D. Edwards, Chas. Smith, instructors.

Masonry department: Erskine Van Houten, superintendent; Thos. Carey, F. Van Houten, instructors.

Plumbing department: John Delehanty, superintendent; John McMenomy, Thos. H. Stevens, Geo. W. Brown, instructors.

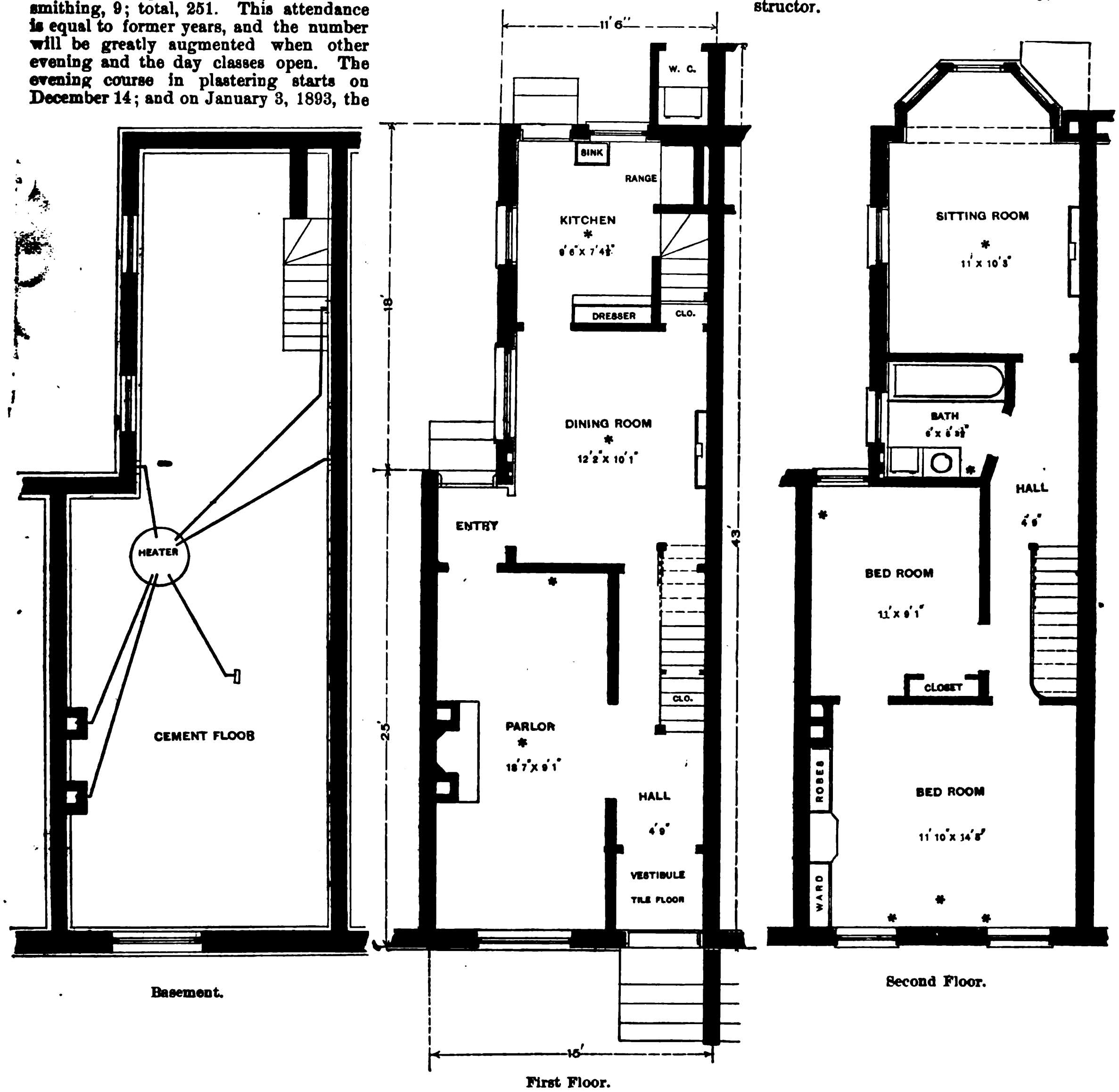
Printing department: Morris Van Vliet, superintendent, John Younanks, instructor.

House painting: John F. McGowan, instructor.

Fresco painting: H. Bornhagen, instructor.

Sign painting: E. A. Kennedy, instructor.

Blacksmithing: F. W. Geniche, instructor.



A Philadelphia Dwelling at the World's Fair.—Floor Plans.—Scale, 1/16 inch to the Foot.

THE DISASTROUS CONFLAGRATION which visited the city of Milwaukee, early in November, seems to have paved the way for the construction of business blocks which will be far better than those destroyed. Some of the factory and business buildings will be put up on a scale much larger and more costly than those occupying the ground before the fire, while some who had contemplated additions to their facilities can now follow out their programme in a way to produce much more satisfactory results. In localities previously marked by tumble-down dwellings there will be handsome and well-appointed houses.

SOMETHING ABOUT WHETSTONES.

THE use for which a whetstone is wanted must always be carefully considered, for then the general character desired is easily determined, and it only remains to find a suitable stone. A few tests to decide what sort of a stone is being offered by the dealer is often useful, says L. S. Griswold, in "Geological Survey of Arkansas." The hardness may be tested by a pocket-knife. If the stone is soft, like the water-of-Ayr stone, the knife edge will cut it easily on its flat sides without injury to the knife; stone of medium hardness, like the Hindostan, will cut on the edges with some difficulty; a hard stone, the Ouachita, for example, can be scratched by the knife point; while a very hard stone, like the Arkansas, receives no scratch from the knife point. The fineness of the grit can best be judged by drawing the edge of the finger nail backward over the stone. The sensation produced indicates well the coarseness of the grit, and a little practice with various stones soon gives one expertness in judging their fineness. The finger nail will tell whether the stone is coarse or contains coarse particles by showing scratches; a fine gritted stone will make no visible scratches. The sharpness of the grit also will be indicated by the amount of the nail worn away.

The general appearance in shape and color also afford valuable means of judging a stone. The sides should be perfect planes, and the angles right angles, though for special purposes the edges may be beveled. Good stones seldom have a poor finish, uneven sides and irregular angles. On the other hand, some poor stones are well finished; so entire dependence cannot be placed on these criteria. The reason why the finish should be a good one is that a poorly finished stone is very sure to wear unevenly, and as soon as a stone has worn to an uneven surface it ceases to do good work. Soft stones are more liable to an uneven wear than hard ones, but care must be exercised in using hard stones, for when worn unevenly they give much worse results than the soft ones.

COLOR OF THE STONE.

The color also is a good indication of the character of a stone. In a good stone the color should be very even, whatever shade it is; an even color denotes a homogeneous stone. Slight yellowish, reddish or brownish iron stains in light colored stones are not objectionable, but strongly marked spots of considerable areas indicate a change, generally toward hardness, in the quality of the stone. Stones may also have hard spots which are white. It is difficult to detect those spots when they occur in white stones, especially in the Ouachita stone, since that is whitened artificially by rubbing with pumice. If the pumice is dusted off, however, and the stone wet, the spots appear. These white spots are due to a closer aggregation of the grains of silica. If these spots can be seen at all, they look denser and harder than the ground mass. They are of occasional but not frequent occurrence; so far as known they are chiefly found in the Ouachita stone, though sometimes in the Arkansas. Soft spots have an earthy, soft appearance, and may be tested with the knife. They are more likely to occur in sandstone. Wetting the stone, which is given as a method for detecting the spots, is a good method of showing the character of any stone.

A new whetstone, fresh from the rub-wheel, has the sharpest "bite" it will ever have. Purchasers should remember this, and not be disappointed because their stones do not cut so well after the slight roughness given by the sand in grinding has been worn away. Some stones are rubbed with pumice by the manufacturers to make them look whiter and more attractive, and sometimes also to hide defects. The pumice gives to the stones a feeling of much sharper grit than they really possess. Any stone hard enough to be used as a whetstone is too hard to have a natural powder on its surface, so when a powder is found it may safely be set down as artificial. It should be brushed off and the stone examined in its true state.

STONES FOR SPECIAL USES.

Having these points in mind, one can safely select a stone for any special use. A stone for general use, however, is the one most commonly in demand, and as there is no stone which will answer all purposes, the whetstone for general use must be a compromise. If the work to be done is usually coarse, a schist or sandstone of medium hardness and fineness is best used. As the Hindostan stone is fine-grained, a sandstone suiting these conditions is not now known in the United States as a whetstone; schists, however, are plentiful. For generally fine work a fine schist or sandstone or the Ouachita stone may be used. The schist and sandstone are good and cheap, with certain advantages favoring the sandstone. The Ouachita stone is more expensive and requires better care than the others, but will also do better work. It will cut steel fully as fast as either of the others, and will give a much finer edge when properly used. It may be used as a razor hone in addition to other uses. Pointed tools cannot be applied to any of these stones without injuring them for ordinary use, and coarse work will injure the fine stones. It is economy for those using the fine stone to use first a coarse sandstone unless the tool is already prepared for the final edge.

A dull tool with a notched edge should no more be placed on a good whetstone than a carpenter's chisel should be used to drill rock; yet such a use of whetstone is a common one. The purpose for which a whetstone is bought should be kept in mind, and it must be remembered that if used for purposes widely different from those for which it is best adapted, the stone will be spoiled for its ordinary work. For this reason it is economy to have stones of different grades wherever tools are in constant use, as in carpenter and machine shops. For reasons already given it must be expected that a whetstone will lose a little of its abrading quality with use; if it loses much, however, the conclusions may be drawn that it is not being properly used, that proper care is not being taken of it, or that it is a poor stone; only do not be too ready to condemn the stone. Many good stones are condemned and given a bad reputation, when the fault lies either in the original choice of the stone, or in the use made of it, or the care taken of it.

Chautauqua Abominations.

The October number of the *Engineering Magazine*, New York, contained a paragraph on the architectural abominations, both sanitary and engineering, of the famous summer resort, Chautauqua. The editor, in commenting on this article, says: "In view of the extraordinary reputation of the place named, it is high time that a general discussion of these atrocities should be made to the end that reformation may be instituted." As likely to interest our readers, we reproduce the item in full:

The village of Chautauqua is one of the most celebrated places in America. The home of one of the most successful centers of popular education, designed and arranged by men of culture, it is the Mecca of thousands of intelligent students who look there for evidences of the most refined, cultured and advanced progress. Architecturally it is one of the most atrocious places on the continent. The houses, in themselves chiefly of an abominable style of architecture, are crowded together almost as closely as in New York City. There is scarcely breathing space between them. There is no sanitation, and the lack of drainage and sewerage is frequently unpleasantly manifested to visitors and native alike. The "streets," if such they may be called, are country roads of the roughest description. The water is obtained from the lake on which the town faces and is daily polluted—to mention no other source—by a numerous fleet of excursion steamers. To crown all, the most pretentious edifice in the place, the Amphitheater, is a plain straight flat roof supported on poles, one side only being inclosed with a wall, in which an organ is inserted. It is hardly possible to conceive of a town wherein the most elementary rules of architecture and sanitation are more openly or apparently more gleefully violated. The condition of the place would be bad enough for an ordinary country village, but for an educational center, an offspring of cultured minds, a model intellectual community, it is nothing short of disgraceful. Of course, decent sanitation and respectable architecture cost money, and the Chautauqua Assembly has labored, and is laboring, under a heavy debt. Further, plans are under active consideration for important changes and improvements, which, it is hoped, will materially affect the chief items contained in this indictment. These, however, will not alter the fact that the houses have been permitted to crowd together in one place, albeit one would suppose that, when a situation so remote from great centers was selected, ample room for healthful, cheerful building would have been had. It is simply another illustration of the old story of popular indifference toward architecture and ignorance of it, which is always the more alarming when cultured men, as was the case here, undertake to design architectural work. To one who has not seen Chautauqua in the hight of its season, when from 15,000 to 20,000 human beings crowd its narrow limits, it is impossible to imagine the unspeakable horror which must exist there, and which are not less marked or less detestable because they may be overlooked in the enthusiasm of ardent study. An educational center like Chautauqua needs to be a model community in every respect. Practical architecture, as well as exercises in Hebrew accents, Assyriology and surd roots, should have ample practical illustration. The Chautauqua Literary and Scientific Circle has done too much for education in America for its headquarters to be a mockery of architecture and a positive danger to human life. A fresh mortgage on the town would be preferable to continuing its present unsanitary state.

AN INGENIOUS method was recently employed in wiring a building for electricity at Rockland, Mass. It was desired to run wires between the flooring, and for that purpose a hole was cut at both ends of the room; then a half-grown kitten, with a slender string attached, was put in at one of the holes, and readily crawled through to the other. A stronger string was then drawn through, then the wire, and the job was done.

A BUILDING which will be used as a theater and apartment house, and to cost in the neighborhood of $350,000, is contemplated at the northwest corner of Fifty-fifth street and Washington avenue, Chicago, Ill. We understand that the structure will have a frontage of 150 feet and a depth of 152 feet, and the exterior will be of Bedford stone in the Venetian style of architecture. The theater, having a seating capacity of 1200 persons, will be located in the rear of the Fifty-fifth street front, while the remainder of the building will contain 50 apartments of from 6 to 11 rooms each.

CORRESPONDENCE.

Letters Wanted.

