CARPENTRY AND BUILDING

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Carpentry and Building

WITH WHICH IS INCORPORATED

The Builders' Exchange

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DAVID WILLIAMS COMPANY, - PUBLISHERS AND PROPRIETORS.
232-238 WILLIAM STREET, NEW YORK.

JANUARY, 1899.

Tall Buildings in a Fire.

A fire which occurred in this city on the night of December 4 during a heavy rain storm, accompanied by a gale of hurricane force, gave the modern towering office building, or "sky scraper," as it is often called, the most severe test it has probably ever experienced. The fire occurred in the five-story marble front building of ordinary construction located at the corner of Broadway and Warren street, and occupied in its lower portion by the clothing store of Rogers, Peet & Co., while the upper floors were used as offices. The material contained in this building made a fire of intense heat, and the high wind prevailing carried the flames against the adjoining structure, which was that of the Home Life Insurance Company. This is of steel frame construction, with a frontage of 63 feet on Broadway, a depth of 104 feet and a hight of 16 stories, the main roof being in the neighborhood of 200 feet above the curb. The north wall is penetrated by a light court about 20 x 24 feet in plan, the numerous window frames and sash being of wood, and the window openings unprotected by iron shutters. The heavy gale which prevailed swept the flames against the Home Life Building, producing in this light court a chimney effect similar to that of a forced draft. The flames were driven through the unprotected window openings and practically consumed everything combustible in the eight upper stories. The floors were of the usual steel beams united by flat arch hollow terra cotta bricks, with a double wooden floor on top, the partitions also being of hollow brick. The columns were well incased in fire proof material, and an examination of the interior of the building a few days after the fire showed the wonderful resistance which this form of construction offered to the flames. In the middle stories, where the fire seemed to be most vigorous, all the wood work and contents of the rooms were consumed to ashes, but there was no serious damage to the frame. The marble front of the building from the eighth floor up was scaled and disfigured to such an extent that it will be entirely replaced, but the wall next to the fire, being of brick, sustained no great injury. So thoroughly was the metal work protected that in making repairs very few, if any, of the floor beams will have to be replaced. In fact, it is estimated that the total cost of repairing the injury to the building will be considerably less than one hundred thousand dollars.

Lessons of the Fire.

The lessons to be drawn from the fire may be taken in a variety of ways. It demonstrated, among other things, the wonderful fire resisting qualities of the modern steel skeleton frame structure, while the situation of the building was such as to lead to the conclusion that by its superior design and construction it acted as a barrier to cut off further progress of the fire. Taking into consideration the character of the buildings to the south of those directly affected, it is to be presumed that with the start it had the fire would have swept a path to the river. From the point of view of the Fire Department officials, however, the experience confirms them in their steady opposition to the construction of excessively high buildings, especially in the lower portion of the city, where the water pressure is limited and it is impossible to bring a stream to bear effectually upon anything above 130 feet, or about ten stories. The hight of the Home Life Building exceeds this figure, and there are in the down town district of the city 25 towering office buildings, ranging in hight from 184 to 385 feet. In addition there are in the same district no less than 150 buildings of more than eight stories in hight. The fire has again demonstrated the necessity of having auxiliary fire plants in the buildings above the level that the firemen can reach. Some of the plans which are now being advocated contemplate the establishment in the lower portion of the city of fire mains, to be supplied by the fire boats at the East or North River fronts, these mains to be connected with stand pipes leading to the upper stories of the buildings, so that the interior can be protected in case of need, and so that an outside fire may be flooded from the upper stories. The fire has also demonstrated very plainly that, although fire proofing has reached an advanced stage as applied to floors, walls, doors, trim and other portions of a structure, there is great room for improvement in this direction. Had the window casings and doors of the Home Life Building been of metal and the floors wholly of tile or cement, there would have been nothing to burn except the contents of the various offices, and the fire would doubtless have soon burned itself out. In the more modern sky scrapers, especially those of the very latest type, this precaution has been taken and the amount of combustible material been reduced to an absolute minimum.

Limiting Hight of Buildings.

The ultimate moral which seems to have been drawn from the occurrence is that buildings should not be carried higher than the firemen can reach. This means, according to the views of Chief Bonner, not more than 200 feet. The experience has lent much force to the argument of those who favor the enactment of a law against the prevailing tendency to put up huge sky scrapers. A year or two ago the New York Board of Trade and Transportation, after conference with the insurance companies, drew up a bill, which was presented to the State Legislature at Albany, limiting the hight of buildings to 200 feet in the wider streets and avenues of the city and to 165 feet in the case of hotels or apartment houses. Proportionately lesser hights were provided for the erection of buildings on the narrower streets. Moreover, it was urged that in every building 137 feet or more in hight there should be two separate stairways from the ground floor to the roof, one of which should be remote from the elevator shaft, and that auxiliary fire plants should be maintained in each high building. The law failed to pass, mainly because the Legislature was busily occupied at the time with the Greater New York charter. A provision was inserted in the charter, however, directing the Municipal Assembly to revise and codify the building laws. Under this clause Mayor Van Wyck has just signed an ordinance passed by the Municipal Assembly providing for a commission to draft a new code of building laws. This commission is expected to take up immediately the matter of limiting the hight of buildings, with the object of securing legislation on this line. The Health Department, too, is known to favor such restrictions, because, among other reasons, high buildings cut off the sunshine from the streets and are consequently detrimental to the health and well being of the community. In many cities of this country limitations are placed upon the hight of buildings, and this course is almost universally followed in Europe. It is time some such legislation was enacted in New York.

Seize the Opportunity.

The conservatism which has so long dominated business circles is now giving way to optimism. Some of the most prudent managers of large interests, whose advice is freely sought by those who are considering opportunities for investment, have recently expressed the opinion that the time has come for pushing any enterprise of merit. The business of the country is on such a solid basis, the last element of uncertainty has been removed, manufacturing establishments are so well employed and a long period of prosperity seems so thoroughly assured that no one needs to hesitate in making a venture which is of a legitimate character. If anything were needed to establish the fact that buoyant confidence prevails, the success of recent promotions in industrial undertakings should be conclusive evidence. The overcautious will, of course, say that things are being pushed too fast, and that a reaction is inevitable which will bring about another depression. That will come in any event, but in the meantime much can be accomplished by those who are quick to seize a golden opportunity and careful not to take excessive risks. An enormous volume of business is due this country in the coming year, and perhaps for several years following.

Evolution in Doors.

The exclusive use of machinery in this line has done away with much chance for variation as far as structural strength is concerned. One door, wherever made, must be very much like every other door in this particular, though varying greatly in perfection of finish. There is, of course, opportunity for poor machine work; tenons may be cut too thin for the mortises, an insufficient quantity or poor quality of glue may be used, lumber may not be properly seasoned, &c., but except for the latter point there is really very little chance for error.

Buyers of American doors, therefore, need not fear that machine made goods are inferior in strength to those made by hand. In point of finish there is, of course, a great difference, and there also may be some discrepancies in grading; still, as far as the latter is concerned, the American door grades are so well defined and the business of the country is so unified by means of widespread competition that grades vary but little. But there is a chance for variations in finish, and this is frequently seen, says a writer in the *Timberman*. Some concerns vastly exceed others in the fine finish of their product, even where the grade (based principally upon defects in the lumber) is nominally the same.

Changes in American door manufacture for a good many years have been of two sorts: First, a gain in perfection of finish, to bring about which have been introduced more perfect stickers and other machinery of that sort; and, second, in securing greater strength as well as better appearance.

The English trade, and the foreign trade generally, for that matter, is devoted to the old fashioned wedged and pinned door. That style of door has been largely abandoned by Americans in favor of something stronger and better and which is more economical in material. The American makers, in abandoning the old style of door, with tenon extending clear through the stile and fastened by wedges, believe that they have made an improvement in strength as well as in appearance. The wedged or pinned door always presents a somewhat unsightly appearance, no matter how carefully finished, unless, indeed, paint covers it thickly; but the blind tenon door, or the dowel door, shows nothing of the construction, and so is perfect in appearance. The question arises, then, as to its strength. The best blind tenon doors are wedged interiorly, and as the tenon only projects about half way through the stile and is there fastened, as well as being glued throughout its surface, much of the trouble which arises from shrinking and swelling of the stile is avoided.

The dowel door is believed by many to be even stronger than the blind tenon. The point of fastening is directly where the rail meets the stile, while strength is given by the large and strong hardwood dowels, which are, it is believed, much stronger than a pine tenon.

A Word of Caution.

Since the last issue of the paper went to press there has reached our desk a letter from a correspondent in the Northwest, in which he relates his experience in ordering certain books from a concern for many years past doing business in this city. The correspondent states that while a part of the order—a book costing less than a dollar—reached him in due course, the more expensive work, which was in two volumes, has not been received, although he forwarded stamps in order that the package might be registered. Most annoying of all, as he expresses it, the three letters written the concern at intervals since October have brought no reply whatever.

This is not the first communication of its kind we have received from subscribers to *Carpentry and Building*, and we take the occasion to offer a word of caution. We would suggest that, before sending money for books or other articles, intending purchasers should fully satisfy themselves of the responsibility of the concern with which they are disposed to deal. In this way they may save themselves not only a great deal of subsequent annoyance, but probably the loss of their money as well. To the end that we may so far as possible protect our subscribers against imposition, we make it a point not to accept advertisements of any concerns whom we have reason to believe are not responsible; nevertheless some years ago we made a mistake in this respect and admitted an advertisement which we have since regretted.

THE Year Book of the Master Builders' Association of the City of Boston, Mass., is an interesting little volume of 58 pages containing valuable information of interest to members of the building trades in that locality. In addition to a list of names of those belonging to the association, there is given a copy of the Uniform Contract, Code of Practice adopted by the association, Schedule of Minimum Charges, and statement of usual and proper professional practice of architects, arranged by the American Institute of Architects; rules adopted by the Boston Society of Architects for governing professional practice and charges, Code of Ethics recommended by the same association, together with a list of architects having offices in Boston.

THE names of the architects of the new South Station, Boston, Mass., will be chiseled in the granite high up on the front façade of that imposing structure, in accordance with plans duly submitted by them.

FEAT IN RAISING A ROOF.

THE erection of a large addition to the New York Life Insurance Company's building on the northeast corner of La Salle and Monroe streets, Chicago, Ill., developed some interesting phases of building construction. The original building was 12 stories high, but it was decided to make the enlarged structure 13 stories, and this necessitated the addition of another story to the old structure. To save time and expense, the builders raised the roof of this building and finished the new story under it. The work was done without disturbing any of the tenants on the 12th story; without entering any of the rooms, and without cracking or injuring the ceiling of that story or the roof in the least. The size of the structure covered by this roof is 80 x 141 feet. The roof is composed of steel framework filled with 9-inch tile arches, covered on the top with 4 inches

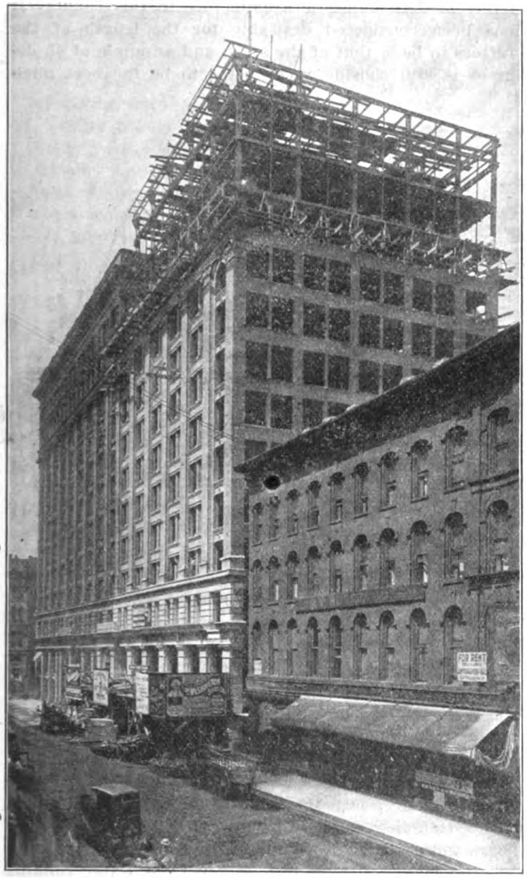


Fig. 1.—View of the Building August 4, Showing the New Part in the Foreground Erected to its Full Hight and the Old Structure Beyond Untouched.

Feat in Raising a Roof.

of concrete. Two large water tanks on the roof were also raised with it without cutting off the supply of water. The passenger and freight elevators also have their top shafts supported by the framework of the roof, and these were likewise raised without interfering with the service. The weight raised is estimated at 1800 tons. The hight of the new story built in is 11 feet 4 inches.

The plans for this work were made by Ralph Starrett, the superintendent of construction and engineer of the Moulton-Starrett Company, Fisher Building, Chicago, who are putting up the new building. Wagers were laid by experienced builders that the work could not be done without entering the rooms on the 12th story and interfering with the tenants. The top of the roof being 155 feet from the pavement, special precautions had to be taken for the safety of the workmen and of pedestrians on the sidewalks below. A heavy terra cotta cornice extended along the top of the building, and this had to be removed. A view of the building is given in Fig. 1, showing the new part built to its full hight, and the old part untouched, as it looked on August 4. The work was begun at that time by carefully piercing a hole through the wall from the inside below the cornice, the space under the roof affording room to work. As soon as the aperture was large enough, a sling was lowered from the roof in which the workmen sat and adjusted the supports for the projecting platform. This was done by August 11, as shown in Fig. 2, which is the view at the left on one of the half-tone supplement plates accompanying this issue. The cornice was then easily taken down and the steel frame work bared. Meanwhile the columns, which are of the standard Carnegie patterns, were disconnected below the floor, but without disturbing the ceiling below. Expansion joints were put in the water pipes connecting with the tanks. These expansion joints were made by using universal fittings and staggering a number of pieces of pipe between them, so that they merely straightened out as the roof was raised. The elevator shafting was also raised on cribbing. A ventilating system used in connection with a restaurant in the basement of the building also had to be cared for. An electric motor and fan in the basement force the foul air and fumes through a vertical pipe terminating above the roof. A slip joint was put in this pipe, so that it also elongated as the roof was raised. A bearing for the jacks was secured by merely spreading out on the floor system. The number of jacks used was 40, each operated by a man, working simultaneously at a signal. The roof was raised ⅜ inch at each signal. After every foot raised, the entire work was "trued" by an engineer to see whether any part was out of level in the least particular.

During this time the sides of the building were protected from the weather with canvas, of which about 3000 yards were used. The canvas was removed when the photograph for Fig. 3 was taken, September 14, this view being the one at the right hand on the supplement plate, and shows the roof raised to the full hight and supported on cribbing, the cornice of the new part being completed. Another view, Fig. 4, taken on the same date, shows the work a little more in detail.

The work of raising the roof occupied less than a week, or from September 8 to 14, the new columns being in position on the latter date. It ranks as one of the memorable achievements of Chicago builders.

Test of Pine Timber Framing.

Some tests of framing in hard pine timber have recently been made in the engineering laboratory of the Massachusetts Institute of Technology which are of interest to architects and builders. In one set of tests, framed floors, consisting of hard pine headers 6 x 12 inches and 7 to 10 feet long, framed at each end into trimmers of the same scantling, and carrying tail beams 3 x 12, 16 inches from centers, framed in with tenon and tusk and pinned, were strained to the breaking point by loads equally distributed on the tail beams. As the object was to test the headers rather than the tail beams or trimmers, the latter were made short, the clear span being only 3 feet. In the first division of the tests the headers were framed into the trimmers with double tenon and joint bolts; in the second division the headers were hung to the trimmers with stirrup irons. Failure in every case took place by the splitting of the header through the line of the mortises for the tail beams; and it is remarkable that the headers hung in stirrup irons showed no more resistance than those framed into the trimmers. In fact, in two cases the headers hung in stirrups failed under a load considerably less than timbers of the same size mortised into the trimmers, and in one case only did the stirrup hung header resist a little longer than that framed with tenons. Tests of heavy timbers notoriously show great variations in their results, but these experiments indicate that the mortised framing, which is much to be preferred in regard to the effect of shrinkage upon it, is little, if at all, inferior in strength to that put together with stirrup irons.

What is Hard Wood?

"What is hard wood?" is a question that must seemingly be answered by every one to suit himself. An instance is cited where a Massachusetts man, having a contract for putting in a hard wood floor, laid it with hard or yellow pine, presumably rift sawn, and I think the majority of lumbermen would agree that he had filled his contract when the specific kind of wood was not mentioned, says J. D. Allen in the *Southern Lumberman,* but the Court of Record of that State has decided against him, because the wood he used was of the coniferal (cone-bearing) family; or, not so much on account of its belonging to that tribe as to the fact that it did not belong to the broad leaved family of trees. According to the customary nomenclature of lumbermen, lumber has been classed as white pine and hard wood, and so listed in lumber reports, price-lists, &c. This would imply that white pine is the only soft wood, but "there are others"—for instance, bass (lynn) wood, buckeye, cotton wood or Tupelo gum would hardly make a satisfactory hard wood floor; but they all have broad leaves, are deciduous, and have other "qualities" distinct from the *pinus strobus,* but are considered softer wood than this, the principal species of white pine in America. It would appear that the only intelligent and safe plan to contract for a hard wood "finish" or floor would be to specify the particular kind of wood to be used. Brother Dan. Baird has taken some of the tangles out of this question in his interesting little pamphlet, "Common and Botanical Names," which every lumberman should read. Using one of his illustrations, we are now classing lumber as the human family would be classed if we were to divide it as John Smith and others; in fact, the white pine men used to run the lumber business quite on that order, but the "others" are very much in evidence these days, counting in the yellow pine and cypress trade.

Pitch of Roofs.

The degree of slope given to the inclined faces of a roof varies according to the covering material employed, as well as to the climate. The ancient Grecian temples had very low or pediment roofs, varying from about 12 degrees to about 16 degrees, the hight being from 1-9 to 1-7 of the span. In Roman buildings the inclination is somewhat greater, being usually 23 or 24 degrees, or from 1-5 to 2-9 of the span. The general introduction of the pointed style of architecture led to the use of very high pitched roofs, a very common proportion being that in which the length of the rafters is the same as the span, so that they formed an equilateral triangle. In comparatively modern domestic architecture in this country it has been considered desirable for the length of the rafters to be ¾ that of the span, and an angle of 45 degrees is still considered by some to be the best pitch when plain tiles are used. As builders can in the present day obtain excellent covering materials, the pitch may be made of any required degree down to the low Grecian pediment, and it therefore depends on the style of architecture and the taste of the builder, the most common hight being from ¼ to 1-3 of the span. High roofs discharge rain the most rapidly and do not retain snow so much as those of low pitch; but where they have gutters they are liable to become choked by snow sliding into them and to overflow from water running into them faster than the pipes can convey it away. Steep roofs may be covered with small slates, and are less likely to be stripped by violent winds. Low roofs, in consequence of their superior lightness, are less expensive, the timbers not only being shorter, but of proportionately smaller scantling, and they press less injuriously on the walls.

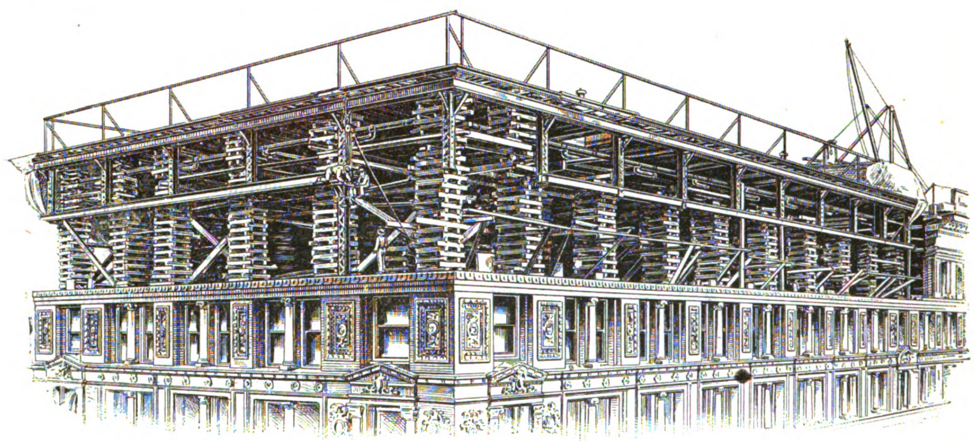


Fig. 4.—View of Upper Part of Building, Showing Roof Raised to the Proper Hight and Ready for Building In the Thirteenth Story.

Feat in Raising a Roof.

THE following little item, in the building news of a Chicago daily, shows the drift of things in that city: "George W. Maher has designed a large stable to be built by A. L. Dewar in the rear of his residence in Sheridan drive, near Glenlake avenue, in Edgewater. It will be two stories and will extend over an area of 50 x 60 feet. The exterior will be constructed of brick and stone, the roof being of tile. The interior frame work will be of steel and will be finished in hardwood and heated with hot water. It will cost $13,000."

PECULIARITIES OF WOOD.

ONE of the papers read at the thirty-second annual convention of the American Institute of Architects related to the peculiarities of wood, and was prepared by Prof. B. E. Fernow, Dean of the New York State College of Forestry and formerly Chief of the Division of Forestry, Department of Agriculture, Washington, D. C. The following extracts from the paper, which is too lengthy to present in full, may prove interesting:

The most noteworthy peculiarity of wood is that this material, which has been so universally employed since the dawn of civilization, is still so little understood, so imperfectly known as to its nature, characteristics and properties.

The defects in our knowledge regarding the peculiarities of wood lead naturally to a crude, improper or wasteful use of the material, which could be greatly improved even if only the existing knowledge were more closely applied. There is a possibility of specifying, selecting and inspecting wood materials which a knowing architect can now secure, thereby increasing the efficiency, durability and stability of the structure.

After briefly referring to the improbability of wood being "entirely or practically supplanted by other materials" and to the lowest requirements of wood for high civilization, the author takes up some of the features which are likely to render the use of wood desirable for a long time to come.

Strength of Pine Beams.

Perhaps it is not realized, he says, that a beam of long-leaf pine will bear without detrimental deflection a load from six to eight times as great as an iron bar of the same length and weight, a cubic foot of iron weighing 10 to 13 times as much as a cubic foot of that wood and costing at least 20 times as much. That means the iron structure is at least twice as expensive. In the combination of light weight, stiffness, elasticity and strength with cheapness and ease of working wood excels all other materials and renders it especially invaluable in all rapid constructions. But the most valuable and unique feature of wood, which is undoubtedly unconsciously but yet not fully appreciated, is the fact that it is a poor conductor of heat and electricity. This property, if no other, will assure to this material a continuous use in the arts, not only for utensils, furniture and finishings, but for construction in general, since a metal substitute, the only material we can think of, would not only bring discomforts, but dangers, which the increase of electrical appliances would constantly multiply. Hence a better knowledge of wood leading to more effective use will remain desirable.

There are three properties peculiar to wood which make its use as a material of construction appear objectionable, and it is of these of which I wish mainly to speak—its liability to shrink and swell, its liability to rot, its liability to inflammation and combustion. All three of these defects can be, and at least in valuable permanent structures ought to be, overcome by proper selection, inspection and treatment of material.

To What Defects are Due.

The first two defects are due partly to the one and the same property of wood—namely, its high hygroscopicity, from 50 to sometimes over 150 per cent., related to dry wood, of the weight of a freshly felled log in water. This is gradually lost in seasoning; but unless artificial means are applied this seasoning progresses rather slowly and, with some species, a yard dry condition is not reached in years, if by yard dry any definite stage of moisture condition is meant. The moisture contained in such yard dry wood, in addition, is very unevenly distributed through the stick, and hence influences the behavior of the stick unfavorably as regards swelling and shrinking.

As a matter of fact, wood is never entirely dry, even when artificially dried. As soon as it comes from the dry kiln thoroughly dried its high hygroscopicity asserts itself; it takes up water from the air, more or less, according to the relative humidity of the latter, so that even the best dried wood in use will contain at least 8 to 10 per cent. of moisture, or even more. If left unprotected, unvarnished and unpainted, this percentage changes with the change in the atmosphere, and hence shrinking and swelling or working is the result. This, of course, is known to all architects and wood workers, but the effort to avoid this most troublesome peculiarity of wood does not appear to be always in due proportion to the knowledge.

There is, of course, a specification of seasoned material, but is there any attempt at defining what is the requirement of seasoned condition? And is there any inspection? If there were, fewer floor joints would open and more doors would shut snugly.

Inspection Tests.

A simple inspection test would be to cut a small piece from the middle of a floor board—the end would not do, as it is always the driest part—weighing it, placing it in an oven or other heater until it does not lose any more weight, when the difference between the first and last weight gives the weight of the water lost; this, divided by the first weight and multiplied by 100, gives the moisture per cent. of the wood. If it is greater than that specified—say 10 per cent. for the best work and 12 to 15 per cent. for cheaper constructions—there is cause for complaint and rejection is justified.

To be sure, it is better to specify so as to avoid the complaint as much as possible. Specify for kiln dried material, which is preferable to yard dried because, as a rule, more evenly dried. For very valuable work immersion in water or steaming should be practiced. Immersion in water, without in any way impairing the value of the wood as building material or otherwise, seems to decrease the hygroscopicity of wood, upon which property the swelling or shrinking rests. The Japanese, excellent wood workers, whose careful use of wood should be an example to us, practice this immersion in ponds to a large extent.

Quarter Sawed Material.

Another specification which reduces the fraction of shrinkage is for quarter or rift sawed material, for it is peculiar to wood to shrink and swell or work more in tangential direction than in any other. Longitudinal working is practically *nil*, but the shrinking in tangential direction—*i. e.*, in direction of the annual ring—is at least 50 per cent. more than in the radial direction. This is due to the fact that the thick walled summer wood of the annual ring, which on account of its thick walls takes up more water and shrinks or swells more than the thin walled spring wood, is in such position toward the latter that in expanding or contracting it carries the latter with it, the summer wood shrinkage per cent. prevails, and hence the working is more pronounced in such a bastard board than in a quarter or rift sawed board, which contains the summer wood in a position where it cannot affect the spring wood shrinkage, and also in a more even, regular distribution of spring and summer wood, thus insuring a more even working along the whole face, and hence no warping.

If immersion is advantageous in promoting thorough seasoning, reducing liability to swelling and shrinking, it is on that account also advantageous in reducing liability to rot because by the immersion soluble materials which serve as food of some of the rot fungi are leached out.

Where, however, the question of time is important, there are other processes which are expedient and effective in keeping out fungi, and, indeed, more so than mere immersion in water.

Some of these processes, as creosoting, treating with chloride of zinc or other mineral salts, are well known and practiced in special engineering works, as in canal or railroad building; they are, however, rather expensive and require a special plant, which, unless situated where the architect practices, would forbid their use.

But there is now coming to the front an effective, cheap and simple means of increasing the durability of wood. It is the application of coal tar oils, which go by the name of "Carbolineum." There are various brands trying to establish themselves, but it is still questionable how far claims of superiority can be demonstrated, and, especially when a higher price is also exacted for such claim, it will be well to inquire closely into the superior merits. This material can be applied with a brush, or, better still, by immersing the wood in the hot liquid for some hours or days. It penetrates the wood to sufficient depth so as to protect it against moisture and the accompanying rot fungi, in such places as architects are likely to have to deal with. Three pounds to 100 square feet—enough to be effective—would not, even at the unnecessarily high price asked for some brands, increase the cost of a building so as to prevent its application even in cheap structures.

Decay of Wood.

Decay usually starts not in the heart but in joints and points of contact, mortise holes, &c., where moisture collects and is not rapidly dried off. Hence contact surfaces, and especially all joists and timbers in contact with damp brick walls, mud sills and posts and material placed where a proper circulation of air cannot be had, and where painting after thorough seasoning is not practicable, should be protected for sanitary reasons as well as to secure stability and permanency.

The choice of species to be placed in such situations should be considered to secure at least partial immunity from rot. The cedar tribe, with the redwood and bald cypress, seem especially capable of resisting rot for a long time. Oak and chestnut come next among the more common woods. It must, however, be understood that these, too, are liable to rot, unless properly handled. If not properly seasoned before using they are as liable to decay as other species; if felled in summer, when temperature and moisture conditions are favorable and fungus spores seek a location, incipient rot may be more readily introduced. If painted while not thoroughly seasoned, the protection intended for the wood becomes a protection to its enemies; bastard cut faces are more apt to admit water readily and give lodging to fungus spores. Circulation of air, which carries off moisture, is one of the most effective precautions against decay.

Perhaps the most objectionable peculiarity or property of wood is its inflammability and liability to combustion. It is well to know in this connection that the supposedly fire proof construction of iron and stone has, after all, proved itself in cases of fire in the contents of the building often more disastrous to the property than a properly designed wood construction would have been, the heat of the fire warping the iron girders out of shape and causing the collapse of the entire building; while in the wood and stone structure the walls have been left intact, and the chances of success in subduing the fire by a good fire department would have been greater. But aside from the fire proof mill construction with wood, there are means for reducing the danger from fire in structures of a simple nature applicable to even the cheapest buildings.

Fire Proofing.

The possibility of fire proofing wood is so well established that it is unnecessary to risk the hazards of construction with untreated material. I do not mean to say that an absolutely fire proof building can be constructed with wood, or, ineed, with any material. The attempts in securing such have been and will probably remain futile. All we can expect to attain, just as with resistance to decay, is a degree of retardation which is sufficient for most cases. Fire retardent rather than fire proof construction should be the aim. If we are satisfied to reduce the danger and merely delay the conflagration until a fire department can arrive and prevent its spread, the problem can be solved by reducing the inflammability of wood without securing absolute incombustibility. There are a number of substances which have proved themselves efficient fire retardents, some of which can be cheaply enough secured to make their application practically and universally possible.

Those interested will do well to study the account of a series of experiments undertaken at the instance of the Belgian Government by Boudin and Donny and reported in 1887, a copy of which may be found in the library of the Division of Forestry.

From this report we find that while untreated wood took fire under the conditions of the experiment at the end of 1¾ minutes, wood treated with water glass or lime, or with ammonium phosphate or various ammonium salts, resisted inflammation for 30 to 40 minutes, while other substances produce less resistance, the ammonium phosphate being the most efficient, acting by the production of a non-combustible vapor. If applied so as to fully impregnate the wood, this would prove rather expensive, as 100 pounds cost $25 and would not saturate more than 25 cubic feet. But there is no need of a thorough impregnation, especially when one of the cheaper protective coatings of asbestos in water glass, &c. (which are efficient by being poor conductors of heat) are used in addition. It must not be forgotten that in the absence of encouragement cheaper methods and materials are slow in being brought forward. There are even now cheap antipyreas to be had, like calcium chloride and ammonium chloride, which, though less effective, would greatly decrease the liability to conflagration.

Finally, it may be of interest that a generous application of siliceous compositions to all exposed wood work has been so effective in reducing fire danger in England as to cause a decrease of 50 per cent. in the insurance rates on houses thus treated. The architect is, we believe, now in the position of bringing into the home he has built "that peaceful security and liberation from a dreaded tax which comes with the practical abolition of danger from conflagration." When due attention is given to making buildings fire proof and rot proof, not only safer, more durable and more sanitary buildings will result, but in the end they will be cheapened more satisfactorily to the investor.

Saxon Builders.

In all the towers called Anglo-Saxon, and which for the most part appear to belong to the eleventh century, the masonry is of a very rude character—rather the work of common laborers than of skilled and practiced masons. It requires a generation to train a body of skilled workmen, and if in the nineteenth century it is found difficult to train a school of workmen to labor in a different manner from what they have been accustomed, how much more difficult must it have been in the eleventh, and how improbable it is that the men who built in the rough manner which we find they did build were the successors of other masons. They were evidently men just learning the art of building in stone. It is clear to those who judge of the age of buildings by the buildings themselves, and not by books only, that the Roman art of building, which was chiefly of brick, gradually decayed and died out in England and other countries; that there was then an interval during which nearly all buildings were of wood, or of rough stone without mortar. Then a revival took place, and the earliest buildings erected after this revival were built of the fragments of Roman buildings then in ruins. When this supply was exhausted the Roman buildings were copied as well as unskilled hands could copy them, and in this revived art of building a gradual improvement took place in each succeeding generation, until the most perfect masonry and construction that the world has ever seen was produced in the twelfth and thirteenth centuries.

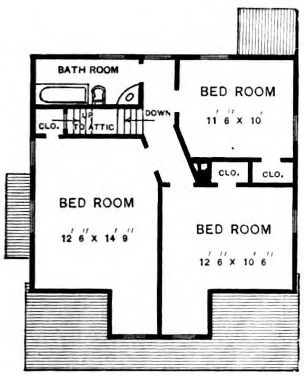
COTTAGE AT MERIDEN, CONN.

(WITH SUPPLEMENT PLATE.)

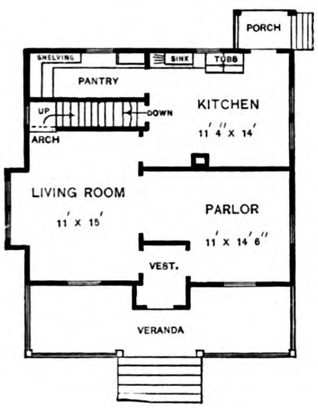
A DESIGN which will doubtless appeal to many of those interested in cottages of comparatively low cost is illustrated upon this and the following pages, while a general view of the completed structure forms the basis of one of our half-tone supplement plates. In external appearance the house presents many attractive features, the treatment of the gables being especially noticeable. The interior is divided into six rooms and bath, there being on the first floor parlor, living room and kitchen, out of which opens a good sized pantry fully equipped with the conveniences essential to this department of the house. The location of the stairs is such as to land at a point of ready access to all the rooms on the second floor.

The cottage is of balloon frame construction, all the work in the balance of the house is pine, painted. The plumbing is of the open type and ventilated. The heating is by means of hot air furnace made by the Dighton Furnace Company, North Dighton, Mass.

The cottage here shown was erected for E. H. White at a cost complete of $1480, the architect being D. Bloomfield of 129 State street, Meriden, Conn. The builder was J. H. Farrell of the same city.



Second Floor.



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

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

Cottage at Meriden, Conn. - D. Bloomfield, Architect.

timber employed being of spruce. The first-floor joists are 2 x 8 inches, the second-floor joists 2 x 7 inches, the attic joists 2 x 6 inches, the studding 2 x 4 inches, all placed 16 inches on centers; sills 4 x 6 inches, plates 2 x 4 inches doubled, and rafters 2 x 5 inches placed 24 inches on centers. The frame is sheathed with hemlock boards and water proof lining paper under all outside trim. The first story is covered with No. 1 cedar clapboards, while the second story and roof are covered with California redwood shingles, those for the sides being 16 inches and those on the roof 18 inches in length.

In the kitchen and bathroom the floors are laid with No. 1 North Carolina pine, while the floors in the other rooms of the house are laid with pine boards 4½ inches wide. The bathroom is wainscoted 3 feet 8 inches high with North Carolina pine finished natural. The wood

American Sash, Doors and Windows in Germany.

In compliance with a request for information concerning the import and manufacture of doors in Germany, Consul-General Mason, at Frankfort, writes the Department at Washington as follows:

Until within the past 10 or 15 years it may be said that the use of ready made doors, sash and various moldings in wood for building purposes was practically unknown in Germany. Every architect designed doors and windows according to his own ideas; each builder made them by hand as required; no two architects or builders used habitually doors or windows of the same size or design; in fact, a single building would often include doors of a dozen or more different sizes. Lumber was costly, labor cheap, houses were built mainly with rough brick or stone walls covered with stucco, and from motives of economy and immunity from fire, wood was used as sparingly as possible in construction.

To a very large extent the same conditions still prevail in this section of Germany. In a city so modern and progressive in character as Frankfort, where building is as active and constant as in any American town of equal size, there are more than a hundred competent builders, either firms or individuals, who undertake contracts to construct almost any kind of a building for residential or business purposes, and who will make by hand every door, window frame, sash, blind or molding that may be required, and this will be done with substantially the same tools that have been used for a century past.