It has been our custom for a number of years past at about this season to request the favor at the hands of our subscribers of letters of inquiry on subjects pertaining to the building trades. As the days shorten and the evenings lengthen, there is ample opportunity for the mechanic to prepare records of interesting pieces of work which have been executed during the summer months, and which are likely to prove not only entertaining to readers in all parts of the country, but to contain suggestions to those following the building business in its various branches. Within the next three months we shall be glad to have at least one letter from every subscriber to this journal, and we can assure each writer he need have no fears that what he has to say will be uninteresting to his brother "chips" in other sections. We therefore urge every reader to ask a question, to answer some inquiry that has already been presented, to state a fact which personal experience has demonstrated, or if no other subject suggests itself, to write critically of *Carpentry and Building*, pointing out wherein the paper has failed of being as interesting and valuable as it ought to be. From this last suggestion the readers will see that we are anxious to have letters from every subscriber even though they contain words of criticism. No matter what the conditions are we desire from every subscriber a letter. Some of these will no doubt provoke discussion, resulting in profit and interest to all.

Carpenters' Aprons.

From JACK, *Ontario, Ohio.* — I am pleased to see the correspondence columns of the paper so full, as it indicates increasing interest in the good of the paper on the part of my brother chips. I have a pattern for a nail apron which suits me better than any I have ever used, and thinking it may interest the readers of the paper I send sketches of it. The apron is made of the firmest of ticking and requires just one yard to make a good apron, which is of double thickness. The straps are made of the same material, and are sewed on to the short pieces projecting, as clearly indicated in Fig. 1 of the sketches. Fig. 2 represents a piece of one of the straps, showing the manner of stitching. Fig. 3 represents the apron when opened out, after having been cut, the bottom section folding over on to the upper section and presenting the appearance of Fig. 1. On the waist and neck straps are sewed buckles as indicated. The pocket is made a trifle wider than the apron so that it will stay open. The corners are sewed in such a manner as to make them round in the pockets, as indicated by the dotted lines in Fig. 4 of the sketches, which shows the appearance of the article when completed. It will be seen that provision is made for a rule pocket if desired.

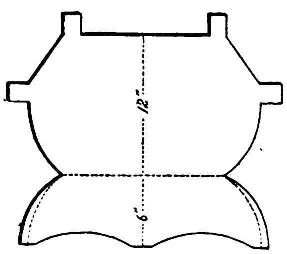


Fig. 1.—The Apron as Cut Double.

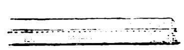


Fig. 2.—A Piece of One of the Straps.

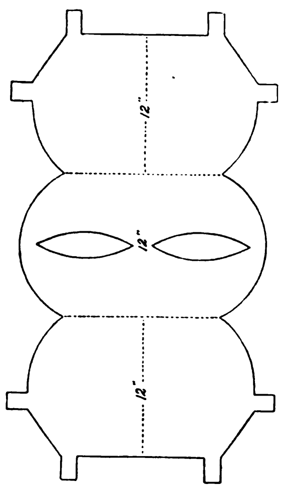


Fig. 3.—The Apron Opened Out after Having Been Cut.

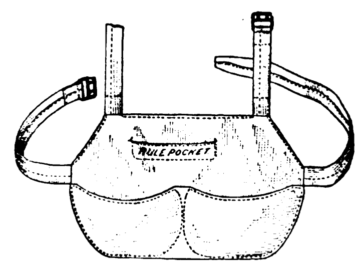


Fig. 4.—The Completed Article.

Form of Carpenters' Apron Suggested by "Jack" of Ontario, Ohio.

Estimates of Cost.

From C. F. GOODRICH, *Pittsfield, Mass.* —In the August issue of *Carpentry and Building* "Ich Dien" of Providence, R. I., gives two designs of cheap country houses. Will this correspondent give an itemized bill of estimated expenses of each house, as well as the total cost, as I think there are many readers of the paper who will be greatly interested in such information?

Pitch of Stage Floor.

From SUBSCRIBER, *West Lebanon, N.H.* —Will some practical reader of the paper tell me the pitch to give a stage floor in order to produce the best results, the floor of the hall being perfectly level. The stage is 18 feet deep, 2½ feet high at the front and 5 feet from the drop curtain to the footlights. The stage is fitted only for amateur performances and for such troupes as are likely to visit a town of 2000 people. The hall is 70 x 40 feet and the floor is level in order that the room may be used for other purposes than a theater.

Bridging Studding.

From H. T. B., *Sardis, Ky.*—In a recent issue of *Carpentry and Building*, I notice the communication of "S. C.," of Fort Worth, commenting on my method of bridging studding. In reply to his criticism I would say that I often place the bridging in such a way that the ends come in contact with the studding opposite each other. I am now erecting a large house in which the bracing and bridging is done in this manner, and which is sheeted outside with white pine. I cover it with No. 70 Empire paper and over this place the weather boarding. This construction gives a good foundation for a first-class job of plastering and I warrant the latter not to crack.

Designs for a Catboat.

From W. B., *Brooklyn, N. Y.*—Will some of the readers of the paper supply me with plans and details for a 20-foot catboat? Any practical informaton will be greatly appreciated by the writer and may prove useful to other readers of the paper.

Tool-Chest Construction.

From C. L. M., *Madera, Cal.*—I have been an interested reader of the paper for some time, and have found in each issue many points of value and instruction. The plan of a tool chest submitted by "M. H. T." is a good one, but I am much in favor of a plan which was presented in the columns of the paper some time ago. It was given by a correspondent writing from San José, Cal. I made a chest after his directions and it has given entire satisfaction. I think it would be a benefit to some of the readers to publish the plan a second time.

Note.—If our correspondent will give us more specific information as to the tool chest to which he refers, it is possible that we may see our way clear to reproduce the matter in an early issue of *Carpentry and Building*. The subject of tool chests has been discussed at various intervals for many years past, and it would be a rather difficult matter to find the particular letter to which our correspondent refers unless he furnish the date of the issue which contains the plan he has in mind.

Design for an Opera House.

From C. G. G., *Madison, Neb.*—I shall be glad to have some of the readers of the paper tell me how to build a brick opera house or concert hall about 100 feet long, 44 feet wide and 20 feet in hight. I desire the stage to be at the rear of the building and the latter to be covered with a cheap roof. At a distance of 8 feet from each side of the building are to be posts on which the roof is to rest. There is also to be a gallery on each side of the building.

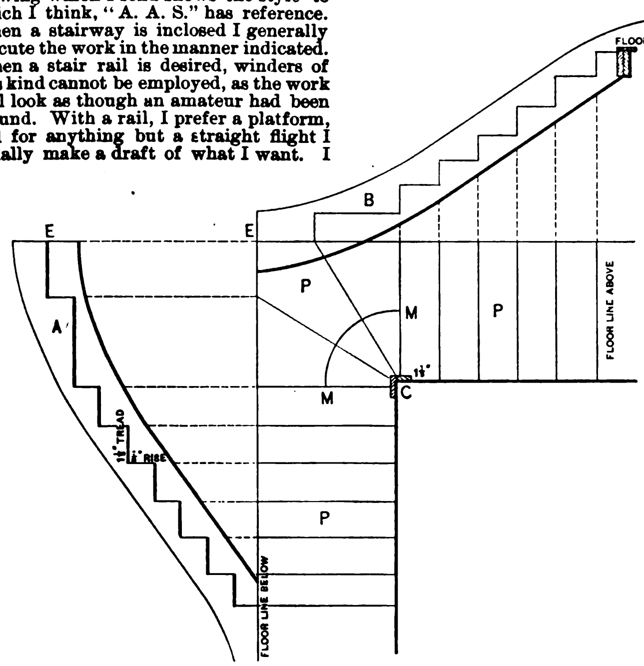
Laying off Degrees of a Circle with a Steel Square.

From E. P. B., *Winter Park, Fla.*—In the October issue "O. L. W.," Dallas, Texas, gives a correct method of laying off degrees with a steel square by the use of a table of natural tangents. Permit me to say, the method could be somewhat simplified by using 10 on the blade of the square, and pointing off one place in the figures obtained from the table, reducing the decimal fraction of 1 inch to 16ths. Take his example, for instance, and using three decimal places we have natural tangent equals .176; multiplied by

10 gives 1.76. Multiplying the decimal 76 x 16 we have $\frac{1216}{160}$ of an inch, which equals $\frac{12}{16}$ or ¾; that is, 1.76 inches equals 1¾ inches, which we would use with 10. Again, suppose we wish to lay off 40°. The natural tangent of 40°, according to the table, is .839, using three decimals. Now .839 × 10 = 8.39, and the decimal, 39 multiplied by 16 gives 4.134, or say ¼, which added to the 8 gives 8¼ inches. We therefore use 10 on the blade and 8¼ on the tongue.

Laying Out Strings and Winders.

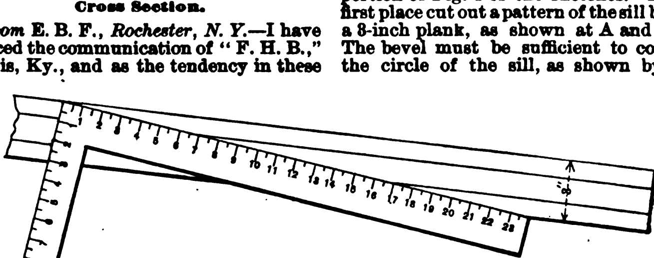
From J. C. M., *Oregon, Ill.*—In the August number of *Carpentry and Building* for 1892 there is expressed a desire from "A. A. S.," New Jersey, to show how to lay out strings with winders. There are a great many shapes or sorts where a return step can be employed, but I venture to say there are hardly two stairways of the same dimensions. The drawing which I send shows the style to which I think, "A. A. S." has reference. When a stairway is inclosed I generally execute the work in the manner indicated. When a stair rail is desired, winders of this kind cannot be employed, as the work will look as though an amateur had been around. With a rail, I prefer a platform, and for anything but a straight flight I usually make a draft of what I want. I put a casing on the corner as shown at C, and the winders are fitted against it. To obtain the shape of winders and strings, I set the dividers from the corner C to the middle of the straight steps, and mark as indicated by M M. Divide this quarter circle into as many winders as it is desired to employ. Then from the corner, mark through these points until the line intersects with the outside. In cases where the stairs are 4 feet wide I would put in four winders. The corner casing can be chamfered after it leaves the treads. In making the curves on the strings, the workman (in case he has no splines) can use a light slab which will bend readily. There should be no short crooks in the curves. The strings A and B join together in the corner at E E. The thickness of the stuff is cut off the end of one string. Where the strings are to be housed, the string A should be changed at the bottom and cut so as to raise the strings the thickness of a step. The housing should be done back and below the lines shown in the plan. The only difficulty with a housed string in this case is in wedging the front half of the middle winder. Sometimes horses are cut out and fastened to the string as shown in the plan. The top strings should be the same distance on a plumb line above all the risers. The short strings are the same, omitting the winders, and are fitted against the edge of the casing in the corner. On the plan marked P P P the lines are intended for the faces of the risers. The drawing shows the strings intersecting with the base at the foot and landing of the stairs. I usually employ a tread 10½ inches, or 11 inches wide, nosing included, and a riser from 7 to 7½ inches high. In my opinion, stairs with 7-inch risers are the easiest that are made. If this answer is not correct, I trust some of the professionals will speak. I am no professional, but an all-rounder.



Laying out Strings and Winders, as suggested by "J. C. M."

Making a Square Timber Octagon in Cross Section.

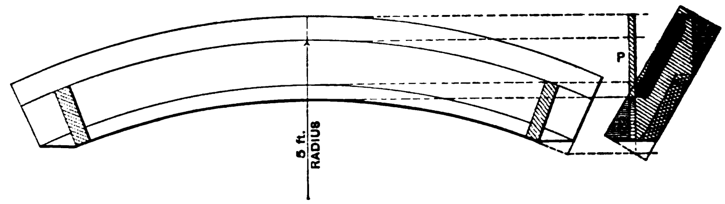
From E. B. F., *Rochester, N. Y.*—I have noticed the communication of "F. H. B.," Sardis, Ky., and as the tendency in these days is to arrive at the desired point in the least time, I venture to give a method of making an octagon which I have never before seen in print. Suppose, for example, we have a square stick that it is desired to make octagon in cross section irrespective of what the face may be; but to be definite, we will say 8 inches. Place the steel square diagonally across the face and mark where the points of 7 inches and 17 inches come, as indicated in the sketch which I inclose. The distance from the edge to these points is the distance to which to set the thumb gauge to scribe the lines. I have been a reader of the paper for many years and think a great deal of it. I enjoy very much seeing these "old kinks" brought out.



Making a Square Timber Octagon in Cross Section.

Circular Window Sills.

From A. L., *Napa, Cal.*—In a recent issue a correspondent, writing from San Francisco under the *nom de plume* "Yank," desires information with regard to circular window sills. I am employed at my trade in the city named, and to hear some of my brother chips talk one would think that to work here for a few years was equivalent to knowing everything and being the swiftest on earth. However, as I consider the most of it to be an effervescence of the corner grocery, I give it very little consideration. Coming down to the question of the correspondent, I think in most cases it will be necessary to have stock as thick as the sill or molding from top to bottom when in position. Another advantage is that it gives a square corner to work from, provided it is worked on the "sticker." However, in some cases thinner plank may be used. I have obtained sills for a circular door from 8 x 12 inch redwood plank and they measured 4½ from top to bottom when in position. The work was done according to the plan indicated at the right-hand portion of Fig. 1 of the sketches. In the first place cut out a pattern of the sill bevel, a 8-inch plank, as shown at A and A A. The bevel must be sufficient to contain the circle of the sill, as shown by the dotted lines. Tack the pattern P on at A, as shown, after which place the bevel at A on a band saw table and saw to the edge of the pattern for the purpose of disposing of the surplus wood. Cut out a 2 x 4 block and fasten to the saw table, as shown in Fig. 2, sawing half way of its



Circular Window Sills.—Fig. 1.—Diagram Showing how Work is Done.