On the other hand, there are in this city two establishments which represent the dawn of a new era in this respect, and where machine made doors, panelings and frames for doors and windows, besides brackets and various beveled and chamfered moldings, used in interior finishing, are kept in stock and are being rapidly and successfully introduced.

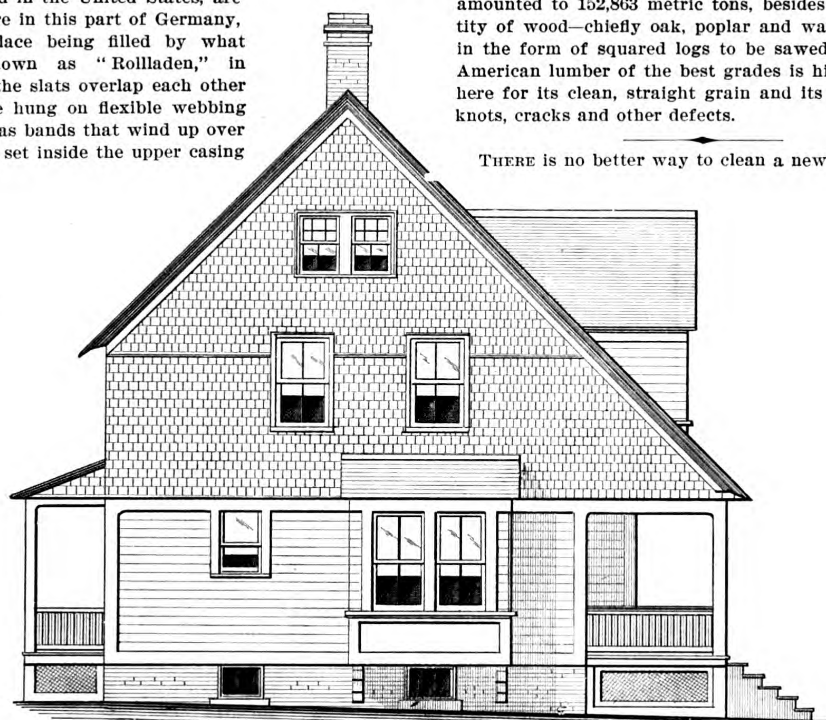
Venetian blinds, hung upon hinges, such as are usually used in the United States, are very rare in this part of Germany, their place being filled by what are known as "Rollladen," in which the slats overlap each other and are hung on flexible webbing or canvas bands that wind up over a roller set inside the upper casing of the window, so that the blind is drawn up or lowered by a strap passing over a pulley at the end of the roller. These blinds are attractive in appearance and cannot slam if left unfastened in a high wind; but they are expensive, and the strap and pulley device for hoisting is somewhat liable to get out of order.

From what has been thus indicated it will be readily inferred that all this class of prepared building materials is far more expensive in Germany than when made by improved machinery from the cheap, abundant lumber of the United States. The fact that such materials, both of home and Swedish manufacture, are now sold and used in considerable quantities would indicate that there is a ready field for the introduction of the American product, provided it can be adapted in respect to size, form and general character to the requirements of German builders and architects. It would no doubt greatly facilitate the development of this trade if American exporters could send an expert to confer with German dealers, architects and builders and thereby ascertain precisely the forms, sizes and other specifications that are best adapted to the requirements of this market.

Catalogues and price-lists intended for use in this country should be in the German language and currency; dimensions in metric measurements. It is useless to offer materials measured by feet and inches to a builder who understands practically only meters and centimeters.

It will also be necessary, in this as in all other lines of export trade, to remember that Europe is not America, and that some concession must be made to German methods of business, which usually involve longer credits than are customary in the United States; but the percentage of profit here may—and should—be proportionately higher.

American staves and pine and oak lumber for flooring and general building purposes have already found a large and steadily increasing sale in this country. The imports of sawed lumber from the United States in 1897 amounted to 152,863 metric tons, besides a large quantity of wood—chiefly oak, poplar and walnut—imported in the form of squared logs to be sawed after arrival. American lumber of the best grades is highly esteemed here for its clean, straight grain and its freedom from knots, cracks and other defects.



Side (Left) Elevation.—Scale, 1/8 Inch to the Foot.

Cottage at Meriden, Conn.

THERE is no better way to clean a new pressed brick wall, says a writer in an exchange, than with muriatic acid and water. All projecting stone sills and caps must be carefully covered up, especially if the trimmings are limestone or marble, as acid falling on the stone would discolor it. To clean an old brick wall scrub the wall with soap and water and give it a coat of linseed oil with just sufficient Venetian red or other suitable staining color in it to hide the discolorations in the brick.

THE only structures in Japan which seem to be earthquake proof are the pagodas which are erected before the temples. There are many which are 700 or 800 years old, and as solid as when first built. There is a reason for this, and it lies in their construction, says the *English Mechanic*. A pagoda is practically a frame work of heavy timbers which starts from a wide base, and is in itself a substantial structure, but is rendered still more stable by a peculiar device. Inside the frame work, and suspended from the apex, is a long heavy beam of timber 2 feet thick or more. This hangs from one end, and to the other end are bolted, at each of the four sides, four more heavy timbers, and if the pagoda be very lofty, still more timbers are added to these. The whole forms an enormous pendulum which reaches within 6 inches of the ground. When the shock of an earthquake rocks the pagoda the pendulum swings in unison and keeps the center of gravity always at the base of the frame work. Consequently the equilibrium of the pagoda is never disturbed.

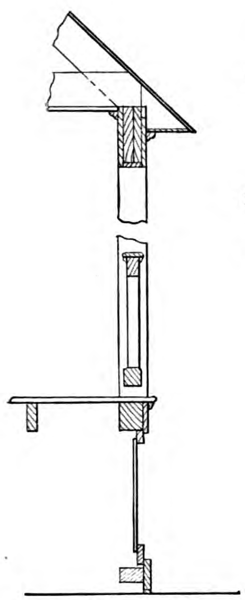
Mixing Concrete by Gravitation.

Concrete has generally been mixed in two ways—either by hand with a shovel, or by steam machine mixers, the three principal advantages of the latter method being economy of cost, thorough mixing and reducing the time of mixing to a point where the full advantage of the initial set of the cement is obtained. Concrete can be thoroughly mixed with shovels by hand if the proper amount of care and time is taken, but it takes so long to mix a batch of concrete by hand that many of the quick setting cements begin their initial set before the concrete is deposited in place. Until recently, says the *Brickbuilder*, there has not been, to our knowledge, a machine on the market costing less than several hundred dollars that could mix all the concrete that four men could shovel into it, and without taking up considerable room for the mixer and the boiler for furnishing steam, and without the expense of a skilled workman to handle the boiler and the engine of the mixer.

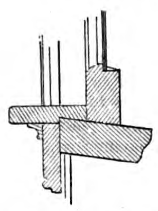
We have recently seen in Boston a concrete mixer consisting of a trough about 10 feet long with a hopper at the top into which the stone, sand and cement are thrown and with an arrangement of pins from one end to the other, and with a stream of water entering the mixer approximately half way down its length, which will give exactly the same process and result as mixing by hand—*i. e.*, the broken stone or gravel, sand and cement are thoroughly mixed dry by striking a large number of pins in the upper half of the mixer and then coming in contact with the jet of water are thoroughly mixed wet through the rest of the mixer, coming out at the lower end into a wheelbarrow, bucket or other suitable apparatus for conveying it to the desired place. The advantages of this mixer are self evident. The concrete is mixed precisely as it is by hand or with the steam machine by being mixed thoroughly dry and then mixed again thoroughly after it is wet; and as the only power required is gravitation, there is no cost for power, fuel or a skilled man to operate it. This machine is made so light that three or four men could lift it up and set it in place without the use of rollers, skids or derricks.

Proportions of Buildings.

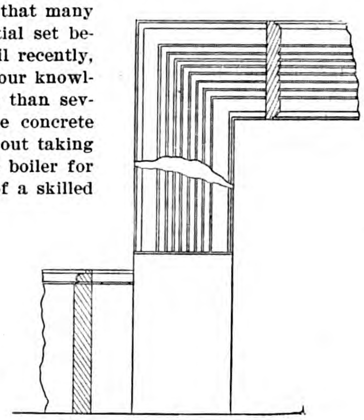
In reference to the proportions of a building, Alberti says the width of a space being 4 feet, say, and its length 8 feet, the proportionate hight—that is, the hight most agreeable to the eye—is 6 feet, as equidistant from four and eight, or bearing a relative proportion to each; but draw this form, and in itself it certainly does not appear so pleasing as a double square. Others say the width being 4 feet and the length 8 the hight should be three-fourths, or 3 feet high. The reasonableness of these rules has to be shown, and their good effect is most doubtful; even if true they can only express one quality, and, according to circumstances, different proportions are necessary. Utility and propriety should influence an architect in interior house design or all design, and beauty of proportion should give way to this, should be made to square with such requirements as far as can be, but certainly should be subservient; and in all that the architect does he has this drawback on the abstract principles of beauty, whatever they are, which should guide his design.



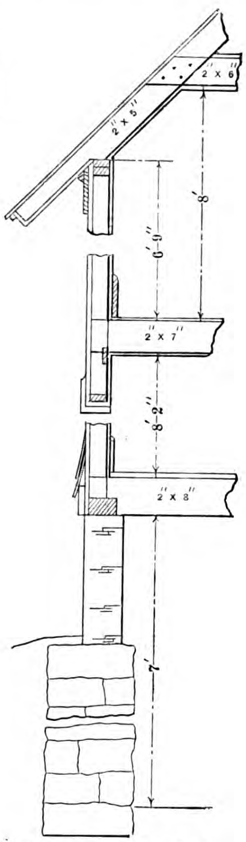
Detail of Veranda.—Scale, ⅜ Inch to the Foot.



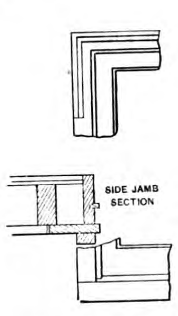
Detail of Window Stool and Finish.—Scale, 1½ Inches to the Foot.



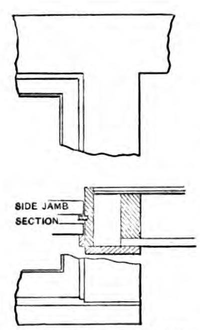
Detail of Inside Trim.—Scale, 1½ Inches to the Foot.



Section of Building.—Scale, ⅜ Inch to the Foot.



Detail of Outside Window Finish at Second Story.—Scale, ¾ Inch to the Foot.



Detail of Outside Window Finish at First Story.—Scale, ¾ Inch to the Foot.

Miscellaneous Constructive Details of Cottage at Meriden, Conn.

SUGGESTIONS FOR HANGING SASH.

THERE is no reason why a sash should not be so hung that the slightest touch of the hand will move it to the desired position, and yet have it fitted so close that it will not rattle or allow a gale to enter the room. One of the reasons why sash do not work well is that when the frames are made, sufficient care is not taken to make the pulley stile straight and true on the face. Often these are left hollow in the center; then the sash must be made wider at the meeting rail than it is at the bottom or the top rail, if it is to fit snug. This being the case, it is impossible for the sash to slide either up or down, so the workman is compelled to narrow the sash at the meeting rail in order to allow them to move easily, and the consequence is that a certain amount of playroom obtains between the sash and the jamb at the meeting rails, which is sure to cause rattling at that point when the wind blows on that side of the house. To make a good tight window and one in which the sash move easily, the pulley stiles should be straight and parallel to each other. Another condition that must be complied with to insure satisfactory results is that there must be as little "play" as possible between the sash and the stops. A rough workman, says a writer in the *Canadian Architect*, will leave from 3-32 to ⅛ inch play, in order, as he imagines, to allow for the space required for five or six coats of paint, and this leaves lots of room for "rattle." One-sixteenth inch space between side of stile of sash and stop is ample, and, more, to allow for paint. A good painter does not besmear his work, but puts on his paint so deftly that it would require fully 100 coats to make an inch in thickness; hence, 6-100 inch would be all the space required to enable the sash to move with freedom in its frame.

Sometimes window frames are forced out of shape after they have been set in the walls. If the building is a frame one, the siding or other covering is cut in too tight against the casings, and this is apt to force the middle of the frame inward, making the pulley stile convex or winding on the sash side. When this occurs it becomes next to impossible to make the sash slide easily in their frames, for the lower part of the lower sash will be wider than at the meeting rail if it fits snug, and it would be impossible to raise it. This necessitates planing off the lower part of the stiles until the sash is the same width at the bottom as at the meeting rails, a condition that is sure to cause a rattling window. The top sash, of course, will have to be treated the same as the bottom one, which gives both sash an opportunity, whenever the wind blows, to play a "rat-a-tat-tat" while the storm lasts, much to the inconvenience of those occupying the room where the window is situated. When sash have been properly fitted and hung, the weights and sash lines tested and properly secured, the "pocket" cover should be nicely screwed in place and left with a smooth face, so that the sliding sash will not make any abrasion, or have more friction at the joint than elsewhere. The pulley axles should be lubricated with graphite, black lead, or, if this is not available, a little hard mutton tallow should be placed in the axle bearings. This will make them run smooth, or at least smoother than if left altogether without some sort of lubricating matter. The common sash pulleys are poor things at best, and should never be used in good buildings, as they make as much noise when in use as a locomotive running at full speed. The best pulleys in the market are not any too good, as they are made as cheap as they can be turned out, and are rough and untruthful. The best axle pulleys are made in England, but they are costly. The axle is of fine steel, turned true in a lathe, and it runs in brass bearings, and there is a small hole in the stile plate where a drop of oil may be inserted on the bearings when necessary. When a sash sticks in the frame because of swelling, or of having too much paint smeared on it or the frame, the trouble may often be cured by rubbing that portion of the frame in which the sash slides with a little moistened soap. Ordinary toilet soap answers the purpose fairly well and has no disagreeable following, but common yellow soap is much better. Fuller's earth may be used, but it is apt to dissolve the paint, and, besides, leaves dust and dirt behind. All sash should have window locks, whether they be situated up or down stairs. While the main object of a window lock is to keep out interlopers, it has a secondary importance; it should be so arranged as to bring the two meeting rails snug together and hold them in that position, to the exclusion of wind and weather.

HIGHER TECHNICAL EDUCATION.

THE subject of licensing of craftsmen is naturally associated with provision for a higher technical education in the mechanic arts. As we survey the situation, the organization of our building trades as relates to the craftsmen themselves is not as favorable for individual development as it was a few generations ago, when the apprentice system, with all its defects and limitations, did manage to turn out a very fair quality of workman, who at least understood his tools and had had experience under the eye of a master who knew more than he did. The apprentice system to-day is a theory rather than a fact in most of our cities. For it the best substitute is afforded by mechanic schools, which in their possibilities are undoubtedly far superior to any apprentice system, but which need to be largely broadened in their scope and brought more closely in harmony with actual handicraft to be of the immediate value which those who are interested in them believe they should be. A good bricklayer need not possess a knowledge of integral calculus. We question even if he need a very special knowledge of even the lower forms of mathematics. But an intelligent appreciation of the material which he uses, the way in which it acts and why it is used as it is, is quite as essential as a mere manual dexterity in the use of the trowel and cold chisel. There are some ideas which die hard with the average mechanic, such as the theory, for instance, that putting lime in cement mortar in cold weather improves the quality of the mixture and keeps it from freezing. If our manual trained bricklayer were properly instructed he would know better, and would, we venture to say, feel a keener interest in building his wall properly and using mortar in a logical as well as scientific manner. Now every one, even in this enlightened age, cannot have a technical education, says the *Brickbuilder*, and yet every one in our free country aspires to a higher position than the one he is born to; and in proportion as the intelligence of the individual craftsman is raised, it goes almost without saying that the resulting work is going to be better because of the possibilities of growth which it puts within the reach of the mechanic himself. Intelligent work is always more economical, even if the price per hour is greater. In the Southwest the saying is that it takes two Indians to do the work of one Mexican and two Mexicans to do the work of one Eastern laborer. It isn't because there is more muscle in one case than in the other, but it is because of the intelligence which directs the hand, so that the trained mechanic is cheaper at $5 a day than an unthinking laborer at $1.

PRESS dispatches from Seattle, Wash., under date of December 20, are to the effect that in order to prevent overproduction and to hold prices well in hand, the cedar shingle manufacturers of Washington have entered into an agreement to suspend winter manufacture, and at least 75 per cent. of the mills in the State are now closed.

THE ART OF WOOD TURNING.—VI.

BY FRED. T. HODGSON.

WE now show a few examples of Colonial work in order that the learner may have at hand a few designs of this style in case of necessity. Just now there is a tendency to adopt in our domestic buildings the plain, simple and sedate architectural methods of our grandfathers, and as the years pass by we become more and more convinced of the appropriateness of the style of our Puritan ancestors to the wants and climatic conditions of the northern half of this Republic. This being the case renders it necessary that every workman in the building trades should have some knowledge of the style and its details he may be called upon to execute. The examples exhibited in Fig. 39 are some of the simplest forms, while later on we will give a few of the more elaborate designs of this style, together with directions as to the manner of making them.

long basils or acute bevels. Frequent grindings will be time well expended. These examples, Fig. 39, in their formation will require of the operator a delicacy of touch equal almost to that of an expert pianist in order to give his work the smooth and graceful appearance of his models. It is a tribute to the artistic skill of the Colonial workmen that the examples reaching us from their hands have no superior and few equals in these days of exact machine wrought work.

So far the author has dealt with what may be termed plain turnings, and hereafter the learner may venture into fields where his efforts and ingenuity may be more severely taxed.

Wood turning is more than a trade—it is an art, and no fine wood work on a large scale can well be carried on, and at the same time be complete and artistic, without the help of the lathe. We have made reference to the fine work executed by colónial workmen, but the author is free to say it was not so much their extreme skill in the application of their tools and the neatness of their work as it was a knowledge or habitual recognition of

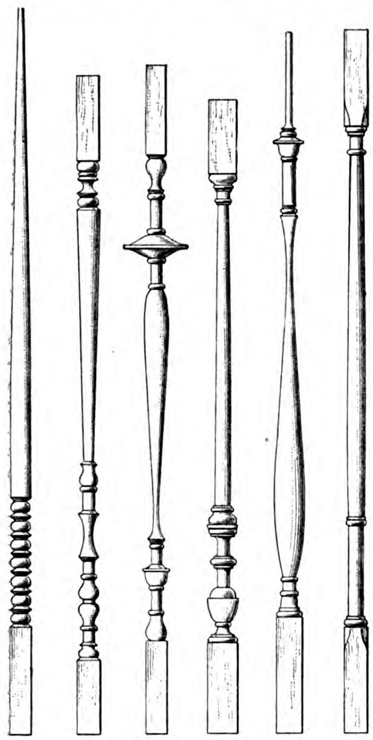


Fig. 39.—Simple Forms of Colonial Work.

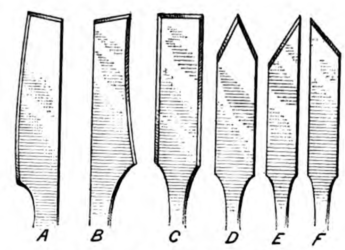


Fig. 40.—Tools for Hardwood Turning.

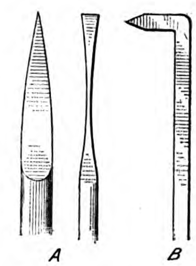


Fig. 41.—Parting Tools.

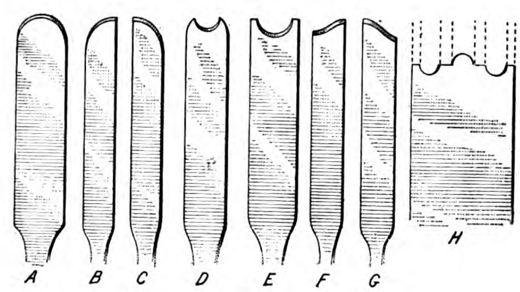


Fig 42.—Views of Some Curved Tools.

The Art of Wood Turning.—Some Tools for Turning Hardwood.

The six examples shown in Fig. 39 are reproduced from work that was in existence a few years ago. The first on the left is taken from a building in Bleecker street, New York City, and the two next to it are from work that was in the old Washington Hotel on Bowling Green, New York City, long since pulled down. The other three examples are reproduced from work now existing in Boston and Philadelphia, the two to the right being from the latter city and the third one from Boston. These examples are offered to the learner because of their having few points about them that will tax his skill more than the previous ones. The most serious difficulty will be found in the slenderness of the work, which, if not properly handled, will prove troublesome to the turner, as the work will be apt to spring or "chatter," as well as retreat from the cutting tool if the least pressure is brought to bear on it in order to make it cut. Here allow the writer to again impress on the reader the necessity of keeping the cutting tools in the best possible order, not only sharp and free from nicks, but with

the unwritten law that governs all good examples of composed design, and what is generally expressed in the word "feeling." A man may be a very good turner —able to follow any design given him—yet, if it lacks "feeling," his work will have a stiffness and a formality about it that fail to draw us to it, or to evoke a spirit of admiration. It is true of the reverse. Often an indifferent workman turns out forms that compel admiration.

In the sixteenth century German turners showed astonishing ingenuity in the management of their lathes, as they invented many contrivances for eccentric motions that were really astonishing and which became the starting point of many of the later inventions that are now so effective in the production of eccentric and irregular forms. It is to the Arabs, however, that we are indebted for some of the most artistic lathe work extant, and it is to them, also, we are indebted for the idea of what may be termed "composite lathe work," or a combination of turned patterns and square work, as we now know it in screws, quills and spindle work arches. It is in this latter kind of work the best opportunities for further advancement by the learner are offered, and to it we purpose devoting a chapter or two.

Additional Tools.

We have arrived at a stage where it becomes necessary that the operator equip himself with additional tools in order to meet a multitude of emergencies that are sure to arise while turning spindle work for grills or screws, and to this end we present in Fig. 40 a number of diagrams of tools that will be found necessary for the manipulation of hardwood work of the kind mentioned. Where shown in the figure all have rectilinear cutting edges. The one at A is a "right side" tool, so called from its cutting on the right end of the work, from the right toward the left, and is employed both for inside and outside work, as well as for cylinders. The illustrations represent the upper surface of the tool where the basil is ground. It will be seen that the meeting of the two cutting edges of the side and end makes rather less than a right angle. The left side tool B is precisely the reverse of that just described, cutting from left to right. The flat tool C is a very useful one. It varies from 1¼ inches in width for the largest to an exceedingly narrow tool. It is, as will be seen, ground up at both sides and at the end. Sometimes the end is ground up at right angles to the sides, but more frequently it is ground up at rather less than a right angle with the right hand edge. This form is found of advantage in dealing with sharp rectangular internal corners. The point tool D is ground at the end with an equal angle on each side, as shown. Bevel tools, E, E, are ground at the end to one angle only. Both these tools are also ground along one side of the blades, as shown. Both the point tool and the bevel tool can be ground to any desired angle at the end, and the former is occasionally ground with two dissimilar angles for special work, or even with one side ground straight and the other curved. Some point tools are made thicker and from ½ to ¾ inch in width, and are very often employed for the turning of beads and moldings.

Whole sets of these tools may be obtained at any well equipped hardware store in the country. A good quality is made by a manufacturing concern in New England. They are put up in a neat box, which contains from 12 to 14 different tools, well handled and finished.

The parting tools shown in Fig. 41 are somewhat similar to those used for parting soft wood. That at A is very thin, and the cutting edge of the largest at the point, which is the widest part rarely exceeds ⅛ inch in width. The sides taper in order to afford good clearance. The inside parting tool, shown at B, is bent at right angles to its stem. It varies from about 1-16 inch to ⅛ inch in width, and from ¼ to about 1 inch in length. The two sides of the cutter are ground away taper. The use of these tools is readily understool if we consider that they are intended purposely for inside work, for cutting off, marking or forming beads or moldings on the interior of a hollow cylinder or other similar work.

Tools for Curved Work.

A series of tools intended for the formation of internal and external curves and moldings is presented in Fig 42, where A shows a round tool which is the must useful of the group. This varies in size from 1-16 inch to 1½ inches in width. These are designed to cut, or rather scrape, the hardest of woods, and are used in ivory turning for "roughing out" in place of the gouge and chisel. The quarter round tools shown at B C are of very great use in turning moldings, and for curves which abut against a square shoulder. They are made right and left to meet varied conditions and run in sizes from ⅛ to 1 inch in width.

The bead tool D is used, as its name implies, for producing beads which are *fac-similes* of its own curvature. The sizes run from about 1-16 to 1 inch in width. The bead tool is generally curved a little less than a semicircle in order to allow of good clearance in withdrawing the tool. These tools are generally used only for small beads, as the larger beads may be turned with the ordinary tools, and because, if employed on large sizes of beads, the friction would be so great that very practical difficulties would arise in the turning. In such cases they are only used as gauges or templates to apply to the work to mark it out or verify it, and the actual roughing out should be done with the gouge or point of an ordinary turning chisel. The astragal E is somewhat similar in general shape to the bead tool, but, as may be seen from its outline, produces a band with a fillet on each side, instead of a single bead. Astragals of different sizes are largely employed for the turning of moldings for various purposes, but more frequently for stair balusters and similar work in hardwood.

The quarter hollow or scotia tools F and G produce the counterpart of the quarter round tools B and C of Fig. 42. They are generally less in range of size than the latter.

Molding Tools.

The molding tool H combines the shape of two or three moldings, as may be desired. These tools are very useful for small groups of moldings, but must not be very wide, or some portion of the work is almost sure to turn out rough. My young friend, whose lathe we have illustrated in these papers, showed the writer a number of cutting, or rather scraping, tools of various shapes and sizes which he had made himself from parts of a broken circular saw, a trifle over 1-16 inch in thickness. These cutters were made the reverse shape of the moldings wanted, and were then ground with a basil on the under side. He also showed samples of work made by aid of these tools, such as picture frames, circular and elliptical, and circular pieces for corners of panels. These latter were first made in one piece, circular in form, and about 12 inches in their smallest diameter. They were then cut through their centers at right angles, each piece making four corners, the shape of the molding being made to coincide with the molding used in the paneling. Bolection moldings were made in the same way and by the aid of tools made from the circular saw blade. The Bolection moldings were, of course, rabbeted on the back to lap over the stile or rail of the paneled work. These moldings were, of course, turned with the rest running across the axis of the lathe bed, the stuff to be turned being fastened flat against a face plate, a process which will be described later on.

IT is stated that steel is being introduced in Colorado to take the place of timber in mining shafts, the first instance of the kind being that of the Portland Company at Cripple Creek, who, the *Idaho Statesman* reports, have determined to use steel for posts, &c., in their shaft, which is 1000 feet deep. The cost is said to be less than for timber, the metal, it is thought, being far more durable, and there will be less excavating necessary in placing the lining of steel. This furnishes a striking illustration of the relative cheapness of the material that has been adopted, for timber is to be had in Colorado for the cutting.

FROM some experiments on the pneumatic caissons of the new quays at Bordeaux, M. A. Pasqueau is of the opinion that it is possible for men to work under compressed air at a pressure of about 77 pounds per square inch, which is equivalent to about 170 feet sea water, but for this depth the pressure should not be reduced at a quicker rate than 10 minutes to about 1½ pounds. He also recommends that the chamber in which work is being done should be warmed to from 68 to 86 degrees F.; that the air lock should be supplied with fresh air during the time the pressure is being let down; that no valves controlling air should be manipulated by the workmen, and that in order to lessen fatigue the men should be brought to the surface by mechanical lifts.

COTTAGE OF MR. E. H. WHITE, ON TREMONT STREET, MERIDEN, CONN.

D. BLOOMFIELD, ARCHITECT.

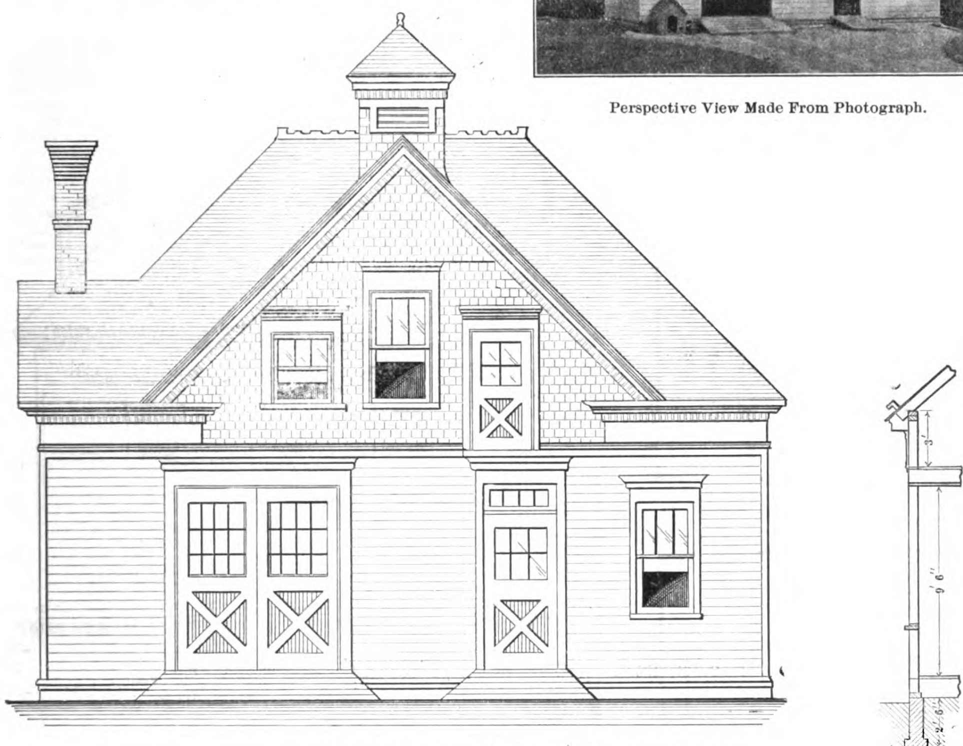
SUPPLEMENT CARPENTRY AND BUILDING JANUARY 1899.

FOR PLANS, DETAILS, ETC., SEE PAGES 7-10.

CARRIAGE HOUSE AND STABLE.

THE carriage house and stable which we represent herewith was erected in connection with the Colonial residence of George G. Teller, the illustrations of which formed one of the leading features of the December issue of the paper. The building is located a few hundred feet to the left of the house as viewed in the lower picture on the half-tone plate for last month, and rests upon brick piers well sunk into the ground. The floor joists are 2 x 12 inches, placed 16 inches on centers, and the rafters are 2 x 6 inches. The outside walls are covered with Novelty siding, while building paper is placed on the inside and ceiled over with narrow boards. The architects, J. A. Oakley & Son of Elizabeth, N. J., state that this method was pursued in order to keep the paper dry, for if it were put on under the Novelty siding it might become wet before the building was inclosed. The gables, it will be seen, are shingled, as is also the roof. The gutters are of tin and the leaders of galvanized iron. The feed boxes and hay racks are of iron. Under the stairs and opening from the carriage room is a large harness closet with hooks and shelves. There are two chutes from the hay loft to the stable floor, with shut off at the ends, so that "feed" may be readily delivered at a convenient point on the main floor and at the same time

Perspective View Made From Photograph.



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

Carriage House and Stable.—J. A. Oakley & Son, Architects, Elizabeth, N. J.

building is surmounted by a small cupola, the sides and roof of which are shingled. The main story is painted white, while the shingled portions are left natural.

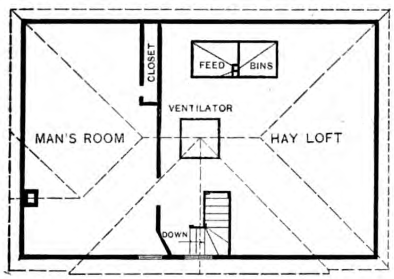
An examination of the plans presented herewith shows the main floor divided into carriage room and three stalls, one of which is a box. On the second floor is the hay loft, with a finished room and closet for the coachman. All the doors and windows are trimmed, the doors having four panels. The entire building, with the exception of the hay mow, is ceiled inside with ½-inch ceiling boards of North Carolina pine. All inside wood work is finished in oil.

The stable floor is of 2¼-inch spruce, with a wash stand of suitable size in the center of the carriage room and connected through a bell trap with the sewer. The stalls are built of 2-inch spruce, the floors having a grade to the steel gutter running along their rear. The avoid the necessity of having the bins located there. There is also a watering trough and a hose attachment for cleaning carriages. The building is equipped with electric light wires and bell system. The contract cost of the building was $850, exclusive of the grading.

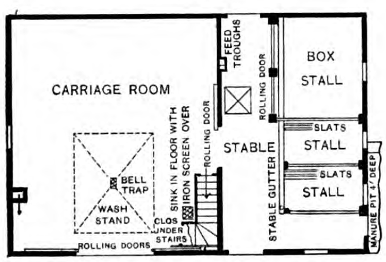
The Costliness of Roman Houses.

In referring to the cost of Roman houses a writer in one of the English architectural papers says that a certain Mamurra was the first that incrusted his whole house with marble. After the conquest of Carthage the ceilings in the Capitol were for the first time gilded; but this species of luxury soon extended to private houses. "We live," exclaimed St. Jerome, "as though we were to die to-morrow, and build as though we should live forever. Walls, ceilings and columns glisten with gold."

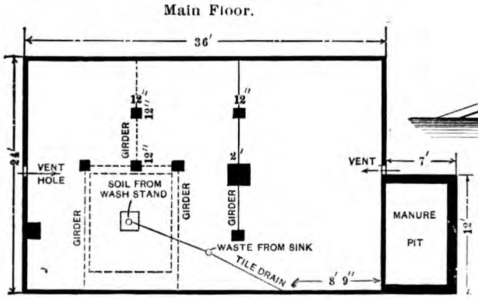
Tertullian also speaks of costly tapestry manufactured at Tyre. Columns were an ornament very frequently employed. It was not uncommon to see many hundreds of them in one single edifice, which perhaps had besides a fountain to cool it. The extent of habitations was prodigious. One of the ancients complains that the palace of Augustus took up as much ground as formerly composed the whole farm of Cincinnatus. During Nero's reign some of the slaves of that tyrant possessed fish ponds which were very large. And Pliny exclaims, "Such were not the habitations of those who founded this empire; they went from the plow or the cottage to triumphs, and their fields were smaller than are now the rooms of their descendants." Sallust and Seneca also compare houses to whole cities. Buildings were immoderately extended not only in length and breadth, but also in hight. According to Juvenal, Ce-



Second Floor.

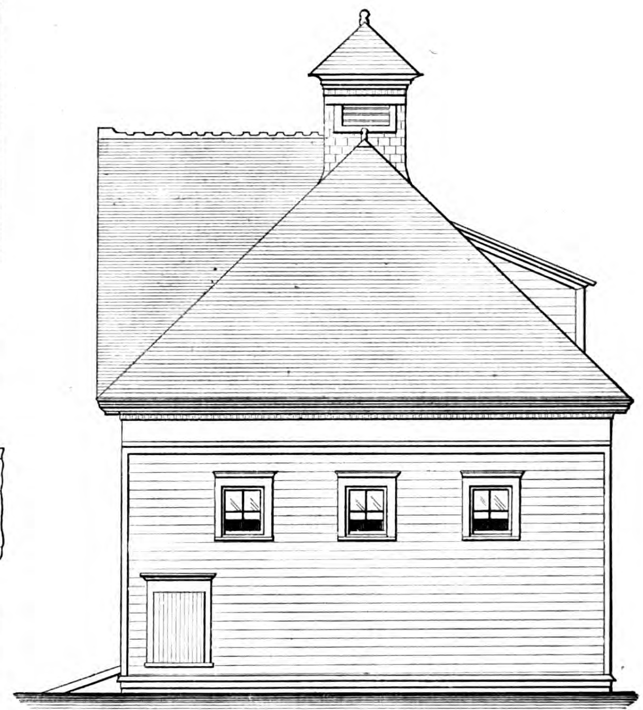


Main Floor.