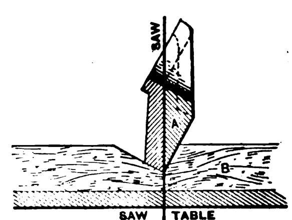


Fig. 2.—Sawing Corners.

thickness. Run a gauge line on the concave side of the sill, and with the convex side down, as at A of Fig. 2, saw off the surplus wood. This is a convenient method of sawing corners of circular molding to prepare them for the sticker. I think a hint to the experienced workman is sufficient. I do not admire "Yank's" way of placing his jambs. I think it better to stand them on a line drawn from the center, the sash to be put in from the outside and the blind stop so arranged that it may be removed.

Framing a Tower Roof Intersecting with Main Roof.

From J. F. M., *Washington, D. C.*—I submit the following reply to the inquiry of "L. V. V.," San Francisco, Cal., which appeared in the July number of the paper. Referring to the diagram which I inclose, A B C D represent the plan and E F G the elevation. Draw plan of the tower rafters, H A H M and H N; then draw the elevation of the tower rafters, O′ G N′ G and B′ G. From the points where these intersect the line of the main roof drop lines to intersect the plan of rafters in the points P′ P, P′ P, R′ R and S. Through these points trace the curve D S B, which will be the plan of the line of intersection between the tower roof and the main roof. Then with P′ H of the plan as a base and H′ G of the elevation as the hight, construct the triangle H P′ P′. From the point G′ set off the distance G′ T on the line G′ R. Connect T and P′; then P′ G′ will be the length of the rafter over the plan P′ H and the angle P′ G′ H will contain the bevel to cut the top of the rafter, and the angle G′ P′ T will give the foot cut. Repeat the operation with the hights I G and J G of the elevation over the lines P′ H and R′ H of the plan, setting off the distance G the distance G′ H in each case to obtain the foot bevel. If the work is accurately drawn to a large scale the length and bevels can be obtained exactly.

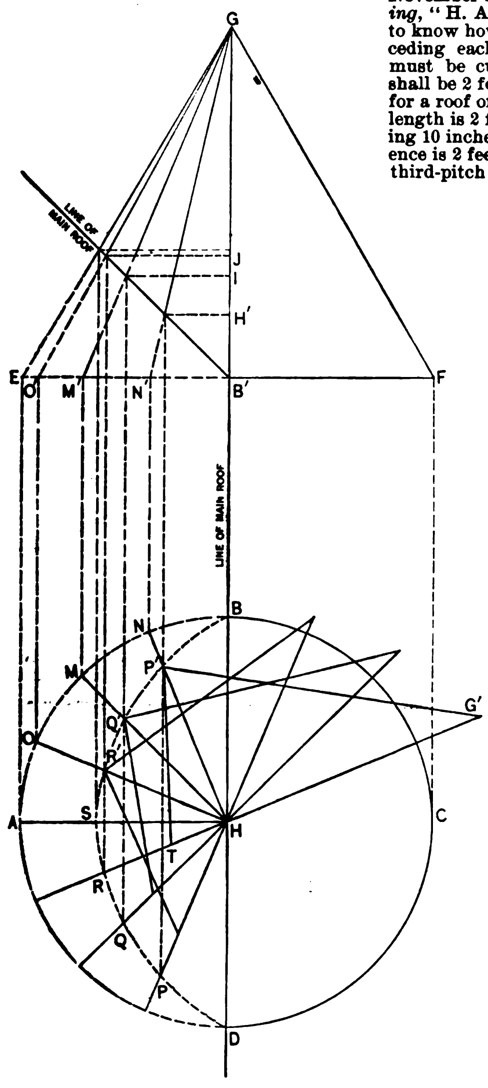


Diagram Showing "J. F. M.'s" Method of Framing a Tower Roof Intersecting with Main Roof.

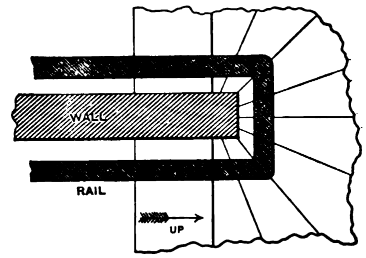
Length of Jack Rafters.

From F. C. P., *Petoskey, Mich.*—In the November issue of *Carpentry and Building*, "H. A. B.," of Moreno, Cal., desires to know how much shorter than the preceding each jack rafter for a hip roof must be cut in order that the rafters shall be 2 feet apart. I would say that for a roof of half pitch the difference in length is 2 feet $9\frac{15}{16}$ inches; for a roof having 10 inches rise to the foot the difference is 2 feet $7\frac{1}{4}$ inches; for a roof of a third-pitch (8 inches rise to the foot) the difference is 2 feet $4\frac{7}{8}$ inches, and for a roof of a quarter pitch (6 inches rise to the foot) the difference is 2 feet $2\frac{13}{16}$ inches.

From C. W. B., *South Denver, Col.*—In reply to "H. A. B." of Moreno, Cal., who asked in the November issue of *Carpentry and Building* how much shorter each jack rafter should be when placed 2 feet apart, I would say that the difference in length of jack rafters placed 2 feet from center to center would be for a quarter-pitch roof $26\frac{13}{16}$ inches, for a third-pitch roof $28\frac{13}{16}$ inches, and for a half-pitch roof $33\frac{15}{16}$ inches.

Getting Out Wall Rail for Corners of Box Stairs.

From A. L., *Napa, Cal.*—I send herewith sketches representing plan and elevation of box stairs with winders, indicating the method of getting out the wall rail to go around the corners. Fig. 1 represents the plan, while Fig. 2 shows the elevation. The sketches so clearly indicate the method of doing the work that little explanation is necessary. The only requirements are that the ends of the easements A A, Fig. 2, extend over the corner lines *b b* to agree with the plan of the rail shown in Fig. 1 and come to a level, as indicated by the dotted lines at A A. A round rail can be worked out of plank the thickness of the rail. If any other pattern is desired the quarter twist may be worked in at the ends A A by using a little thicker stock. Where a continued rail is needed in the attic, back



Getting Out Wall Rail for Corners of Box Stairs.—Fig. 1.—Plan View.

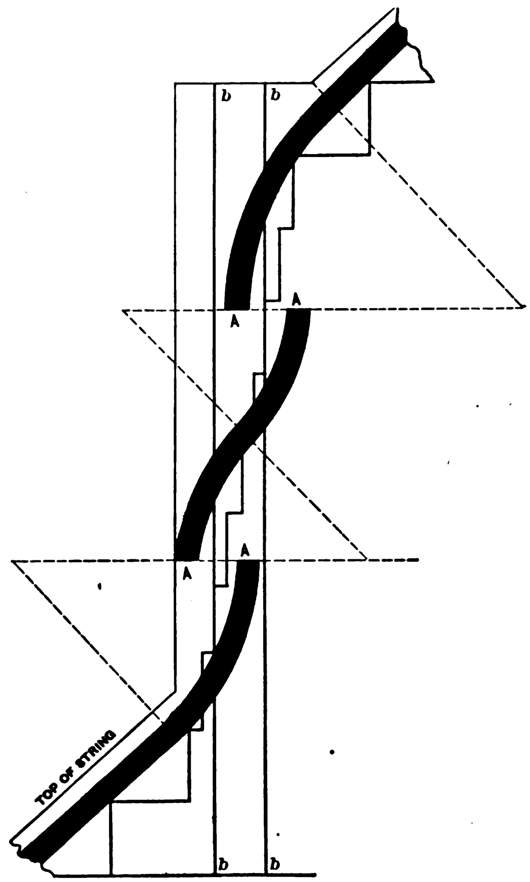
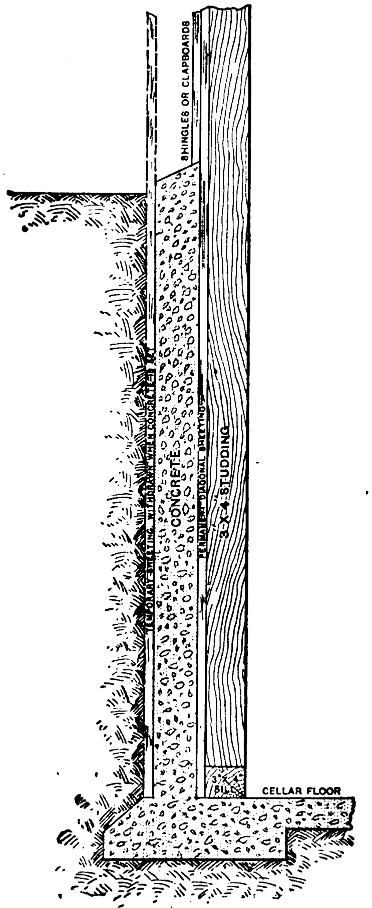


Fig. 2.—Elevation.

cellar stairs, &c., and it is not required to go to the expense of circles the method outlined will be found useful. I have recently built a 2½ round rail grooved on the bottom and placed on ⅞ ceiling forming a square corner.

Cheaper Building Construction.

From F. T. CAMP, *New York City.*—I send a sketch of a new way of building cheaply that portion of a structure below ground designated as the cellar, which I wish to submit to the criticism of the readers of *Carpentry and Building.* My idea is if concrete is impervious to moist-



Cheaper Building Construction.

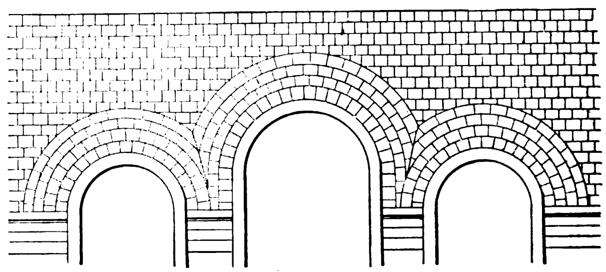
ure on a cellar floor why would it not be equally so on side walls, as shown in the sketch. The resistance to the earth bank is met by the strength of the studding and sheeting, and as an additional safeguard against dampness a course of tarred paper felt on the outside of the sheeting could be used. The mode of constructing such a wall would be, first, to excavate 12 or 15 inches larger than the size of the foundation, then lay the concrete footing course 6 inches thick and 18 inches wide and set up the sill and studding wall, sheeted, and then set the temporary sheeting 4 inches out from the permanent sheeting; tar paper the latter, putting temporary blocks to hold firmly 4 inches apart; tamp in the concrete a foot at a time, moving up the blocks as the work progresses, until the grade line is reached. At this point a finish is made on a wash with cement plaster, either clap boards or shingles, from the water table down to meet the cement, and when set withdraw the temporary sheeting and ram in earth around the concrete. The result is a non-porous wooden wall, 50 per cent. at least calculation cheaper than stone, brick or a concrete wall 10 to 12 inches thick. I would like very much to be criticised in advancing this method and to hear if anything like it has ever before been attempted.

Preventing Tools from Rusting.

From R. C.—In connection with the various communications which have appeared in the columns of the paper regarding the method of preventing tools from rusting, permit to say that if the correspondent inquiring will use the finest olive oil, put on very thin, and then wrap the tools up in strong tissue paper, coated with oil, he will have no trouble in keeping them from rusting. This is the method employed by many English manufacturers of tools for packing their goods for export. Vaseline is another good rust preventive; also Selico enamel, the latter being a very white hard varnish.

Shingling Above Circular-Top Windows.

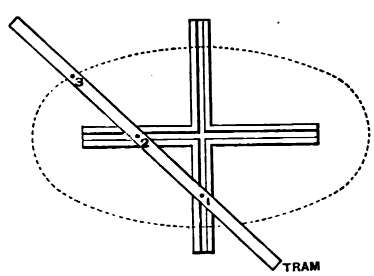
From A. H., *A-Town, Pa.*—I would like to have a little problem solved through the columns of *Carpentry and Building* and inclose herewith a rough sketch showing what I desire. I would like to have some of the practical readers tell me how to shingle the circular-top windows exactly as indicated in the sketch.



Shingling Above Circular-Top Windows.

Laying Out An Ellipse.

From A. D. E., *Branchville, S. C.*—I have been a devoted reader of *Carpentry and Building* for several years, having received great benefit from it, for which I extend thanks to the publisher and the many contributors. Among other matters I notice considerable has been said in regard to laying out an ellipse. I have a contrivance which is a little different from anything I have yet seen in the paper, and which I find is both correct and simple. It can be made any size desired, the one I have being provided with cross arms of 2 feet length, while the tram is 3 feet. It is made of ½ x 2 inch hard wood. The tram is ½ x 1 inch. Referring to Fig. 1 of the sketches, the dis-



Laying Out an Ellipse.—Fig. 1.—Tram for Drawing an Ellipse,

tance from point 1 to point 2 equals the distance from the spring line to the top of the ellipse and from point 1 to point 3 equals the width of the opening. Point 3 is intended for the use of the pencil. By carrying the point 3, or the pencil, clear around, it will describe the ellipse. I think almost any carpenter will understand by the drawings what I mean and how to use the device, as Fig. 2 represents a cross section through one of the arms,

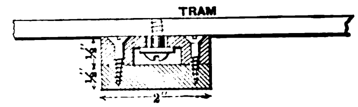


Fig. 2.—Section through one of the Cross Arms, showing Manner of Fastening.