Foundation.

Scale, 1-16 Inch to the Foot.



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

Carriage House and Stable.

tronius built a house which was more lofty than the Temple of Hercules and Fortune, and Posides erected another that surpassed even the Capitol in elevation. Fruit gardens and pleasure grounds were inclosed within the walls of such edifices, or even laid out upon the roofs. Fruit trees were highly valued. A single apple tree yielded its owner a yearly profit of £10. These, however, were only common trees; there were others of rarer kinds for pomp or pleasure; for instance, the lotus. Valerius Maximus relates that Domitius accused his colleague Crassus of having adorned his portico with columns from Mount Hymettus. "What do you value my house at?" asked Crassus. "At 60 times 100,000 sesterces," was the reply. "And how much lower will you rate it if I cut down 10 shrubs (arbusculos)?" "Thirty times 100,000 sesterces." These ten shrubs consequently cost £15,000. The palace of Clodius, who was assassinated by Milo, cost £110,000. It probably contained none of these shrubs or trees, otherwise the expense would have been much greater. Hirrius received merely from the buildings that surrounded his fish ponds a yearly income of £60,000. This luxury in building spread with extraordinary rapidity. In the consulship of Lepidus and Catulus, 29 years before Julius Cæsar, the house of this Lepidus was the finest in Rome; and 35 years afterward it was surpassed in magnificence by more than 100.

American Hotels in Cuba.

It is stated that the first American hotel in Cuba is to be put up in Havana in accordance with designs prepared by architects Goodrich & Goodrich of Baltimore, Md. The architects state that it will be fire proof, earthquake proof, damp proof, storm proof and vermin proof. It will be constructed entirely of steel, and the outside will be covered with Portland cement on expanded metal, while the inside will be Cumberland hydraulic cement laid on expanded metal. There will be 465 rooms, and every sleeping apartment will have a bath attached. The finish of the main portion of the house will have old copper as the predominating feature, the office being finished in onyx. The hotel will be equipped with an ice plant, electric light plant and gas plant. All the water used will be distilled, and the sewage will be forced directly into the ocean. The house will be surrounded with beautiful tropical gardens, the hotel being designed especially to accommodate winter tourists. We understand that the structure will be put up by the American Hotel Company, Limited, and that the building at Havana will be but one of a chain of similar hotels to be erected in Cuba and Porto Rico.

WHAT BUILDERS ARE DOING.

SINCE the last report of the conditions and prospects in the building interests of Baltimore no material change has taken place. Secretary Miller of the Builders' Exchange says that the members generally are looking forward to a busy opening of the season of 1899.

The exchange at its last regular quarterly meeting listened to a most interesting address by Dr. William Bullock Clark of the State Geological Survey on the subject of the rocks of Maryland. A collation was served and the attendance was unusually large. The affair was so successful that it has been decided to provide a speaker and a lunch at future quarterly meetings. The following statement, compiled by the Geological Survey, showing the sums produced in 1896 from Maryland rocks, was read by Dr. Clark at the conclusion of his address:

Gneiss and granite	$335,000	Porcelain materials	25,657
Marble and limestone	100,000	Marls	1,000
Slate	90,500	Iron ores	115,000
Sandstone	35,965	Coals	3,192,656
Serpentine	1,000	Gold (1890)	16,886
Miscellaneous	2,000	Mineral paints	2,000
Lime and cement products	472,392	Tripoli	3,500
Clay products	1,753,003	Mineral waters	63,500
Sand	1,752	Total	$6,206,025

Total number of men employed, over 8000.

Boston, Mass.

The season in Boston closed without any unusual features, no new work of any magnitude being offered for competition. The majority of the best builders are busy with inside finishing work, alterations, &c., and everybody seems expectant that the coming year will prove profitably busy.

The new South Terminal Station, which is arranged to handle more trains than any other station in the country, was expected to be sufficiently completed to be ready for service on January 1. This was by far the most important building project undertaken in Boston for a number of years, and, together with the contingent building and alterations in adjacent localities, has involved the expenditure of large sums of money.

At its annual meeting on December 21 the Master Builders' Association unanimously elected the following officers for the ensuing year:

President,
Lyman D. Willcutt.
Vice-President,
William N. Young.
Secretary and Treasurer,
William H. Sayward.
Trustees for Three Years,
Orlando W. Norcross and Walter S. Gerry.
Trustee for One Year (to fill the unexpired term of William N. Young),
William J. Sullivan.

At its December meeting the Boston Associated Board of Trade, which is composed of 25 different business organizations, took action, at the instance of the Master Builders' Association, one of its members, in relation to the attempt by the mayor of the city to prohibit the employment of non-union workmen on public work, to the following effect:

. . . . "Upon the general principle involved we do not hesitate to declare ourselves opposed to discrimination for or against workmen purely because they are or are not members of trade organizations.

"We therefore recommend that it be expressed as the sense of this board that in the awarding of contracts or the execution of work by the city discrimination against workmen on account of membership or non-membership in organizations is an unwise, unsound and unsafe public policy."

Chicago, Ill.

A correspondent in Chicago sends the following clipping as indicating the condition of building in that city at the close of November: The end of November finds a good many projects under way in Chicago that have been held in abeyance for several months, and there are other indications that a profitable building season is near at hand. The termination of the war and the November elections have given a stimulus and stability to business that will react favorably for building operations in a few months, as well as offering some immediate improvement. November operations were larger than any other month of the year except March, the south side showing unusual activity in medium sized apartment buildings, its new structures amounting to $1,919,800 of the total $2,685,400 that is to be expended for buildings started in Chicago during the month of November. Chicago architects are doing a large amount of preliminary drawing at this time, and it is a quite general feeling that these projected improvements have better prospects for consummation than in previous years.

Cincinnati, Ohio.

The report of the Building Inspector of Cincinnati for November shows that the following permits were issued: Fifteen for wooden frame buildings, costing $10,840; 71 for brick and stone buildings, costing $76,045; 11 for alterations and repairs, costing $28,082; a total of $114,967. The total cost involved in the transactions of the office in November last year was $120,075, making a falling off this year of over $5000.

Cleveland, Ohio.

During the month of November the amount of building projected in Cleveland, as indicated by the building inspector's report, took a pronounced upward turn. Two hundred and fifteen permits were issued for buildings estimated to cost $332,285, as against 204 to cost $191,873 in November, 1897. The Builders' Exchange has a plan on hand to establish an exhibition of building materials, for the benefit of the builders and architects of Cleveland. It will be a general clearing house. The plan has not as yet been completed, but a committee will soon be appointed by the association to push the matter. The idea is to rent some building and give an exhibit of the different materials used in constructing a house. The exhibit will be a permanent affair. The different firms who will exhibit will have certain seasons of the day when their representatives may be present to make sales, and to attend to business. No building has yet been decided on and the plans have not yet been completed.

Columbus, Ohio.

Secretary R. J. Gardiner of the Builders and Traders' Exchange writes that they have added to the exchange rooms and exhibition department a library of trade catalogues of every description, for the use of architects and their clients, members of the exchange and the building public in general. All the architects of the city are members of the exchange and have suggested this idea, which is regarded as a very good one. In order to obtain a good library it is suggested that manufacturers and dealers forward to the exchange copies of their catalogues so that they may be placed on file in the exhibition department.

Denver, Col.

Building permits issued during November in Denver call for new work to the value of $117,700, against $133,800 for last year. The new work has been scattered throughout the city but largely confined to residence districts. Little new work is reported in the hands of architects, a few dwellings of the better class and about the usual amount of repairs and alterations being all that is reported.

Detroit, Mich.

Building conditions in Detroit during November showed no improvement over the dullness from which the city has been suffering for a long time past. The new building undertaken during the month was valued at $217,300, as compared with $328,900 in 1897, as shown by the report of the Department of Building. There seems to be an uncertainty among contractors as to whether the early part of 1899 will show any marked improvement.

Doylestown, Pa.

During the past year building in Doylestown has taken on the proportions of a boom, and present indications point to renewed activity as soon as spring opens up. Most of the new work has been confined to dwellings of a substantial character in the districts traversed by newly established trolley lines. It is expected that further extension of the lines will result in a further increase in building.

Hamilton, Ont.

A meeting of Hamilton contractors, builders, dealers in builders' supplies and architects was held in the Board of Trade rooms recently to discuss the advisability of forming a builders' exchange. Speeches were made by many of those present, and the workings of exchanges in Buffalo, Cleveland and elsewhere were explained. The objects of the proposed organization were outlined as natural improvement in the acquisition of general knowledge of building and to reform abuses in the trade.

Eventually it was decided to form an association, and the following were appointed a committee to draft a constitution and report at a future meeting: J. E. Riddell, W. J. Reid, Geo. Clapham, Wm. Laking, Wm. Hancock, J. Matthews, Edward New, James Stewart, W. W. La Chance, R. G. Olmsted, S. S. King, F. H. Carpenter and George Ritchie.

Harrisburg, Pa.

Builders and architects of Harrisburg are doing comparatively little business now. They anticipate a healthy reaction in the spring of 1899, when they believe previous seasons will be eclipsed. There is already a good demand for the right sort of single residences. Business along this particular line, however, is by no means at a complete standstill even now, and, everything taken into consideration, it would seem that there were about as many buildings in the course of construction as was the case at this time a year ago. The city is keeping pace with other Eastern cities of like size.

An architect recently summed the situation up by saying: "Business is decidedly dull and I do not expect any until spring. Should some of the houses now vacant be rented before spring it would tend to inspire others to put up buildings."

Indianapolis, Ind.

Indianapolis builders were encouraged by the improvement in building during November as indicated by the increase in volume over that placed on the market during the same month of 1897. The total is still smaller than the contractors would like, being $167,545, against $126,346 for 1897; but there appears to be a hopefulness for next year based upon improved general business conditions prevailing in the city.

Kansas City, Mo.

Building in Kansas City showed a slight gain during November over the amount done in the same months of last year, the total being $177,310, an increase of about $9,000. The increase in number of operations for the month was 73. The improvement during the season just closed over the four or five immediately preceding it is believed by the majority of the contractors to be an indication of a permanent resumption of the more prosperous times of the past.

Louisville, Ky.

Building during November was very quiet in Louisville so far as new work was concerned, the total value of the work undertaken during the month being, according to the building permits, but $60,285, a decrease in volume of over one-third from the record of the same month last year.

Milwaukee, Wis.

B. F. Sanders, the newly appointed assistant secretary of the Builders and Traders' Exchange of Milwaukee, says: "The past season has been one of considerable activity among builders, although prices have not gained the standard of former years. Dwellings and smaller buildings predominate, but the Federal Building nearly completed, the Public Library and Museum, a large electric power plant, several large mercantile buildings and a large glue plant at South Milwaukee add to our list of large contracts. Local manufacturers report a very successful season and indications point to a large increase for the coming year. The same may be said of the building line.

"The members of the Builders and Traders' Exchange are busy as bees preparing for the coming convention of the National Association of Builders, which will be held here the second week in February The General Committee having this matter in charge are sparing neither time nor labor preparing for the reception and entertainment of the delegates and guests and to make this one of the most successful gatherings of the national body that has ever been held, and at the same time maintain the standard of our city, already famous for its ability to cater to the demands of her guests. The committee hereby extend a cordial invitation to all the friends in the building line to join in making this convention a grand success, a good time being assured."

Minneapolis, Minn.

Building and property improvements in Minneapolis are decidedly on the increase The statistics showing the total number of buildings of various sorts and the cost of their construction, as filed with Building Inspector John A. Gilman, cover the first nine months of the fiscal year 1898, and represent a total outlay in building of $2,532,425.

The feature of the season's building consisted in the numerous beautiful and well appointed homes recently completed The Lowry Hill, Kenwood and Oak Lake districts have been highly favored in this respect. Notable examples are the residences of George Partridge and S A. Harris, costing $50,000 and $30,000 respectively. The city itself has indulged in building to the extent of three capacious school houses, the Bryant and Sidney Pratt, constructed of stone and brick at a cost of $20,000 and $15,000 each, and the Harriet, a wooden structure, at a cost of $8000.

In the line of store construction the most pretentious example is the recently completed Syndicate annex or Plymouth Block, a brick and terra cotta iron structure, costing in the neighborhood of $50,000. The proposed Andrus Building, for which the foundations are already laid on the site of the old Hale Block, corner Fifth and Nicollet, will cost upward of $100,000. The building is to be of brick and terra cotta, with steel construction. According to the present plans it will be nine stories high.

New York City.

As a result of the recent fire at Warren street and Broadway, which showed the difficulty the fire department experienced in controlling a fire more than ten stories above the ground, one of the daily papers prints the following:

A little table of tallest buildings in New York suggests why the city is deeply anxious over the rapid working limit of the fire department:

29 stories	1	17 stories	5
26 stories	1	16 stories	4
23 stories	2	14 stories	3
22 stories	3	13 stories	8
21 stories	3	12 stories	7
20 stories	5	11 stories	11
19 stories	4	10 stories	19
18 stories	4		

The Manhattan Life Insurance Building is 246 feet high; the Manhattan Hotel, 225; Dun Building, 223; Hotel Netherland, 220; Gillender Building, Nassau street, 219; Johnston Building, Broad street 212; Mutual Life, Nassau street, 210.

Although the work of establishing arbitration as a permanent institution for the settlement of all differences between organized employers and workmen is being steadily pushed, the matter has not yet reached the stage which prevents the rivalry between unions from disturbing the progress of work. Several strikes among the carpenters occurred during the past month as a result of a difference between rival unions. It is expected that this condition will gradually disappear as the several trades develop better central organizations.

The Builders' League held their fourth annual dinner on Saturday evening, December 3, the occasion being a very enjoyable one in every way. There were something like 200 present, representing every branch of the building trade. John P. Leo, president of the League, presided. Interesting remarks were made by Senators John Ford and Thomas F. Donnelly, both of whom urged the builders to keep track of bills which might be introduced at Albany affecting the building trades. William J. Fryer of the Board of Examiners and president of the Society of Architectural Manufacturers, urged that the present tenement house law, which now forms a part of the act governing the Health Department, be transferred to the building code, in order that the commission of experts to be appointed by Mayor Van Wyck to revise and improve the present building code may have power to alter it so as to conform with the rest of the code. Commissioner Thomas J. Brady of the Building Department made a short address, in which he declared that the building trades in New York City were enjoying an era of unusual prosperity, giving figures to support the statement. He added that, instead of American architects copying from Europe, Europe was to-day copying from us, and that during the past year the building trades of Europe had sent a number of experts to this country to study American methods and styles.

Philadelphia, Pa.

The monthly report of the Building Inspection Bureau of Philadelphia, compiled after the close of business for November, shows that 719 permits were issued, authorizing 948 operations, the estimated cost of which was $915,010. This is the smallest exhibit made in any month since January, while November of last year showed 678 permits for 1043 operations, estimated to cost $1,169,485 a falling off this year from the corresponding period of 1897 of $254,475, and from October of this year of $495,410. As the building season for this year is practically completed, the decrease in business to date exceeds $4,200,000. There are operations such as the Mint, now under way, which do not come within these calculations, the local officials having no jurisdiction.

Much information regarding the progress upon and present condition of the public buildings is contained in the annual report of the architect, W. Bleddyn Powell, which opens with a financial statement showing that the unexpended balance of appropriation December 31 last was $28,080; appropriation for 1898, $1,000,000; expended to October 1, on account of salaries, wages, contracts and incidental bills, $827,818.15; leaving an unexpended balance of $200,261.85.

Commissioner Franklin M. Harris, after glancing through the report, called attention to the fact that the cost of the building to date has been $16,843,334.20, instead of $22,039,822.26, as recently published. The total expenditures have been the latter sum, but the maintenance of the building and the cost of fitting and furnishing rooms for city departments has been $4,835 052.98.

At the regular meeting of the Master Builders' Exchange in the exchange rooms the following nominations were made of delegates and alternates to attend the twelfth annual convention of the National Association of Builders at Milwaukee February 14 to 16: Charles H. Reeves, William Conway, David H. Watts. A J. Slack, Thomas Armstrong, R. C. Ballinger, William McCouch, Cyrus Borgner and Michael Melody.

Secretary Harkness says that the members of the Exchange are all fairly busy doing a safe business, but that, while all are hoping for an improvement in the volume of building next season, no one seems sure enough of the outlook to express an opinion.

Pittsburgh, Pa.

The report of the Bureau of Building Inspection of Pittsburgh for November shows an increase in operations over those of October of $80,867 in value and 22 in number of buildings. As compared with November, 1897, an increase of 18 buildings is shown, but the decrease in value is $379,549. This, however, is due to the fact that November of last year included the permits for several large down town improvements. Altogether the record for last month is better, as it shows that building is more general than for the same mouth last year. Another pleasing feature is the marked increase in the number of brick buildings.

Sub-contractors are watching with interest a suit now being tried in the courts to compel the defendant to pay certain workmen for work done in the performance of a sub contract. The defense claims that being a sub-contractor he cannot pay his workmen until the general contractor pays him, and that the general contactor is withholding money which he (the general contractor) has received in payment for work satisfactorily performed by the sub-contractor.

St. Louis, Mo.

The amount of building begun in St. Louis during November as shown by the building permits is valued at about $490,000, being a slight decrease from the value of that begun in the same month of 1897. At a recent meeting of the Master Builders' Association of St. Louis the following nominations for officers and trustees were made. The election will take place while this issue of *Carpentry and Building* is in the printer's hands. For president, F. J. Remmers and Geo. G. Chapline; first vice-president, Hiram Lloyd, A. W. Black and C. D. Morley; second vice-president, Moritz Eyssell and Bernard Stock; secretary, J. L. Westlake and E. A. Steininger; treasurer, Adam Bauer; trustees, three to be elected, Aug. Fick, L. J. Evans, Gus M. Viernow, H. R. Becker, John Low, M. W. Muir.

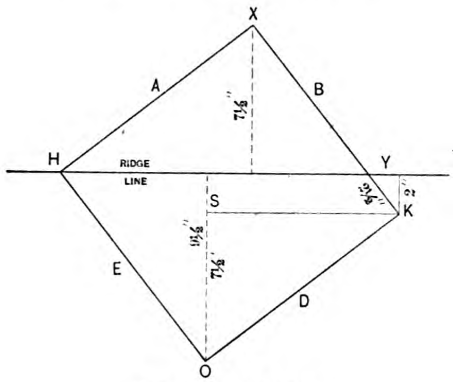
Removing Iron Rust from Marble.

The removal of iron rust from marble is an operation which depends upon the solubility of iron sulphide in a solution of potassium cyanide, and to properly do the work the following scheme is suggested by a writer in an exchange: Clay is made into a thin paste with ammonium sulphide, and the rust spot smeared with the mixture, care being taken that the spot is only just covered. After a lapse of ten minutes this paste is washed off and replaced by one consisting of white bole mixed with a solution of potassium cyanide—1.4—which is in its turn washed off after a lapse of about two and a half hours. Should a reddish spot remain after washing off the first paste a second layer may be applied for about five minutes.

CORRESPONDENCE.

A Steel Square Problem.

From J. H., *Tressbank, Manitoba.*—In a recent issue "Puzzled" wants to fit a box 12 inches square over a one-half pitch saddle roof, as per sketch. In reply I would say take the rise from 0 to the ridge, 9½ inches which is the same as the run, being a one-half pitch), on



A Steel Square Problem

the blade and 12 inches on the tongue, which is the length from O to H, and apply to the edge of the box standing plumb on the ridge, and use the short bevel. The same plan will work for H X, X Y and Y K. On a line from the ridge to O draw a line square to K, which will give the run from O to S, 7½ inches. The rise for 7½ run will be 7½ inches. Then 7½ inches and 12 inches or O K will give the cut for D, using the short bevel on the edge standing plumb at K. This will work for any pitch, and if "Puzzled" can wait until winter, when I am not so busy, I will give him a few problems of this sort.

Some Questions in Plumbing.

From F. K. T., *Raleigh, N. C.*—Answering the questions of "N. H. D.," Newburgh, N. Y., in the order in which they appear in the December issue of *Carpentry and Building*, I would say that a tank of the size mentioned will contain approximately 675 gallons and weigh, with tank, 6000 pounds. The 3 x 6 inch floor beams, 12 inches on centers, will be sufficiently strong to carry the weight of the tank when filled.

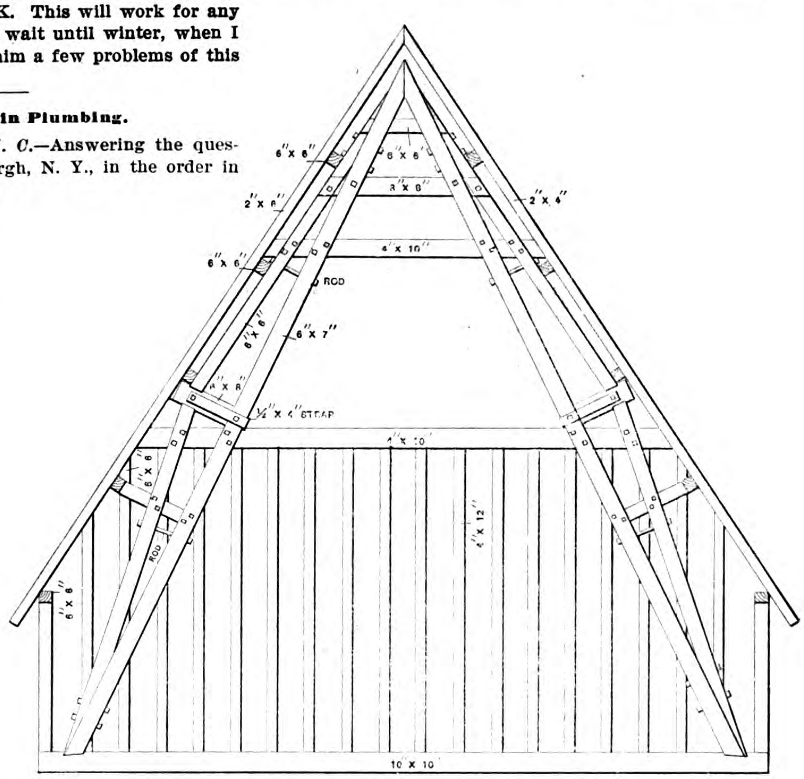
The apparently weak point in the construction shown in the sketch subsubmitted by "N. H. D." is in having the weight of the bathroom and closet partitions, ceiling and attic floor rest on the center of the 13-foot floor beams underneath them. However, on estimating the weight carried by these beams I find them to be of ample size, providing the span overhead is also 13 feet and there is no great weight added in the way of storage in the attic. Additional strength can be gained by bridging or putting a light truss in the closet partitions to carry the weight to the cross partitions on the lower floor.

The plumbing should be done by a practical man competent to do a perfectly sanitary job. Ordinarily a ½ or ⅝ inch lead or galvanized iron supply pipe to the fixtures would be used with 1¼ or 1½ inch lead waste pipes properly trapped. Where the pressure is low, as in this case, the larger sized pipes should be used for supply. There should be no connection whatever between the tank and soil pipe. The overflow pipe can be satisfactorily run to the leader, provided the leader does not connect with the drain tile to the sewer. The gutter shown if properly graded is sufficiently large to carry off the rain water from the roof surface mentioned.

Framing a High Building with Short Posts.

From JAMES F. HOBART, *Brooklyn, N. Y.*—A few years ago a skating rink was to be erected on Fourth street, in the city of Worcester, Mass., and while it was proposed to put up a wooden structure the building inspector got in his fine work and would not allow a wooden building of the required hight of posts to be constructed within the fire limits of the city. The architect then decided to dispense with posts altogether and to set the roof of the building directly on the ground. I do not remember how the matter was settled with the building inspector, but the structure was erected and was standing the last time I visited that city. Nothing larger than 2 x 8 was used in the entire building. The roof timbers, about 12 x 12, were in the shape of half circles, and were all built up of 1 x 12 inch boards.

Another case of placing the roof on the ground is illustrated in the sketch which I inclose and forms a fine example of stiff roof framing. I do not know whether this building was thus framed to avoid another building inspection regulation, or whether it was for some other purpose. It stands on the north shore of Staten Island, just below New Brighton, and is used for the reception and storage of gypsum before that rock is burned into



Framing a High Building with Short Posts.

commercial plaster of paris. The space without any framing is occupied by the tracks, trolleys and runways for conveying and dumping the rock. The material is first hoisted from the vessel, then run down the building to the proper bin and automatically dumped, the cars stopping and immediately starting to return without any appreciable pause at the end of their journey. The dimensions of the several members of the roof being given in the sketch, no description is necessary save the statement that the building is about 100 feet wide, and the hight equals the width as nearly as can be estimated by the eye. There is no sign of settling or spreading in any portion of the structure.

Plans for a Grain Elevator.

From R. C., *Lee, Ill.*—Will some reader send for publication sketches or plans of an elevator having a capacity of about 30,000 bushels and suitable for erection in a country town ?

Note.—Here is an opportunity for some of our Western friends to show the style of elevator construction employed in their locality, and we trust they will come forward with sketches calculated to meet the requirements of the correspondent making the inquiry above.

Design for Five-Room School House.

From H. L. A., *Wilmington, Vt.*—Can any of the readers of *Carpentry and Building* furnish a design for a school house of five rooms, two on the first floor and three on the second floor, all suitably arranged for plumbing and furnace or steam heating ?

Strength of Floor Joist.

From S. W. J., *Huntington Ind.*—If the editor will allow me the privilege of talking with the readers of his valuable journal, I will try and interest them in matters which I think concern all those who follow the business of contracting. I have found among my acquaintances few carpenters who understand the strength of materials, such, for example, as the load a certain beam or joist will bear for a given span under certain conditions of loading, or the size of joist and how spaced on a given span, required to support a certain size water tank, or the safe load a certain size iron rod will sustain. Changing the subject, however, to a little different channel, although of just as much interest to this class of workmen, I wonder how many know how to find the required length of a certain rafter for a given rise and run. To be honest with my brother chips, I think they do not study mathematics as much as they should. It is impossible to work out many of the above problems without some knowledge of square root at least, and this can be mastered by close application in a very short time. I will give an example with its solution as being of general interest in this connection:

What should be the dimensions of a hard pine joist in a storeroom, the span or distance between bearings being 19 feet and the joist spaced 12 inches on centers ?

In this case we would use a factor of safety of 5, although in the case of short spaces, as in dwelling house floors, a factor of safety of 3 would be ample. The superimposed load—that is, the load to be brought to bear upon it—is to be taken at 154 pounds per square foot and the weight per square foot of floor itself at 20 pounds. The value of the constant for hard pine is 375 pounds. Assume 2 inches for the thickness or breadth and we have the square of the depth equals the factor of safety multiplied by the distance between centers multiplied by the length squared, and this in turn multiplied by the superimposed load and the weight of the floor itself, the product being divided by two times the breadth multiplied by the constant.

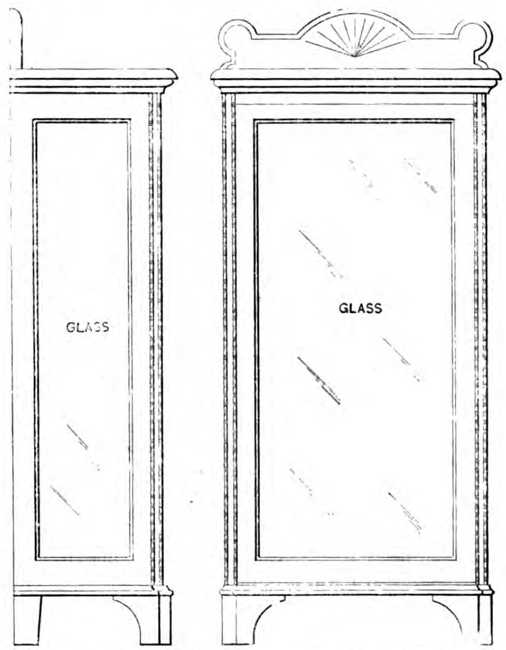
On working out the formula it is found that the square of the depth of the joist equals

$$\frac{5 \times 1 \times 361 \times 174}{2 \times 2 \times 375} = \sqrt{210} = 14 \text{ inches.}$$

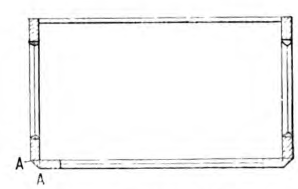
Therefore the required joist would be 2 x 14 inches spaced 12 inches on centers. If spaced 16 inches on centers the formula would show 1 1-3 after the 5, as the lengths and distances between centers must be taken in feet.

Design of an Oak China Closet.

From B. F. H., *New York City.*—I send inclosed drawings of an oak china closet, which may be of interest to some of the many readers of the paper. I have already constructed two of these china closets, and the material cost me about $4. The back is wainscoted with 3½-inch ceiling, and there are three adjustable



End and Front Elevations.—Scale, ¾ Inch to the Foot.



Beading at A A.—Scale, 6 Inches to the Foot.

Plan.—Scale, ¾ Inch to the Foot.

Design of Oak China Closet.

shelves in the closet, the sides and front of which, as will be seen from an inspection of the drawing, are of glass.

How Should Doors be Hung ?

From W. H. RICHMOND, *Scranton, Pa.*—The house where I now live was built 25 years ago. An architect and a builder were employed, but there was no contract work, except on doors, shutters and sashes, and changes were made, as the work went on, as directed. At that time I was not aware of any practical and good way to hang sliding doors, as all my experience was in the old way—of a rail on the floor, on which the door was to slide. As wide openings were wanted, double doors connecting the main rooms on the lower floor were used. When it came time to determine how the doors should be hung, and which one should open first, I was consulted by my builder, and we had quite a discussion on the subject. When I suggested that the doors should open into the corridors, instead of into the rooms, he raised many objections, one of them being that it would be so very awkward for a servant to usher a guest into the room. To this I replied that it would be one of the useful and neat points gained; for instead of opening the door with a push and going into the room with it, thereby disturbing, perhaps, some nervous lady sitting near, it would be opened out by the servant, and after the guest had entered the room it could be very conveniently closed. The chief objection, however, which the builder urged was that architecture in all ages had directed that each room should take its own doors, &c., and he said that if I insisted on having the doors hung in that way, I might employ some one else to finish the work, as he could not consent to such an innovation. I replied: "I shall be at the house again to-morrow, and, unless you present more forcible objections, will direct that the doors open into the corridors, and if you do not wish to finish the work another must." Next day, when the subject came up, the builder had decided there would be many advantages, and at my direction he would hang them in that way.

Up to this time my attention had not been drawn to this subject, but I have seen the advantages of this plan, and believe that no rules or customs of the ages should be observed if we can find better ones. When occupying rooms at hotels, with ample corridor room, I often find the door of the room opening in and against a bathroom or closet door and note the inconvenience, which would be saved if it opened out into the corridor, and I believe that in most houses changes could be made in the hanging of the doors which would be of much benefit. What do the readers think of the suggestion ?

Making a Floor Heat-Proof.

From C. O. M., *Homestead, Iowa.*—I have a question which I should like to submit to the practical readers of the paper. It relates to a job which I have on hand and about which I am somewhat in doubt as to the method of doing the work. I am a young chip and am a long way from knowing everything, so if my brothers in the trade can tell me how to proceed so as to give the greatest satisfaction I shall be under obligations. The building is a brick structure, two stories high, and covers an area 24 x 60 feet. The first floor is used as a bakery and the second floor is divided into living rooms. The occupants of these rooms complain of the great heat from the bake oven in the summer time, and I have been called upon to remedy the difficulty. Now, according to my notion, the best way is to first place a layer of paper on the floor and put on top of it strips, say 1 x 2 inches, and then on these place another floor, so that there will be a double floor with an air space between them. I think this method would assist in remedying the difficulty, but there may be some of the readers who know a better way, and I hope they will take up the matter and express their views through the Correspondence columns of the paper.

Note.—With no desire to anticipate our readers in this matter, we think our correspondent will secure good results by using some deafening material between his double floors. There are several of these on the market admirably adapted to the purpose. We lay the inquiry, however, before our readers and shall be glad to have them discuss it in the light of their own experience.

Suggestions for a Roof Plan.

From C. H. W., *Los Gatos, Cal.*—In reply to "Down East," Maine, in the November issue, I inclose sketches showing my suggestions for roof plan and two rooms in the attic, which I trust may prove of interest to the correspondent making the inquiry and possibly to some others. The dotted lines on the plan of the attic, Fig. 1, indicate the hips, valleys and ridges of the roof, each of these being clearly shown in the elevations, Figs. 2 and 3. The attic floor plan also shows the roof of the front porch with gable over the front steps. In the construction of the porch I think it would be necessary to add another column with a girder running back to the house to assist in carrying the weight of the closet and storeroom of the second story. In Fig. 2 of the sketches there is also shown a section indicating the framing of the attic and roof. At the right of this is a front elevation, while in Fig. 3 is an elevation of the right side. The spaces outside of the rooms and closets shown in the attic floor plan, Fig. 1, are under the roof and must of necessity be waste room, the extent of which, however, is quite small.

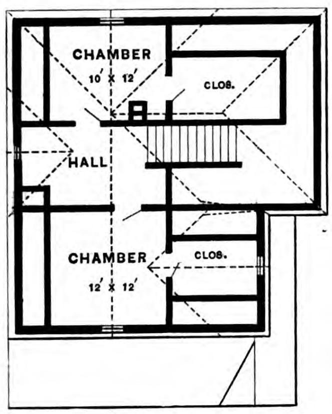


Fig. 1.—Attic and Roof Plans.

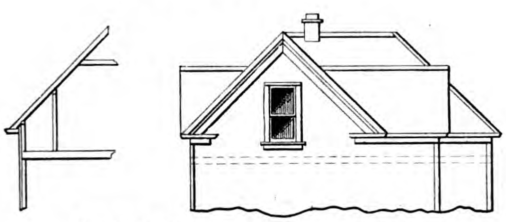


Fig. 2—Section and Front Elevation of Roof.

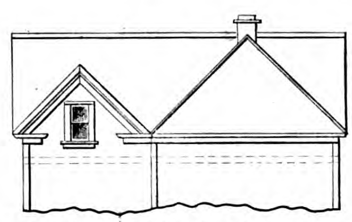


Fig. 3.—Side (Right) Elevation of Roof.

Suggestions for a Roof Plan.—Scale, 1-16 *Inch to the Foot.*

Home Made Lathe.

From A. E. S., *Brockton, Mass.*—In connection with the home constructed lathe mentioned in the articles on wood turning will you please explain the use of the stirrup marked K and the manner in which the mortise is fixed where it goes into the floor frame?

Answer.—We submitted the inquiry of our correspondent to Mr. Hodgson, who replies as follows: The stirrup, shown at K, is for the purpose of carrying a "back center," the object of which is to prevent the cone R, Fig. 8, from being pressed too tightly in the paper bearing, which would be the result if the tail screw, shown in Fig. 3, was turned one or two revolutions more than enough to hold the material in the lathe. The stirrup with its center and jamb nuts is so arranged that the wear in the front bearing may be taken up by turning the back center.

The tenons of the uprights of the lathe are fastened into the mortise of the floor frame by means of wooden pins or iron bolts. The tenons and mortises are draw bored. If the mortises and tenons do not hold the uprights steady a wooden knee may be screwed to the angle formed by the floor frame and the upright.

Keeping Out Dampness.

From PROSPECTIVE HOME BUILDER, *Troy. N. Y.*—In a recent work on home building is the statement that brick or stone foundation walls should, in order to keep out the dampness, be plastered on the outside with Portland cement, and on top of this cement two coats of asphalt. I write to ask if asphalt, as suggested above on the outside of foundation walls, meaning, of course, next to the soil, will stand the decay induced by the soil as well as though the asphalt were first placed on the stone or brick foundation and the cement on top of the asphalt ?