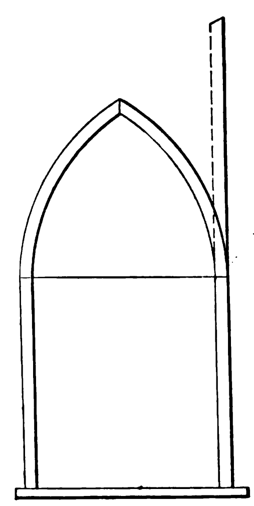
clearly indicating the manner in which the tram is secured. If any one has a better device for accomplishing the purpose I should be very glad indeed to have him present it.

Pitch of Door and Window Sills.

From W. B. V., *Newark, N. J.*—In reply to "M. E. L.," who asked in a recent issue with regard to the pitch of door and window sills, permit me to offer the following information: For door sills I would allow ½ inch pitch in 4 inches, and for window sills the correct bevel is ¾ inch in 4 inches.

Gothic Window Frame.

From J. S. Z., *Morgantown, Ind.*—I inclose a diagram of a Gothic window frame



Sketch Accompanying Letter from "J. S. Z."

and would like some of the readers of the paper to give me a rule for finding the length of the jamb before bending. I would also like to know a rule for obtaining the bevel to which to cut the stop so it will miter in the head. The sketch which I send may not be in exact proportion, but it will, I think, illustrate my meaning.

Problem in Half-Pitch Roofs.

From N. W. H., *Los Angeles, Cal.*—I have been much pleased with the interest taken in the roof plan which I submitted for the consideration of the readers of *Carpentry and Building*, and which was published in the issue for October, 1891. The method suggested by "J. N. H." of Texas is a very good one and is a natural result of the ground plan. "G. L. McM." of Tacoma suggests a method that is practically the same, and I think would produce a better looking roof than that of "J. N. H." It is possible that some of the readers of *Carpentry and Building* would like to know what kind of a roof I have made for the plan shown in the October issue. For the benefit of such I submit the accompanying sketches. The dotted lines shown on the plan view, Fig. 1, indicate where, under ordinary conditions, there would be valleys, but in the construction employed I omitted them by setting the common rafter A A on a line with H H. I used half the pitch of B B for the rise of the rear, as shown by Fig. 3 and at B in Fig. 4. In Fig. 2 is shown a front view of the roof. I think further explanation unnecessary, for the reason that the other portions of the roof are framed the same as all hip roofs.

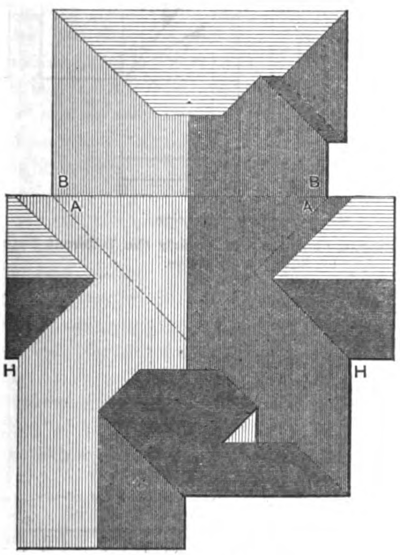


Fig. 1.—Plan View.

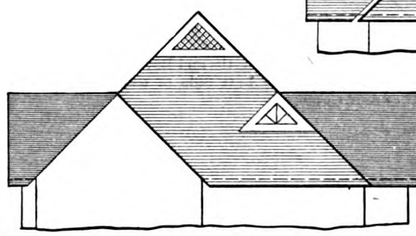


Fig. 2.—Front View of Roof.

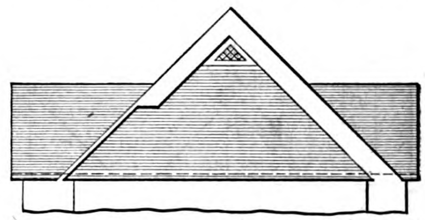


Fig 3.—View of Rear of Roof.

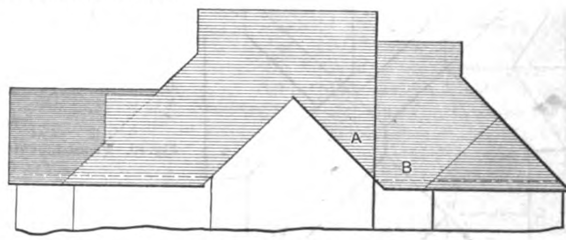


Fig. 4.—Side View.

Problem in Half-Pitch Roofs.—Views Showing how "N. W. H." Framed the Roof in Question.

Face Mold for Stair Rail.

From A. L., *Napa, Cal.*—I notice in the September issue of the paper an answer to "Constant Reader" contributed by Morris Williams, of Scranton, Pa. In behalf of "Constant Reader" I wish to state that the reply given is incorrect. In Fig. 28 the drawing of a face mold is well enough, but it occupies the position it should when we slide it up to mark the plumb line, thus making the shank too long and resulting in a material difference when the joint is not square to the face of the plank. In Fig. 29 Mr. Williams simply gives a case of a quarter circle face mold with the different pitch of tangents. Now, I understand "Constant Reader" to ask to have it come to a level at the post, or if the post is removed to join the level rail. However, he has made no allowance for extra wood, which is required for fitting the rail to the post on the pitch of his upper tangent. I wish to ask Mr. Williams if his corresponding numbers in Figs. 21 and 22 are not a little astray. If he will cut out a couple of blocks and hold them in position he will readily discover the error to which I refer. In one of his first articles he said there was no twist in the wreath piece from pitch to level. As this is news to me, I should be very glad indeed if he will explain.

What Is Two-Thirds Pitch?

From G. A. L., *South Hanson, Mass.*—Will some of the readers of *Carpentry and Building* kindly explain what is meant by two-thirds pitch? I have had several discussions with different carpenters and the claim is made that two-thirds the width of a building is two-thirds pitch. For my part, I consider that two-thirds pitch is two-thirds of a square. For example, if a building is 12 feet wide the rafter would be 8 feet long. I would like to know which is the correct plan.

Note.—There are several methods of expressing the pitch of a roof, and while one plan may be customary in one section, something different may prevail in a widely separated locality. Generally speaking the term "pitch" as applied to roofs is the slope or slant of the rafters and is dependent upon width, or span, and the rise. Perhaps the most general plan of expressing pitch is by hight in parts of the span. If, for example, the span, by which is meant the distance between supports, is 30 feet and the hight is 10 feet, the pitch of the roof by this method is called a third pitch, while if the span is 20 feet and the hight 10 feet the pitch is called half pitch. Another plan, which, however, is not in very general use, is to designate the pitch by the length of rafters in parts of the span. Suppose, for example, the span is 30 feet and the length of the rafter 20 feet, then the roof would be said to have a two-thirds pitch. The subject is one which admits of discussion, and we shall be glad to have the practical men in the trade express their views.

Design for Small Church.

From E. J. A., *Lyons Falls, N. Y.*—I would like to ask through the columns of *Carpentry and Building* for designs of a church having an auditorium capable of seating about 200 people. I desire the building to have folding doors between the auditorium and the church parlor and a covered driveway at the side entrance.

Note.—The inquiry of our correspondent is one which we trust many of the practical readers of the paper who have had experience in church work will see fit to consider. We are sure that a number of designs of small churches showing arrangement common to different sections of the country will prove of great interest and value, not alone to the correspondent making the inquiry, but also to a host of others who are more or less frequently called upon to execute work of this character.

Deadening Floors.

From A. J. C., *Jacksonville, Fla.*—In answer to the inquiry of "F. A. L.," Springvale, Maine, whose letter appeared in the July issue of *Carpentry and Building*, I would say that some six months ago I put up a hall 30 x 60 feet, there being a store on the ground floor and rooms above. I filled in between the joists with lime mortar 2½ inches deep, and this has given entire satisfaction in deadening sound. I am now having the foundations laid for stores and hall above, the building measuring 40 x 60 feet, and shall fill in between the joists in the same manner as indicated above. I would suggest to "F. A. L." that he put down another floor on top of the present one, leaving a space of some 2 or 3 inches to be filled in with lime mortar, mineral wool or sawdust; the latter, however, I do not like on account of vermin. Should "F. A. L." adopt any of the suggestions offered, I would be pleased to hear through *Carpentry and Building* of the results achieved.

Blue Prints Direct from Original Drawings.

From D. H., *Chicago, Ill.*—Will you please inform me through the columns of your paper how to make drawing paper transparent so as to take a blue print from the original drawing, and thus save the time and trouble of tracing? I have tried boiled oil and turpentine, but find the plan too slow.

THE BUILDERS' GUIDE.*

By I. P. HICKS.

Art of Roof Framing.

(Continued.)

TO FIND the lengths and bevels of the jacks on the right side of the front gable draw a horizontal line G C, Fig. 76, representing the plate line. On this line set off the location of the right gable K C. From the center of the gable set off the length of common rafter on the front gable T M, which is the same as G F of Fig. 74. Connect M with K for the position of valley rafter for finding the lengths and bevels of jacks on the right side of the front gable. Square up the length of the common rafter on the ing the lengths and bevels of the jacks on the left side of the front gable. A bevel set in the angle at x will give the bevel across the back. The plumb cut or down bevel will be the same as that of the common rafter on the front gable. The lines H I N show the lengths of the common rafters on the left gable.

In order to throw as much light as possible upon the subject and present a choice of methods, we 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.

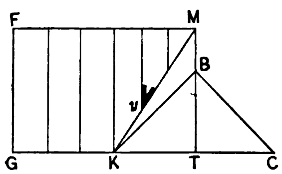


Fig. 76.—Finding Lengths and Bevels of the Jack Rafters on the Right Side of the Front Gable.

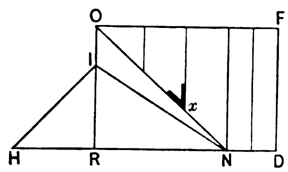


Fig. 77.—Finding Lengths and Bevels of Jacks on the Left Side of the Front Gable.

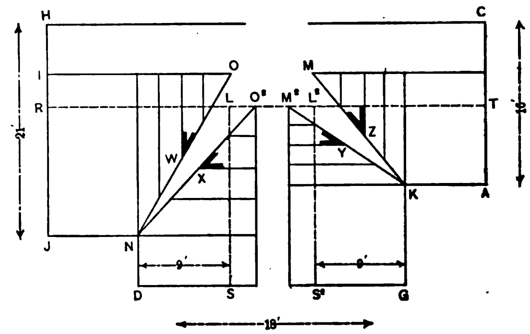


Fig. 78.—Diagram Showing More Clearly the Different Cuts of Jack Rafters.

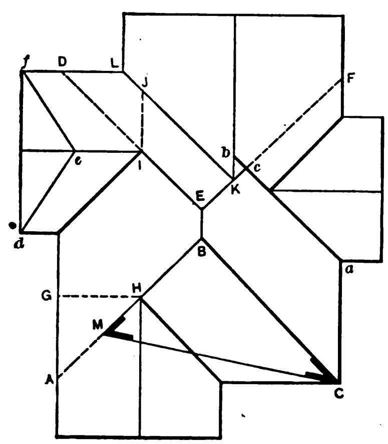


Fig. 79.—Plan of Hip and Valley Roof.

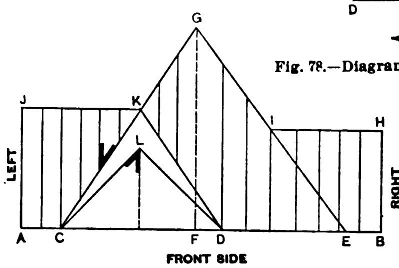


Fig. 80.—Front Elevation of Roof Plan Shown in Fig. 79.

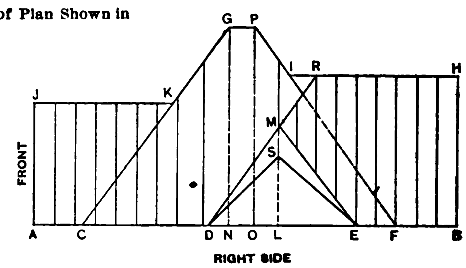


Fig. 81.—Right Elevation of Roof Plan Shown in Fig. 79.

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front gable, G F, and connect F M for the ridge line. Space the jacks on the ridge line and draw perpendicular lines to the plate and valley, which will give the lengths of the jacks on the right side of the front gable. A bevel set in the angle at Y will give the bevel across the back. The plumb cut or down bevel will be the same as that of the common rafter on the front gable. The lines K B C show the length of the common rafter on the right gable. To find the lengths and bevels of the jacks on the left side of the front gable draw a horizontal line, as H D of Fig. 77, representing the plate line. On this line set off the location of the left gable, H N. From R, the point directly under the ridge of this gable, set off the length of the common rafter on the front gable R O, which is the same as D F of Fig. 74. Connect O N for the position of the valley for find-

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Fig. 78 shows the wall plate lines exactly the same as in Fig. 74, except it is divided on the ridge line of the front gable, and spread so far apart that when the roof is developed, showing the different jack rafters in their various positions, there will not be a series of lines crossing each other to cause confusion. Let H, C, A, K, G, D, N, J, represent the wall plate lines. The dotted lines R L S and S' L' T, are the lines plumb under the ridge of the gables. We 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 W 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 O², are of the same length and show the valley rafters in different positions for finding the lengths and cuts of the two divisions of jacks—namely, the eft gable and the left side of the front gable. The valley lines K M and K M² 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 elevate the four sections of the roof containing the different jacks to their proper pitch, and move the two divisions of the diagram together till the dotted lines L S and L² S² meet plumb under the ridge of the front gable. What is the result? N O and N O² join as one line and constitute the left valley. K M and K M² also join as one line and constitute the right valley. This would also 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. 74, as shown and described before. The cuts could be shown in Fig. 78, but as they would only serve to make the diagram more complicated, they are omitted. 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 Figs. 74 and 78 in one diagram. If they will imagine one of these diagrams placed over the other, the result will probably be satisfactory.

HIP AND VALLEY ROOFS.

In Fig. 79 is represented the plan of a hip and valley roof. This form of a roof is frequently termed broken-back hip and valley, because the main hips are intersected by the common rafters of the gables from one side and the valley rafters from the other. This breaks the line of the hip, hence the origin of the term broken-back. In Fig. 79 let A B, B C, D E and E F represent the line and run of the four main hips. It will be seen that C B is the only hip line which is not broken by a common rafter or a jack from the gables. The main hip line A B is broken at H by the common rafter on the front gable which joins it, as shown by the dotted line G H. If A was the bottom terminus of the hip it would cause several of the common rafters on the left side of the front gable to be cut in two, making more jacks and more work, while weakening the general construction of the roof. In framing, the hip should stop against the ridge of the front gable at H. The hip line D E is broken at I by a jack on the left gable, shown by dotted line I J. In framing, the hip should stop against the ridge of the left gable at I. The hip line F E is broken at K by the intersection of the valley rafter L K. For a scientific job of framing the valley rafter *a b* on the front side of right gable should extend to the ridge of the rear gable, as it is the nearest place of support, and the hip rafter E F should stop at *c* against the valley *a b*. The line B C is the run of the only hip rafter which forms an unbroken line.

From B square down the rise of the hip to M, and and connect M with C for the length of the hip rafter. A bevel set at M will give the down bevel and at C the bottom bevel. The method of obtaining the lengths of the hip rafters which are termed broken back, will be plainly illustrated in other diagrams.

Before proceeding further, however, the reader should be reminded of the fact that on one-half pitch roofs the run of a hip or valley is the length of a corresponding common rafter, hence the dotted line D I shows the length of the common rafter on the left gable for a roof of one-half pitch. If the roof was some other pitch—say one-third, for example—then the length of the common rafter for this gable could be shown by setting off the run and rise, as indicated by *d e f*. Proceed in like manner with the gables, and also with the main common rafter. Fortunately, there is always an easy way of doing work, and we will now proceed with the method that makes all roof framing easy. Referring to Fig. 80, first draw a horizontal line, A B, representing the front plate, and set off on this line the location or starting points of all hips and gables shown on the front of plan as C D E. Now, C E represents the starting points of two of the main hips, and also the span of the building having the longest common rafter, F being the center of the span. From F set off the length of the common rafter perpendicularly, as shown by the dotted line F G. Connect G with C and E for the length and position of the main hips. Set off the length of the common rafter on the right gable B H, and draw the ridge line H I; then I E is the length and position of the right gable valley rafter. Set off the length of common rafter on the left-hand gable A J and draw the ridge line J K; then K C is the length and position of the left-gable valley. Connect K D for the front-gable valley. Space and draw the rafters as shown, which will give the length and cut of every jack in the front elevation, including those which cut from the broken hip K G to the valley K D. The line K G is also the length of the broken hip, which stops against the ridge of the left gable. A bevel set in any of the angles where the jacks join a hip or valley will give bevel across the back. The plumb cut is the same as that of the common rafter. C L shows the length of the common rafter on the front gable.

In Fig. 81 is shown the right elevation of the roof plan, A B representing the length of plate line, C D E F the starting points of the hips and valleys on the right side of plan, while C and F are the starting points of the main hips. From C and F set off the run of the main common rafter as C N and F O. From N and O set off the length of the main common rafter, as shown by the dotted lines N G and O P. Connect G and P, which is the ridge of the main roof. Connect G C and F P for the main hips. Set off the length of the common rafter on the rear gable B H and draw the ridge line H I. Set off the length of the common rafter on the front gable A J and draw the ridge line J K. From the center of the right gable set off the length of the common rafter, as shown by the dotted line L M. Draw the valley from D through the point M, continuing it to the ridge line or rear gable, which is the nearest place of support. Then D R is the length of the valley rafter on the front side of the right gable. Connect M E for the valley on the back side of the right gable. C G is the main hip, which is full length.

C K is the front gable valley, and the jacks are cut from the ridge line J K to the valley C K, also from the plate C D to the main hip C G, and from the ridge G P to the valley D M. The main hip P F is broken at I, but extends to the valley rafter D R for a proper place of support. Jacks are cut from the ridge line I H and the valley line M R to the valley M E, as shown. The dotted portion of the hip line P F shows that if the hip was put in full length it would necessitate cutting two common rafters and two jacks on the rear gable, which would make additional work and have a tendency to weaken the roof. Thus the length of every rafter in the right elevation of the plan has been shown, and as the bevels are the same as indicated in Figs. 79 and 80 further explanation is unnecessary.

In Fig. 82 is shown the left side elevation of the roof, in which A B represents the length of the plate line. C D F, the starting points of the hips and valleys, and C and F the points of the main hips. From C and F set off the run of the main common rafter, as C D and F O. From O and D set off the length of main common rafter, as shown by the dotted lines O P and D G. Connect G and P for the main ridge. Draw G C and P F for length and position of main hips. Set off the length of the common rafter on the front gable A J and draw the ridge line J K. Set off the length of common rafter on the rear gable B H and draw the ridge line H I. Now from the center of the left gable set off the length of the common rafter, as shown by the dotted line L M. Connect M and D for length and position of valley rafter on the front side of the left gable.

shows the length of the common rafter on the rear gable; I E is the right gable valley. The broken hip P K stops against the ridge of the left gable at K, and the broken hip P M stops at the ridge of the rear gable at M. The jacks are cut from the ridge line H I to the valley E I and from the broken hips M P and P K to the rear gable valley M D. This completes the rear elevation and shows the length of every rafter as viewed from this side of the roof. It will be noticed in Fig. 83 that the right gable appears to the left hand in the diagram and the left gable to the right. This is due to the fact that as we view the front elevation of the roof, Fig. 80, we call the gables right and left. Now, if we view the roof from the rear, the right gable will be to our left and the left to our right, as shown in Fig. 83.

AN IMPORTANT POINT.

For the purpose of illustrating an important point in roof framing we will refer to Fig. 84, which represents the plan of a roof having three gables of the same pitch, but the front gable being narrower than

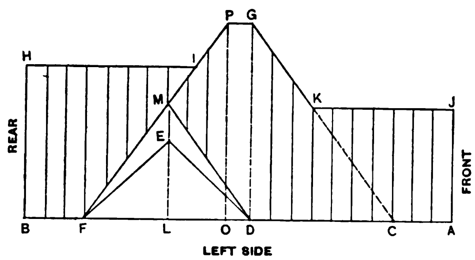

Fig. 82.—Left Side Elevation of Roof.

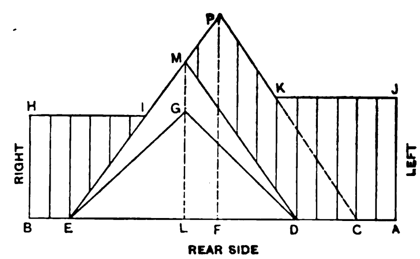

Fig. 83.—Rear Elevation of Roof.

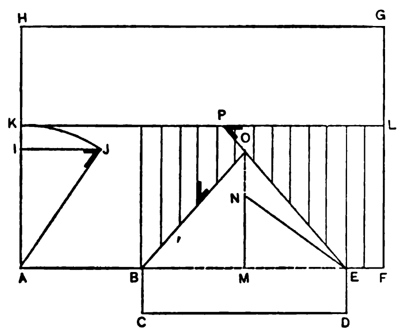

Fig. 84.—Roof Having Three Gables of the same Pitch, the Front Gable being Narrower than the other Two.

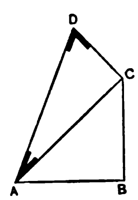

Fig. 85.—Finding the Plumb Cut of the Valley Rafters.

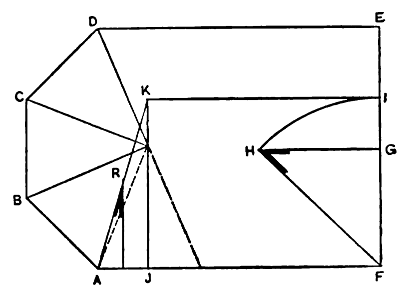

Fig. 86.—Finding the Lengths and Bevels of Hips and Jacks on an Octagon Roof.

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F I will be the length of the valley on the rear gable. M P is the length of the broken hip which stops against the ridge of the left gable at M, and G K is the length of the broken hip which stops against the ridge of the front gable at K. The jacks are cut from the ridge line H I to the rear gable valley F I; also from the broken hip M P to the valley M D and from the broken hip G K and ridge line K J to the plate line A D. The length of the common rafter on the left gable is shown by F E. This completes the left side elevation and shows the length of every hip, valley and jack, as viewed from this side of the roof.

The next diagram, Fig. 83, shows the rear elevation of the roof; A B represents the length of the plate line, C D E the starting points of hips and valleys, and C E the starting points of the main hips. Set off the run of the main common rafter, as E F, and draw the length of the common rafter perpendicular, as shown by dotted line F P. Draw P E and P C for the length and position of the main hips. Set off the length of the common rafter on the left gable, A J, and draw the ridge line J K. Set off the length of the common rafter on the right gable D H, and draw the ridge line H I. From the center of the rear gable set off the length of the common rafter, as shown by the dotted line L M. Connect M and D for the rear gable valley. E G

the other two. Let A B C D E F G H represent the wall plate and from A set off the run of the common rafter to I; square up the rise to J, and connect A and J for the length of the common rafter on the main part of the roof. Swing the common rafter around to a perpendicular position, as shown by A K on the left gable. Set off the length of the common rafter on the right gable F L, and connect K with L for the ridge line. Next, set of the run of the common rafter on the front gable E M; square up the rise M N, and draw E N for the length of the common rafter. From M set off the length of the common rafter perpendicular to O and then draw the valley from E through the point O, continuing it to the ridge which is the nearest place of support in a self-supporting roof. It is a common practice among mechanics to stop both valley rafters at O, but this leaves the valleys without support and as a consequence the roof sags and gets out of shape even before the carpenter has it finished. This is noticeable on large roofs, where to secure the greatest strength in the framing of the roof it is necessary to run the first valley rafter to the ridge as shown by E P, and butt the second valley rafter against the first as shown by B O. E P is the length of the valley rafter which joins the ridge and the bevel at P is the bevel across the back of the same. B O is the length of left valley rafter and cuts square across the back. The jacks are cut from the ridge to the valleys as shown. A bevel set in the angle where they join the valley will give the bevel across the back. The plumb cut is the same as that of the common rafter shown at J. To find the plumb cut of the valleys set off the run of the common rafter on the front gable A B, Fig. 85; now, at right angles to A B set off the run of common rafter from B to C, and draw A C for the run of the valley. From C square up the rise of valley to D and draw D A, which will give the length of the left valley the same as B O in Fig. 84. The bevel at D, Fig. 85, is the plumb cut and at A the bottom cut. The plumb cut of the valley E P is the same as the extension of the rafter to the ridge line and does not change the cuts.

OCTAGON HIP AND JACK RAFTERS.

Let us now consider the problem of finding the lengths and bevels of octagon hips and jacks by the easy system. Referring to Fig. 86, let A B C D E and F represent the wall plate line, F G being the run of common rafter, G H the rise and F H the length of common rafter. Next swing the common rafter round to a perpendicular position, as F I. Set off half the side of the octagon A J and square up the length of the common rafter J K. Draw K I for the ridge line and K A for the hip. Space and draw the jacks perpendicularly from A J to the hip as shown.

the line C D and draw perpendicular to the hips as shown, which will give the lengths. The bevel shown at L is the bevel across the back, the down bevel being the same as that of the common rafter.

JOINING GABLES DIAGONALLY.

One of the most difficult problems in roof framing with which the mechanic has to contend—namely, that of joining a gable cornerways or diagonally to another gable—is illustrated in Fig. 89. This method is frequently adopted in city residences to produce diversity in design. Let A B C D E F G represent the wall plate lines in the plan; F H, the run of the common rafter on the main part; H I, the rise, and F I the length of the common rafter. Transfer F I to F and draw J K, which represents the main ridge. From the center of the corner gable square up the rise of the common rafter L M, and draw A M for length of common rafter on the corner gable. From C square up to N what the main common rafter rises in the part of its run represented by L C. Then L N will be the length of main common rafter up to the point where the left valley starts. Transfer L N to L O, which is the starting point of the left valley. From O set off O P, which should be the length of the dotted line L G and of the common rafter A M.

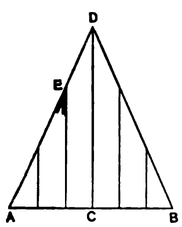

Fig. 87.—Showing how to find the Lengths and Bevels of Jack Rafters in an Octagon, Hexagon or Polygon.

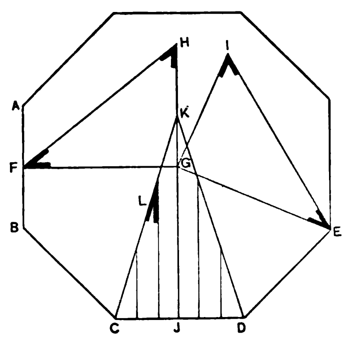

Fig. 88.—Diagram Illustrating the Method of obtaining the Lengths and Cuts of all the Rafters in any Regular Polygon.