Note.—Both methods have been adopted in practice, and so far as we know with satisfactory results. In cases where the ground is not generally saturated with water a coating of asphalt or Portland cement on the outside of the wall will, in most cases, serve the purpose. One authority considers asphalt applied boiling hot to the outside of the wall as generally the most lasting and durable of all coatings. In order to insure perfect protection care should be taken in building the wall that the joints be well pointed and the whole allowed to dry before the coating is applied. There should be two or more coats of asphalt, and these should be carried down to the footings. If there is danger of the moisture rising in the wall by absorption from the bottom, which is likely to occur if the soil is saturated with water, it is a good plan to place two or three thicknesses of what is known as asphaltic felt on top of the footings just below the basement floor, these being laid in hot asphalt.

In the case of the construction of an important building in this city, where it was desired to render the basement water proof, the footings in the outside basement walls were covered with four-ply burlap mopped on solid, commencing at the inner edge of the sidewalk and running down the outside of the wall to the bottom; thence through the wall and turning up against it. In order to further protect the cellar from dampness this covering was plastered with Portland cement mortar. Our correspondent may, perhaps, derive some valuable suggestions from the articles on the subject which appeared in the issues of the paper for July and August of the present year.

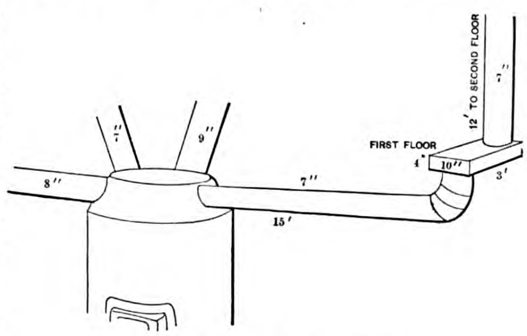
Hot Water Proof Cement for Cistern.

From S. B. R., *Pennsylvania*.—Can you tell me how to make a cement that will stand water at 160 and 170 degrees ? I have a brick cistern 34 feet deep and 12 feet in diameter which has been covered with cement, but it gets hot and crumbles off and the water leaks out. Do you know anything in the line of cement or paint that will resist the hot water ?

Answer.—There are a number of hot water proof cements, in which rubber, gutta percha and varnishes are used, but they are too expensive for water proofing a large cistern. Much of the trouble probably comes from the great depth of the cistern (34 feet), which when full has a pressure of 15 pounds per square inch near the bottom—too much for a brick cistern. We apprehend that the cement used in plastering the cistern was not of the best kind. The ordinary hydraulic cement used for building purposes is not water proof nor suitable for plastering cisterns and water tanks. We advise taking off the old cement as much as possible and replastering with pure Portland cement, freshly made up in small batches for immediate use. When set, say one day, thoroughly dry the surface by a wind sail or other means to produce a circulation of air in the cistern. Then oil the surface of the plaster with boiled linseed oil and facilitate its drying by air circulation.

Some Questions in Furnace Heating.

From W. B., *Bridgeport, Conn.*—Will some of the readers of the paper kindly give me a little assistance in the following case ? I have a house which has a hot air furnace in the cellar and in which there is a register on the second floor on the south side of the building that does not heat and never did heat. There are three other pipes taken from the furnace which heat very well. The sketch shows these pipes and also a 7-inch pipe 15 feet long which connects with a rectangular pipe 10 inches wide and 4 inches deep and 3 feet long on the way to the second floor. This rectangular pipe is run between the joists. A 7-inch round pipe leaves the top of the square pipe and runs vertically to a register in the room on the second floor. From the first to the second floor the pipe runs up alongside of the chimney on the outside of the building. When the fire is first started in the furnace and all other registers are closed a little heat will come out of this register, but as soon as the other pipes are open in the other parts of the house no heat at all can be obtained through this register. Is the failure to heat due to the fact that this pipe runs on the outside of the building ? Would a larger pipe in the cellar overcome the difficulty ?



Some Questions in Furnace Heating.

Would the pipe now in use work if it was covered with asbestos paper ? Many different experts have examined this job and have failed to devise a remedy.

Note.—We shall be glad to have our practical readers come to the assistance of this correspondent. We think that an 8 inch pipe carried from the furnace direct to the bottom of the 7-inch vertical pipe without the use of the rectangular box would greatly aid the heating of the room in question.

Covering Shingles with Galvanized Iron.

From G. A. R., *Illinois.*—I notice the letter from "G. J. M.," Ontario, in issue for November, in which he asked for information about covering a shingled cottage roof with galvanized iron. I do not think it would be well for him to put galvanized iron or tin over an old shingle roof, as it does not give the metal a fair show. To do the job right, in my estimation, the shingles should be removed and the roof boards moved close together, after which the galvanized iron covering should be put on. My experience has taught me that it is just as important to have good tight roof boards as it is to select a good quality of material to put over them.

Carpenters' Squares Finished in Colors.

From ENGINEER, *New Haven, Conn.*—Have any of the readers seen carpenters' squares finished in blue or black and the figures in white ? If so can they tell how it is done ? I would like to know if, in their opinion, the finish is lasting and if it will prevent rust. Is the white retained in the figures any time, or does it fall out ?

Note.—There are squares such as our correspondent

VIEW AUGUST 11, SHOWING PROTECTIVE WORK AROUND THE ROOF OF THE OLD BUILDING SEEN IN THE BACKGROUND.

VIEW SEPTEMBER 14, SHOWING ROOF RAISED TO THE FULL HEIGHT DESIRED AND SUPPORTED BY CRIBBING.

RAISING THE ROOF OF THE NEW YORK LIFE INSURANCE CO.'S BUILDING, CHICAGO, ILL.

SUPPLEMENT CARPENTRY AND BUILDING, JANUARY, 1899.

describes, but we are unable to say as to the degree of satisfaction which they have given in the hands of practical men. We shall be glad to have our readers take up the subject and discuss it in the light of their own experience.

Safety in Electric Wiring.

From L. & S., *Jasper, Ind*—I would like to know through the columns of the paper if there is any danger of fire in electric wiring when not insulated and coming in contact or nearly so with wood? Is there any danger of igniting the wood? This has reference particularly to inside concealed work.

Note.—Our correspondent can get from the insurance companies their rules for electric wiring. From these he will learn that wire insulated in the best manner should be used for all inside work. A number of fires have been started from the electric wires in buildings, and usually where the insulating material has been destroyed or removed by rats or accident or careless workmanship. More efficient service is also gained when insulated wire is used.

Sheet Metal Roof in Hot Climate.

From G. L R, *Illinois.*—I notice the inquiry in the issue for November last from "R. P. S.," Texas, asking if there is any way of preventing a metal roof from heating the room below, as it was a great drawback to the use of metal roofs in a hot climate like Texas. Perhaps the experience I had the past summer in cooling a room that was heated by the roof so that it was almost impossible to live in it on a warm day may be of use to him. After examining the building, which was a one and a half story cottage, I finally decided upon the scheme shown in Fig. 1 of the illustrations. I put a 12 inch ventilator on the roof as near the ridge as possible without it being seen from the front of the house or the street. Then, in order to get a suction through the attic, I had enough 3 inch holes bored under the cornice to equal the capacity of the ventilator. I then covered the 3-inch holes with wire screen so as to keep the sparrows from building nests in the cornice. I placed an 8-inch register face in the ceiling of the room mentioned, which permitted the heat from the room to be drawn into the attic and out into the ventilator. In case it would be undesirable to place a ventilator in the roof, your correspondent could obtain the same results by having a ventilating ridge. This principle will work on any building where the roof joists are not used as ceiling joists, as the main object is to form a suction under the roof and draw the warm air from the rooms below. I am satisfied that "R. P. S." will find the plan I mention a satisfactory remedy for rooms overheated by metal roofs.

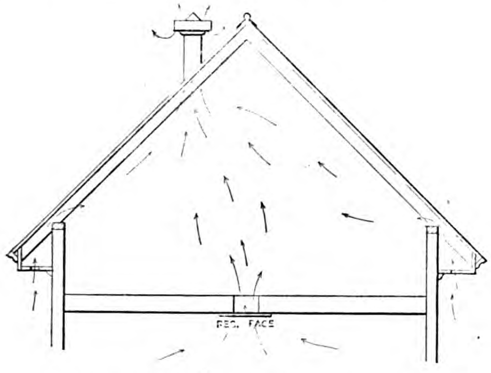


Fig. 1.—Sketch Accompanying Letter from "G. L. R."

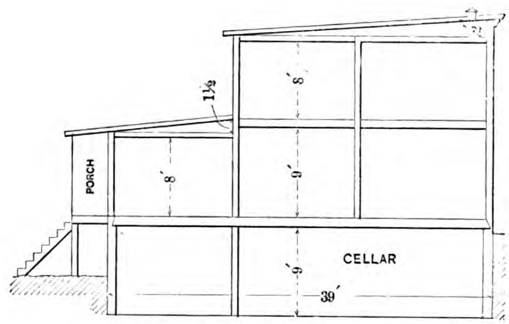


Fig. 2. Sketch Submitted by "B. H. D."

Sheet Metal Roof in Hot Climate.

From B. H. D., *Vienna, Va.*—With regard to the inquiry from "R. P. S," Texas, that appeared in the paper for November, I will say that if he will put on the roof boards a double layer of building paper, and on the highest point of the roof ventilators of proper size, he will find a metal roof as comfortable as a shingle one. The greatest trouble is that the space between the rooms and the roof is not ventilated. I inclose a sketch, Fig. 2, of my own building, and can say that this system will work satisfactorily. In my building air is taken from the cellar and travels between partitions up to the two ventilators, each 10 inches in diameter. I also have above the stairway a skylight which can be raised or closed at will, and my house is comfortable in the hottest weather.

Details of Plank Frame System of Construction.

From F. P. M., *Florida, N. Y.*—I would like to see something more in regard to the plank frame system. While I do not think it is equal to the old style of framing, yet I believe it has its merits. I would like the sills, plates, both main and purlin, as well as the corner posts, more fully explained, especially when the purlin posts start from the sills.

Note.—We lay the inquiry of our correspondent before the readers of the paper, and shall be glad to have them discuss it as fully as they may feel inclined. It is possible that Mr. Shawver may find time to prepare something on the subject in question.

Strength of Roof Trusses.

From P. C. D., *Richmond, Maine.*—I am very much obliged for the answer to the roof truss problem presented in the issue for December. I was aware that a truss held together with iron rods was better than the one of which I sent a sketch; but my object was to obtain something that could be cheaply put together, as it was for a cheap building, and there was no ceiling to be carried. The trusses shown in Figs. 5 and 6 in the December issue can be put together just as easy as the ones I had in mind, and I now see the advantage of using the design presented.

A Puzzle for the Curious.

From YOUNG CHIP, *Montreal, Canada.*—The captain of a ship one day found a hole in one of the boats 4½ inches square. The only piece of wood the ship carpenter had was a piece 10 inches long by 2 inches wide. Considering the surface measurement of the hole to be 20¼ inches and that of the wood only 20 inches, he had a pretty lively time in filling it up; yet he so distributed that ¼ inch that a little paint filled up the whole business. The question is, how did he do it?

New Publications.

MODEL HOUSES FOR LITTLE MONEY. By William L. Price. With an additional chapter on Doors and Windows by Frank S. Guild. Size 4 x 6 inches; 193 pages; numerous illustrations; bound in flexible covers, with appropriate side title in colors; published by Doubleday & McClure Company; price 50 cents, postpaid.

This little work contains a number of plans and elevations of houses having from six to twelve rooms and ranging in cost from $1000 to $4000 each. The aim of the designer of the houses has been to aid in the building of small houses, the matter originally appearing in the *Ladies' Home Journal*. The popularity of the designs is evidenced by the statement that over 500 houses were built in one year from the plans given. The first design is that of a dwelling suitable for erection upon a suburban site and costing from $3500 to $4000. The second is one costing from $2000 to $2500, following which is a house intended for erection on a lot having a frontage of 30 feet. This in turn is followed by an $1800 city brick house, a $1500 house for a 25-foot lot, a $2200 house for a small square lot, a house for $1000, a model house for $1000 to $1250, designs for three small churches and a cabin which, it is stated, can be built at a cost of from $800 to $1000. As indicated in the title there is a chapter by Frank S. Guild on " remodeling the front door " and " what a window will do for a home."

Roman Villas.

The villa or country house of the Roman gentleman, properly so called, was often built near the sea, because, says Winckelmann, fevers or great heat were not experienced on the coast. The country house discovered at Herculaneum was situated on the edge of the sea, and a long causeway led from the garden to a circular summer house, pierced with windows in every direction and situated in the sea itself. In short, the grand distinction from town houses consisted in the villas being insulated by a moat, single or double, with a wall between the two, or in their inclosing a piece of water. This last, like our modern public gardens, was surrounded with a piazzza, divided by columns into boxes for conversation or bathing. Between the columns were placed busts and statues alternately. In general these houses had only one story.

The country houses of Rome (properly defining the term) were villas of enormous magnificence and exquisite situation; but as the great public men could not be long absent from Rome, they had inferior and smaller residences in the outskirts of the city, which they called their gardens, and also villæ suburbanæ, or suburbana. Of course those at Pompeii, being existing specimens, are the fittest to be considered.

These villas present nothing to the road but bare walls. The windows are all toward the garden, like the houses of the East. In the center of a square was a bath and ædiculum, the square formed by a piazza, the roof of which was a terrace, and at each of the hither corners at least was a summer house. The plans were by no means uniform, and, according to the Pompeian villas, there is no important difference from the town house, except in the annexation of the garden, inclosed within a porticus or piazza.

The villa on the road, called of Herculaneum, was placed upon the edge of the declivity, which sloped toward the sea, and consisted partly of two stories, the upper one being on the level of the street. It was spacious, and near the entrance was a bath, with all the necessary appendages. In the rear the best rooms opened upon a terrace running the whole width of the house, and overlooking a garden or xystus about 30 yards square. Under the terrace was a portico for exercise in shade or during rainy weather. At the further extremity a small temple, supported by six columns, projected toward the villa, and in its front a bath or basin occupied nearly the center of the garden. The lower apartments, under the arcade, were paved with mosaic, coved and beautifully painted, as was also the greater part of the villa. One of the rooms had a large glazed bow window. The glass was very thick and deeply tinged with green. It was set in lead, like a modern casement. In the cellars were many large earthen wine vases ranged in order against the walls. In that part of the lower story which was removed from the covered portico the rooms, more simply finished, contained implements of husbandry. To this division of the house was a separate entrance.

The Roman villa was divided into three parts—the urbana, for the master and family; the rustica, for the farmer and husbandmen, and the fructuaria, or storehouse for corn, wine and oil. The servants who were immediately attendant upon the master, and belonged to the villa urbana, were the atrienses, or what the Italians style the sala, in speaking of the liveried servants collectively; the valets, cubicularii, who, it is presumed, were usually freedmen; the secretary, styled notarius; the gardeners for the pleasure garden, topiarii, and the musicians and comedians and persons for entertainment during repasts. This villa urbana, also denominated pseudo urbana, and prætorium from obvious distinction, had a peristyle or court, surrounded by a portico, at the further extremity of which, opposite to the gate of entrance, was the atrium or hall, with a portico on each side looking toward the place of exercise—as lawns, galleries for wrestling and other smaller buildings. The baths were also annexed to this part of the building, and were always so situated as to enjoy the winter's setting sun. Besides the sitting rooms, chambers, library and dining room—they would often have one of the latter kind in the midst of a park, as we should call it—and sometimes a bedroom for the sake of quiet and retirement.

In the villa rustica or farmhouse, in apartments over the gateway, lived the procurator or steward, that he might know who went in or out; on one side of this, the villicus, bailiff or chief of the husbandmen, and near the fructuaria or storerooms the villica or housekeeper, under whose order were the female servants employed in providing food and clothing for the family. The inferior slaves lodged in one great room, and the sick in an apartment called the valetudinarium. The lodgings of the freedmen had a southern aspect. The aviarius had the care of the poultry, and in considerable villas, far from a town, was a master of the workmen, ergastularius, with smiths and carpenters under him. Horses and mules were kept for the use of the master, and asses and oxen for that of the farm, which had yards much resembling the modern. Particular care was taken of the geese, hens, pigeons, peacocks and other birds, who had also separate dwellings assigned to them; and not only deer, hares and every kind of game was attended to, but there can scarcely be named an animal which was not kept by the more opulent Romans at their country seats.

The villa urbana or pseudo urbana was also divided into a winter and summer house, because it had a suite of rooms adapted to either season. The parts which composed the summer residence were nearly the same as those of the town, except that the dwelling apartments, which did not commonly exceed one story, were always surmounted by a tower, on the top of which was a room pierced with windows on every side, uniformly destined for meals, so that they could add to the pleasures of the table those of light and prospect. They nearly always built their villas along the high roads, for two reasons—one to get to them more easily, the other to place them more in sight. In the Pompeian paintings we have villas of this kind. One on the sea shore, of two stories, has trees planted on the roof. Winckelmann says that the architecture of the villas of Herculaneum is the same as that of the large houses of towns, so that the plan and elevation of the one is the same as that of the other.

BATH CONNECTIONS.

A CORRESPONDENT of *The Metal Worker*, discussing in a recent issue the subject of bath connections, says:

While baths are found connected as shown in Fig. 1 of the accompanying illustrations there is still room left for the trade paper, and still a necessity for the spread of a little more knowledge among the men who are engaged in the work, and also for the englightenment of the general public. Such blunders are not confined to towns and country places removed more or less from the large centers, but are to be found in both city and country.

In this age of inspection, registration and examination it is getting to be more and more difficult for anybody to do bad and unsanitary plumbing. Yet there is still lots of room for improvement in places where the regulations (if there are any) are not lived up to, where there is no inspection of plumbing, and where any one may do it according to his own ideas. In Fig. 1 the soil pipe was ended with a Y branch for the closet connection, into the top of which the bath waste was emptied, and the end of the Y closed with cement.

The tub in this case, shown inclosed with a wood casing, was no mean affair, but at the time it was put in was doubtless looked upon as being just the thing, and was made to match other fixtures, the closet at one time also having been incased. The piping thus being hid from view made it difficult to locate any errors without tearing up carpets and removing wood work, which was supposed to have been left in such shape as to be easily removable, but out of which it was almost impossible to get the screws, that through time got a tighter grip than any devilfish. There was a bad odor in the bathroom, but the fixtures were all trapped, so how could it be? To some—in fact, to most—people whose knowledge of the subject is limited, the fact that the fixtures are trapped conveys a full assurance that the work is well done.

The overflow from the bath had been connected to the waste on the sewer side of the trap, and was a by pass also answering the same purpose as a first-class vent for protection against siphonage. The soil pipe was not run up through the roof, but was ventilated in some measure by a 2-inch pipe from the closet trap. The closet shown in the illustration is of earthenware, and has a trap, although from a front view it might be mistaken for a straight hopper. This is a good object lesson of "How not to do it," and would be a good thing to hang up in front of every apprentice in the land.

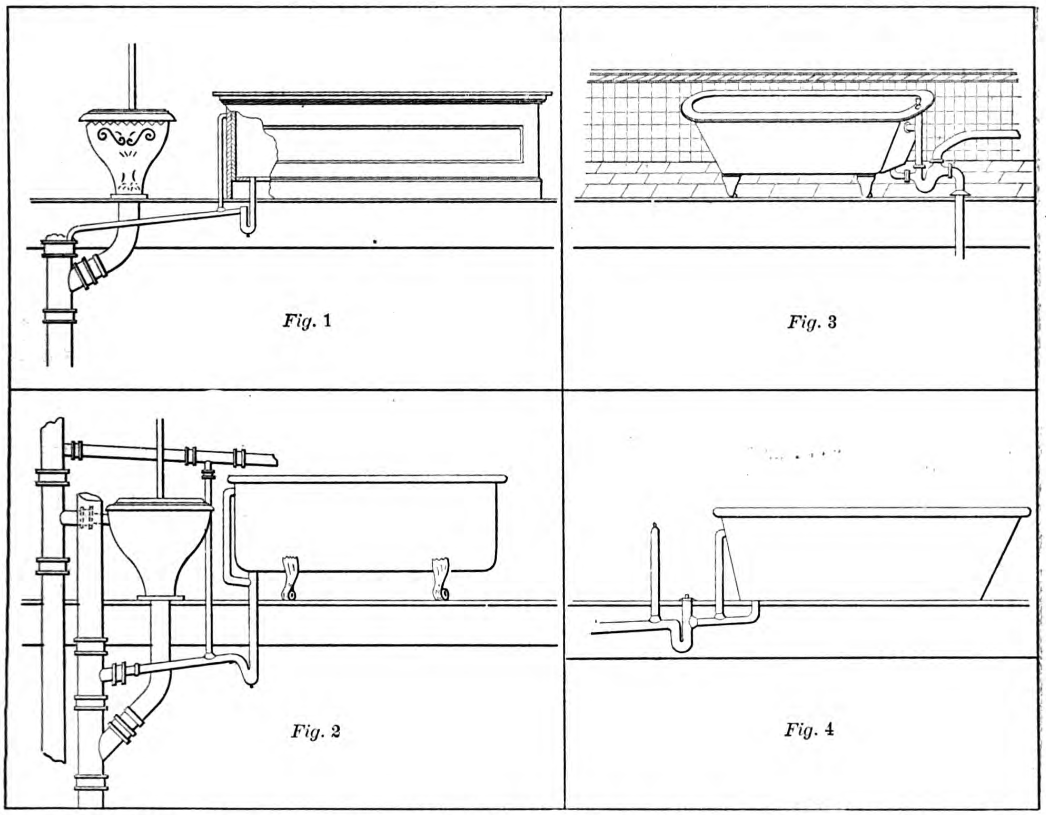


Fig. 1.—A Defective Connection.—Fig. 2.—An Exposed Sanitary Connection.—Fig. 3.—A Modern Connection.—Fig. 4,—A Safe Connection.

Bath Connections.—How They Should and Should Not be Made.

In Fig. 2 an example is shown of "How to do it." This shows the bath waste run through the floor and along the ceiling below into a tee or a half Y provided in the soil stack for that purpose. By this means the trap is exposed to view, and is easily accessible for cleaning. The overflow is branched into the waste just below the tub, and is connected as it should be upon the house side of the trap. The soil pipe is taken through the roof for ventilation, and in order to conform to the modern requirements a separate stack is provided for trap ventilation. This system of placing pipes where they can be readily seen and examined is much better than placing them between floors and in partitions where they are inaccessible. The fixtures all being open, and the pipes and traps exposed, admits of cleaning on every side and allows a free circulation of air around every part, so that there is not the opportunity for dirt to collect, for pipes to continue to leak without being seen, and for disease germs to breed. Moreover, work that is exposed is more likely to be well done than work that is hidden.

A nice job is shown in Fig. 3. The floor and the walls to a hight of 4 feet are of tile. The bath is set up on legs high enough to allow the use of a nickel trap and fittings above the floor. The trap vent is shown here lower than perhaps it should be, for in case of a stoppage in the waste the water might be carried off by the vent, but it would not empty the tub, so it would soon be observed.

Some baths not being provided with feet are intended to be placed upon or let into the floor, Fig. 4 being an example. The trap is shown between the joists, but is a great improvement over Fig. 1, as the trap screw is removed from the bottom and a clean out placed at the floor line so that any obstruction could be easily removed.

The idea that plumbing work needs to be incased in order to present a decent appearance is exploded. The cost of the casing put into painting or bronzing will work wonders, and repairs will be reduced to a minimum.

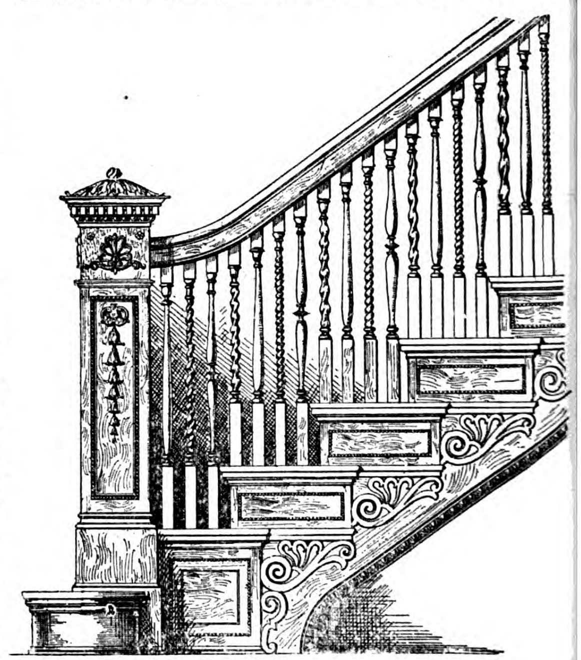
The best plumbing, however, will not keep in a sweet and sanitary condition unless a certain amount of labor be spent upon it. Any good closet is expected to be self cleansing, and they are, but it should not be expected to appear as good after six months' use as when first purchased, unless treated to a good scouring once in a while.

Ancient Roofing Tiles.

Roofing tiles were originally made, like bricks, of baked clay. According to Pausanias, Byzes of Nazos first introduced tiles of marble about the year 620 B. C. Besides the superior beauty and durability of the material these tiles could be made of a much larger size than those of clay. Consequently, when they were employed in the construction of the greatest temples, such as that of Jupiter, at Olympia, the Parthenon, at Athens, and the Serapium, at Puteoli, their dimensions were in exact proportion to the other parts of the building, and the effect of the parallel rows of joint tiles descending from the ridge to the eaves and terminated by ornamental frontons, with which the lions' heads over the cornice alternated, was exceedingly grand and beautiful. How highly this invention was prized by the ancients is proved by the attempt of the Roman censor, Q. Fulvius Flaccus, to despoil the temple of the Lacinian Juno of some of its marble tiles in order to adorn another temple which he had vowed to erect in Rome. A still more expensive and magnificent method of roofing consisted in the use of tiles made of bronze and gilt. Tiles were originally made perfectly flat or with nothing more than the hook or nozzle underneath the upper border, which fulfilled the purpose of fixing them upon the rafters. They were afterward formed with a raised border on each side. In ord r that the lower edge of any tile might overlap the upper edge of that which came next below it its sides were made to converge downward. It was evidently necessary to cover the lines of junction between the rows of flat tiles, and this was done by the use of semi-cylindrical tiles called imbrices. The roof also, by the exact adaptation of the broad tegulœ and the narrow imbrices throughout its whole extent, became like one solid and compact frame work. The rows of joint tiles divided the roof into an equal number of channels, down which the water descended into the gutter to be discharged through openings made in the lions' heads. The rows of flat tiles terminated in a variously ornamented front, which rose immediately above the cornice. The frontons, which were ranged along the cornice at the termination of the rows of joint tiles, were either painted or sculptured so as to represent leaves, aplustria or masks. The invention of these graceful ornaments is ascribed to Dibutades of Corinth. The same arrangement of tiles which was placed round a temple was also to be found within a house which was formed with an opening in the center. Hence any person who descended from the roof into the open court or inpluvium of a house was said to pass "through the tiles." Pliny mentions a kind of tiling under the name pavonaceum, so called probably because the tiles were semicircular at their lower edge and overlapped one another like the feathers in the train of a peacock.

Attractive Stair Construction.

In these days of ornamental house construction, when the hall is frequently of such size as to be employed as a reception room as well as an entrance to the main stairs, it is necessary that the latter shall be of attractive design, thereby adding to the general appearance and finish of that portion of the house. The opportunity is offered for a great deal of variety in the design of the main stairs and some of the styles which are put out by



Attractive Stair Construction.

the manufacturers making a specialty of this work are both novel and effective. In the accompanying illustration we show a stair design which has proven very popular, and which embodies features calculated to attract attention wherever introduced. The ornamentation is treated in a rather clever manner, the novel feature being the introduction of different styles of balusters in each set of four and imitating paneling at each riser along the string board, thus giving a substantial and costly effect to the work. In making the panels at the end it is not essential that the actual panel be built in, as a fancy bead molding can be sunk half way into the stairs, thus forming a panel, as shown in the engraving. This, of course, is a cheaper way of securing the same effect. The manufacturers of this design, the Foster-Munger Company, West Twentieth and Sangamon streets, Chicago, Ill., state that they have built the stairs a great many times in both styles with quarter sawed white oak, which is much in favor in that section of the country. They also say that a flight of stairs constructed as shown costs but very little more than with a plain string board.

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

Officers for 1897-8.

President,
Thos. R. Bentley of Milwaukee, Wis.
First Vice-President,
Wm. H. Alsip of Chicago, Ill.
Second Vice-President,
Stacy Reeves of Philadelphia, Pa.
Secretary,
Wm. H. Sayward of Boston, Mass.
Treasurer,
George Tapper of Chicago, Ill.

Directors.

Baltimore, Md.	S. B. Sexton, Jr.
Boston, Mass	C. Everett Clark.
Buffalo, N. Y.	Charles A. Rupp.
Chicago, Ill	Wm. M. Crilly.
Detroit, Mich	John Finn.
Lowell, Mass	Wm. H. Kimball.
Milwaukee, Wis	W. S. Wallschlaeger.
New York City	Chas. A. Cowen.
Philadelphia, Pa	Geo. Watson.
Portland	George Smith.
Rochester, N. Y	John Luther.
St. Louis	P. J. Moynahan.
Worcester	John H. Pickford.

Twelfth Annual Convention of the National Assoc ation of Builders.

CIRCULAR NO. 1.

To All Constituent Bodies of the National Association of Builders:

The twelfth annual convention will take place at Milwaukee, Wis., beginning Tuesday, February 7, 1899.

Constituent exchanges are entitled to representation in accordance with the Constitution as follows:

ARTICLE VI.

REPRESENTATION AT CONVENTIONS.

In all conventions and meetings of this association each constituent body shall be entitled to delegates, as follows: One delegate-at-large, who shall be the director chosen at the preceding annual convention, and one delegate in addition for each 50 members or fractional part thereof consisting of 10 or more, upon which membership the per capita tax fixed at the preceding convention shall have been paid.

All delegates to conventions or meetings must have credentials from the associations they represent in form approved by this association.

Each delegate shall be entitled to one vote, and may be represented by an alternate.

Issued by order of the
EXECUTIVE COMMITTEE.

WM. H. SAYWARD, Secretary.

Circulars relating to transportation arrangements, programme and other details of the convention will be issued as soon as possible.

To Constituent Exchanges and Their Members.

The approach of the time for the twelfth annual convention of the National Association of Builders brings uppermost, for the moment, one of the phases of usefulness of builders' organizations which at other times is apt to receive insufficient attention. The existence of every builders' exchange which forms a part of the National Association is based upon certain needs in the city where it exists, which it is believed such an organization can best supply. The fact that these exchanges continue to receive support from the members of which they are composed confirms the belief that they confer more or less benefit upon them. The degree of efficiency of an exchange and the amount of benefit it confers is not as much dependent upon the needs of the building fraternity as upon the amount of support lent to its purposes by the individuals of which it is composed. Increase of support means increase of benefit and efficiency, and exchanges which barely exist may be surrounded by more pressing needs than the exchange whose efficiency has reached a high state of development. In either case the existence of needs amply sufficient to warrant the establishment of an exchange is unquestioned.

The particular phases of their usefulness with which exchanges are most concerned during the remainder of their year are those which relate particularly to the local conditions by which they are surrounded and by which their members are affected. The phase of usefulness brought uppermost by the approach of the national convention is that relating to conditions prevailing outside of the city in which they exist. The needs for organization exist in every city in the country, and exchanges already established can be useful and helpful to an extent seldom recognized or understood by lending their aid to fellow builders in cities in which no organization has yet been formed. Not only can great help and benefit be given to builders without organization, but most substantial aid may be given to exchanges whose vitality is low, and whose efficiency is but little understood or developed. Most of the exchanges now strong and prosperous were dependent at the time of their formation upon the help, in some form or other, of other organizations which had already passed through the formative and experimental period.

The national convention offers almost the only well recognized opportunity for putting this helpful phase of their usefulness into operation, and the exchanges which form the association should avail themselves of it, if for no other reasons than that there are builders in and out of exchanges and exchanges in and out of the national body that need help and that will look to the convention for it.

An especial effort will be made at the Milwaukee meeting to make the whole business programme, so far as possible, consist of matters of vital interest to the fraternity, both as a whole and as individuals. The questions of constitution and the internal government of the association which have absorbed so much of the time of the past two or three conventions have been all settled, and the sessions of the coming meeting will be free for the consideration and discussion of matters which more nearly affect the welfare of the builder and his exchange.

Each constituent body of the National Association is urged to send as many of its members in addition to the regular delegates as can be persuaded to attend, as it is hoped that an opportunity will be given to all who may desire to do so to be heard. Early in the convention a motion will be introduced asking that the privileges of speech be extended to alternates and visitors in addition to the regular delegates. The power to vote, of course, will be confined to the regularly appointed delegates.

Entertainment at the Convention.

The members of the Builders and Traders' Exchange of Milwaukee are preparing to extend a most cordial welcome to all delegates and visitors to the National Association Convention.

Visitors, whether regular delegates or not, and whether they represent constituent exchanges or not, will all receive the same hospitable greeting. The committee having the entertainment features of the meeting in charge are arranging an elaborate programme, which it is intended will provide some interesting incident for the entire time of the visit except that devoted to the business of the occasion.

The business and entertainment of the convention will be so arranged that the two will not conflict and so that there shall be ample time for both.

The members of the Milwaukee Exchange are especially anxious that all constituent bodies shall be represented by as large delegations as possible, and wish to inform the members of sister exchanges that their hospitality is abundantly ample for all who can attend.

Builders in cities in which no exchange exists or members of exchanges wishing to investigate the nature and work of the National Association will be gladly welcomed and cordially entertained.

Law in the Building Trades.

LIABILITY FOR THROWING DEBRIS ON SIDEWALK.

The lessees of a building, by throwing *débris* from the building on a sidewalk and leaving it there at night, without placing a light or other warning at such obstruction, are negligent and responsible for an injury to a passer upon the sidewalk resulting from such negligence.—Shidet *vs.* Jules Dreyfuss Co. (La.), 23 So. Rep., 296.

RIGHT TO BUILD AREA UNDER STREET.

An abutting lot owner who owns the fee of the street has a right to construct therein an area, and to use the same, subject to the public easement.—Dell Rapids Merc. Co. *vs.* City of Dell Rapids (S. D.), 75 N. W. Rep., 898.

CONSTRUCTION OF CONTRACT TO MAKE "WATER TIGHT" CELLAR.

Under a contract to make a "water tight" cellar, by pursuing a specified method, mere proof that the cellar, as actually constructed, was "water drained," fails to establish a performance, for the defect is not merely technical, inadvertent or unimportant, but pervades the whole contract.—MacKnight Flintic Stone Co. *vs.* City of New York, 52 N. Y. Supp. Rep., 747.

BICYCLE NOT PROFESSIONAL TOOL OF AN ARCHITECT.

Under a law providing that there shall be exempt from execution, to a person not a constituent of a family, among other things, "all tools, apparatus, and books belonging to any trade or profession," a bicycle is not a tool or apparatus belonging to the profession of an architect, and is not exempt.—Smith *vs.* Horton (Tex.), 46 S. W. Rep., 401.

UNLICENSED PLUMBER CANNOT ENFORCE CONTRACT.

As a contract to do plumbing, by a person who has not registered his name and address or received a certificate of registration, as required by the laws of New York, is thereby made unlawful, the courts will not give any aid in enforcing it, and will not permit him to recover anything because he has performed it.—Johnson *vs.* Dahlgren, 52 N. Y. Supp. Rep., 555.

SUBCONTRACTS AND MECHANICS' LIENS IN NEW YORK.

A subcontractor seeking enforcement of a mechanics' lien must plead and prove an unpaid balance on the principal contract when the lien was filed, as the law of New York provides that the owner shall not be liable by reason of liens filed to pay a greater sum than the price agreed upon in the principal contract and remaining unpaid at the filing of the liens.—Ball & Wood Co. *vs.* Clark & Sons Co., 52 N. Y. Supp. Rep., 443.