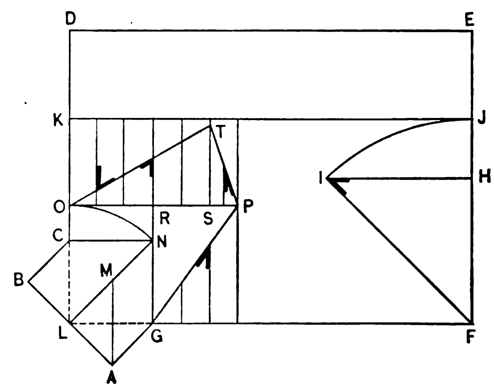

Fig. 89.—Framing Gables which Join Diagonally.

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The bevel at R is the bevel across the back and the plumb cut is the same as that of the common rafter shown at H. The length and bevels will be the same on each side of the octagon, hence further explanation of Fig. 86 is unnecessary.

The cuts of jacks in an octagon, hexagon or a polygon of any description may be found in the following manner. Referring to Fig. 87, let A B represent the length of the side, and from the center set off the length of the common rafter C D. Draw A D and B D for the length and position of hips. Space the jacks on the line A B and draw perpendicular to the hips as shown, which will give their lengths. A bevel set in the angle at E will give the bevel across the back, the down bevel being the same as that of the common rafter. Fig. 87 refers only to the length and bevel of the jacks, but the length and cuts of all the rafters in any regular polygon may be found in the following manner: Referring now to Fig. 88 let A B C D and E represent four sides of an octagon. Set off the center of one side as B F, and square into the center G F, which is the run of the common rafter. Square up the rise G H and draw F H for the length of the common rafter. The bevel at H is the top bevel, and at F the bottom bevel, G E being the run of the hip. Square up the rise G I and draw E I for length of hip rafter. The bevel at I is the top bevel, and at E the bottom bevel. From the center of C D set off the length of common rafter J K, which should be the same length as F H. Draw K C and K D for the position of the hip rafters for finding the length and bevel of the jacks. Space the jacks on

Square up G R, which should be the same as L O. From R set off the rise of the common rafter on the corner gable to S, which is the same as L M.

From S square up the length of the common rafter to T, which is the same distance as L M. Connect T with O for the length and position of the left valley. Connect T with P for the length and position of the right valley, which runs from the ridge of the corner gable to the plate of the corner gable. Draw P G for the length and position of the right valley, which runs from the plate of the corner gable to the main plate. Space the jacks on the main ridge and draw perpendicular lines as shown. The jacks from K J to valley O T are the jacks in the main roof. The jacks from O S to the valley O T are the jacks on the left side of the corner gable. The valley T P on the right side of corner gable is but little longer than the common rafter on corner gable, and runs so nearly straight with the rafters on the main roof that the jacks on this side are seldom needed in the corner gable; but in case they are, space them between S P and draw to the valley T P, which will give the length and bevel, as shown. Draw the jacks from the valley G P to the main plate, which will give the length and cut of the same. The down bevel of the jacks will be the same as that of the common rafter.

It is natural for one to think the valley rafter O T should start from the point C, but such is not the case, as will be plainly seen by referring to Fig. 90, which shows that the valley starts at O on the line of the main common rafter, and comes far above the point C, for C O is the same as C N in Fig. 89.

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The Mid-Year Meeting.

The mid-year meeting of the officers and directors of the National Association of Builders was called to order at 10 o'clock a.m., October 17, in Indianapolis, Ind., the Builders' Exchange of that city having provided rooms for the purpose in the New Denison Hotel. The following officers and directors were present in person or by substitute; President Anthony Ittner of St. Louis; First Vice-President Ira G. Hersey, Boston; Second Vice-President Hugh Sisson, Baltimore (substitute); Secretary William H. Sayward, Boston; Treasurer George Tapper; directors, Noble H. Creager, Baltimore: James I. Wingate, Boston; A. A. Berrick, Buffalo; C. W. Gindele, Chicago; S. D. Tippett, Cincinnati; A. Chapoton, Jr., Detroit; Jas. McGauley, Indianapolis; Thos. Armstrong, Louisville (substitute); Geo. W. Libby, Minneapolis; John J. Tucker, New York; N. B. Hussey, Omaha; Stacy Reeves, Philadelphia; N. E. Redlon, Portland, Me. (substitute); Jeremiah Sheehan, St. Louis; G. J. Grant, St. Paul (substitute); A. S. Reed, Wilmington; C. D. Morse, Worcester. The following members of the Lien Law Committee were also present: John S. Stevens, Philadelphia; J. Milton Blair, Cincinnati; Edward E. Scribner, Chicago; Arthur McAllister, Cleveland.

The first work of the meeting was the appointment of Ex-President John J. Tucker as director for New York City in place of Marc Eidlitz, deceased, and the acceptance of the substitutes for absentees. The morning session was devoted to reports of the secretary, treasurer and committees.

SECRETARY'S REPORT.

The secretary's report covered the ground gone over since the last convention and touched upon the various phases of the work of the National Association that have been pursued during the year. The field has steadily increased and the opportunities for advice and counsel offered by the National Association have been taken advantage of by builders all over the country, the number of new correspondents and new communities assisted being greater than those of any similar period since the association was established. Employers are taking more careful and thorough steps toward forming associations than ever before and with a greater knowledge of the possibilities and functions of organization, because of the examples made public through the secretary's department of the National Association. The cities in which permanent organizations have been established were enumerated, and with those in which preliminary work to the same end is now under way, comprised a large number of the important cities of the country. The opinions of foreign English-speaking nations regarding the work undertaken by the National Association is shown by the adoption of many of its recommendations by builders in Canada and Australia. The progress made by the filial bodies in carrying out the methods advocated by the National Association was shown, such as securing a regular discount for the contractor from stock prices on building material, the adoption of a fixed code of practice, the use of the form of arbitration between workmen and employers and the system of apprenticeship, the use of the Uniform Contract and the various other plans advocated for the conduct of exchanges. The secretary next touched briefly upon the routine work of the office, its volume, methods, &c., and urged the directors to impress upon the local secretaries the importance of keeping the national secretary posted as to new developments of any kind affecting building interests, even in addition to answering inquiries from headquarters. A *résumé* of the various important steps taken by the local exchanges, as viewed from the secretary's office, indicated steady progress in nearly all the exchanges, and demonstrated that the recommendations of the National Association are beneficial wherever carried out. The Builders' Exchange department in *Carpentry and Building*, through which the members of the filial exchanges are reached in a more general way than is possible by correspondence, was regarded as of great value both to the association and to the fraternity of builders at large. Letters of inquiry are constantly being received from builders outside the national body or its exchanges, prompted by matter published in the interest of the association. All sorts of queries are constantly presented to the secretary that are the result of the work in this department. The secretary took occasion during the progress of his report to impress upon the directors the necessity of having each filial body carefully test the recommendations of the National Association, and pointed out the direct benefits resulting from such a course that had been derived by builders in exchanges where the methods suggested had been adopted. In recapitulating the secretary said that at no time in the history of the association was the necessity for earnest, hard work more apparent than now. The exchanges are just beginning to feel the effect of the labor that has been spent, and the importance of securing the adoption of universal practices among builders becoming more fully appreciated.

The report of the treasurer was next presented, and showed that several of the exchanges were in arrears in the payment of the pro rata assessment. The amount in the treasury, together with the amount due from delinquent exchanges, will be barely enough to carry the association through the year.

REPORTS OF COMMITTEES.

The Committee on Uniform Contract reported that no important changes had been suggested since the last meeting, and stated that a call had been issued for a meeting of the Joint Committee at Chicago immediately after the adjournment of the mid-year meeting. The Committees on Resolutions, Legislation and Statistics reported that nothing had been done in the way of formal action, but that out of the work of the mid-year meeting reports would be prepared for presentation to the convention. The Committee on Building Law reported that no action had been taken since the last convention, as no meeting had been held. The Committee on Lien Law had failed to find any new light on the question, but stated that material for an annual report was being secured. The morning session adjourned shortly after noon.

AFTERNOON SESSION.

The directors came together for the afternoon session promptly at 2 o'clock, the first business in order being the reports from the filial bodies regarding existing conditions. Baltimore reported the exchange as being in excellent condition, with 138 members in good standing on the rolls. It has been the custom for some time past to serve a lunch at the quarterly meetings, and the fraternal feeling among the members seems much benefited thereby. The attendance at meetings has averaged over 80 per cent. during the past year, although the number who visit the rooms daily during the 'change hour, is not as large as is desired. The Builders' Exchange Building Company, which is composed of members of the exchange, has bought for $100,000 a piece of real estate 84 feet 4 inches x 76 feet 6 inches in a very desirable location, upon which it proposes to erect a building to cost $225,000 as a home for the exchange. The condition of affairs between employers and workmen appears to be satisfactory, no trouble having been experienced since the big carpenters' strike in May, which was reported in the columns of *Carpentry and Building* at the time.

BOSTON, MASS.

The report from the Boston Exchange showed that business generally had been in a very favorable condition during the year, and that no serious trouble with the workmen has occurred aside from the effect of the granite workers' strike, which caused more or less delay on work in that branch of the trade. The Master Builders' Association is in excellent condition and has greatly profited by the alterations in its building, which have largely increased the facilities and conveniences for transacting business. The changing of the building into offices has centralized the building interests of the city about the exchange more than ever. The working of membership, based upon a corporate (contractors') and non-corporate (material dealers,) classes, the former only being entitled to hold office and vote, was explained. The uniform contract is comparatively little used.

BUFFALO, N. Y.

In Buffalo the exchange has been instrumental in securing many advantageous changes in the practices formerly existing in the building business. Through the action of the exchange reforms have been secured in the building law of the city. A prominent member of the exchange has been appointed Superintendent of Public Buildings; a code of practice based upon the recommendations of the National Association has been adopted and put into practice; the uniform contract is almost exclusively used; compensation has been secured by a lowest bidder who failed to receive the award of contract, and one of the best office buildings in the city has been erected and is now occupied as a home by the exchange. The membership is steadily increasing, and the exchange is in good financial condition.

CHICAGO, ILL.

The report from the Chicago Exchange showed that organization to be maintaining its high standard as one of the institutions of the city, and is using its influence to establish the recommendations of the National Association. The arbitration system between employers and workmen is operating satisfactorily, and the code of practice is the subject of a meeting to be held soon to consider the advisability of its adoption. The Uniform Contract is but little used.

CINCINNATI, OHIO.

The membership of the Cincinnati Exchange has steadily increased during the year and the new quarters in the Opera House Block are a great improvement over the old ones, both as to location and convenience. The change of location is but the first step by the exchange toward securing a building of its own. The Uniform Contract is not used to the extent that is desired and a definite code of practice such as is advocated by the National Association has never been adopted. The form of arbitration, however, has been put in operation between the employers and workmen by the planing mill men and the bricklayers. The Congress of Builders is still in existence, but there has been but little call for its active operation of late as regards its function of adjusting differences with the workmen.

CLEVELAND, OHIO.

The Builders' Exchange of Cleveland has largely increased its membership since the last convention and has enlarged its quarters by taking in several additional rooms in the Arcade. Through the efforts of the exchange the Uniform Contract is growing into more general use, and an agreement has been entered into with the material dealers whereby a regular discount on builders' supplies will be given to regular contractors. A code of practice has been formulated, but as yet has not been put to the test of operation. The form of arbitration has never been considered by the exchange as a body, and no steps have yet been taken to secure a building.

DETROIT, MICH.

The Builders' Exchange of Detroit reported a membership of almost 100 and annual dues $40. The 'change hour is being well attended by the members and proves its benefit as it becomes better established. A custom of holding monthly dinners has been adopted with the pleasantest results, and the establishing of a paid secretaryship has proved of great benefit to the exchange. An effort is being made to secure for contractors a reduction from the price of building material by the dealers. The exchange has established a practice of requiring an allowance of 3 per cent. on subcontracts "placed" with a principal contractor upon which he has not estimated. The code of practice and form of arbitration have never been adopted, and as a result of the architects uniting against it the Uniform Contract is not in use in Detroit.

LOUISVILLE, KY.

The Builders' and Traders' Exchange is in excellent condition, with a growing membership of 99. The project to erect a building of its own is well under way and gives every promise of successful fulfillment. The Uniform Contract is but little used, and the form of arbitration has never been tried. A very fair and desirable code of practice has been successfully adopted, and its operation has been very satisfactory.

MINNEAPOLIS, MINN.

The Minneapolis Exchange was reported as being in good condition and the 'change hour gradually being recognized as one of the best means for facilitating the transaction of the builders' business. The Uniform Contract is but little used and neither the code of practice nor form of arbitration has been adopted. Business dull.

NEW YORK CITY.

The report from the Mechanics' and Traders' Exchange of New York City indicated an increase in the use of the Uniform Contract, and that a similar plan of arbitration to the one advocated by the National Association is in use by the mason builders. No final steps toward securing a building have yet been taken.

OMAHA, NEB.

Business has been depressed in Omaha for some time past, but the interest in the exchange has been maintained and the membership increased. The practice of giving with each regular meeting a collation, over which important subjects are discussed, has proved highly beneficial. The exchange has made much progress during the past year, and is one of the important organizations of the city. The Uniform Contract is making headway, and the form of arbitration and code of practice have been the policy of the exchange since they were recommended.

PHILADELPHIA, PA.

The Master Builders' Exchange of Philadelphia is in a healthy condition as to membership and finances, and the building business has been good throughout the season. The Uniform Contract is gradually coming into more general use although the form of arbitration and code of practice are as yet subjects for action. The interest in the National Association has been increased during the past year, and its work and purposes are aided in every way possible. The trade school is in successful operation, and it is expected that larger quarters will soon be necessary for its accommodation. Since the last convention the exchange has added a restaurant to its building and under its own control, which the members find very convenient and patronize liberally.

PORTLAND, MAINE.

The interest in the affairs of the Builders' Exchange of Portland is not as active as is desirable, but the attendance at meetings and the 'change hour is fair. The code of practice and the use of the Uniform Contract are partially established, but the form of arbitration has never been put into use. The total of membership is 52.

ST. LOUIS, MO.

The report of the director from St. Louis showed the exchange to be in an active and healthy condition with a membership of 250. The attendance at meetings is good and members show full appreciation of the improvement in the quarters made by the move to the present location. Building has been good all the season and few disturbances have occurred with the workmen. The use of the Uniform Contract is extending and the form of arbitration has been adopted by the plumbers and their employees. The code of practice has not yet been successfully established. The exchange is recognized as one of the solid institutions of the city.

ST. PAUL, MINN.

The Builders' Exchange of St. Paul has reorganized upon a new basis of membership, admission being given to trade associations only. The exchange seems to be in good condition.

WILMINGTON, DEL.

The Builders' Exchange of Wilmington reports 60 members and everything in good condition, although the attendance at meetings is not what it should be. The code of practice has been adopted, but is not fully established as the custom. The Uniform Contract is but little used.

WORCESTER, MASS.

The Worcester Builders' Exchange states that it is in excellent condition both as to numbers and finances. The attendance during the 'change hour and at meetings is fair and the code of practice and Uniform Contract are both growing in favor. Business has been good throughout the season, and the New England granite strike has been the only disturbance of note among the workmen.

MARC EIDLITZ.

The hearing of the foregoing reports was suspended at 4 o'clock p.m., and the president appointed a committee of five to draft resolutions on the death of Marc Eidlitz, in whose decease the National Association lost one of its stanchest supporters, a man of rare ability and intelligence, who had been closely identified with the association since its first preliminary meeting. The committee consisted of ex-Presidents John S. Stevens of Philadelphia; J. Milton Blair of Cincinnati; Edward E. Scribner (president at St. Paul) of Chicago, John J. Tucker of New York City and Arthur McAllister of Cleveland. The following resolutions were prepared and presented, and after feeling remarks by each member of the committee, and also President Ittner, Secretary Sayward and Treasurer Tapper, expressive of the deepest regret and appreciation, the board adjourned for the day at 4.30 o'clock out of respect to the memory of Mr. Eidlitz. The following are the resolutions:

RESOLUTIONS ON THE DEATH OF MARC EIDLITZ.

Whereas, The National Association of Builders since its last meeting has met with the loss of one of its most honored directors by the death of Marc Eidlitz, who represented in its councils the great and varied interests of New York City;

Whereas, Our brother has since the inception of the National Association been closely identified with its interests, leaving upon its plan of organization and its subsequent operations the imprint of his personality, and from his practical experience as a builder offering countless wise and useful suggestions for his younger and less experienced brethren; therefore, be it

Resolved, That the officers and directors of the National Association of Builders in Mid-Year Meeting assembled do hereby offer a loving tribute to the integrity and sterling worth of our dear brother, and testify to the deep sense of loss which his death has brought to this association at a time when his ripe judgment, advice and counsel were most needed by his associates;

Resolved, That these resolutions be entered upon the records and a copy of the same be sent to his family, to the Mechanics' and Traders' Exchange and the Building Trades' Club of New York City, as expressing regret from his brethren of the building fraternity of the United States.

TUESDAY MORNING.

The meeting was called to order at 10 o'clock on Tuesday morning and the hearing of reports from filial bodies further suspended. The first work of the morning was the consideration of new methods of work in the secretary's office for the purpose of increasing the interest in local exchanges and to secure greater benefits through the National Association. The consideration of this subject resulted in the expression of a feeling of reliance upon the wisdom of the work in the secretary's department and an appreciation of the importance of each filial body contributing as much as possible of its experiences for the general welfare of the National Association.

The next business was the presentation of the following resolutions, which were unanimously adopted:

Whereas, Our honored and esteemed vice-president, Ira G. Hersey, has on several occasions expressed his intention of declining election as president in favor of Wm. H. Sayward; and

Whereas, The Board of Directors are of the opinion that it would be detrimental to the best interests of the N. A. B. to lose the valuable services of our honored secretary at this time, therefore be it

Resolved, That in Vice-President Hersey we have a gentleman who will do honor to the office of president of the N. A. B., and will fill the position with dignity to himself and to the entire satisfaction of the association.

We therefore request him to reconsider his determination and to accept of the position.

THE EIGHT-HOUR LAW.

Next on the programme was the consideration of the bearing of the new eight-hour law passed at the last session of Congress, and the advisability of securing an official opinion from the United States Attorney-General upon the relationship of the law to the contractor in the building trades. After discussing the subject the secretary was instructed to secure an opinion from the United States Attorney-General as to the working of the law and as to the extent of its operation, a case being cited, for example, of a contractor, who was also the owner of a stone quarry, who had entered into a contract to furnish stone for Government work. The men at the quarry worked nine hours per day, and in the course of work the stock for the Government was quarried in conjunction with that for other jobs; the question being, Would the contractor be compelled under the law to hire a gang of men to work eight hours for the purpose of getting out the stone for the Government, or, the quarrying of the Government stone being incidental to the work of the quarry, would the men all be required to work only eight hours while the Government contract was being filled? Opinions were desired on other cases of similar nature.

The consideration of the advisability of making an effort to secure a Congress of Builders in connection with the World's Fair Auxiliary resulted in a vote that no steps be taken in the matter. During the discussion of the subject Mr. Gindele of Chicago, on behalf of the Builders' and Traders' Exchange of that city, extended an invitation to the National Association to hold its mid-year meeting for 1893 in Chicago during the time that the World's Fair would be open. The invitation was received and ordered referred to the association at the St. Louis convention for action, and the secretary instructed to return the thanks of the board to the Chicago Exchange for its invitation.

The advisability of preparing a standard form of organization to be recommended to builders' exchanges was referred to the Legislative Committee with instructions to report at the next convention.

REVISION OF CONSTITUTION.

The last subject on the programme was the advisability of suggesting a revision of the constitution, and if so, what? The question was very carefully discussed, suggested changes in articles IV., VII. and IX. being presented by the director from Philadelphia. After thoroughly going over the matter, it was decided to instruct the secretary to request all filial bodies to prepare and submit such suggestions, if any, as they may have to offer in revision of the constitution in time for reference to the Legislative Committee 60 days before the coming convention. The secretary was also instructed to secure reports from all committees in time to be printed and distributed to the local exchanges before the next convention.

P. J. McGuire, Secretary of the United Brotherhood of Carpenters and Joiners of the United States, requested the privilege of delivering an address before the St. Louis convention on the relationship of employers and workmen. Mr. McGuire's request was referred to the Executive Committee for action. Mr. Carpenter of Louisville presented the following resolution, which was presented to the association at the fourth convention in St. Paul, but upon which no action was taken at that time:

Resolved, That the National Association of Builders recommend to its affiliated bodies, that, when any difficulties or disagreements arise between architects and themselves relative to violations of rules, such affiliated body shall immediately notify the National Secretary, who shall as speedily as possible notify all affiliated bodies, through their secretaries, not to make any estimates or interfere with the matter in question until the same is reported as settled by the body from which such difficulty or disagreement originated.

Resolved, That the above be referred to the proper committee to report at the next annual meeting.

The above was referred to the Committee on Resolutions.

Several filial bodies having made request for visits from the secretary, the matter was laid before the directors, who authorized the secretary to make such visits as were deemed necessary.

The following resolutions presented by Mr. Tippett of Cincinnati were unanimously adopted:

Resolved, That the thanks of the National Association of Builders are heartily tendered to the Builders' Exchange of Indianapolis for the whole-souled and fraternal manner in which its members have greeted and entertained the delegates to its mid-year meeting of officers and directors; and further

Resolved, That we will carry with us to our different exchanges a greater amount of enthusiasm in the work of the National Association, which has been so ably assisted by the courteous attention of our Indianapolis brethren

With the unanimous passage of these resolutions the business of the mid-year meeting for 1892 ended.

ENTERTAINMENT.

The entertainment offered by the Indianapolis builders to their visitors was of the most cordial kind, and such times as were not occupied by the business of the meeting were devoted to visiting points of interest in the city and to enjoying the generous hospitality so warmly extended. On Monday night, October 17, a banquet at the new Denison Hotel was tendered to the officers and directors by the exchange, and proved a most delightful affair. The room and tables were beautifully decorated with flowers and plants, and the *menu* was of the finest that could be provided, the builders doing full justice to the tempting results of the caterer's art. Orchestral music enlivened the evening until cigars were lighted and the toastmaster, J. C. Adams, rapped for silence. Each of the ex-presidents, except Mr. Prussing of Chicago, who was unavoidably absent, responded to a toast, Stacy Reeves of Philadelphia speaking for Mr. Scribner, who was compelled to withdraw on account of illness. There were several other speakers, including the National Secretary, and the evening was thoroughly enjoyed by all, which fact was in no small degree attributable to the happy manner in which Mr. Adams essayed the duties of toastmaster.

On Tuesday evening after the adjournment of the meeting, those of the directors who were members of the Committee on Uniform Contract immediately left for Chicago, where a meeting of the Joint Committee of the American Institute of Architects and the National Association of Builders was called for Wednesday, October 19. The majority of the rest of the directors followed more leisurely, arriving in Chicago in time for the festivities attending the dedication of the World's Fair buildings. The members of the Builders' and Traders' Exchange of Chicago did everything in their power to afford the visiting builders every facility for seeing all that was to be seen at a time when such service was particularly valuable.

"Missionary Work."

The first visit of the National Secretary during his recent trip through the West was to the Builders' and Traders' Exchange of Omaha. An evening meeting was arranged for the hearing of a "talk" by the secretary and a large attendance was secured. The exchange had provided an elaborate dinner, which was served in the rooms at 8.30 o'clock p.m. After the various courses had been satisfactorily discussed, President N. B. Hussey made a few introductory remarks and was followed by the secretary, who spoke at considerable length upon the possibilities of organization, and particularly in relation to the benefits inherent in the form advocated by the National Association. A builders' exchange comprehends the entire ground occupied by building interests, and is capable, with proper direction and administration, of proving itself of incalculable value to the fraternity. The secretary dwelt upon each of the more prominent functions of an exchange, giving practical examples that have demonstrated the wisdom of the course and methods recommended by the National Association. After the secretary had finished his talk, several of the members asked him questions and some time was spent in replies, so that it was a late hour before the meeting ended. The Omaha Exchange has made remarkable progress since the secretary's last visit, both as regards the number of members and the efficacy of the organization.

From Omaha the secretary went to St. Louis, and there also he found a marked improvement. The new rooms now occupied by the exchange are much more convenient in location and arrangement than the ones formerly occupied, and the membership has greatly increased since his last visit. The secretary congratulated the members upon the improvement made and the progression thus indicated, and hoped that the change would only be a step toward securing a home of its own by the exchange. During an address delivered to the members at a well-attended meeting the secretary covered the ground taken by the National Association in its relationship to the filial bodies, and took occasion to caution the St. Louis builders not to attempt to elaborate a programme for the entertainment of the delegates to the convention in February. The conventions are first for business, and the entertainment should be only incidental.

From St. Louis the secretary proceeded to Cincinnati, where he was met by ex-President John S. Stevens of Philadelphia, who assisted at a special meeting of the exchange in its new rooms, adding his congratulations to those of the secretary on the marked improvement which the new quarters indicated. The attendance at the meeting was large and the interest of the members was maintained throughout. The secretary's address embraced the needs and advantages of a builders' exchange and the benefits of the National Association and organization generally. Mr. Stevens spoke on the possibilities of an exchange, using the Philadelphia Exchange as an example. The next day Mr. Stevens and the secretary were asked to attend a meeting of the Real Estate Exchange and to present their views on the advantages and importance of such organizations owning buildings of their own, in furtherance of a project to have the two bodies take the matter up together, and secure a home for both under one roof. A favorable impression was made, the members of the Real Estate Exchange apparently appreciating the wisdom of such a course. It is probable that before another year has passed the Builders' Exchange will have secured a home of its own, either alone or in conjunction with the Real Estate Exchange.

Notwithstanding the indications of progress apparent in the exchanges visited, the National Secretary is greatly impressed with the necessity for persistent and unceasing endeavor in order to secure for the builder the adoption of the improved conditions and better methods which are needed.

The Uniform Contract.

The Joint Committee on Uniform Contract of the American Institute of Architects and the National Association of Builders met in Chicago on October 19, and after prolonged consideration adopted a number of changes in the form which will materially shorten it and also greatly improve it as a document. When the committee finished its labors the new form was considered adopted, but it has been deemed best to make several minor changes that will assist in the perfection of the form, which will probably be ready for issue before the first of the year.

CIRCLE ON CIRCLE.