LIABILITY FOR PARTY WALL PAYMENT IN PENNSYLVANIA.

Under the law of Pennsylvania providing that the first builder of a party wall shall be reimbursed by the next builder before the latter shall be permitted to use such wall, one who supports the roof of his building on timbers projecting into a party wall previously built is liable to the owner of the party wall.—Trust & Safe Deposit Co. *vs.* Hafner (Pa.), 6 Pa. Sup. Ct. Rep., 48.

LIABLE FOR OWNER'S CONSENT FOR ERECTION OF BUILDING.

If the owner of land authorizes another to have a building erected upon it, the owner to pay the expense, whatever it may be, he makes his land liable to the lien of the mechanics for labor and material furnished.—Hough *vs.* Collins, 70 Ill. App. Ct. Rep., 661.

CHANGE IN LIEN LAW MAY AFFECT PRIOR CONTRACTS.

The remedy afforded by a mechanics' lien law, being but a cumulative remedy is as much within legislative control as any other legal remedy, and applies to contracts entered into before the passage of the act.—Smith *vs.* Bell, 70 Ill. App. Ct. Rep., 490.

LIABILITY OF CONTRACTOR IN HOISTING MATERIALS.

An employer who undertakes to raise materials to a considerable hight is bound to provide against injury to employees who have to work under the hoisting apparatus, where the materials are liable to fall.—Pioneer Fireproof Const. Co. *vs.* Hansen, 69 Ill. App. Ct. Rep., 659.

WHEN OWNER IS NOT RESPONSIBLE TO THIRD PARTIES.

Where the entire work of construction of a building is exclusively in the hands of independent contractors, the owner of the building, merely as such, is not responsible for injuries resulting to third parties from the negligence of such contractors.—Wolf *vs.* Am. Tract Soc., 49 N. Y. Supp. Rep., 236.

LIABILITY FOR ERECTING HOUSE ON WRONG LOT.

Where one, without the knowledge of the owners of a lot, and without license, but by mistake which was the result of his own negligence, erected a house on same, the house became a part of the real estate and he could not remove it, nor would a lien lie against it for the value of the house.—Mitchell *vs.* Bridgeman, Minn., 74 N. W. Rep., 142.

CONTENTS.

Carpentry and Building

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—THE ART OF TALKING BACK.—"I hardly know how to answer you," said she when the widower proposed.

"I would not let that worry me," said he, soothingly. "That is something a woman learns perfectly soon after marriage."—*Cincinnati Enquirer.*

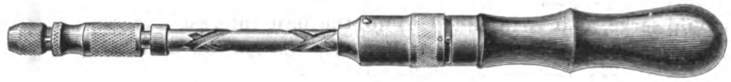
—A FELLOW FEELING.—Disappointed Suitor (savagely)—What's that, you little imp? You say you just overheard your sister tell me she would be a sister to me, and that you are glad of it?

Small Brother (meekly)—Yeth, thir—mithery loveth company, thir.—*Judge.*

NOVELTIES.

Millers Falls In and Out Screw Driver.

The Millers Falls Company of 93 Reade street, New York, have placed on the market an in and out screw driver, known as No. 41, and illustrated in Fig. 1. It is reversible for driving or withdrawing screws, a part turn of the shell near the handle shifting the movement either way, while giving it half of the possible turn makes for the time a rigid screw driver. Extended, the extreme length is 18 inches, closed 12 inches. Particular attention is drawn to the method of cutting the grooves, each running on a different plane, so that in operation the dogs traversing the channel cannot interfere at the intersection of the spirals. This also prevents the objectionable rattle peculiar to some spiral screw drivers. Three bits are put up with each handle, as seen in Fig. 2, two of them having double ends, giving five blades in all. The handle is of polished hardwood, cocobolo finish, and the metal portion is nickeled. Back of the chuck for holding the bits is a checkered loose sleeve to grasp with one hand when operating the screw driver.



Novelties.—Millers Falls In and Out Screw Driver.—Fig. 1.—General View of the Tool.

Strelinger's Catalogue of Wood Workers' Tools.

The catalogue of wood workers' tools which has been issued by Charles A. Strelinger & Co. of Detroit, Mich., will be found by those interested in this direction a very valuable handbook for reference. In its arrangement and general make up it is in some respects different from the ordinary trade catalogue, among its many commendable features being its size and compactness. While it consists of something like 400 pages, it is issued in a form to render it very convenient for desk use, or it can be carried in the pocket in case one goes out to estimate on work for which various tools and supplies may be required. The illustrations are numerous, being small in size, yet so well executed as to clearly show all that is necessary. Another feature which will commend the work to those engaged in the trades addressed is the manner in which prices are presented. In this respect Strelinger & Co. have made a radical departure from the time honored custom of printing manufacturers' lists with their numerous discounts. In issuing this edition of the work the company state that all prices and lists given in previous catalogues of wood workers' tools are canceled, and the request is made that former issues be destroyed. About everything in the way of tools that is required by carpenters, builders, cabinet makers, mill wrights, carvers, pattern makers, ship carpenters, draftsmen, &c., is illustrated and described in this work, the text being of such a character as to render the volume more of a handbook than a trade catalogue. Reference is also made to supplies, machinery, &c., together with interesting remarks on methods of doing certain kinds of work connected with the wood workers' trade. Among the closing pages is to be found a short treatise, entitled "The Contractor, Craftsman and Apprentice," by W. D. Baker, this embodying the elements of descriptive geometry as applied to the trades, and giving the methods of finding the different lengths and bevels in carpenter work, sheet metal and iron work, together with instructions for making cross and detailed sections of work and the direct application of the steel square. There are also builders' estimates, blank forms of estimates, bonds, contracts, &c. The catalogue has been arranged with due regard to the requirements of the trades addressed, and the company will forward a copy to any one on receipt of 25 cents to cover mailing expenses. Accompanying the catalogue is a little pamphlet relating to tools and tool chests, the trade in which has grown to such proportions as to compel the company to make it a special department of their business.

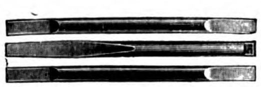


Fig. 2.—Bits for Screw Driver.

The Youngstown Iron & Steel Roofing Company.

The Youngstown Iron & Steel Roofing Company, Youngstown, Ohio, have recently made, through W. H. Stevens & Co., New York City, their agents for Africa and India, a large shipment to Algoa Bay, South Africa. Mr. Stevens leaves for Africa in a short time, and upon his return the Youngstown Iron & Steel Roofing Company expect to make further shipments to that far-off country. This concern advise us that business with them in the roofing line is very satisfactory, and they are meeting with a steady demand for their material. Since placing their Youngstown corrugated expanded metal lath on the market they have met with a very large demand for it, the orders considerably exceeding their capacity to turn it out, but with the installation of new machinery, which will be made shortly, their capacity for its manufacture will be very largely increased, and they expect to be in a position to fill all orders promptly. They state that architects and expert plasterers throughout the country have thoroughly examined this corrugated expanded lath, and have proven in tests to their own satisfaction that it is an economizer for them in the amount of plaster used to the extent of 25 per cent. The fact is referred to that it makes a stiffer and stronger wall or ceiling than the ordinary expanded lath. This is on account of the corrugations that are worked throughout the expanded meshes. During the past summer this company have furnished quite a number of city bridges with Buckeye trough flooring. They are also meeting with a good demand for their fire proof flooring, and are in receipt of large orders for their Union metal corner bead, which is used for protecting plaster corners, and which this concern have been manufacturing for some time. The demand for this article is steadily increasing, and in summing up the year 1898 the Youngstown Iron & Steel Roofing Company advise us that it has been the best year in their history, and the outlook for 1899 they regard as exceedingly bright.

The Buffalo Standard Acetylene Generator.

The splendid light produced by acetylene gas, the simplicity of the apparatus for making the gas, the ease with which the apparatus can be operated and the fact that it may be attached to a regular system of gas piping have all made this method of lighting very popular, particularly in places where city gas or electricity is not available. In Fig. 3 of the illustrations we show a sectional view of the Buffalo Standard acetylene gas generator, made by the Pan-American Acetylene Company, Buffalo, N. Y. This generator, the company claim, has been developed by careful experiments and is now put on the market after having been thoroughly tested. The construction provides for an automatic operation stopping the generation of gas when the lights are turned out.

In this apparatus the gas is generated on the tight gas bell principle

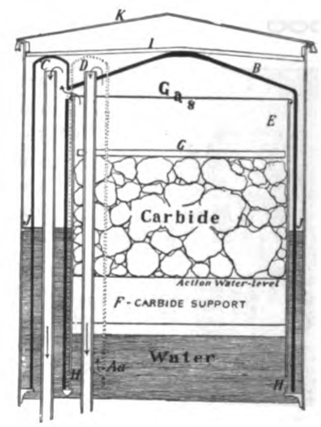
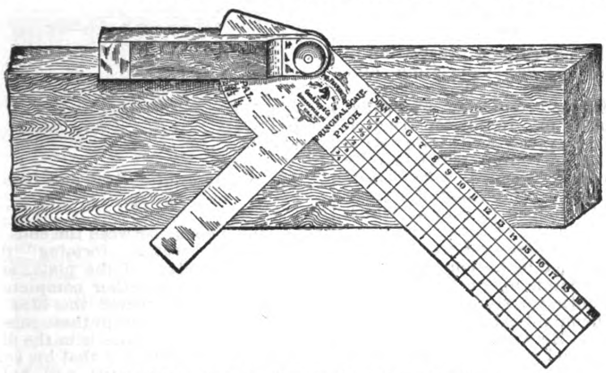


Fig. 3.—Sectional View of Generating Chamber of the Buffalo Standard Acetylene Generator.

with bottom water seal, the bell shown by the heavy line B resting in the water. This bell has at the top two caps covering the pipe C, which carries the gas to the holder, and the pipe D, which prevents an excess of pressure and disposes of the moisture from condensation. The generating chamber is provided with a carbide holder, E, and water enters the chamber through the openings H and H from the compartment I J, which is so supplied with water that it can never rise higher than the fixed water line shown. When the water rises to this point it comes in contact with the carbide and gas is generated and flows to the holder and thence to the pipes till all is filled. Then as the back pressure is felt the gas forces the water down away from the carbide and generation stops. If lights are turned on as the gas is used the water will rise to start gas making again. A gate is provided at the bottom so that the residuum may be readily drawn off. There is a blow off opening provided on the pipe C, and pressure can never be developed greater than can be held by a 7-inch water seal. The generators are made of different sizes, holding different weights of carbide, and their capacity is based on 1 pound of carbide producing about 5 cubic feet of gas, which in a ½-foot burner having 24 candle power will burn for ten hours, or would supply four burners for two and one-half hours. As carbide can be purchased for 5 cents per pound the expense of this method of lighting is easily found. The company issue a pamphlet fully describing their generator and giving a variety of information on acetylene gas.



Novelties.—Fig. 4.—Topp's Roof Framing Tool.

Topp's Roof Framing Tool.

A framing tool which is of undoubted interest to carpenters and builders generally is that which has been placed on the market by G. A. Topp & Co. of Indianapolis, Ind., and which is illustrated in Fig. 4 of the engravings. The tool is of such a nature that it will give different pitches in roofs, together with bevels and lengths of principal rafters, hips, valleys, jacks and cripples in feet and inches, and it can also be used as a "try" or "bevel square," as well as for framing. The simplicity of the tool makes it easily understood, as the blade has the pitches and rafter scales as well as predetermined lengths indicated thereon. As an example of its usefulness, suppose it is desired to frame a common ridge roof of one-half pitch and 10 foot span. In order to obtain the plumb cut at the point of the rafter, move the handle until its inner edge coincides with the one-half pitch mark on the scale marked "Principal" on the sector; then use the tool in the same manner as the common bevel square, marking the plumb cut. In order to obtain the length of the rafter refer to the table marked "Principal" on the blade of the square; find the 10 foot column and run down the same until it intersects the one half pitch line in the intersecting square, when the length of rafter in feet and inches will be found. Measure the required lengths from the point on the back of the rafter and mark the foot without moving the handle. In framing a hip, valley, jack or cripple roof, move the handle to the desired rafter and refer to the scale for the rafter wanted, the same as shown. The manufacturers refer to the tool as meeting with success wherever it has been introduced, and that it is offered at such a low price as to bring it within the reach of every carpenter and builder.

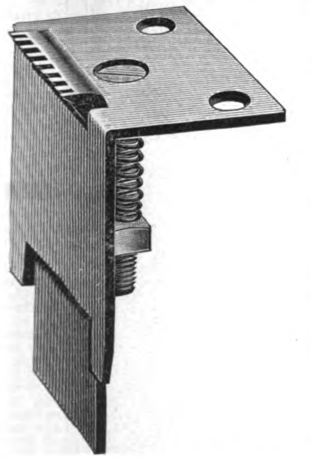


Fig. 5.—The Wilcox Steel Bench Stop.

The Wilcox Steel Bench Stop.

The Wilcox Mfg. Company of Aurora, Ill , have commenced the manufacture of a bench stop which is illustrated in Fig. 5. It is easily attached to the work bench, and the toothed stop is raised or lowered by the use of a screw driver in turning a screw working in a thread cut in a projecting part at the back of the stop. The stop then slides in slots in the plate to which it is attached. A coiled spring between the top plate and the threaded piece below holds the stop firmly in the position in which it is either raised or lowered. It is made of steel plates bent in the proper shape and is referred to as both light and strong, with a fine, rapid and positive adjustment. The solid back of the jaw is to give it additional strength and it can not, it is claimed, move or tilt.

The Daimler Stationary Kerosene Motor.

The Daimler motor, which was formerly manufactured to be operated by gasoline and illuminating gas, is now constructed so that common kerosene oil can be used to advantage, and, it is said, with the same efficiency. In the operation of the motor the supply of kerosene from the tank to the vaporizer, as well as to the burner is carried through a pipe by means of a slight pressure, which is produced in the tank by a hand air pump connected by a rubber hose with a pressure valve. After the motor is started, by giving the starting crank a few turns, it supplies itself with the necessary pressure by catching up a part of the exhaust in a pressure receiving tube and carrying it through the pressure supply pipe to the tank. The necessary explosive mixture of gas and air is produced automatically in the vaporizer by the first downward stroke of the piston; air, as well as fluid kerosene, is drawn up and enters as explosive mixture the interior of the cylinder. The hight of kerosene in the float chamber is regulated by the float valve so that the suction of the kerosene remains even. The further action of the motor proceeds according to the well known principle of the four-cycle gas engine; the following upward stroke of the piston compresses the explosive mixture in the explosion chamber, forcing it out into the explosion cap, and this cap, being heated by the burner, ignites the explosive mixture, the expansive power of which forces the piston downward again. The now following upward movement of the piston forces the products of combustion from the explosion chamber through the exhaust valve into an exhaust drum and from there to the outside. The motor is simple and compact in design and economical in the use of fuel It runs at a steady speed, thus adapting it to electric lighting purposes. The motors are built by the Daimler Mfg. Company of Long Island City, N. Y., in sizes from 2 to 35 horse power. The smallest size measures 4 feet 1½ inches in hight, occupies a floor space 28½ x 27½ inches, and weighs 475 pounds. A view is shown in Fig. 6.

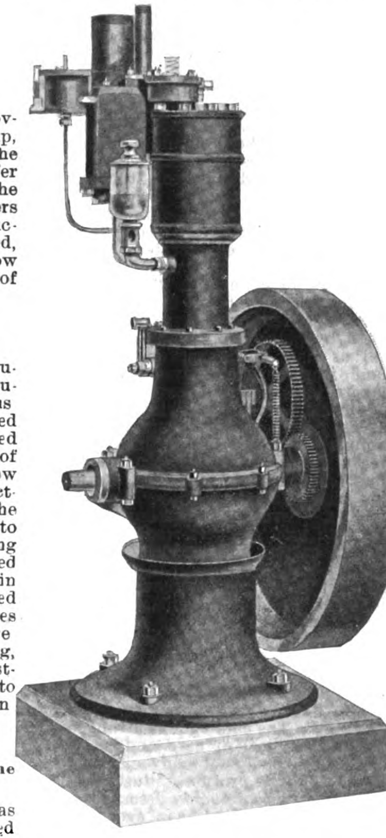
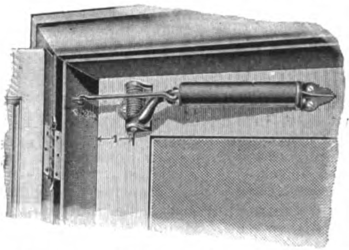


Fig. 6.—The Daimler Stationary Kerosene Motor.

Wood Workers' Tools.

The illustrated catalogue of wood workers' and other tools, foot power machinery, &c., which has just been issued from the press by William P. Walter's Sons of 1233 Market street, Philadelphia, Pa , is a volume in which building mechanics generally cannot fail to be interested. In presenting this volume of 222 pages to the public the company have endeavored to offer in as condensed and convenient form as possible a varied line of tools and machinery of the most approved makes and latest designs, in the hope, as they express it, "that it may prove to be a convenient handbook for the use of all wood working mechanics." It is obviously impossible to enumerate in a work of this size all of the items required by a good mechanic, but the manufacturers suggest that in case the tool wanted is not



Novelties. — Larimer Door Check and Spring. — Fig. 7.—Screen Door Check and Spring.

found in the catalogue the mechanic write them before concluding they do not furnish it. Among the opening pages of the volume are some interesting suggestions with regard to the method of ordering tools, the way in which money may be forwarded, discounts, and an extended index arranged alphabetically. In a consideration of the tools enumerated, attention is first given to a varied line of hand saws, in connection with which mention is made of saw sets, clamps, vises and miter boxes, these being followed by planes of various sorts, as well as sizes and shapes of cutters, plane irons, spoke shaves, carriage makers' tools, squares, bevels, plumbs and levels, hatchets, drawing knives, chisels, carving tools, screw drivers, hammers, bits and braces, hand and breast drills, miscellaneous rules, tapes, combination tool sets, drawing instruments, handles, clamps, punches, wrenches, vises, work benches, tool cabinets, tool chests, molding cutters, foot and hand power machines, such as scroll saws, band saws, lathes with and without saw attachment, hand post drills, portable forges, screw plates, taps and dies, tackle blocks, jack screws, wheel barrows, &c. A circular accompanying the catalogue calls attention to the India oil stones, which are referred to as "fast cutting and of great strength." The catalogue is arranged with a great deal of care, and is of a size which renders it convenient for reference. It is profusely illustrated, and the text is not only descriptive, but gives sizes and prices in every instance. The binding is in colored paper covers, with side and back titles in silver letters, so that when the catalogue is filed away with others it can be instantly identified by the name upon the back.

Larimer Door Check and Spring.

The Larimer Mfg. Company, Latrobe, Pa., are making door checks and springs for both screen and panel doors, as shown in the accompanying engravings. Fig. 7 illustrates the Larimer screen door check and spring designed particularly for screen doors, or it may be used for any light inside doors. It is so constructed that it can be put on the top of the door or on the middle rail as desired, and is reversible for right or left hand doors. The escape of air in the cylinder is regulated by a small screw at the rear of the tube. Fig. 8 represents Larimer automatic door check and spring, designed for heavier doors, which is made in two sizes, No. 1 for doors not larger than 2 feet 8 inches wide and 2 inches thick, or 2 feet wide and $2\frac{1}{4}$ inches thick. A No. 2 size is made for heavier doors than those mentioned. Explicit directions are sent, so that almost any one can readily put them on.

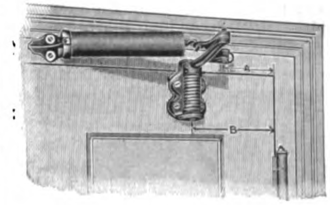


Fig. 8.—Automatic Check and Door Spring.

The Kinnear Improved Steel Ceiling.

We take pleasure in illustrating in Fig. 9 an improved steel ceiling joint recently patented by W. R. Kinnear of the Kinnear & Gager Company, Columbus, Ohio. In this construction he has done away with any nails showing on the ceiling, which is quite an advantage in good work. How well he has accomplished this may partially be judged by the cut, which is a photogravure of one of the series of panels of similar design and varied sizes just issued by his company. The question of joints for steel ceilings has been a continued study to Mr. Kinnear. One might call him the pioneer in that line. He was a large contractor in cornice and galvanized iron work for county buildings, and having to erect some ceiling in which the flat edges of the plate simply overlapped with nails driven direct through, he realized that there was room for improvement, and since then has bent his energies to getting a perfect joint, straight, easily erected, tight and possessing an architectural character. He first patented a joint about 1 inch broad on which were stamped large buttons to make it fit, with the nails through the center of the buttons exactly. This did very well for a large ceiling and plain panels, and many of the ceilings of this pattern are in place to day with never a dust mark on them, showing the mechanical perfection of the improvement.

His next design reduced the width of the bead to about $\frac{1}{8}$ inch, with the nails 6 inches apart. This was abandoned, because the great distance apart of the nails made it unreliable as to tightness, and he introduced his present nailed joint, in which the nails are all 3 inches apart except at the corners and centers of the plate, where they are spaced $1\frac{1}{2}$ inches, making a nailed joint which is absolutely tight and practically water proof. In addition to this shortening of the distance between them, the nails are driven through small circularly raised buttons which come between the ends of the beaded trusses forming the strengthened edges of the plate, and the whole grips together completely tight. He has patented the idea of punching the nail holes in these raised buttons while the plate is in the die, so that he is able to say that his ceiling is straight when the nail holes match.

About five years ago the interlocking joint was devised. This is a slip joint especially fitted to ceiling work, and until this year was used on but two sides of the panel. Now, however, it has been arranged so that it is put on all four sides of the sheet, as is shown in the illustration. The metal is so bent by folding back and underneath the panel on itself, and then forward again, as to form a groove, through the lower edge of which the nails are driven, and into which a tongue on another sheet fits, slipping over the nails on the lower and free edges of the grooved edge and hiding them completely, so making a joint which fits as shown in the cut above.

J. Wendell Cole & Son, 911 Chicago Opera House, Chicago, Western agents, state that this new design of construction will be furnished without any advance in price where it is desired.

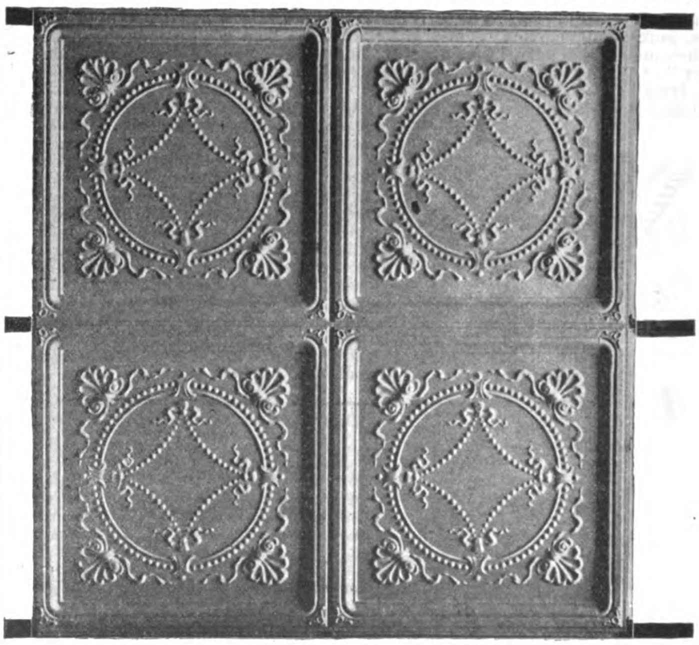


Fig. 9.—The Kinnear Improved Steel Ceiling

TRADE NOTES.

"HOW ROOFING TIN IS MADE" is the title of a little folder issued in attractive covers by Merchant & Co., Incorporated, of Philadelphia, Pa. The text consists of "a treatise on tin plates for roofing purposes," and is published, we understand, in the interests of consumers, as well as for the protection of the reputable roofing plate manufacturers of the United States. The style is concise and the descriptive matter gradually leads up to some remarks relative to the brands of high grade roofing plates which are offered the trade by Merchant & Co., these including Merchant's Old Method, Merchant's Roofing, Merchant's Old Style, Camaret and Alaska. These brands, it is said, are regularly made and carried in stock at different points in the company's various warehouses. Besides other and minor advantages they claim for their high grade roofing plates that they are made of the very finest quality of material at their own works and under their personal supervision. By their special process and care in handling the sheets the makers claim to have overcome entirely the extreme difficulty in having a uniform distribution of metal over the surface of the sheets, and that they are all made by the palm oil process, no "acid flux" whatever being used in any stage of their manufacture. Merchant & Co. also have something of interest to say in their announcement, which will be found in our advertising columns this month.

ONE OF the interesting exhibits at the Trans-Mississippi International Exposition at Omaha, Neb., was that of Bommer Brothers of 351-353 Jay street, Brooklyn, N. Y. They showed their Bommer spring hinge, which, as is well known, is made of wrought steel, bronze or brass and in all styles of finish The goods of the concern were regarded with great favor and we have been informed that the display was awarded a gold medal.

THE WILLIAM INGLIS WIRE & IRON WORKS, Detroit, Mich , are distributing among those likely to be interested in such goods a copy of catalogue C, which relates to their specialties in wire and iron work. The little volume is oblong in shape, neatly printed on good paper, profusely illustrated and bound in deep green paper covers with lettering in old gold. The illustrations cover a great variety of designs of work which the company are prepared to execute in iron or wire, the assortment including railings, partitions, cages, grills, wickets, name plates, brackets, &c., for bank and office fixtures, elevator cars and inclosures, wire guards, &c. The goods are finished in a great variety of styles, some of the most popular in electro-plate being oxidized copper, old copper, oxidized brass, oxidized silver, frosted silver, steel blue, statuary bronze, Japanese bronze, electro bronze, Bower-Barff, bright silver, plain bronze, nickel plate and polished brass. The company state that when work is finished in electroplate or natural metal they always treat the surface with a coating of water proof lacquer, which they claim produces a beautiful luster and protects the work from tarnishing. The company also make a specialty of ornamental and plain grills for heater, ventilator and radiator screens, wire window guards for schools, asylums, &c., stable fixtures, area gratings and builders' iron work. They state that they have a tinning plant and make all kinds of wire specialties.

THE BERGER MFG. COMPANY of Canton, Ohio, have utilized one of the large size commercial postal cards for calling attention to their metal ceilings. The face of the card carries miniature illustrations of some of the principal war ships of our navy, intertwined about which are the names of officers prominently identified with the army and navy during the recent war with Spain, together with some of those identified with the earlier history of the country. The other side of the card leads off with a quotation from Emerson, to the effect, "When you get the right man question him close." The company assert that they are the right people to question about metal ceilings, as they know the business from A to Z Their ceiling plates, they claim, are the deepest stamped and are the most artistic. They also claim that during the past year they have brought out many new and artistic designs and are prepared to-day to furnish complete classified designs in harmony with leading styles of architecture. The company request those who are in want of information regarding metal ceilings to communicate with them.

"GRAPHITE" is the title of a four-page publication which has been issued by the Joseph Dixon Crucible Company of Jersey City, N. J., in the interests of Dixon's graphite products and for the purpose of establishing a better understanding in regard to the different forms of graphite and their respective uses. While this is the first number of the publication, we understand it is the intention of the company to issue it regularly. In addition to interesting remarks relative to graphite, the first number contains items of a general nature, some of which are humorous as well as instructive.

WE ARE indebted to the Interior Hardwood Company of Indianapolis, Ind., for a copy of an exceedingly neat little pamphlet entitled "Parquetry Past and Present," this being an address delivered before the Cincinnati Chapter of the American Institute of Architects on September 27, 1898. The matter is of an interesting character and was prepared by Charles H. Comstock.

THE MONTROSS METAL SHINGLE COMPANY of Camden, N. J., are directing the attention of the trade to their specialties in the way of shingles and tiles by means of a heavy card folded in such a way as to give on one side a place for the name and address, and on the other a representation of the door to a brick house. On the glass panel of the door is a wreath of holly, while below on the panels are the words "Always Welcome." Opening the door, by which means the card is unfolded, we find various illustrations showing some of the applications of the company's shingles to roofs. There is a section of a roof covered with their Octagon shingles, another treated with their Eastlake shingles, a third has their Diamond tile over its surface, while others show the appearance of Victor shingles and Gothic tile. The manufacturers request those who are interested to send for a copy of their illustrated circular and price-list.

WE ARE indebted to Samuel H. French & Co , York avenue, Fourth and Callowhill streets, Philadelphia, Pa , for a copy of the memorandum calendar which they are distributing as a New Year's greeting It is in the shape of a pad, the leaves of which are fastened at the upper end in such a way that the leaf for each week may be readily torn off when desired. At the top of each page is the name and address of the company, together with an enumeration of some of the specialties which the company are prepared to furnish. The sheets are ruled with the month and year across the top and the days of the week up and down the left hand, while the spaces for the days are of such size as to readily adapt them for memorandum purposes. At the bottom of each page in red letters is a request to see the company's exhibit at the Bourse and also at the Master Builders' Exchange A yearly calendar is also provided and there is a list of classified mail matter, together with rates thereon, which will likely be found of interest in this connection. On the back of the pad is a list of some of the leading goods which the company make, among the number being paints of various kinds, plaster, cement, mantels, grates, fire grate goods, tile, architectural ornaments, &c.

THE EASTERN GRANITE ROOFING COMPANY, 130-148 Eleventh street, Jersey City, N. J , are distributing among the trades likely to be interested a little pamphlet calling attention to their Perfected granite roofing, which is especially adapted for steep or flat roofs, as well as for covering old shingle and metal roofs It is turned out by machinery ready for laying on a building. It is referred to as being both fire and water proof, as more durable than tin and less expensive, while the sun will not make it run nor will the frost crack it. It is rolled in sheets 41 feet 3 inches long by 32 inches wide, each roll containing 110 square feet, thus covering 100 square feet of surface, allowing a lap of 3 inches. Directions for laying the roofing are given, accompanied by illustrations which help to explain the text The little pamphlet also gives a number of testimonial letters from some of those who have used the company's goods.

WE ARE INDEBTED to W. H. Mullins, Salem, Ohio, for a copy of a catalogue of sheet metal work which had been compiled especially for the use of architects, contractors and those who contemplate building. The pages show a wide assortment of designs covering cornices, building fronts, iron work, &c., which are suitable for almost every style of building. All the work shown is made of the very best quality of crimped galvanized iron or steel, with heavy zinc ornaments, all joints soldered and riveted and all parts made in the best manner and of the most improved construction. Any of the designs shown are subject to modification and can be either enlarged or reduced to suit special requirements. Most of the work in the catalogue may also be reproduced in copper if desired. Particular attention is called to a large variety of designs for finials and weather vanes, patent Spanish tile roofing plates and roof trimmings, wrought iron grills and awnings, stamped and embossed ceilings, especially those of new rococo design, ceiling center pieces, skylights and embossed sheet metal boats. The designs of building fronts are varied in character, some covering buildings intended for store purposes only, while others show designs for stores on the first floor while the second floor is used for dwelling or other purposes. The metal fronts are stamped in imitation of rock face, giving very pleasing effects.

IT IS SAFE TO SAY that there are comparatively few among the readers of this journal who fully appreciate the time, skill, care and peculiar refinement displayed in the manufacture of the highest grade iron body carpenter's plane. A voume would be required to describe all the processes through which the raw materials pass, but many valuable points touching the subject are contained in an article which appeared in *The Iron Age* for November 3, 1898, wherein are described some of the more important steps connected with the planes turned out by the Stanley Rule & Level Company of New Britain, Conn. Reference is made to the production of the cast iron body, the manner in which the bottom and sides are planed, the grinding of the bottom and the way in which the surface is tested with a straight edge. A description is also given of the method of making the corrugated plane turned out by this company, and concluding with a reference to the testing and inspection of the finished goods. The article is illustrated by means of 13 engravings showing some of the machines employed in the production of the goods, together with various views of a plane at different stages of manufacture.

THE CORDESMAN MACHINE COMPANY of Butler street. Cincinnati, Ohio, have recently shipped a carload of planing mill machinery to Mexico, N. Y. They report a better inquiry for wood working machinery, mainly from domestic sources in the saw mill districts, both North and South. Planing mill orders from the cities where they used to abound are getting scarcer each year, as this class of work is now being done as near the points of first production as is possible.

THE fourteenth annual edition of the Columbia Desk Pad Calendar, issued by the Pope Mfg. Company of Hartford, Conn., is in appearance similar to those which this well-known concern have sent out in previous years. It will be found very convenient for the desk, as engagements to be made and duties to be performed can be jotted down on its leaves, and the daily reminder will save much time and annoyance. At the tops of various pages appear clever bits of verse about bicycling in general, these contributions being largely the product of the company's own customers relative to the merit of the Columbia bicycle. The pages for Sundays and the first day of each month and holidays present appropriate selections from well-known authors We understand that any person may obtain a copy of the Columbia calendar for 1899 by sending five 2-cent stamps to the nearest dealer in Columbia bicycles, or to the calendar department, Pope Mfg. Company, at Hartford, Conn.

A VERY ATTRACTIVE wall hanger or poster has recently been issued by the Egan Company of Cincinnati, Ohio, for the purpose of calling attention to some of their leading specialties. It is handsomely printed in two colors, red and blue, giving on the white paper a very striking effect. The poster shows about 100 of the company's latest improved machines, especially adapted to a great variety of wood work, and every user of machinery will find it convenient to hang up in his office or shop for reference. The company, we understand, are distributing these posters free to all who are sufficiently interested to make application. For the past 12 or 18 months the company have had a special corps of expert mechanics and draftsmen at work in designing machines on advanced principles and improving those already built. The line now offered is very extensive and the manufacturers are in a position to furnish either single machines or complete equipments for doing any kind of work in wood.

J. D. JOHNSTON, 66-79 Mill street, Newport, R. I , is directing the attention of the trade to an improved automatic catch for outside blinds. The claim is made that blinds fitted with this catch secure themselves in an open or closed position, and cannot slam back and forth in the wind. The tubular shell or casing, as well as the socket plate, are made of brass, while the balance is of iron. The fastener is simple and strong in its construction, and is said to work easily when applied. The little pamphlet which Mr. Johnston has issued illustrates and describes the hardware specialties for windows which he is offering.

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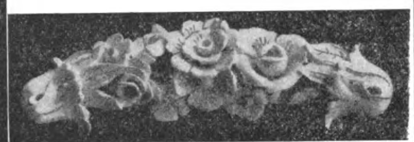

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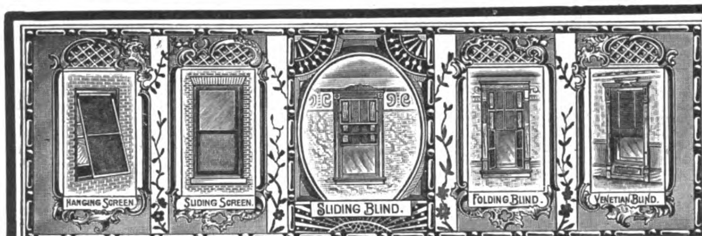

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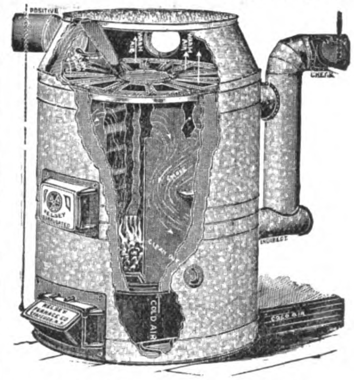

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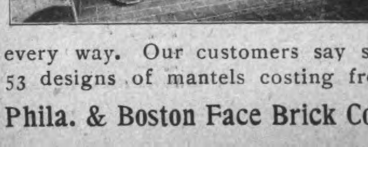

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FEBRUARY, 1899.

Rights of Non-Union Men.

An interesting decision was recently rendered by the Supreme Court of Illinois which strikes at the practice, now becoming quite common, of public officials prescribing that only union labor shall be employed by contractors doing work for them. In the particular case adjudicated the Chicago Board of Education had adopted such a rule, and the right of that body to do so was made the subject of a legal contention. The Court said in its decision: "Upon what theory it could be claimed that this Board of Education, which exercised merely the functions of the State in maintaining public schools within a limited portion of the State, can possess either power or discretion which the State, in its sovereign capacity, could not confer upon it, we are unable to imagine. No argument is made which would justify such a conclusion. There can be no greater power of the board to act of its own motion than by virtue of positive law. The results, in either case, are equally in conflict with the organic law, and such legislation, contract, or action, whatever form it may take, is void. Nor can the fact, if it be a fact, that an individual might make such a bargain, authorize these public officers, exercising a public trust, to do so. The individual may, if he chooses, give away his money, but the public officer, acting as a trustee, has no such liberty and no right to surrender to a committee or any one else the right of those for whom he acts." According to this decision no discrimination can be made against one set of citizens in favor of another, merely because the former do not belong to certain organizations known as "unions." If this could be permitted it would be lawful for an official board to provide that no work should be given to a contractor unless he agreed to employ only those of a certain religious belief or only of a certain nativity.

The Building Outlook.

Records of building in the principal cities of the country for 1898 show a general decrease in volume in the area this side of the Mississippi River, there being a marked falling off in several of the larger cities of the extreme East. The district west of the Mississippi, on the contrary, shows a proportionally marked improvement. Nearly every city of any importance in the Northwest and between the river and the Pacific Coast, with the exception of St. Louis and San Francisco, shows a decided upward tendency, and the builders in these localities are looking forward to a good year in 1899. Nothing appears now to threaten the relations between employers and workmen, no evidence of any concerted action by either side being visible. Amicable adjustment of differences between the two, through the wider adoption of arbitration and conciliation as preventions rather than as cures, is steadily improving the harmony under which their relations are sustained. There have been numerous struggles between the two during the year, and strikes and lockouts have occurred apparently much the same as usual; but when the whole field is viewed there is no doubt that the tendency toward preventing trouble by joint argument is steadily gaining ground.

A Fire Proof Office Building.

In the issue for last month we referred somewhat at length to the very severe test to which the modern office building of steel frame construction was subjected in the fire which attacked the Home Life Insurance Company's 16 story building on Broadway, this city, on the night of December 4. Since then the effects of the fire upon the structure have been pretty accurately determined with results which are highly creditable, particularly as regards the manner of protecting the metal work of which the skeleton frame is composed. At least this would seem to be the inference to be drawn from the report of the fire adjusters who appraise the damage done by fire and water at less than two hundred thousand dollars, the building being valued at about a million dollars. As to the repairs necessary to be made, the Building Department has decided that the entire front from the eighth floor up must be taken down, and the appraisers agreed that the cost of doing this work, the material being marble, would be $73,200. The balance of the award is confined almost exclusively to the wood work, the paint, tiling, steam piping, electric lighting apparatus, elevator apparatus and the iron work. The apportionment for the latter is practically *nil*, considering the total aggregate of the damage done. The result would appear to demonstrate that, if adequately designed and thoroughly constructed, the "sky scraper" of the present day is practically proof against fire, either from an inside or an outside source.

Fire Losses for 1898.

The year 1898 was an expensive one for the fire insurance companies, for not only were rates generally lower than ever before, but the grand total of losses by fires for the year, in the United States and Canada, reached the largest figures in many years. According to the statistics available they amounted to the sum of $119,650,500, being $9,300,000 in excess of 1897 and $4,000,000 above the 1896 losses. During the year there were no less than 23 fires, each of which involved a loss of over $500,000, the largest being at New Westminster, B. C., where more than $2,500,000 worth of property was wiped out. Individual fires in Chicago, San Francisco, Montreal, Pittsburgh and Prescott, Ariz., each accounted for a loss of between $1,000,000 and $1,500,000, while the fires of a destructiveness exceeding $10,000 each numbered last year 2023. Considering the advances which have been made of late years in fire fighting methods, and the large sums spent annually by American municipalities to increase the strength and efficiency of their Fire Departments, the record of fire losses made last year seems discouraging. That an average of nearly $10,000,000 worth of property should be absolutely lost through fire accidents each month of the year is a deplorable waste of money, not to speak of the suffering and misery to individuals involved therein.

Laying Brick in Dead Walls.

The present manner of laying brick in dead walls gives one the impression that the quantity of bricks laid is of far more importance than the quality of the work done. The only way to obtain good solid brick walling is to either flush the joints solid with mortar every course or make a shove joint. The former method takes too much time and material, and the latter is rarely done, except in very heavy buildings. The custom generally adopted, says the *Canadian Architect*, is to spread the mortar on the bricks (a portion only of which gets in the joints) and lay the bricks on top, each succeeding course being bedded in mortar; but the longitudinal and cross joints are only partially filled, the butting joint of the brick receiving a little dab of mortar gathered on the point of the trowel by cleaning the surplus mortar from the outside joint. Grouting with cement mortar every two courses in hight might be adopted for basements and first stories of buildings when great strength is required. Full headers for face bricks are better than clippings and should be specified for all heavy buildings. The face bricks are often built up 15 or 20 courses high before the backing up is done, a custom that should not be permitted, as it leaves the wall subject to many defects, as it cannot be well bonded or tied together sufficiently strong to be able to resist unequal strains successfully. For good strong work the mortar joints should never exceed 5-16 inch in thickness.

Modeling in Clay.

Modeling in clay is popularly supposed to belong exclusively to the sculptor's art, but this is a mistaken notion. The best art teachers recommend modeling, especially in *bas-relief*, as an important aid in the development of the faculty of drawing. *Bas-relief* is the simplest form of modeling, as drawing is the primary step in the painter's art. It will also be found of invaluable assistance in plaster work, wood carving and kindred arts. And the employment is withal so fascinating and productive of such pleasing results, at a small outlay of money and labor, that the amateur will find in it alone ample compensation, leaving out the possibility of the knowledge gained being turned to account in other work. The clay is easily procured at any potter's, and should be finely ground and free from hard lumps. To ascertain whether this be the case, it may be cut through and through with a wire (modelers usually have a wire fitted with handles for the purpose). It should then be thoroughly beaten and worked until it shall have become tough and somewhat elastic and shall have lost that property denominated as short. The tools used need not be many or costly, although the sets that are offered for the purpose are, I believe, appalling in number and perplexing to the beginner, writes a correspondent in one of our English contemporaries. Two or three simple boxwood blades and a few scrapers, with saw shaped edges, are quite enough, but the fingers, together with tools shaped with a convenient jack knife, may be used more than any other implement. The shapes of the tools required will suggest themselves during the progress of the work. A sponge is useful in finishing. Get some boards for a panel or an upright piece of wood fixed with a base for a figure, and knock nails into the timber, so as to better help the clay to stick; procure some gas piping to form the stamina for arms or legs, and then chuck the clay on, throwing it as hard as you like, building up bit by bit. Then, having got your subject in roughly, commence getting it into shape with a couple of big tools and your thumb, adding wee bit by wee bit clay as you go on. The clay must be kept wet until finished. To attain this cover with damp cloths when not at work. Great care must be taken in winter time not to let your clay blow up. If the work is anything like large, in that season, the studio must be kept at about 60 degrees day and night. If once the frost should get into the damp clay it will make it fly like the rocks at Giant's Causeway, in the north of Ireland, and the labor of weeks—maybe months—will be lost in a night.

Molded Bricks in Italian Buildings.

Nothing more clearly marks the line which separates the good from the vulgar artist than the power which the former always retains to use and not abuse his material, or his opportunities for its free use. The good artist in brick values properly the use of molded brick and terra cotta, and uses them wherever he can do so safely and artistically. The bad artist seems, on the other hand, to rejoice in the endless profusion of ornament with which the cheap reproduction of molded forms supplies him. And the consequence is that in some of the fronts of the later Italian churches we are annoyed and disgusted by the endless repetitions of features which would never otherwise have been marked at all, says a writer in one of the London architectural journals. Such are the rich string courses, and eaves and gable moldings, which are everywhere to be seen, and which ought never to be imitated. They generally consist of several courses of molded bricks, and frequently of continuous arcades of intersecting arches. In some districts, as for instance at Pisa and in Bologna, round disks of glass or earthenware are introduced in combination with these, and by the introduction of bright greens and blues among the somber bricks much richness is given to the work. In San Francesco, Bologna, these disks are inserted at intervals in the wall, under the gable cornices of the west front, while in the north steeple of San Francesco, at Pisa, they are inserted above the horizontal cornices or strings which divide its various stages. Many of the Italian cornices are so deep and complicated in their design as to astonish extremely those accustomed to the entire absence of so marked a horizontal line in English buildings. And their general effect seems to be not only un-English, but at the same time unpleasantly exaggerated; still the beauty of the detail is often very great, and they afford ample evidence of the kind of perfection attainable by means of the repetition of the same molded forms.

Origin of the Word "Lumber."

The word lumber, which has an essentially American origin as applied to manufactures of timber, was first used in Boston in an official way in 1663. It is a most comprehensive word, and other countries have no expression for it that covers the ground so completely. In Great Britain, for instance, each item of lumber has its name, as with us; but, if they were speaking of manufactures of wood as a whole, about the only term which they have that covers the case is "wood goods," which is an awkward expression at best. The word lumber was coined in Boston. A recent writer in the Boston *Journal* states that the word has not had full justice accorded to it. From 1630 for nearly 100 years Boston was the chief lumber market of the world, and that industry was one of the principal foundations of Boston's wealth. Other Boston staples were fish and leather, but in magnitude of transactions lumber was in the lead. The site of the old State House, known as Market place, was formerly a lumber yard. The men of Boston got to calling sawn timber lumber because the ships that brought that article of commerce to Boston used to lumber up the wharves and streets with their product.

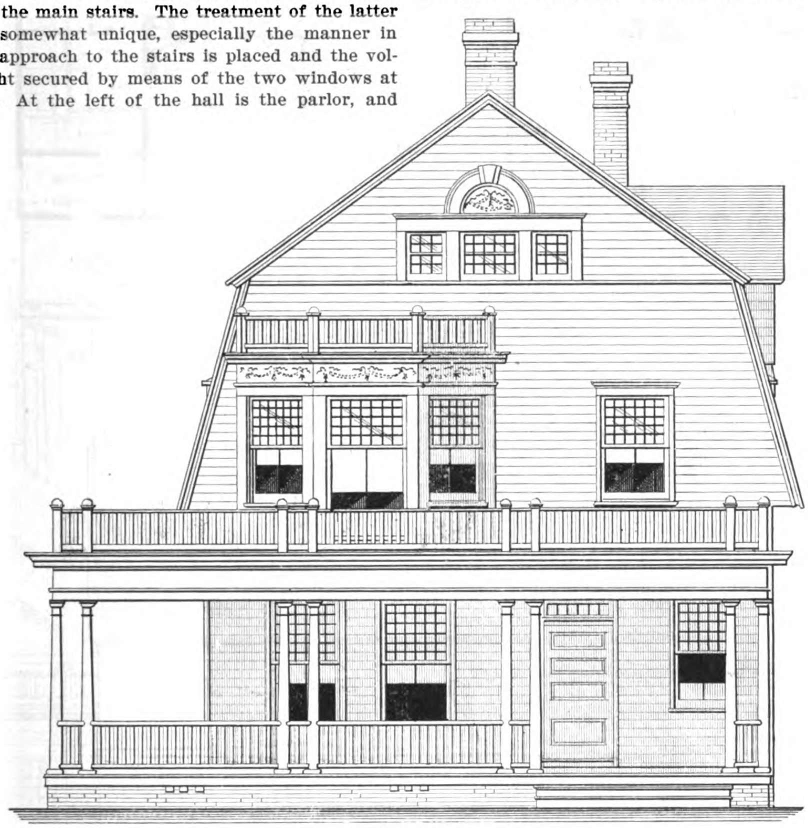
In 1663 the police regulations of Boston provided that the wharves and all streets "that butt upon the water" must be kept free from all "lumber and other goods." Boston lumber carried in Boston ships went to all parts of the world and laid the foundation for Boston wealth.

COTTAGE AT CAMBRIDGE, MD.

THE cottage which forms the basis of our half-tone supplemental plate this month was completed late last fall in Cambridge, Md., for Miss E. May Stevens. An inspection of the engraving shows the treatment of the exterior to be in what is designated as the modern colonial style, and, with the immediate surroundings, gives to the cottage very picturesque effects. The floor plans, which are presented in connection with the elevations and constructive details shown upon the pages which follow, indicate the general arangement of the interior. It will be seen that there is a commodious hall which may be used as a reception room and from which rise the main stairs. The treatment of the latter feature is somewhat unique, especially the manner in which the approach to the stairs is placed and the volume of light secured by means of the two windows at the corner. At the left of the hall is the parlor, and beyond this the dining room, communication between the two being established by means of sliding doors. In the hall, parlor and dining room are open fire places, and there is also one in the principal chamber on the second floor. The kitchen is at the rear of the house and communicates directly with the front hall by means of a passage, shut off by means of doors from both rooms. The position of the pantry is such as to be readily accessible from both dining room and kitchen. There is a rear hall and porch, also a rear flight of stairs to the second floor, where there are three sleeping rooms, bathroom and a boudoir.

In consequence of the lowness of the site of the cottage, near the Choptauk River, there is no cellar. The foundations above ground, as well as the chimneys and fire place, are cased with red brick laid in brown mortar. We learn from the architects' specifications that the sills are 4 x 8 Georgia pine; the plates 4 x 4; the studs 4 x 6 and 2 x 4 at the corners, the others being 2 x 4 native pine placed 16 inches on centers; the joists 2 x 10 and the rafters 2 x 6 inches. The cottage is of balloon frame construction, the weather boarding and shingles of cypress being placed over heavy sheathing felt. The entire house is finished in two-coat plaster work prepared for papering.

The finish of the first story is in cypress, the remainder of the house being in yellow pine. The outside flooring is 1-inch Georgia pine and the inside of No. 1 Virginia pine of even widths. The bathroom and kitchen are wainscoted 4 feet high. The plumbing is of the open type with nickel trimmings. The interior wood work is finished in hard oil semigloss, while on the outside the shingles are stained olive green and the weather boarding painted colonial yellow, the dressed work being ivory white.



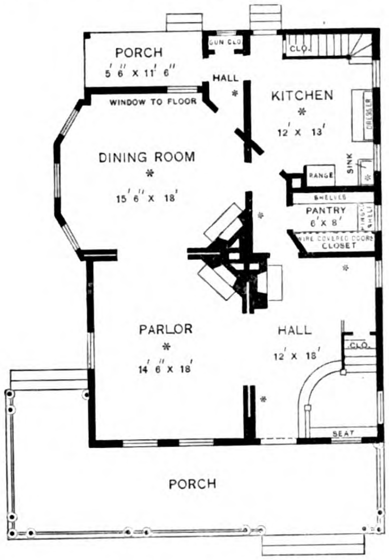
Front Elevation.—Scale, ⅛ Inch to the Foot.

Cottage at Cambridge, Md.—Ghequier & May, Architects, Baltimore, Md.

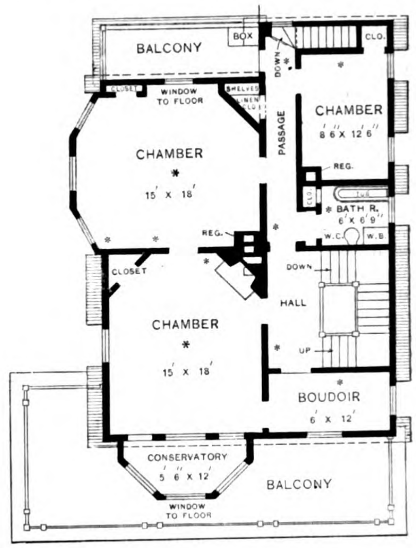
The cottage here shown was designed and erected under the supervision of Ghequier & May, architects, 227 St. Paul street, Baltimore, Md., at a cost of about $2,800. The builder was J. A. Rodbird of the same city.

Philippine Architecture.

The typical Philippine house, says Professor Worcester, who has spent much time in traveling through the group, rests on four or more heavy timbers, which are firmly set in the ground. The floor is raised from 5 to 10 feet into the air. There is not a nail or a peg in the whole structure. The frame is of bamboo, tied together with rattan. The sides and roof are usually of nipa palm, although the former may be made by splitting green bamboos, pounding the halves flat and then weaving them together; while, if nipa is very scarce, the roof may be thatched with the long grass called cogon. The floor is usually made of bamboo strips, with their convex sides up; they are tied firmly in place, but in such a way that wide cracks are left between them. The windows are provided with swinging shades, which can be propped open during the day. You have to climb a habitable by smoke. In the better dwellings there is a place partitioned off for cooking, usually at the head of the ladder, while the body of the house is divided into two or more rooms.



First Floor.



Second Floor.

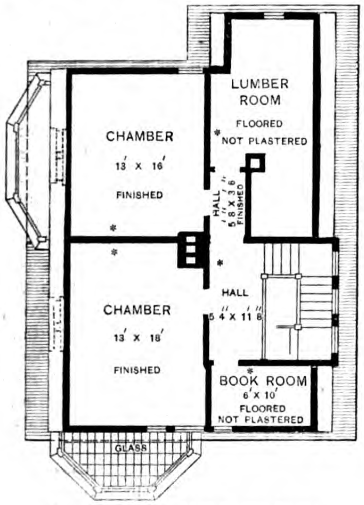
Side (Left) Elevation.

Cottage at Cambridge, Md.—Floor Plans.—Scale, 1-16 Inch to the Foot.—Elevation.—Scale, 1/8 Inch to the Foot.

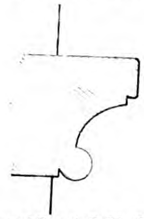
ladder to enter the house. Frequently there is but one room for cooking, eating and sleeping. The cooking is done over an open fire built on a heap of earth in one corner, and the house is often rendered almost unin-

Professor Worcester states in the Washington *Star* that native dwellings of this latter sort have much to recommend them. The ventilation is perfect, and the air is kept much cooler than in a tightly closed building.

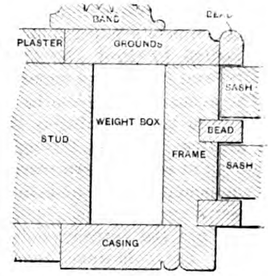
Moreover, if such fabrics are shaken down by an earthquake, or blown down by a typhoon, no one gets hurt, houses of boards with galvanized iron roofs and limestone foundations, but they are very much more expen-



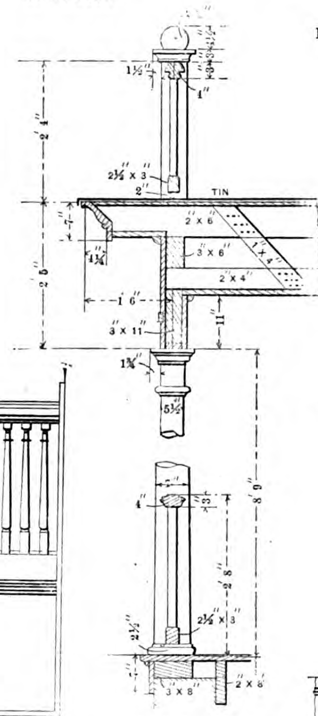
Attic.—Scale, 1-16 Inch to the Foot.



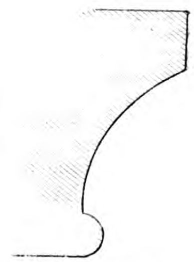
Section of Front Gable Window Sill and Cap.—Scale, 3 Inches to the Foot.



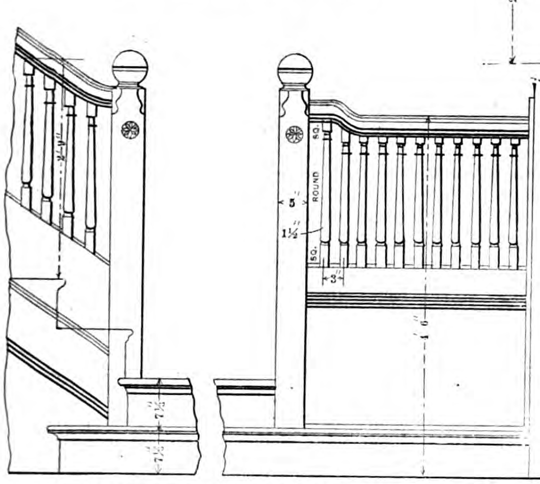
Detail of Window Frame.—Scale, 3 Inches to the Foot.



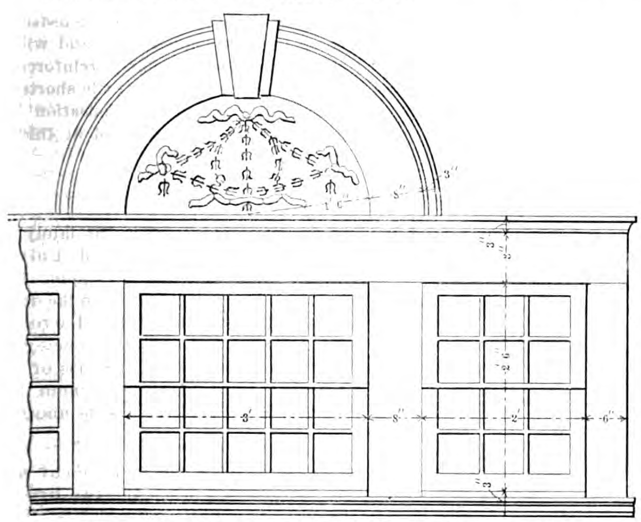
Details of Porch Column and Cornice.—Scale, ⅜ Inch to the Foot.



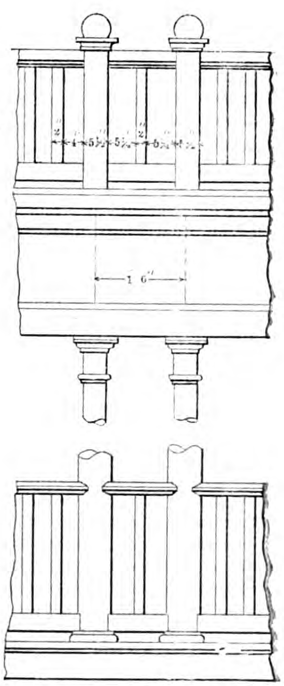
Profile of Main Cornice.—Scale, 3 Inches to the Foot.



Detail of Main Stairs.—Scale, ½ Inch to the Foot.



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



Partial Elevation of Porch.—Scale, ⅜ Inch to the Foot.

Miscellaneous Constructive Details of Cottage at Cambridge, Md.

for the materials used are too light to do harm when they fall. It seems that rich natives sometimes build sive and are pronounced decidedly less comfortable than the humbler dwellings of bamboo and nipa palm.

ARCHITECTURAL ACOUSTICS.

AT the late convention of the American Institute of Architects a paper under the above head was presented by Prof. W. C. Sabine of Harvard University, and from it we make the following extracts:

The acoustical problem by which the architect of an auditorium is confronted is threefold—that of securing the greatest loudness throughout the hall of a sound produced at some chosen place, proportional loudness of all component notes, and the greatest distinctness of successive enunciations. These three are the necessary, as they are the entirely sufficient, conditions for good hearing. Each, however, can be secured only at the partial expense of the others. The solution of the problem is therefore essentially a compromise. Moreover, it is a compromise that must be met differently, according as the hall is to be used for speaking or for music, and, if for music, differently for different kinds.

The simplest auditorium is, of course, the open air. In this case, however, the sound diminishes rapidly in intensity as it spreads uninterruptedly to a greater and greater distance. A wall immediately behind the speaker would reflect to the audience the portion of sound otherwise lost in that direction. A ceiling overhead, side walls, and a wall behind the audience, would save even more. Should these surfaces be perfect reflectors, no matter how they might be placed, all the sound reflected from wall to wall would ultimately reach the audience. In fact, however, walls, though good, are not perfect reflectors, and there is more or less loss. Moreover, the sound that has suffered many reflections and has traveled far will arrive too long after the sound coming directly to be of service in reinforcing it. It is desirable, therefore, to so shape the room, so turn the walls and so incline the ceiling as to reflect the sound directly on the audience. Surfaces not so available should be deadened into being poor reflectors.

Some Recommendations.

These considerations lead immediately to the following recommendations, which, however, are not always practically available. A wall immediately behind the speaker, angle walls cutting off the corners of the room at each side of the speaker, and a sloping ceiling, not high, immediately above him, are advantages. A curved ceiling over the audience, or one with sloping sides, is favorable. On the other hand, there is no especial advantage in giving to the room an ellipsoidal shape, as is often stated. An accurately ellipsoidal shape, with the speaker at one focus—an often recommended arrangement—would profit but one particular point in the room—the other focus, and would make of the whole a whispering gallery. Again, a room shaped like a paraboloid—and this also has been proposed—would be positively bad unless the axis of the paraboloid were very much inclined to the horizontal—never part of the plan. Indeed, the conic surfaces have been merely words to conjure by. There is no simple geometrical surface ideal for this purpose; for the variables—reflection, diffraction and absorption—make the problem very complex. Each case must be worked out on its merits. To return, a curved ceiling over the audience, reaching low behind the speaker and at the rear and sides of the hall, is good; but a curved ceiling having the speaker at the center of curvature is the very worst possible. The rear wall and the more distant side walls are, on account of distance, likely to be valueless, or worse than valueless, except to the audience near them. They may, therefore, to advantage, be low, or occupied by galleries, which, when furnished with cushions or filled with people, are poor reflectors.

Special Cases.

In considering any special case it is to be borne in mind that the sound coming directly from the speaker is diminished in intensity not merely on account of the distance, but also from absorption by the garments of the audience over which it passes. Therefore, if the ceiling be very low, hearing, while good in front, will be bad in the rear of the hall. This is especially true beneath a low gallery. Here there is a double disadvantage; the sound enters the opening in front diminished in intensity by traveling over the audience; and, screened by the gallery, this part of the house gets no benefit from the reflection by the ceiling. The expression of persons occupying such positions is that the sound seems smothered. On the other hand, the sound that enters the gallery, having traveled further above the audience, has lost less by absorption, and is more reinforced by reflection from the ceiling. The hearing in the front rows of the gallery is therefore excellent, and the gallery may well have a greater depth than the balcony below it. In both, the seats should rise more rapidly than on the floor in front, not merely for seeing, but for hearing purposes, and also to avoid leaving bare walls to reflect prejudicial sound to other parts of the hall. In even the gallery the depth cannot much exceed the clear hight above it without giving cause for complaint. Throughout all speculation in regard to reflecting surfaces there is one point that must not be lost sight of. Reflection from any extended surface is regular only when the minor inequalities, as ceiling decorations, paneling, ornamental niches, recesses of doors and windows, are small in comparison with the wave length of the sound; otherwise the reflection is diffused.

Interference.

The next phase of the architect's problem is much more intricate, and only an outline may be here attempted; in scientific acoustics it is called "interference." Up to this point the direct and the reflected sound have been spoken of as if always reinforcing each other when they come together. A moment's consideration of the nature of sound will show that as a matter of fact it is entirely possible for them to oppose each other. Thus, the sounding body in its forward motion sends off a wave of condensation, which is immediately followed through the air by a wave of rarefaction produced by the vibrating body as it moves back. These two waves of opposite character, taken together, constitute a single sound wave. The source continuing to vibrate, these sound waves follow each other in a train. Bearing in mind this alternating nature of sound, it is evident that should the sound, traveling by different paths—by reflection from different walls—come together again, the paths being equal in length, condensation will arrive at the same time as condensation and will reinforce it, and rarefaction will, similarly, reinforce rarefaction. But should the one path be a little shorter than the other, rarefaction by one and condensation by the other may arrive at the same time, and at this point there will be comparative silence.

(To be continued.)

THE holding power of wood screws as lately determined by Norris M. Works, at Cornell University, showed with white pine that the maximum holding strength of a screw inserted at right angles to the direction of the grain is obtained when no hole is bored to receive it, or the hole is about eight-tenths of the diameter of the screw at the base of the thread. In the case of screws inserted parallel with the grain, the maximum holding strength is obtained when sunk in a hole about four-tenths their diameter.

A JAPANESE wood carver is said to have cut a figure in wood so like himself that when the two are placed side by side observers can hardly tell which is the living and which the wooden man. The figure is composed of 2000 pieces of wood, dovetailed and joined together with such wonderful skill that no joints can be detected. The hairs are inserted in tiny holes and the eyes are glass.

THE ART OF WOOD TURNING.—VII.

BY FRED. T. HODGSON.

IN turning hardwood the position of the tool is something different than when turning soft woods. The tools are held to the work radially and horizontally, and must lie flat on the rest, as shown in Fig. 43. What is meant by horizontally in this case is that the tool must be held in a position as nearly horizontal as is practicable for ordinary work. To secure perfect exactitude in this respect it would be necessary to raise or lower the rest a little with every change of tools owing to their varying thicknesses; but their delicacy is really not regarded in practice, because the experienced turner soon learns to adjust his tool almost instinctively to every new condition. The tool is grasped firmly in the right hand by the handle, with the forefinger and thumb of that hand extended along the blade of the tool, the under side of the thumb pressed against the face and the inner side of the forefinger against the right side of the tool. The fingers of the left hand are passed around the pedestal of the rest, and the left thumb, pointing upward, is pressed against the left side of the tool opposite the forefinger of the right hand.

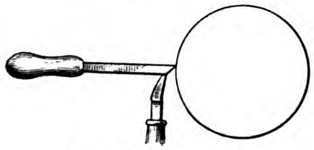


Fig. 43.—Position of Tool.

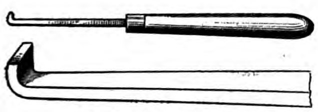


Fig. 44.—Views of Arm Rest.

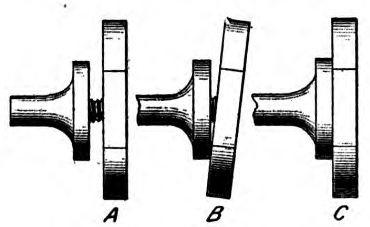


Fig. 46.—"Chucking" the Face Plate.

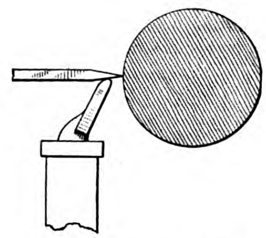


Fig. 47.—Trimming the Edge.

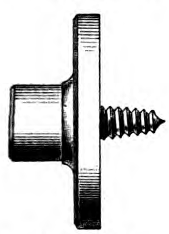


Fig. 45.—Conical Screw Chuck.

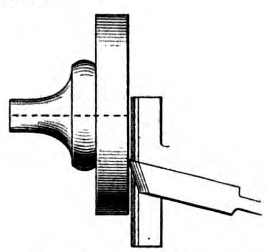


Fig. 48.—Position of Chisel as Viewed from Above.

Art of Wood Turning.

The tools are occasionally held by some expert turners as for soft woods, but the horizontal position is the one generally adopted. Some of the larger tools require the extra purchase of a long handle. The rest should be set as close to the work as possible. Tools cutting at their ends are generally presented to the work with their shafts at a small vertical angle, the cutting being obtained by simple pressure or by lowering the handle.

Side cutting tools are generally held slightly tilted upon their left under corner, their faces being at a small vertical angle to the surface which they are cutting. Leverage is obtained by slightly twisting the shaft upon itself from left to right. Tools for working hardwood and ivory that are used for horizontal cutting are, says Holtzapfel, "thin in proportion to their width; they vary with the size of the tool from about ⅛ inch to ¼ inch, some large tools occasionally reaching ¾ inch in thickness. All are ground with a single bevel, or on the one face only, with a cutting angle of from 40 to 60 degrees, and are handled principally on short handles, with which they measure from 8 to 12 inches. Some of the larger of the tools are required in long handles."

There is an adjunct to the lathe much used in executing fine work in the harder of the woods or in ivory called the "arm rest." In many descriptions of turning it is necessary to make frequent changes of turning from the surface to the cylinder, and *vice versâ*. These changes often necessitate a change of the rest, which means a great loss of time; so, to obviate this, the arm rest was invented.

We show a diagram of this tool in Fig. 44. It consists of a smooth steel shaft, from 7 to 9 inches in length by about ¼ inch or a little more in thickness. The tool is about ½ inch wide at the handle, tapering to less than ¼ inch at the end, which is turned up at right angles, as will be seen by reference to the cut, so as to form a hook or stud. The handle is plain and from 13 to 15 inches in length.

In use the handle is held under the left upper arm, close under the armpit, pressed against the side, the blade lying flat upon and overhanging the rest, work uppermost. The turning tool, held in the right hand, with the thumb and finger stretched out along it in the usual manner, lies on the arm rest, the forefinger just touching the hook, which catches the side of the tool. The left hand grasps the pedestal of the rest by the three lower fingers with the thumb pressed on the surface of the blade of the tool, lying on that of the arm rest, holding both together down upon the T. The left forefinger is bent like the other fingers around the pedestal, but it is held just free of it, and presses up and supports the under side of that portion of the arm rest blade that overhangs the T, the position of the bent second joint of the left forefinger under the arm rest being nearly and sometimes directly beneath the tool. The forefingers and thumbs of both hands, the ends of the tool and the arm rest are thus arranged together in one compact group.

In making circular moldings or what may be termed "face work," chucks or face plates will have to be provided to suit the kind of work in hand. These appliances usually screw onto the mandrel nose (see *h* R, Fig. 8, September issue, 1898), but on some lathes this nose may have an internal or female thread into which the chuck or other attachment is screwed. Chucks are used in wood turning of various kinds, but the conical screw chuck shown in Fig. 45 will be found the most convenient for the beginner. This chuck is screwed on the lathe mandrel, then a piece of 2-inch plank—seasoned pine or whitewood preferred—should be screwed solid to the face of the chuck, as shown at C in Fig. 46. Care must be exercised in starting the plank on the screw so as to have the face of the plank parallel with the face of the chuck as seen at A, Fig. 46. If the plank be started at an angle other than described the result will be unsatisfactory and similar to that shown at B of the same figure. If the plank in this latter case is forced against the plate until it is in contact with it at every point, either the plank will be loose on the screw or the latter will be bent out of shape. It is supposed that the plank, which will now be used as a face plate or backing for the work, has been made as nearly circular as it can be cut with a band or jig saw, and that the screw in the chuck has entered the compass center. If the work has been well done there will be very little stuff to take off the edge to make it true. Whatever stuff there is should be turned off before attempting to " true up " the face of the plank. In finishing the edge of the plank a very small cut must be taken off at a time or slivers will be likely to chip off, as the revolving plank will present to the edge of the chisel or gouge, end and side wood alternately. The operator will very soon discover the depth of cut to take while trimming the edge of the plank. The point of the chisel or gouge should be on a line with the center of the work, and the tool should be held in a horizontal position, as shown in Fig. 47.

When the edge of the plank is finished the " rest " should be turned across the bearers, so that the gouge or chisel may be traversed across the flat face of the plank, as shown in Fig. 48, where the long point of the chisel may be seen with its lower face on the rest and its cutting point in contact with the face of the plank. The proper position of the chisel or gouge, while facing

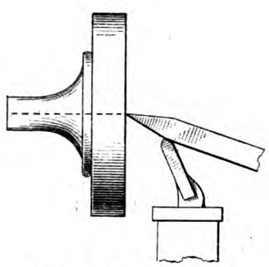


Fig. 49.—View of Chisel in Position.

Fig. 50.—Views of Square Ended Chisel.

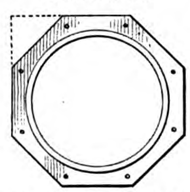


Fig. 51.—View of Ring Molding.