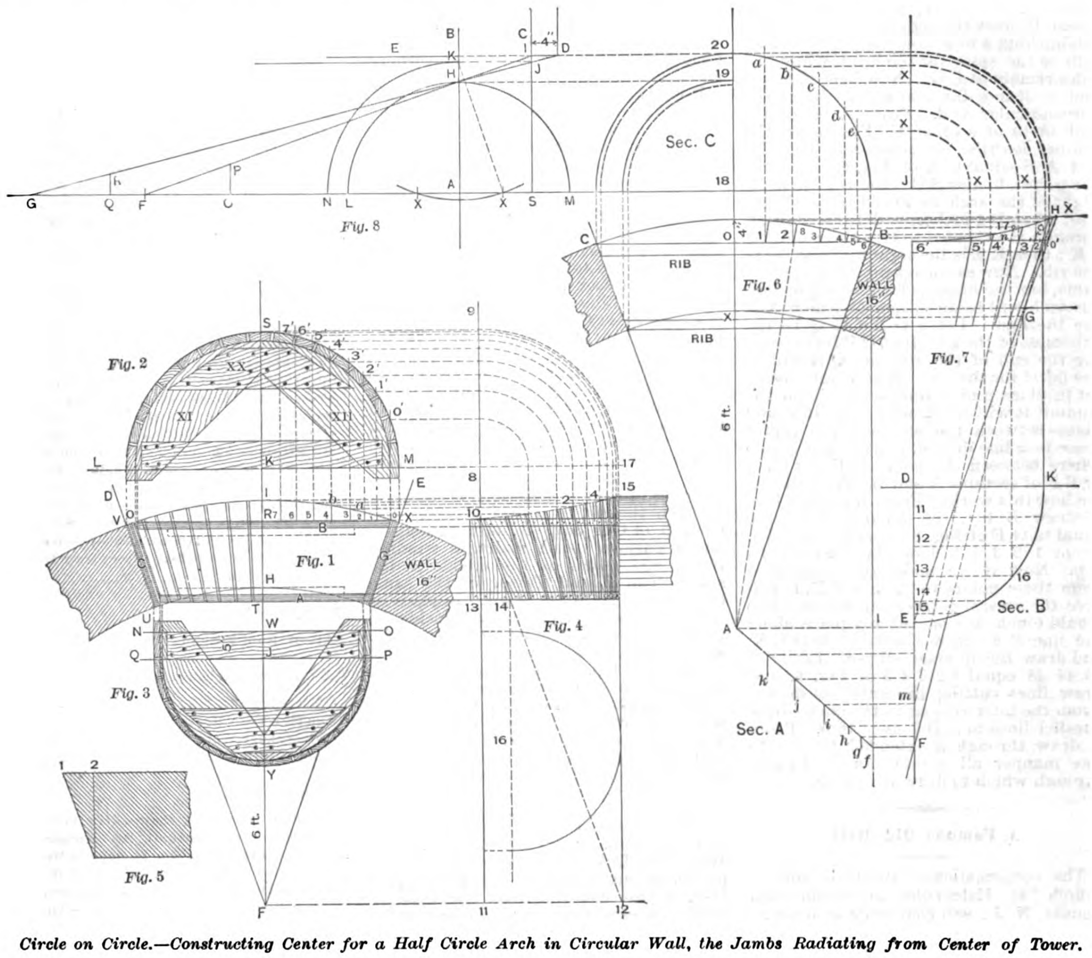
CONSTRUCTING THE CENTER FOR A HALF CIRCLE ARCH IN A CIRCULAR WALL, THE JAMBS RADIATING FROM THE CENTER OF THE TOWER.

A CORRESPONDENT writing from a prominent city in the Empire State asks for a method of constructing a center for a half circle arch in a circular wall, the jambs to radiate from the center of the tower. He desires a strong center to carry a heavy arch, and states that although the same question has come up before he has failed to discover the explanation of it. For the benefit of this correspondent as well as of other readers who may be interested, we present the following solution of the problem furnished by J. V. H. Secor, well known among his associates in and about this city as a mechanical draftsman of high attainments :

We are not told whether the crown is to splay the same as the sides, or if it is to be level, but we will endeavor to answer, assuming that the two ways mentioned are to be considered, the question. The first problem will be one with a level crown. For the diameter of the tower take, say, 12 feet, and for the opening at the outer edge of the wall 4 feet, these giving a radius of 6 feet, while the arch will be 2 feet high. The thickness of the material must be considered, and in this case we will use $1\frac{1}{4}$-inch lumber for both the ribs and the staves. Referring to Fig. 1, from F as center, with 6 feet as the radius to the outer face of the wall, and 16 inches for the wall, draw the inside face. Let F V be the face of one jamb and F X the other. Along the face of the openings mark the thickness of the staves, as shown at C G, Fig. 1. Then *O O* will be the length of the rib B. Draw L K M indefinitely, and at *O* and *O* erect perpendiculars cutting L M for the chord line. Now from K as center and R *O* as radius describe the line of the rib. Let XI and XII be the ribs with a joint at S, and add on about 2 inches of straight below the chord line. Take a piece, as shown at XX, and nail across the joint, and at the chord take a strip about 5 inches wide and secure the lower ends. Now the ends of the ribs are on a level to fit to the wall, but the crown being level the edge of the rib must be worked until it comes to nothing at the crown. Fig. 5 shows a section of the end bevel, drawn a trifle less than half full size. The inside rib, Fig. 3, will be worked in the same way, excepting that the center will be raised so that W Y will be the same hight as K S of Fig. 2. Take Q P for the chord line, and P O and Q N for the straight. This will be put together the same as the other rib. To draw the side elevation of the center, Fig. 4, proceed as follows : At any convenient place draw 10 11, letting 11 12 equal the hight of the arch ; parallel to 10 11 draw 12 15. Draw the diagonal line 10 12. This is the spring line and all the staves must radiate from the summit at 12. The triangle 10 13 14 is a level surface. From the face of the rib B, Fig. 1, erect any number of perpendiculars, as 7, 7′, 6, 6,′ &c., cutting the upper face of the staves, as shown. Now, from 7′ 6′ 5′ to 0′ draw horizontal lines terminating at the perpendicular 8 9. From 8, as center, describe the several curves terminating at 8 17; draw the straight lines as shown. Now, from the various divisions in the curve of plan, as *a b*, Fig. 1, draw the horizontal lines, as shown at 2 4 of Fig. 4. Draw all the lines to make the intersections and then trace the curve.

We will now give a more expeditious way to line off the end. Having built the drum with the staves running well over the outer rib, set the drum over the plan and square up from *O*, 1, 2, 3, and so on, of Fig. 1, marking across the end of the staves and then back over the face a short distance, transferring the distance as taken from the plan, and mark on the face of the drum from the rib line. Then bend a flexible strip and mark the curve ; then saw the ends off and dress down the projecting angles, and it will be complete.

We will now construct a center, with the head splayed the same as the side jambs, taking the same radius and opening as that of Fig. 1. This we will illustrate by Fig. 6. From A as center all the lines must radiate to the outer line of the wall at the crossing of the rib, as at 1, 2, 3, 4, 5. Erect perpendiculars cutting the line of arch at *a*, *b*, *c*, *d*, *e*. From J as center draw the several lines as *e*, *x*, *x*, 5′ and *c*, *x*, *x*, 3′, and all other points in like manner. Now from E of Fig. 7 as center draw the radial lines through the points 5′, 4′, 3′, 2′ 1′, 0′. Now from the radial points in plan as shown draw lines par



Circle on Circle.—Constructing Center for a Half Circle Arch in Circular Wall, the Jambs Radiating from Center of Tower.

allel to the face of the rib, which will establish points through which the curve is to be drawn, as 8 in plan, Fig. 6, to 9 in elevation of the center, Fig. 7. The same plan may be adopted to obtain the curve on the face of the staves, as was described, as a more expeditious way. Section C represents the two arches, showing the line to which to level the edge of the rib. Now, if it should be required that the two outer arches must be of one hight at the line of the walls, Figs. 1 and 6, then it is evident that these requirements are not met. Now we will look at Fig. 7 and see the hight of the arch. From O to the outer line of arch is 4 inches; then the incline E O′ H, reaching out that 4 inches, has raised the arch 1½ inches, as shown at H X.

We will now construct a center that will conform to the above conditions, taking the hight of the small arch as the standard. From O′, Fig. 7, draw O′ H. From H draw through G, extended, and establishing a new point at F; then F G will be the splay for the head, while the sides remain at E G. Now look at Fig. 8 and see it in a different light. Erect the perpendicular A B. From A as center and 18 19 of section C, Fig. 6, as the radius, describe the semicircle L H M. Let A S equal O X of Fig. 6, and erect the perpendicular S C. Let S I equal the hight of the arch 18 20 of Fig. 6. From I set off to D 4 inches, and from D draw through H extended to G. From J draw J K; then K A is the hight we must make the rib. Now as the opening remains the same, but the hight is lowered 1½ inches, the arch will be an ellipse of which X X are the foci. Let F O and G Q be the thickness of the rib; then O P is the bevel for the end of the rib, and Q R will be the bevel for the top. Now if the ribs be set in place and a line drawn from the summit it will reach out to G. If at any place between the end and the center there be a line drawn, it will come somewhere between the points G F of Fig. 8, or E F of sections A and B. We will now see how this works. From B in plan, Fig. 6, draw B I *f*, the distance I *f* being equal to G F of Fig. 8. Connect A and S. From 1 2 3 4 5 6 in plan draw *k j i h g*. Now if we make the connection from these points to the line E F, it will give the several points from which a line would touch, as *i m*. At any place along the line F 6′ draw the triangle D E K, and draw the quarter ellipse. Let 11 12 13 14 15 equal 1 2 3 4 5 of Fig. 6, and draw lines cutting the curve as shown. From the intersections in the curve draw parallel lines to E D 6′ as in 16 *n*. From *m* draw through *n* extended to 17. In like manner all points can be located through which to draw the curve.

A Famous Old Bell.

The congregation of the little colored church at Haleyville, in Cumberland County, N. J., will contribute an interesting historical relic to the Columbian Exposition in the shape of the bell that has for years called them to church. In the year 1445 the bell, it is said, hung in one of the towers of the famous mosque at the Alhambra. After the siege of Granada the bell was taken away by the Spanish soldiers and was presented to Queen Isabella, who in turn presented it to Columbus, who brought it to America on his fourth voyage and presented it to a community of Spanish monks, who placed it in the Cathedral of Carthagena on the island of New Granada. In 1697 buccaneers looted Carthagena, and carried the bell aboard the French pirate ship "La Rochelle," but the ship was wrecked on the island of St. Andreas shortly afterward, and the wreckers secured the bell as part of their salvage. Captain Newell of Bridgeton purchased it and brought it to this country and presented it to the colored congregation of the Haleyville church. The bell weighs 64 pounds and is of fine metal.

Church Towers and Spires.

English and French spires have eight angles, generally, says the London *Standard*. On Caldy Island, Pembrokeshire, there is one with six. Some very old spires, like those at Tournai Cathedral, in Belgium, and Valladolid, in Spain, are four-sided; while at Verona, at Piacenza and elsewhere in Italy there are circular or conical ones, shaped like an extinguisher. Towers vary in form as much as spires. The great majority, of course, are square. Octagonal ones are also numerous. Two of those at Ely Cathedral are ten sided, and the Golden Tower at Seville has 12 sides. In Norfolk and Suffolk round towers are common. The reason for this is supposed to have been the scarcity of freestone. The walls were built of flints, which were plentiful enough; but at every corner quoins of dressed stone were necessary. There was, therefore, much to be saved by adopting a plan which had no corners, and needed no quoin stones.

Round towers, however, have been built where this motive could not have existed, and one of the most noted, though not the most beautiful, of all such structures, the leaning tower at Pisa, is circular. On a smaller scale, for example, in turrets, the circular shape is often very pleasing. This can hardly be said of the triangular one, and yet at Maldon, in Essex, there is a three-cornered belfry tower of considerable dimensions. This last is one of the oddities of tower design. Of these there are many. The strangely twisted spire of Chesterfield Church, which, from some points of view, looks as if it were in the very act of falling, cannot perhaps be fairly classed among them. It is odd enough beyond all question, but its oddity was probably undesigned. It is built of wood, and not of stone, and the twisting seems to result from the prolonged action of sun and wind on badly seasoned timber. The spire of St. Michael's, Lewes, which is of similar materials, is similarly twisted, though in a less degree. The Church of Our Saviour, at Copenhagen, has a curious spiral staircase winding round and round on the outside of the spire. The Round Tower in the same city has no staircase at all. In place of one there is a paved roadway inside it, turning round and round an inner circle, and thus rising at a gentle slope till it reaches the top. Horses and carriages, even, have at times made the ascent.

Of fantastic ugliness in tower forms, we are not without examples in London. The misshapen obelisk, for instance, which serves as the tower of St. Luke's, Hoxton, might have been decided on by a committee chosen from the neighboring madhouse. A church just on the north of the railway between London Bridge and Bermondsey is not much better. Where St. Luke's has an obelisk, it has one enormous column. We are happily free, in this country, from the bulbous excrescences which deform so many buildings in Holland and North Germany. There the tulip mania seems to have made its way even into church building, and roofs shaped like magnified tulip roots often take the place of spires. Sometimes there are several, one above the other, as, for example, in the great church of Middleburg. But even this was outdone in Russia. In the Kremlin, at Moscow, stands what is probably the oddest of all architectural oddities. This is the Church of Vasili Blagennoi. It is like no other church on earth, and almost indescribable. If it suggests anything, it is a gigantic cruet stand. Nine polygonal towers stand round a loftier central spire, like the cruets round the handle. But this is not the whole of the resemblance. Each polygonal tower has a bulb-shaped top, forcibly recalling a familiar type of stopper. To complete the suggestion, every tower, and still more, every top, is covered over with just such projecting patterns as the glasscutter most affects. There are ribs, and lozenges, and pyramid ornaments; one bulb has a twisted surface, another a diapered one, and another is embossed in squares. Théophile Gautier compares the building to a stalactite grotto turned upside down. But the comparison is much too poetical. The affinities of the design are not with nature, but with art; and with precisely that sort of art which is turned out wholesale by a prosperous town in the Midland Counties.

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