Art of Wood Turning.

up the work, is shown in Fig. 49, where it will be seen that the cutting edge is exactly on a line with the center of the work. Turning of this kind is generally termed " plank way turning," and the same description of tools may be employed as in ordinary cylindrical turning, the only difference being in the position in which they are applied, as plank way turning requires considerably less inclination of the tools while in operation. Some turners prefer shorter tools with short handles for plank way turning, but the young beginner can get along very well at this work with his ordinary set of turning tools.

In facing up the plank it will be necessary to first rough it up with a small pointed gouge, then by separate cuts with the chisel traversing from right to left, both hands moving with the tool and maintaining its axis always parallel with itself during the operation across the work. The rough surface is now made smooth with a square ended chisel having a basil on one side only, as shown in Fig. 50, and which requires some care in applying so as to prevent the corners from digging into the wood. The operator must use a straight edge of some sort while at work on the face, testing it from time to time in order to see that hollow places are not made in the work. It is not necessary that this disk or plank should be very smooth, as it is only intended to be employed as a sort of auxiliary chuck, but when finished and work of a similar kind is required it may be smoothed up nicely by an expert use of the flat chisel and a subsequent application of fine sandpaper.

In the foregoing example we have made use of white pine or clear whitewood, as these are best adapted to the purpose for which the work is intended, but the same rules offered for this work in the management of the tools and adjustment of material are equally applicable to the working of medium and hard woods, only that a little more care will be required in handling the square ended tools.

We now have a wooden face plate on which we can fasten material when turning ornaments, moldings, flat rings or other similar work. How shall we proceed? Suppose we require a molded ring 12 inches in diameter over all, the ring to have a flat side and a torus profile, and to be, say, 1 inch wide and ½ inch deep? Our disk is supposed to be 14 inches in diameter or thereabouts, so there will be ample room to attach to it the board to be turned. Procure a board 13 or 14 inches wide, cut off a piece of the same length, center it, and from this center describe a circle of the largest diameter required by the ring or molding, which in this case is 12 inches. Cut off the corners similar to the illustration in Fig. 51, leaving enough room between the line of molding and the outside edge to insert a small screw, if desired to fasten the work to the disk. There are several ways of attaching the work to the disk. It may be fastened with screws as mentioned, or it may be held in place with screws inserted from the back of the disk, gripping the portion of the wood that will not come in contact with the cutting tools. The better way, however, in the opinion of the writer, is to glue the work to the disk or wooden face plate, inserting a piece of thick paper between the disk and the wood to be wrought. By the latter method the work may be completely finished and polished, if desired, before removing it from the face plate. It can readily be removed by inserting a table knife or other similar implement between the finished work and the disk, at the line of junction where the paper holds the two together. The paper will split easily without causing injury to the molding or disk. The fragments of paper can then be removed by dampening them with warm water or with steam, when they can be easily scraped off. If this method of attaching work to the face plate is adopted, and there is considerable work to do of the same kind, it will be well to have two or more face plates made so that while one is in the lathe the glued work on the other may be drying. This will prevent loss of time, inasmuch as there need be no waiting for the glue to dry.

It must be remembered that the face plate may be removed from the lathe at will by simply unscrewing it from the conical screw, or the whole chuck with face plate attached may be removed from the mandrel and all returned to place again without disturbing the centers. If, however, only the wooden portion is removed great care must be taken in unscrewing and screwing it, for should the central hole be enlarged or forced out of shape the least bit it will throw the whole of the work out of true. If the turning is finished, however, this will make but little difference, as any new work will adjust itself to the new center.

THE Utica *Observer* relates a remarkable freak that the wind played recently on the Presbyterian church at New Hartford, N. Y. It blew the steeple above the belfry out of plumb about 25 degrees, so that the spire pointed in a northwesterly direction, and it was feared that it would fall. Next morning men were about to set to work straightening the steeple and putting in stronger supports, when the wind veered around and blew it back into its original position.

ONE of the advantages that is being claimed for acetylene gas is that the products of its combustion are not injurious to plant or animal life, as is the case with coal gas. A test is reported to have been made with acetylene recently in a greenhouse, in which absolutely no bad effect was produced, whereas coal gas had a markedly injurious influence upon the growing plants.

WHAT BUILDERS ARE DOING.

At a special meeting of the Builders' Exchange of Baltimore, held for the purpose, the following were elected as representatives to the Milwaukee Convention of the National Association of Builders: J. J. Walsh and Israel Griffith, delegates; E. M. Noel and Joseph H. Hellen, alternates; S. B. Sexton, Jr., delegate at large for the ensuing year.

Boston, Mass.

Builders generally are hopeful of an active season this year, and there are present indications that the opening of the season will be satisfactory. Architects report a tendency to the erection of an unusually high class of residences and apartment houses in the suburbs, and an encouraging amount of new work in the city proper is said to be in sight.

The Master Builders' Association is making preparations at the time of this writing for a musicale and dance, to occur while this number of *Carpentry and Building* is in the hands of the printer.

Bridgeport, Conn.

The annual meeting of the Master Carpenters' Association of Bridgeport was held on Saturday evening, January 7. The secretary and treasurer's report showed the organization to be in a financially prosperous condition. Much benefit accrues to the members from the fellowship and social relations that are fostered by such an organization, and the members consider this one of the most important features. The meeting proved to be one of unusual interest and profit. A number of subjects of importance to the building trade were informally discussed and will receive attention at future meetings, and will no doubt result profitably.

One matter which will probably prove of general interest and appeal to the social inclinations of all was a proposition to have entertainments of various kinds, these to be followed if it seems advisable by a smoker and light lunch as an adjunct, the first to be held in the near future.

The officers elected for the ensuing year were: President, S. W. Hubbell; vice-presidents, W. A. Disbrow, D. C. Mills, J. M. Sanger; secretary, W. L. Savage; treasurer, W. S. Hurlburt. Advisory Board—S. W. Hubbell, W. L. Savage, J. H. Bronson, D. C. Mills, C. H. Botsford, W. D. Haydn. Trustees—A. A. Brown, J. H. Bronson, J. M. Sanger.

Buffalo, N. Y.

Secretary Almendinger of the Builders' Association Exchange of Buffalo made the following statement on January 5:

The annual election of the Builders' Association Exchange will be held on Monday, January 16. The polls will be open from 11 a.m. to 2 p.m. The corporate members extend a cordial invitation to the non-corporate members to attend luncheon, which will be served in the exchange room. The following nominations have been made:

For President, John W. Henrich, Henry W. Wendt.

For Vice-President, Robert F. Sherman, George E. Frank.

For Treasurer, F. T. Coppins.

For Trustees—John Carter, George W. Voss, John C. Watson, William H. Pinck.

For Secretary, John C. Almendinger.

For Arbitration Committee—B. I. Crooker, Nicholas Niederpruem, Avery C. Wolfe, H. C. Harrower, A. A. Berrick, John Feist.

For Delegate to National Convention at Large, Charles A. Rupp.

For Delegates to National Convention—Edward M. Hager, Charles Geiger, Henry Schaefer, Henry Rumrill, Jr.

Two trustees are to be elected, three members of the Arbitration Committee and two delegates to the National Convention.

Chicago, Ill.

City Architect Sierks of Chicago reports the expenditure of $20,000 for the Cottage Grove avenue and $10,545 for the Forty-seventh street police stations, both completed, and $10,145 for the Sheffield avenue police station, not completed.

The Michigan avenue Fire Department station, to cost $17,831, is under construction, and bids have been opened for the Lawndale avenue station, $6490, and the Cuyler avenue station, $4145.

Expenditures for public bathhouses and laboratory in Health Department aggregated $12,725. For the Department of Engineering the architects' expenditures were $188,949. Architectural changes in the City Hall cost $15,244.

For a cell house addition to the John Worthy School at the House of Correction $50,000 was expended.

The amount of other building during 1898 was practically the same in point of cost as that of 1897, although the number of structures for which permits were issued was smaller by 1227. During 1898 permits were issued for 4067 buildings, costing $21,288,325, as against 5294 buildings and $21,777,230 in 1897, a decrease of $488,905 in cost and 1227 in the number of permits.

The Builders' Club has extended an invitation to visitors passing through Chicago on their way to attend the National Convention at Milwaukee to make the rooms of the club in the Chamber of Commerce Building their headquarters while in the city.

The Builders' Club, at the annual meeting, January 9, elected the following officers for the ensuing year:

President, Edward Kirk, Jr.
Vice-President, Addison E. Wells.
Second Vice-President, Patrick Nacey.
Treasurer, Chas. W. Gindele.

MANAGERS:

W. W. Butterfield, H. C. Knisely,
Joseph Downey, D. V. Purington,
Robert Vierling.

Cleveland, Ohio.

The Cleveland Builders' Exchange held its annual meeting and banquet during the month of December. Just previous to the banquet a business meeting was held, at which the officers for the year were announced as follows: Arthur Bradley, president; C. W. McCormick, vice-president; John A. Kling, secretary; E. W. Palmer, treasurer; C. L. Briggs, assistant secretary. The first four named officers, with the following gentlemen, constitute the Board of Directors of the exchange: James Rochford, E. W. Reaugh, W. J. Warden, C. N. Griffin and W. H. Hunt.

The proposition to rent the entire third floor of the new Chamber of Commerce Building for the use of the exchange and its members was received enthusiastically. The general plan of the members of the exchange is to use a part of the floor for headquarters and let out the remainder of the space to manufacturers and contractors who are members of the exchange. It is expected that the manufacturers will have exhibits of building material on this floor, making it possible for a busy man to select the materials for a new house entirely from what the manufacturers display. A committee appointed to further this project is as follows: E. W. Palmer, W. J. Warden, G. E. Needham, James Rochford and E. W. Reaugh.

Kansas City, Mo.

The closing of the year 1898 shows a most satisfactory increase in the amount of building over the record of the previous year. In 1898 3096 permits for work to cost $3,092,240 were issued, as against 2048 and $1,763,020 in 1897. Recent indications point to the possibility of a large investment of Eastern capital in Kansas City real estate and in the erection of new buildings during 1899. The feeling among builders throughout the city generally is very hopeful over the prospect for the coming season.

Indianapolis, Ind.

Building in Indianapolis increased in 1898 from the record of 1897 nearly one-quarter. The value indicated by the permits issued last year is about $2,350,000. For 1897 it was less than $1,937,000. Builders are expecting a still greater increase in 1899, but at present there seems to be no work of unusual magnitude in sight.

Milwaukee, Wis.

The members of the Builders and Traders' Exchange are rapidly perfecting their plans for entertaining the delegates and visitors to the National Convention, and report that everything will be finally arranged in ample time for the meeting.

A compilation of the work done in the city and county of Milwaukee during 1898 shows improvements valued at $3,800,000. The *Sentinel* states that the value of all building done during 1898, including the new Federal Building and work in the suburbs not designed or supervised by architects, amounts to $4,600,000.

Montreal, P. Q.

The first annual meeting of the members of the Builders' Exchange of Montreal took place recently in their cozy rooms. A large attendance gathered to hear the directors' and secretary-treasurer's reports for the past year, which were most satisfactory. The members unanimously passed a vote of thanks to the Board of Directors, the Committee on Admissions, the honorary secretary-treasurer and the auditors for their efforts in the interest of the organization.

The same board was elected for the ensuing year—viz: James Simpson, president; C. T. Williams, vice-president; Peter Lyall, Amos Cowen, John McLean, W. P. Scott and F. Fournier.

Minneapolis, Minn.

Building in Minneapolis during 1898, as shown by the building permits, increased nearly one-half over the amount recorded for 1897. The figures for 1898 were $2,271,755; for 1897, $1,591,500. There is a general feeling among builders that the ensuing season will show still greater increase and that the dullness of recent years is broken at last.

New York City.

As shown by the records of the Department of Buildings, there were issued in New York City (Boroughs of Manhattan and Bronx) 5900 permits for buildings estimated to cost $78,484,627.

A special meeting of the Building Material Exchange was held recently, with President Clifford Miller in the chair, to receive Warren A. Conover, Charles A. Cowen and Stephen M. Wright, a delegation from the Joint Legislative Committee, whose object is to protect the rights of employers at Albany, and which is made up of committees from the following organizations: The Mason Builders' Association, the Mechanics and Traders' Exchange, the Building Trades Club, the Master Carpenters' Association, the Marble Industry Employers' Association, the Steam Fitters' Association and the Master Plumbers' Association. The delegation desired to enlist the support and co-operation of the Building Material Exchange. After thorough consideration the exchange decided to appoint a committee of three to co-operate with the Joint Legislative Committee.

On the evening of January 6 a meeting of the "old guard" of the National Association of Builders was held in the form of a banquet at the Arena. About 45 gentlemen who have been prominently identified with the association ever since its formation were present, including Ex-President John S. Stevens and Secretary Sayward. Prominent members of the Baltimore, Boston, Philadelphia and New York exchanges were in attendance, and a thoroughly enjoyable reunion was had. The meeting was purely social and nothing of a business nature was introduced. Arrangements for the banquet and other details were carried out by Messrs. Wright, Cowen, Conover, Fertig and others of the New York exchange.

A bill is being prepared for introduction in the State Legislature limiting the hight of buildings in New York City. The proposed legislation is advocated by the New York Board of Trade and Transportation. The bill will provide among other things that no building hereafter erected shall exceed 200 feet in hight, and that no building used as a hotel or apartment house shall exceed 165 feet in hight.

The Mason Builders' Association held its fifteenth anniversary and annual meeting in the rooms of the Building Trades Club on the evening of January 19. An address was made by John J. Tucker, who has been president of the organization since its foundation. The following officers were elected for the coming year: President, John J. Tucker; first vice-president, Warren A. Conover; second vice-president, Charles T. Wills; treasurer, Walter S. Harrison; secretary, Charles A. Cowan; Executive Committee—Henry M. Tostevin, P. J. Brennan, J. Cockerill, P. Gallagher and James Livingston.

New Haven, Conn.

As is usual at this season of the year, there is but little activity in building matters; yet there are in New Haven quite a number of buildings going up and also a number of alterations being made. There is, however, a prospect that the season of 1899 will be a busy one for architects and carpenters. John S. Osborn, the well known builder, has purchased a large tract at Rocky Beach, the summer resort between Savin Rock and Woodmont, on the line of the Milford and Bridgeport electric line. It fronts 191 feet on the beach and runs back 475 feet to the electric line. He will lay out the property in 13 building lots, and on one of them he is now engaged in putting up a new cottage for his own use.

The New Haven Builders' Exchange has elected the following named officers for the ensuing year: President, James A. Fogarty; vice-president, F. A. Curtis; treasurer, J. Gibb Smith; secretary, C. Elmer Dibble; trustees for three years, James E. Todd and Frank L. Stiles.

Paterson, N. J.

At the last regular meeting in December the Master Carpenters' Association of Paterson gave a smoker to its members. After the business was finished an interesting programme of musical and humorous selections was presented. Refreshments, solid and liquid, were served during the evening. There was a liberal supply of cigars, pipes and tobacco, and when the carpenters and their guests departed at a late hour it was with the satisfaction of having spent a merry time.

Philadelphia, Pa.

During the past year the permits issued for buildings in Philadelphia numbered 8237, covering 13,197 operations, the estimated cost of which was $21,860,985, as against $25,915,770 in 1897 and $24,819,700 in 1896, a falling off in the one case of $4,054,785, and of $2,958,715 in the other.

The Master Builders' Exchange celebrated the last day of the year by a luncheon served at the exchange rooms, 18 to 24 South Seventh street. There were no set speeches or toasts, as the luncheon was purely informal, but the occasion was none the less enjoyable. Following the luncheon there was an entertainment consisting of music, songs, recitations, magic, moving pictures and humorous recitations. The programme embracing all these features was very cleverly arranged. The entire affair was arranged by an entertainment committee consisting of W. S. P. Shields, chairman; R. C. Ballinger, William B. Carlile, John N. Gill, A. B. Barber, Frank R. Whiteside, William H. Boyd, J. Turley Allen, William J. Gray.

Allentown, Pa.

During the year just closed more buildings were erected in Allentown than in any year since 1893. The operations for 1898 included many notable improvements, chief of which is the Commonwealth Building, a seven-story office structure, erected by F. A. R. Baldwin, which is conceded to be the finest structure in Eastern Pennsylvania outside of Philadelphia. The building permits issued during the year numbered 177, and called for the erection of 337 houses, most of them substantial dwellings, and in many cases elegant residences. In 1893 the new houses numbered 362; in 1894 they numbered 231; in 1895, 240; in 1896, 138, and in 1897, 183. One of the buildings rapidly approaching completion is the Allentown Hospital. The city is in great need of such an institution, and the want of it these many years has been a reproach. The value of the building operations during the year was about $2,000,000.

Portland, Maine.

At the annual meeting of the Builders' Exchange the following officers were chosen: Josiah C. Ward, president; James Miller, vice-president; George W. Libby, secretary; Slyvanus Bourne, treasurer.

The building outlook for the year in Maine is excellent. Probably the largest venture is the pulp and paper mills near Norcross. Seven hundred and fifty thousand dollars has already been invested in power and lumber lands, and no doubt from $1,500,000 to $2,000,000 more will be invested ere the enterprise is completed. The new paper mill at Winslow will doubtless cost a couple of hundred thousand, while other pulp and paper mill prospects should cost from $500,000 to $1,000,000.

Reading, Pa.

While building operations during the year may have seemed slow, the aggregate number exceeds that of 1897, the total being 399 as against 342. During the past year there were erected 23 one-story buildings, 193 two-story buildings, 175 three-story buildings, 7 four-story buildings, and 1 five-story building.

St. Louis, Mo.

The report of the St. Louis Department of Buildings for the past year shows a decrease of nearly two million dollars. The total estimated value of all building work recorded, new buildings, alterations and repairs, amounts to $7,775,976, as against $9,471,640 for 1897 and $10,034,908 in 1896.

At the annual meeting of the Master Builders' Association, held in December, the following officers were elected: Frederick J. Remmers, president; Albert W. Black, first vice-president; Moritz Eyssell, second vice-president; Edward A. Steininger, secretary; Adam Bauer, treasurer, and Lewis J. Evans, John Low and Matthew W. Muir, trustees. The installation of the new officers occurred at a later date and was made the occasion of a lunch and entertainment.

On January 10 the annual meeting of the Builders' Exchange was held, with President H. C. Gillick in the chair. After the transaction of the regular business nominations for officers for 1899 were made, as follows:

President—Henry Fairback, L. B. McFarland.

Vice-Presidents—T. E. Cavanagh, Jos. P. Kelly.

Directors—H. C. Gillick, J. H. Daues, Thomas Kelly, E. R. Darlington, John M. Doyle, John A. Lynch, T. P. McKelleget, H. Thomson, John R. McKnight, John J. Fletcher, Geo. M. Blair, Geo. Kretsinger.

Committee of Arbitration—H. A. Boeckeler, Wm. S. Simpson, A. Leiweke, Julius Seidel, Jeremiah Fruin, P. L. Dauernheim, Henry Schmidt, P. Hengen, Lawrence Kennah, James Green, Jos. E. Doyle, J. F. Hines and J. H. McCracken.

Committee of Appeals—John M. Sellers, Wm. H. Swift, Wm. A. Rutter, C. S. W. Cobb, Joseph Winkle, Geo. Sauerbrunn, Geo. W. Simpkins, C. C. Jackson, Henry Kiel, Thomas Mockler, Geo. Simm, F. R. H. Lohse, E. R. Gregg.

The election will take place Tuesday, January 17. The president appointed P. Mulcahy and S. O'Connor judges of election.

San Francisco, Cal

The San Francisco *Bulletin* of a late date in December makes the following statement in regard to the condition of building at that time and the prospect for the coming season: "There is a good showing of building contracts placed on record this week, but many are for work started some time ago. All branches of the building trade are active, and there seems to be enough work in sight to make matters lively until well along into the new year. This week's record calls for an expenditure of over $79,000, against $161,262 for last week and $68,722 the week before. The value of the building improvements for the present month to date is equal to the same period in 1897, although the number of contracts is smaller. The record for this year will thus fall considerably below the record for the year 1897, as the total for this month cannot possibly bring the year's total up to last year's figures."

St. Paul, Minn.

The year 1898 showed a very satisfactory gain in the amount of building done in St. Paul as compared with 1897. The number of permits issued in 1898 was 902 for buildings to cost $1,758,542; the number and amount in 1897 being 987 and $1,424,274. There seems to be some ground for believing that a permanent return to more prosperous times than those of recent years has begun. The amount of work in the hands of architects and increasing movement in real estate and general business are the grounds of the hopeful feeling among the builders.

Worcester, Mass

The annual meeting of the Builders' Exchange was held at exchange headquarters, Knowles' Building, on the evening of January 11. There was a large attendance and the reports of the secretary, treasurer and various committees showed that the exchange is in a most prosperous condition. The financial balance is greatly in excess of that of last year. There are at present 87 active and 29 associate members in the exchange.

The following officers were elected for the ensuing year: President, Bertrand W. Stone; vice-president, Burton C. Fisk; treasurer, Frank H. Goddard; trustee to fill vacancy caused by the election of B. C. Fisk, Elwood Adams; trustees for two years, Oliver S. Kendall, Benjamin F. Marsh and Edward J. Cross.

The secretary is chosen by the Board of Directors, which is composed of the officers and trustees. They met at a later date to elect a successor to Charles C. Brown, who resigned to accept a similar position with the Plumbers' Union.

The first of the winter socials given by the exchange was held at the headquarters on the evening of January 12 and was a most enjoyable affair. Secretary Charles C. Brown was called to the platform and presented with an elaborate hall stand on behalf of the members of the exchange, as a token of the esteem in which he is held on the completion of his five years' term with the exchange. The presentation speech was made by Oliver S. Kendall.

HEATING AND PLUMBING A HOUSE.

IT may be interesting to many of our readers to describe the heating and plumbing systems of a modern dwelling with a view to showing one of the methods by which the problem has been successfully solved. We shall take for an example the residence of A. C. Coburn, at New Britain, Conn., which was erected in accordance with drawings prepared by Robert Coburn, architect, of that place. The house is heated in part by warm air so as to effect an inflow of pure air pleasantly warmed from out of doors, and open grates provide an outlet for the air in the building. The heating and plumbing systems were installed by F. C. Weiant & Co. of 67 Arch street, New Britain, Conn.

A combination heating system was installed, a No. 827 Richmond combination hot water and hot air heater having been selected for the purpose. The location of the heater is shown in Fig. 1, which represents a plan of the basement of the building. It is arranged to be supplied with cold air from out of doors through a 20-inch tile pipe, which leads to an air chamber under the furnace, of the same diameter as the casing, which is 48 inches. This chamber is circular in form and there is a vertical partition between the ash pit of the furnace running from one side of the chamber two-thirds the way across. On the opposite side of this partition on the cold air inlet a 16-inch round tile pipe connects by means of a galvanized iron pipe with a 16 x 18 cold air register face in the hall. In both ducts dampers are so arranged that they can be readily operated from the first floor. By this means early in the morning, when the house has become chilled during the night, the cold air from out of doors can be shut off and the air in the house sent through the furnace again, by this means raising the temperature of the air in the building much quicker than could be done if all cold air was used. After the temperature has been raised to a satisfactory degree it is only necessary to close the circulating damper and open the cold air supply damper to secure a continual inflow of fresh warm air.

The arrangement and size of the hot air pipes are shown in Fig. 1. From the water heater in the furnace a 2½-inch pipe is carried to a point over the furnace, where it branches to a 1½-inch pipe running toward the back of the house, a 1¼-inch branch being carried to the radiator, presenting 60 square feet of surface, located in the first-floor hall, as shown in Fig. 2, which is a plan of the first floor. This riser also supplies two radiators in rooms on the third floor. This branch is then reduced to 1¼ inches in size and carried to a 1-inch riser, which supplies a radiator of 16 square feet of surface in the bathroom on the second floor, as shown in the plan presented in Fig. 3. A 2-inch branch runs toward the front of the house, where it again branches into two 1½-inch pipes. One branch runs to the riser which feeds a radiator having 30 square feet of surface in the smoking room and the other branch feeds a radiator of 50 square feet of surface in the living room on the first floor and a radiator of 75 feet of surftce in the family chamber on the second floor. The return mains are the same size as the flow mains and follow them in returning to the heater.

For the convenience of those who wish to study the proportions existing between the different parts of the system we have given on the plans the size of the rooms, the cubic contents, the amount of wall surface, the glass surface and equivalent glass surface, rating 10 square feet of wall surface as the equivalent of 1 square foot of glass surface. The ratio existing between a square inch of area in the hot air pipe, with the amount of wall surface and the equivalent glass surface, is also given. These proportions vary owing to the fact that the hall and the living room have both a hot air pipe and a radiator in them. The proportion to the space when divided would be about 1 square foot of surface in the radiator to every 30 cubic feet of space, 1 square inch of area in the hot air pipe to every 30 cubic feet of space in the hall, and the proportion would be slightly less in the living room owing to the fact that the living room is exposed to both the north and the west. The total amount of space heated is 21,241 cubic feet, and the wall surface exposed is 2711 square feet and the equivalent glass surface is 680 square feet.

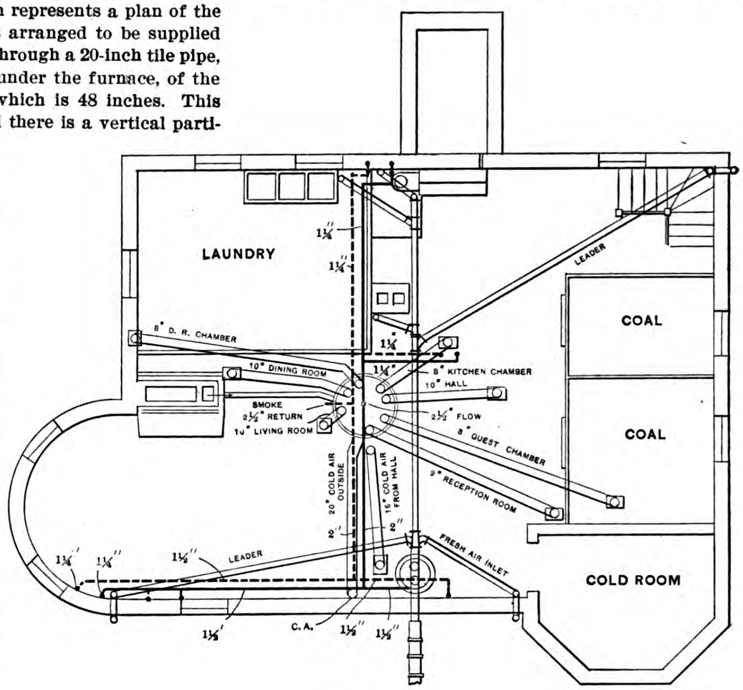


Fig. 1.—Basement Plan.

Heating and Plumbing a House.

The two rooms on the third floor each contains a radiator exposing 30 square feet of surface and the expansion tank is connected with the piping to one of them so as to keep up circulation, a vent and overflow pipe being also provided. These two rooms contain 4000 cubic feet of space and six windows and expose 480 square feet of wall surface, 75 square feet of glass surface and 115 square feet of equivalent glass surface. The other rooms on the attic floor also derive some heat from the main hall, which is open to the third-floor hall, so that the work which the furnace has to do and the cooling surface which has an influence on it is considerably greater than is shown by the figures presented. The furnace has a 48-inch casing and a 25-inch grate, with a fire pot flaring to 27 inches in diameter at the top. On top of the fire pot is a steel dome, in which there are a number of round tubes and a diving flue, giving the effect of an indirect draft. The surface exposed for heating air is approximately 75 square feet. Suspended in the steel dome is a cast iron water heater of corrugated shape, so as to add to the surface presented about 25 square feet. The combined area of the hot air outlets is 447 square inches, and the area of the cold air duct is 320 inches, so that the cold air supply is something over two-thirds of the hot air outlets. The area of the 16-inch tile pipe is 200 inches, so that with the aid of the partition in the cold air chamber under the furnace it is possible to circulate air in the building as well as to secure an inflow from out of doors at the same time and provide a cold air supply more than equal to the hot air outlets.

The grate has an area of 490 inches, or a proportion of 1 square inch of grate area to 43.3 cubic feet of space, to 5½ square feet of wall surface and 1.4 square feet of equivalent glass surface. The area of the grate is equal to 3.3 square feet, or a proportion of 1 square foot to 7.4 square feet of surface in the water heater, which has a total surface of 25 square feet. This water heater is rated to carry 250 feet of surface and has a proportion of about 10 square feet of radiation to each square foot of surface. The total amount of radiation in the system exclusive of the flow and return mains is 300 square feet. The grate also has a proportion of 1 square foot to 22 square feet of air heating surface exposed in the steel dome, fire pot and tubes. This heating surface bears a relation of 1 square foot of surface to 270 cubic feet of space, to 36 square feet of wall surface and to 9 square feet of equivalent glass surface. The combined area of the hot air pipes is 447 square inches and bears a proportion of 1 square inch of hot air pipe area to 47.5 cubic feet of space, to 5.6 square feet of wall surface and 1.5 square feet of equivalent glass surface.

This furnace has now been in use for three years and has been thoroughly and satisfactorily tested. The consumption of fuel has been on an average between 8 and 9 tons for the entire time the fire has been necessary during the year. The house being exposed on all sides this is looked upon as being an economical consumption, and it is due to the fact that the furnace is rated by the manufacturers for heating a much larger building. The advisability of using a large heating apparatus has frequently been pointed out by those who have had the most experience in heating, and it is the exception and not the rule where the heating apparatus has an excess of power over what is absolutely needed. The system has demonstrated its ability to heat a larger house, and if the building were larger the proportion in the system might be nearer to the old rule for rating furnace capacity used by some, which is that 1 square inch of grate area is equal to heating 50 cubic feet of space.

The Plumbing System.

The building is well supplied with plumbing fixtures for the convenience and comfort of the family. The laundry in the basement is shown in Fig. 1, where an intercepting trap is located in a brick chamber with a hand hole arranged for removing any obstruction that might reach it. A fresh air inlet connects with a double Y just inside of the trap and leads out in front of the building to the lawn, where it rises above the ground and is protected by means of a hood. The leader from the front of the house connects with the other opening of the double Y, and in case of heavy rains secures a thorough flushing of the trap and the tile drain outside of the front wall. The drain in the house continues toward the back, receiving a leader from the back of the house and a branch from the lavatory in the back hall on the first floor. At the back of the basement it receives the waste from a three-compartment laundry tray, the waste from the sink in the butler's pantry and a connection from a wash out closet in the basement, as shown in Fig. 4, which is an elevation showing the waste and vent piping.

The main soil stack rises as shown, receiving the waste from the kitchen sink, and continues to the second floor and receives independently the waste from the siphon closet, a lavatory and the bathtub. Continuing to the third floor it receives the waste from the sink and then continues through the roof. The traps to all the fixtures are ventilated, all the vent pipes being carried above the fixture and then over to the main vent pipe, as shown, with the exception of the vent from the lavatory in the first-floor hall, which is run alongside of the chimney independently through the roof.

The main vent stack, after receiving the vent pipes from all the different fixtures, connects with the soil stack above the highest fixture, where the soil pipe is enlarged and is carried through the roof. By this means any fixture in the building may be flushed without endangering the seal of water in the traps of the other fixtures. It further allows a free circulation of air through both the waste and vent pipes, by this means

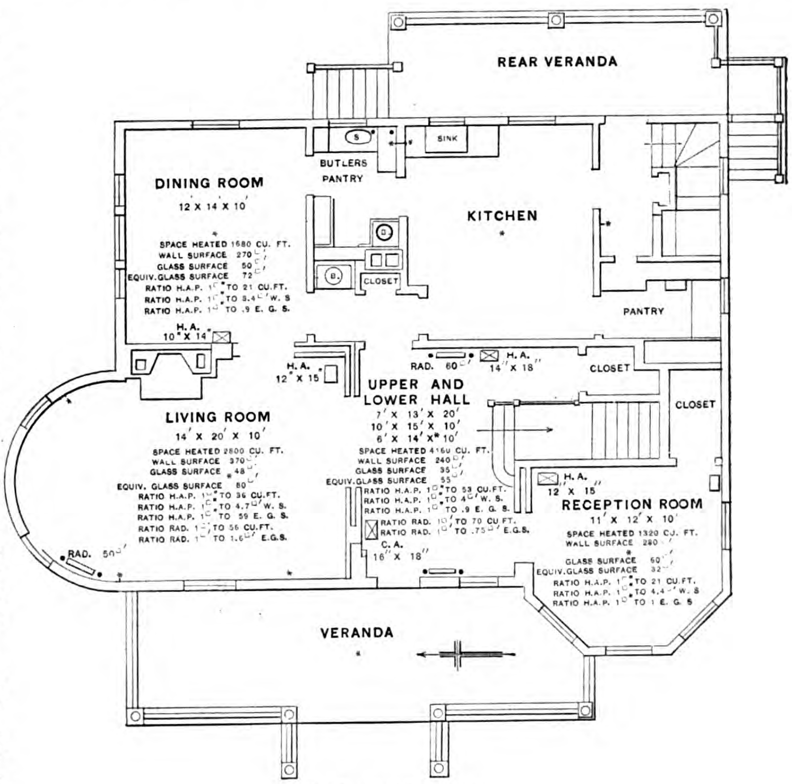


Fig. 2.—First Floor-Plan.

Heating and Plumbing a House.

allowing the gases to escape which would otherwise congregate and have a deleterious effect on the lead and iron pipe.

Scaling of Paint from Plaster.

A writer in one of the London architectural papers says that the remedy for preventing scaling of paint from plaster is to saturate the plaster with a solution of wax in some volatile hydrocarbon, such as naphtha, paraffin, or benzine, so as to fill up the interstices in the plaster with a water repelling substance. By such a course, water will not be imbibed either from the surface or by capillary attraction. To render the surface suitable for painting on, the wax should be well driven into the interior of the plaster by holding a brazier of coal, or some other source of heat, some little distance from the surface of the plaster. Allow the hot plaster to cool before proceeding to paint it. If the surface of the plaster shows any signs of being powdery, such powder should be well scraped off before proceeding to wash it with a solution of wax.

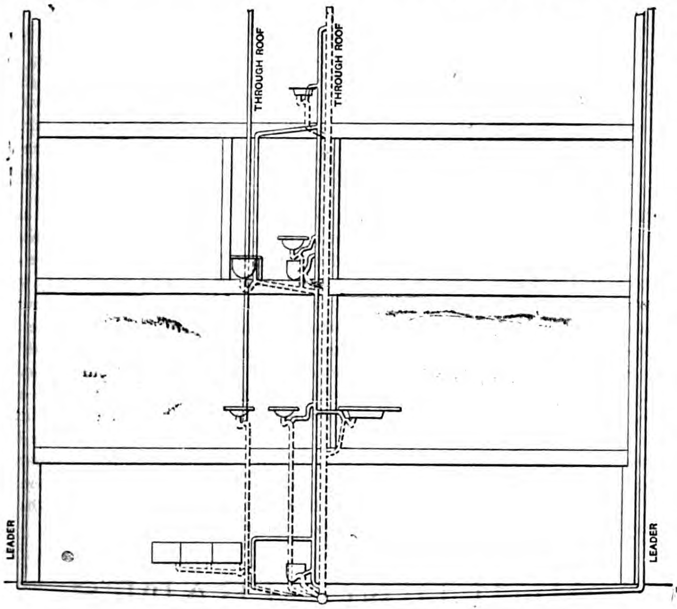


Fig. 4.—An Elevation of the Plumbing System.

A cheaper method of rendering the plaster non-porous is to well saturate it with a solution of hot soap and water in which rosin has been dissolved; thus, dissolve common rosin in a solution of caustic or carbonate soda by boiling, and then mix this fluid with a strong solution of soap and water—about ½ pound of soap per gallon of water; well brush this into the plaster with a big brush, using it hot. Another plan is to saturate the plaster with soap water, and when that has partially dried, lay on a solution of sulphate of iron (green copperas), sulphate of copper (blue copperas), or sulphate of alum and potash (common alum); the effect of any one of these chemicals is to convert the soap into a sebate of the metal (iron, copper, or aluminum, as the case may be), which is insoluble in water; consequently, by this means, the pores of the plaster are filled up with a water repellent material, and thereby the plaster becomes rendered proof against the imbibition of water from any source. Another process for rendering plaster proof against absorption of water is to saturate it with a solution of iron, copper, or alumina sebate in turpentine. Such sebate is made thus: Make a strong syrupy solution of soap in water, and also a saturated solution of either of the above named chemicals (*i. e.*, green or blue copperas or alum) in water; mix the two solutions and collect the flocculent precipitate that falls down, wash this precipitate with water once or twice, and then dry it, and when dry or free from moisture dissolve it in hot oil of turpentine. This is the fluid required for saturating the plaster with. It will render the plaster as hard and endurable as stone, and gives a splendid surface for painting on. The last three processes can be used equally as well on brick, stone, tiles, and any porous materials as on plaster. They are much superior to silicate paints, which only disintegrate in course of time and crumble off.

A CURIOUS state of things was discovered the other day by the city works officials of Dayton, Ohio, when investigating the electrolysis of water pipes. It was found that stones and pebbles near the pipes were in some places electro plated with the metal of the pipes.

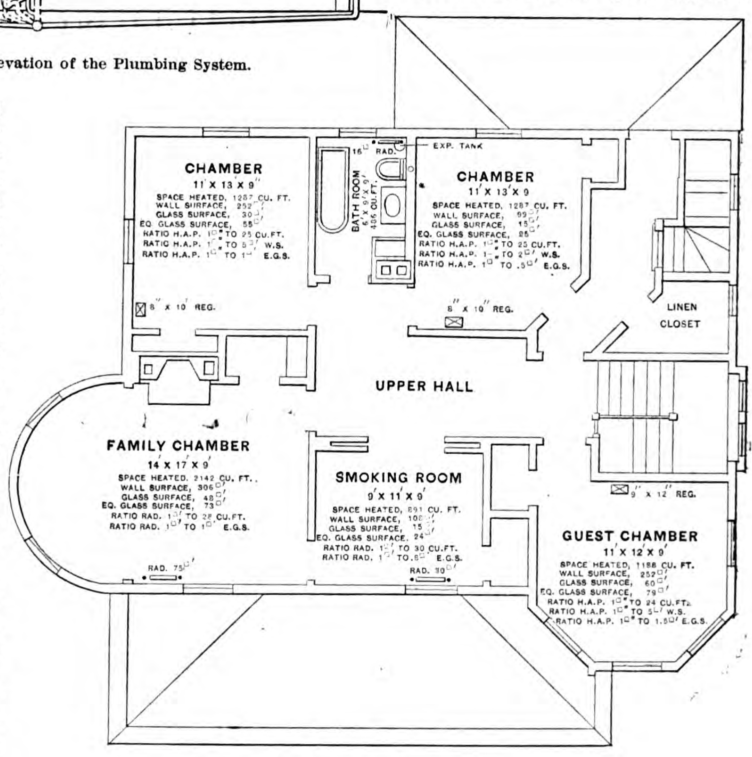


Fig. 3.—Second-Floor Plan.

Heating and Plumbing a House.

EFFECT OF FREEZING ON CEMENT MORTAR.

SOME interesting experiments have been made by A. C. Hobart, Fellow in Civil Engineering, University of Illinois, showing the effect of freezing on cement mortar. The phenomena incident to the freezing of freshly mixed cement mortar having already been investigated with tolerable thoroughness, Mr. Hobart devoted himself mainly to the study of such mortars which were frozen only after setting had begun. In order to secure uniform conditions, he obtained the use of a room in a cold storage warehouse, where a constant temperature was maintained of about 20 degrees F., and the briquettes of cement, of various kinds, were removed to this room after a definite period had been allowed for setting in the rooms of the Enginering Laboratory.

The cements experimented with were all of sorts not much used in the East, the natural brands being Clark's Utica, Louisville Black Diamond, Louisville Star and Akron; while only two Portland cements were used, Saylor's and Dufossez's. With all these, freezing immediately after molding caused loss of strength, and where frozen in contact with water, total disintegration; but where the briquettes were allowed to set before freezing the result was very different. In the case of the natural cements, where the briquettes were allowed to set for six hours, or, in some cases, less, and then frozen, it was found that the strength, instead of being diminished, was greatly increased, such briquettes, after careful thawing, resisting a greater tension than similar briquettes of the same age which had not been frozen.

Mortars made with 2 parts sand to 1 of cement were more favorably affected than the one-to-one or the neat mortars, the Louisville Black Diamond briquettes, mixed 2 of sand to 1 of cement, allowed to set for two or three hours only, showing, after freezing and subsequent thawing, a resistance about three times as great as that of similar briquettes, made at the same time, and tested at the same time, but not frozen meanwhile. It is curious that the same mortar, if allowed to set for several days before freezing, gained much less by the process, but even after 14 days' setting freezing added something to the strength. With Portland cement there was no gain by freezing in any case, and, generally, a considerable loss, but the loss in strength was less when frozen after 24 hours' setting than after six hours, and mortars made with a considerable proportion of sand lost, proportionally, much less than neat cement.

The conclusions which Mr. Hobart draws from the experiments are that cement mortars, made either with natural or Portland cement, if frozen in the presence of water, are likely to be disintegrated and destroyed; but that, if extraneous moisture is kept away from them, natural cement mortars, if allowed to set from three to six hours, are improved by subsequent freezing; while mortars of Portland cement, under such circumstances, lose strength, particularly when mixed with a large excess of sand. Moreover, while mortars of natural cement usually suffer a slight surface disintegration by freezing, although the total resistance of the briquette is greatly increased, briquettes of Portland cement mortar show no change on the surface, although their strength may be almost entirely destroyed.

LAW IN THE BUILDING TRADES.

DEFENSE AGAINST SUIT FOR COMMISSION ON CONTRACT.

In an action against a contractor to collect a commission by one claiming to have assisted him in securing the contract, the fact that the contractor based his bid upon statements fraudulently made by the claimant, which caused the contractor to take the contract at a less price than he would otherwise have done, is a proper matter of defense.—Lake *vs.* Weber, 6 Pa. Sup. Ct. Rep., 42.

UNREASONABLE USAGE AS TO MEASUREMENT.

A usage that the whole price of stone, sold at a certain price per cubic yard, is to be computed by measuring the stone after it has been laid in the wall, is unreasonable, when the result of such computation would be to double the quantity of stone actually sold.—Rogers *vs.* Hayden (Maine), 39 Atlantic Rep., 283.

WHEN CONTRACTOR CAN RECOVER ON CERTIFICATE OF ARCHITECT.

Where a contractor sued on a certificate issued by the architect, as provided by the building contract, the owner of the building could not impeach the issuance of the certificate by showing record of a suit in equity against the architect by such owner, unless it was shown also that the contractor had notice of the suit.—Davis *vs.* Gibson, 70 Ill. App. Ct. Rep., 274.

CONTRACTOR COMPLYING WITH SPECIFICATIONS NOT LIABLE.

Where a building contract requires the building to be erected according to the plans and specifications of the architect, and the iron work put in according to such specifications is insufficient to support the part of the building intended to be supported by it, the contractors are relieved of the absolute obligation to complete the work.—Murphy *vs.* Liberty Nat. Bank (Pa.), 39 Atlantic Rep., 143.

WHEN CONTRACTORS WILL NOT BE RESPONSIBLE FOR DAMAGE

A building contract provided that either tile or improved make of concrete might be used for fire proofing, and that bids should state what material is contemplated. The contractors named tile as their material, and they used tile in which there was no defect. Arches in which such tile was placed fell, through no fault of the contractors, and the owner had others put in other material. The court held that the original contractors could recover.—Murphy *vs.* Nat. Bank, 39 Atlantic Rep., 144.

AN ARCHITECT CANNOT VARY TERMS OF CONTRACT FOR BUILDING.

Under a clause in a building contract providing that "should any difference arise respecting the true construction of the drawings or specifications, the same shall be decided by the architect, and his decisions shall be final and conclusive," the architect cannot vary the terms of the contract, and his decision that the builder need not furnish a heating apparatus called for by the contract is of no force.—Mallard *vs.* Moody (Ga.), 31 S. E. Rep., 45.

A provision in a building contract that "any questions that may arise as to the true intent and meaning of said plans and specifications" shall be determined by the architect does not authorize him to decide a disputed method of measurement of the bricks used in the walls.—Walker *vs.* Syms (Mich.), 76 N. W. Rep., 320.

WHEN CERTIFICATE IS UNNECESSARY.

A contract provided that a builder should be paid on producing an architect's certificate that the work had been satisfactorily performed. The architect was satisfied with the work, but arbitrarily refused to give the certificate. The court held that the builder could recover without producing the certificate.—Terra Cotta Company *vs.* Sharp, 7 Pa. Dist. Ct. Rep., 544.

WHEN OWNER NOT LIABLE TO SUBCONTRACTOR.

A building contractor employed another to do the plastering. The plasterer told the owner of the premises that he would not do the work unless the latter would pay him, as he did not think the contractor good; and the owner said he would pay the plasterer if he did the work. The court held that unless the plasterer's agreement with the contractor was abandoned, the promise of the owner was collateral to it and void under the statute requiring certain contracts to be in writing.—Wilhelm *vs.* Voss (Mich.), 76 N. W. Rep., 308.

WHEN CONTRACTOR CANNOT RECOVER.

Where the contractor admits and the evidence shows that there has been no substantial compliance with the contract, and the owner has suffered damages, a verdict for the contractor for the balance of the contract price will be set aside.—Charlton *vs.* Rose, 46 N. Y. Supp. Rep., 1073.

CORRESPONDENCE.

Covering Shingles with Galvanized Iron.

From F. and H., *Brookville, Ind.*—In reply to "G. A. R.," Illinois, whose letter appeared in the January issue, we do not consider a tight sheathing as absolutely necessary to a standing seam roof to give satisfaction. We know tinners as well as carpenters do not like tight sheathing on such roofs, because of extra care required to maintain a footing. We, however, believe tight sheathing to be cooler, especially when paper is also used under the tin. As to laying a metal roof over old shingles, we find the objections to be, first, inability of nail to hit the sheathing every time; also lack of finish and proper fastening at drip.

Truss for Self Supporting Roof.

From J. W., *Hubbard, Iowa.*—I notice, according to the letter of "C. K. S.," Wayland, Iowa, in the December issue, that his request has not been altogether gratified, and as I erected a hall here the past season for the I. O. O. F. Society, measuring 36 x 70 feet in plan, I send a sketch of the rafter used. We placed the rafters 16 inches on centers, the main room in the building being 47 x 33 feet 8 inches, with 16-foot ceiling, finished. The parlor and anteroom, occupying the balance of the space, were 14 feet high, this part having partitions to support the ceiling and roof, so that really the long rafters were not necessary. The roof over the main hall is as solid as a rock, and I believe would hold up several times as much as is required of it. When made, these rafters had 2¼-inch camber, and I believe they have it yet. One thing must be borne in mind in making a roof of this kind, and that is to make good close joints. Keep the camber the same, and don't spare the nails. Do not take up less than 3 feet for the shallowest rafter. The sketch which I send, and which is shown in Fig. 1, represents one-half of the truss employed.

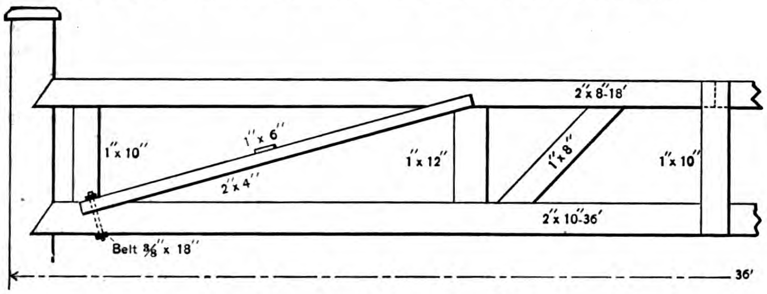


Fig. 1.—Half of Rafter as Employed by "J. W"—Scale, ¼ Inch to the Foot.

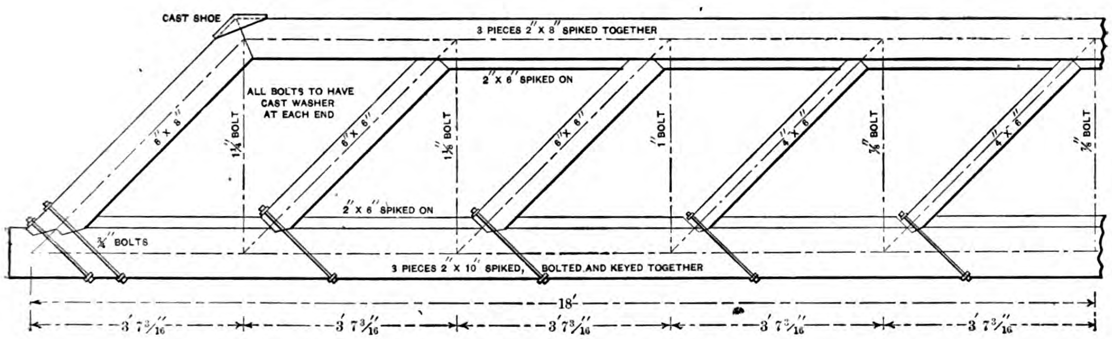


Fig. 2.—Half of Truss as Suggested by "A. A. M"—Scale, ⅜ Inch to the Foot.

Truss for Self Supporting Roof.

From A. A. M., *Elmira, N. Y.*—Having been a reader of *Carpentry and Building* for the last 12 years, and having gained much valuable information therefrom, I venture to send drawing of a truss design for the benefit of "C. K. S.," Wayland, Iowa. Half of the truss is shown in Fig. 2, from which it will be seen that the upper chord is made of three pieces of 2 x 8 spiked together, while the lower chord is made of three pieces of 2 x 10 spiked, bolted and keyed together. The roof joist are 2 x 10, covered with ⅞-inch hemlock and tin, while the ceiling joist are of 2 x 8, plastered underneath.

Information Wanted About a Plug Cutter.

From A READER, *Denver, Col.*—Can any of the readers of the paper tell me where I can get a plug cutter which bores the hole for the plug and screw, and by removing the bit slides a cutter down to cut the plug? A man by the name of Jenks, I believe, was the inventor, and had the device patented, but he died not long after. He lived in the town of Dansville, N. Y. I have never been able to find the device on the market.

Note.—We are not familiar with the tool to which our correspondent refers, and therefore lay the inquiry before our readers for their attention.

Splicing Rope.

From C. W. B., *Reading, Pa.*—I have been a reader of *Carpentry and Building* for some time, and have obtained much useful information from its columns; but I now want to ask some of my fellow readers to explain through the Correspondence department the best way of splicing a rope—that is, to make an endless rope such as is used in connection with dumb waiters and for all kinds of uses like rope transmission for machinery. I want the splicing to be done in such a way that the rope will retain its natural thickness, and thus pass freely through the pulleys.

Roof for an Armory.

From A MAN FROM NORTHERN OHIO.—I am about to erect for a military company here a frame building 44 x 100 feet in size, with 14-foot posts and shingle roof, but do not know how to construct the roof without having posts in the center of the hall, which would, of course, interfere with drilling, as the structure is to be used as an armory. I would like some advice in the matter, and would ask the subscribers to tell how to build the roof as cheaply and in as substantial a manner as possible.

Note.—Our correspondent will require for his building a truss roof, various forms of which may be made to serve the purpose. The question affords an excellent opportunity for our practical readers to show the way in which they would execute the work, and we lay it before them for their early attention.

Lengths and Cuts of Rafters for Porch Roof

From W. W. BRINTON, *Kansas City, Mo.*—I send by to-day's mail sketches which will, I think, give the information desired by "D. R.," St. Thomas, Ont., and may be of interest to others. In Fig. 1 is shown the position and lengths of valley, hip, jack, cripple and common rafters. The plumb cuts are found at G, I, K and L, and are also drawn above these letters in Fig. 2. The dotted lines in Fig. 1 represent the rafter drawn to a scale of 1½ inches to the foot, and may be drawn full size on the roof plan.

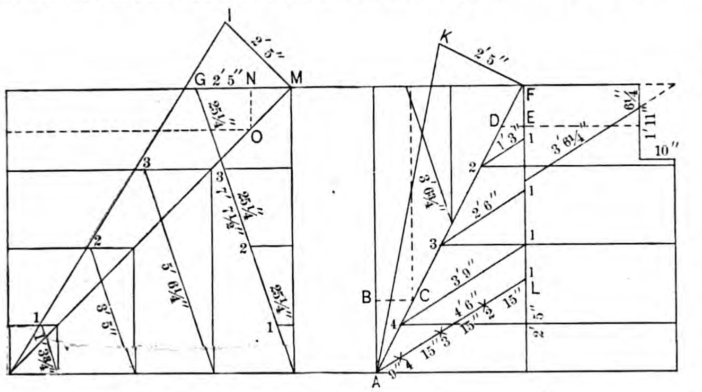


Fig. 1.—Plan of Roof.—Scale, ¼ Inch to the Foot.

The dotted lines in Fig. 2 are obtained from Fig. 1, as the distances from A to B, D to E and M to N. In Fig. 2 draw dotted lines parallel to the plumb cuts, and at the distances shown by corresponding letters in Fig. 1. The rafters are 2 feet on centers. In order to get the lengths of jacks measure on the square from 24 inches, the run in 2 feet, to 8 inches rise in 2 feet, which gives 25¼ inches as the difference in the lengths of the jacks. Now take 25¼ from 7 feet 7½ inches, the length of the common rafter, and of the longest jack, and we have 5 feet 6¼ inches as the length of the next jack, and as found at 3 and 3, which shows the length by both methods.

The lengths of the cripples are found in the same manner as the jacks. The difference in the length on one side will be 15 inches and the short cripple on the other side will be 3 feet 6¾ inches, all as shown. The plumb cut at the ridge or wall will always be the same at the valley, also from a hip to a valley. This will answer "J. M. S.," Paterson, N. J., whose communication I somehow overlooked until a short time ago. This method will work on any pitch, and the seat of hip or valley may be at any angle.

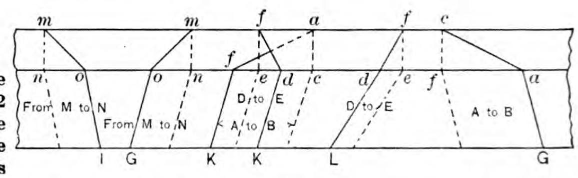


Fig. 2.—Rafter, Drawn to a Scale of 1½ Inches to the Foot.

Lengths and Cuts of Rafters for Porch Roof.

Trimmings and Fixtures for Tool Chest.

From VIRDER, *Illinois.*—As a subscriber to *Carpentry and Building*, I wish to be informed where I can secure trimmings and fixtures for a tool chest.

Note.—Our correspondent fails to sign his letter of inquiry, so that we are unable to communicate with him direct for the purpose of ascertaining more specifically the kind of trimmings and fixtures he desires. We take this occasion, also, to reiterate what we have often suggested in these columns, and that is that all letters of inquiry should carry the names and addresses of the writers, not necessarily for publication, but for the purpose of enabling the Editor to reach them by personal letter in case such a course should prove desirable. With regard to the inquiry of our correspondent above, we should suppose that any first-class hardware house would be in a position to supply what he requires.

Framing a High Building with Short Posts.

From J. M. B., *Monroeton, Pa.*—I think the roof illustrated and described by James F. Hobart and published in the January issue was designed by C. C. King, C. E. and D. W. King, architects, and erected by J. B. King & Co. of New Brighton, Staten Island, as a cheap way of housing stone from the weather before grinding it. I think the matter was published in *Building* in October, 1884.

Making Walls of Frame Buildings Vermin Proof.

From PROSPECTIVE HOME BUILDER, *Troy, N. Y.*—In a house recently built here the space in the wall between the clapboards and the lath is open down to the top of the cellar walls. Standing in the cellar one may see the opening upward, and all there is between outdoors and the cellar is the clapboards and the sheathing. In what way can this form of building be improved upon? Do builders ever fill in the space between the floor beams and the top of the foundation walls?

Answer.—This space is usually filled in, especially if the house is well built and it is desired to keep rats and mice from going between the studding, as well as between the floor joists. This can be accomplished in a variety of ways, and we shall be glad to have our practical readers describe the methods which prevail in the communities where they reside. We would suggest in this connection that if the building has an under floor the boards could be extended close against the outside sheathing, or in case there is no under floor the finished flooring, if laid before plastering, could be extended in the same way. Another plan is to fill the spaces with two or three courses of brick and mortar or with mineral wool, the latter being a very efficient article for the purpose. Still another method is to cut in between the studding a piece of 2 x 4 scantling so as to effectively close the space.

Seating Space in Halls.

From W. T. T., *Onaga, Kan.*—I wish the Editor would state in the Correspondence department of the paper the amount of floor space required to a person in an audience hall—that is, the average floor space per head to seat an audience comfortably—also the space required for aisles.

Answer.—There seems to be no universal rule covering the question raised by our correspondent, as very much depends upon the circumstances of the case. As a general thing, the following figures are regarded as meeting average requirements. For halls it is considered that 18 inches front and 24 inches depth is sufficient space for a seat for one person, though in cases of emergency this might be reduced to 15 x 20 inches, but it would

COTTAGE FOR MISS E. MAY STEVENS, AT CAMBRIDGE, MD.

GHEQUIER & MAY, Architects.

SUPPLEMENT CARPENTRY AND BUILDING, FEBRUARY, 1899.

necessitate some crowding. Very much, of course, depends upon the style of seat used, for if orchestra chairs are employed the space can be contracted, while if wooden seats, benches or pews are provided the full dimensions named should be employed. A method often followed by architects is to find the square feet of floor space and divide it by 5, this giving the approximate number of people that may be comfortably seated in the room. In this case the 5 is understood to represent the square feet allowed for one person with his proportion of the space for aisles, the latter often varying in width according to circumstances. It is probable that some of our readers may have made use of other figures in matters of this kind, and we shall be glad to hear from them on the subject.

Details of Plank Frame System of Construction.

From JOHN L. SHAWVER, *Bellefontaine, Ohio.*—Referring to the inquiry of "F. P. M.," Florida, N. Y., in the January issue of *Carpentry and Building*, I would say that it is no unusual thing for people to doubt the desirability of a plank frame barn when they have never seen a frame of this kind. Indeed, I should think it strange did people not object to it at first. Most people are inclined to find fault and criticise new tricks in their own trades, but there is one gratifying feature about the plank frames, and that is that though people will have a great deal of sport at the expense of the man who is the first to build such a frame in any given neighborhood, they come around soon or late and admit that it is a pretty good thing, while the next man who builds will, in nine cases out of ten, erect a plank frame. Although I might fill several pages in elaborating upon the merits of the system, it would probably do little good. The letters from people who have built plank frame barns show the satisfaction which they have given under all circumstances.

I would like to caution those who do not fully understand the system to be extremely careful not to build barns of plank and omit to guard against every possible strain. Some have gathered a few ideas of the system from conversation or newspaper mention and have built barns, with the result that not being properly braced, or supported, the roof has sagged, the sides bulged out, or the ends have given way. See to it that each piece of timber is placed in its proper position, that the braces are put where they are effective, and that no weak spot is left without reinforcements provided for the emergency, which, though it may never come, would endanger the stability of the frame. But now a few words for the benefit of the subscriber who is fair enough to say he believes the plank frame has its merits.

In making the sills of the superstructure I usually employ three planks, each 2 x 8 or 2 x 10. These I set on edge, never on the side, as some would have it. These sills are interspaced by the lower ends of the posts, and also splicing blocks when necessary, as illustrated in Fig. 1 of the accompanying sketches. The posts are sometimes filled out by using a 2 x 4, a 2 x 6 or a 2 x 8 in the space between the two planks, but this is not necessary unless the barn is quite large or one having a slate roof. In Fig. 2 is shown the main plate. First make a box plate of 2 x 8 plank in pairs of sufficient length to reach from bent to bent. These are spiked together with No. 60 spikes and inverted over the tops of the posts. One inch, 1½, or in large barns 2-inch plank, 10 inches wide, are then spiked on top of these and the joints broken as shown. When thus put on the entire plate becomes one united whole, and is stronger than any carpenter is likely to make of square timber by ordinary scarfing. In Fig. 3 is shown the manner in which the purlin plates are constructed, A A being the purlin posts, 2 x 10 inches; B the roof support, also 2 x 10 inches; C the purlin plate; D the coupling, 2 x 10 inches by 6 feet, and E E the braces, 2 x 6 inches. The plank are always placed at right angles with the line of resistance, bringing the weight upon the plank edgewise. The foot of the brace E does not therefore connect with the purlin post, but with the subsupport, which is usually 3½ or 4 feet below the main roof support. This is shown in Fig. 4, where C C represent the purlin plate, with the coupling omitted. The foot of the brace E is secured at the point F. Some of the first carpenters who thoroughly master the details of this system soon build up a special trade in barn work in their locality, and are able to command double the wages usually secured for plain work.

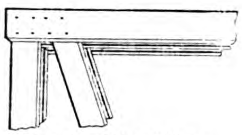


Fig. 1.—Sill and Posts.

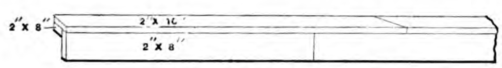


Fig. 2.—Main Plate.

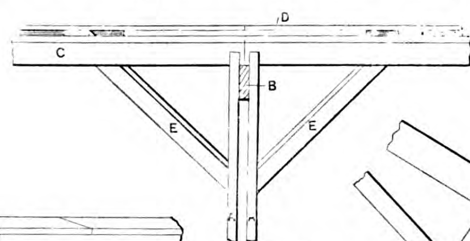


Fig. 3.—Purlin Plate, Showing Manner of Connection.

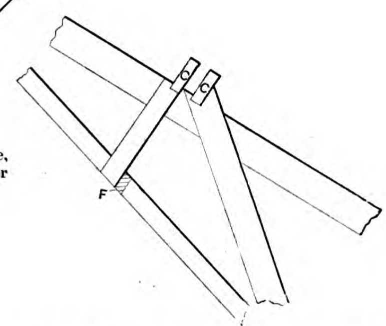


Fig 4.—Side View of Purlin Post and Framing.

Details of Plank Frame System of Construction.

Design for Planing Mill.

From G. McG., *Canonsburg, Pa.*—I would like to ask through the columns of the paper for the plan of a planing mill, either of brick or steel frame, so it can be covered and sided with the same material.

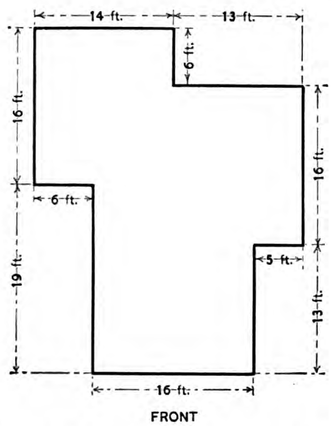
Note.—Will those of our readers who have had experience in this line of work forward sketches of some of the buildings they have erected ?

Some Questions in Furnace Heating.

From C. G. S., *Westerly, R. I.*—In response to "W. B." of Bridgeport, Conn., asking for a "little assistance," I am led to the conclusion that his case, as described and illustrated, needs not "a little" but considerable assistance, and a good medium with which to apply a portion of it would be a No. 10 boot, following the direction of the person who installed the plant. The unscientific construction and location of the present conduit suggests nothing but its abandonment, after which "W. B." should procure a good coil or other water heater and place it in his furnace; then with a few feet of pipe connect the same with a tank and a radiator in the room he has attempted to heat. He will then be able to make that room the warmest one in the house, and save enough in two years to pay the cost of the change. I can conceive of no excuse for exposing over 20 square feet of flue surface to outside temperature. If there was no place to carry the flue up to the second story inside the house, the inside of the chimney would have been a most excellent place, and could even now be used if it is especially desirable to have fresh heated air instead of a radiator in the room.

Roof Plan Wanted of One-Third Pitch.

From A. S., *Lancaster, Ill.*—I inclose sketch of floor plan for a two-story house, and would be very much pleased if some of my brother carpenters would give suggestions as to the method of putting a one-third pitch



Roof Plan Wanted of One-third Pitch.

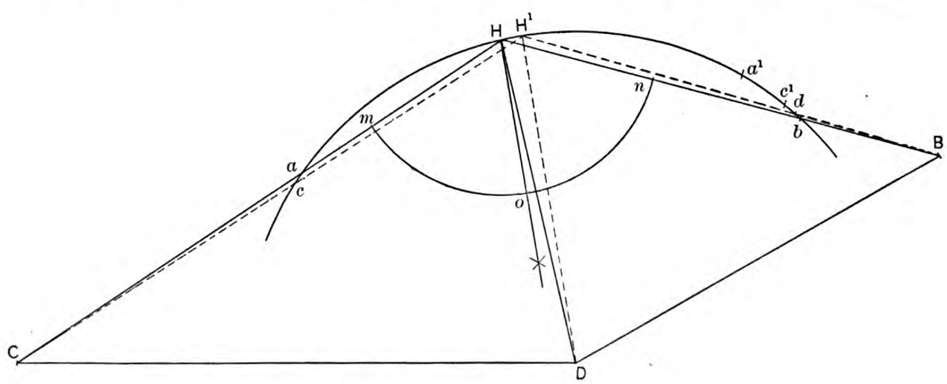
roof on the house. I am a reader of *Carpentry and Building*, and would like to see this published and answered at once.

Truss for Dredge Boat Crane.

From TRIANGLE, *Champaign, Ill.*—I submit for consideration a solution to the problem of the dredge boat crane, presented by "F. O." of Amana, Iowa, and which appeared in the October issue of *Carpentry and Building*. While I believe the problem may be accurately solved, this solution, though really only an approximation, is, nevertheless, sufficiently accurate for all practicable purposes, and has the advantage that it may be accomplished by ordinary drafting methods in the following manner: In the accompanying diagram C, D and B represent the fixed points, as given in "F. O.'s" original sketch. From the point D, with a radius equal to the length of the king post D H, first describe an arc, *c b*, as shown. Upon this arc assume any point, as H, as its probable correct position, and draw H D, representing the king post; also draw H C and H B, representing the guy ropes. An inspection of the diagram will now show that, since the chord H *a* is less than the chord H *b* (A H being radial), the angle C H D is greater than the angle B H D, the problem being to equalize these angles. From H as a center describe an arc, *m n*, as shown, cutting the lines of the ropes in the points *m* and *n*. Next bisect the arc *m n* by any regular method, obtaining the point *o*, and draw the line H *o*. Now from the point D, and parallel to H *o*, draw the line D H^1 (representing the king post in its corrected position), cutting the first arc drawn at the point H^1, and finally draw H^1 C and H^1 B, representing the ropes in the positions occasioned by the shifting of the king post.

It will be discovered upon inspection that while H^1 D is drawn parallel to a line which bisects the original angle at H, it does not bisect the angle C H^1 B, because as the top of the king post travels from H toward H^1 the angle at its right decreases faster than the angle upon its left increases, for the reason that the line H B is shorter than H C. The angle D H^1 B is consequently still somewhat smaller than D H^1 C, and, therefore, requires further correction. To ascertain the approximate degree of correction obtained, first transfer the distance H *a* to the other side of the arc, as shown by H a^1; then a^1 *b* will represent the amount of original error. Next transfer distance H^1 *c* to the other side of the arc, as by H^1 c^1, when the distance c^1 *d* will represent the amount of the remaining incorrected error, which, by measurement, proves to be approximately one-sixth of the original error.

Should it be desirable to make further correction, the foregoing operation may be repeated, using the point H^1 as the center of another arc for bisecting the angle C H^1 B in the same manner that the arc *m n* was used to bisect the original angle at H. As the first operation corrected five-sixths of the original error, so the second operation may be assumed to correct five-sixths of the error remaining after the first operation, thus leaving one-sixth of one-sixth, or one thirty-sixth, of the original error, uncorrected. Whether this remaining error is more or less than one thirty-sixth is of little consequence, as, should it be found to be appreciable, the operation of correction could be performed a third time, thus reducing the error to about one two-hundredth of its original proportions. The operation could be repeated as many times as space to draw the lines would permit, depending on the size of the work.



Truss for Dredge Boat Crane.—Solution Presented by "Triangle."

Iron Roof Over a Shingled Roof.

From J. W. W., *Bladen, Neb.*—Will some of the readers of the paper tell me the best way to fasten an iron roof over a shingled roof and not remove the shingles at the bottom where they extend over the fascia? What puzzles me is to fix it so it will run into the eave trough.

Trouble with Loose Blind Slats.

From J. M. B., *Monroeton, Pa.*—I would like to ask the readers of *Carpentry and Building* if any of them have a remedy for loose slats in common rolling slat blinds—that is, where they are worn out from use and as a consequence rattle.

THE FLOORS OF OUR GRANDFATHERS.

COMMON as is the word flooring, and as simple an every day article as it is, there is still more or less lack of information, as well as misinformation, regarding it. The floors of our grandfathers in this country were of the simplest kind. Probably the first following the use of the original ground were made of what were familiarly called puncheons, or small trees split through the middle, hewed rather roughly on the split sides, with the edges trimmed somewhat so as to make them lie closely together without too much of a crack between, and which were either bedded in the soil under the house or laid with the ends upon the sills, gains being cut at the ends when necessary to make them all of the same hight. This was a floor that was a floor and would last as long as the logs or hewn timbers of which the house was built. It is quite probable that the first oak floors used in this country were made from the split logs as here described, as oak was usually easier split than the soft woods and would last longer near to or in contact with the ground, as the floor was usually placed.

I have in mind, says O. S. Whitmore in a recent issue of the *Woodworker*, a house still standing in New England, built fully 200 years ago, of square hewn oak timbers on a stone foundation, well raised from the ground and with a well ventilated cellar underneath the entire house, which has just such an oak floor as is here described, except that very straight grained logs were selected, which were split into three pieces instead of two, the middle piece having two cleft sides. This house was of considerable pretentions for the time, having three large square rooms, the ground plan being in the form of an L. There was also quite a comfortable, roomy attic in the high hip roof, which was lighted with gable and dormer windows. All the floors in the house were made of split oak logs, both upstairs and down. Under the middle of each floor ran a heavy square oak beam to stiffen the middle of the puncheon. The lower floor was made of the logs just as they were split, with one of the middle sections to two of the slabs or outer sections of the logs. They were all very nicely jointed together and were hewn at the ends and through the middle where they rested over the sills and center beams, so that they laid perfectly flat and level. My impression now is that, after being carefully edged and jointed, these hewn pieces of flooring were halved together or else the edges were plowed, as it was called in those days—that is, there was an inch wide groove made in the edge of each piece and a portable or separate tongue, made of soft wood, probably pine or basswood, was driven into the groove on the side of the first slab laid, with the groove of the next one forced over the strip until a close joint was made. This made the floor as snug and tight as any modern dressed and matched floor laid without an under floor, and even tighter and much better.

Grooving the Boards.

This was the primitive method of making matched flooring. I know of many houses built in the colonial days in New England, New York and Pennsylvania with similar floors. It may be said here in connection with this subject that this same method of making matched flooring, or, as it was then called, tongued and grooved flooring, was used long after saw mills were built in the New World and sawed boards or planks were used instead of the split puncheons. For a long time after the advent of the saw mill the sawed flooring boards were made 2 inches or more in thickness to allow the use of the heavy tool employed for making the groove. This tool was called a plow, which was simply an extra heavy wooden block plane with a narrow chisel bit in the center, the planer block having a deep lip on one side which set down over the edge of the piece to be plowed to act as a guide. The work of operating this plow was so heavy that there was a staple in the front end to which a rope was attached, and often one or two men would take hold of this rope to help pull it, with another man to hold the plane handle to act as guide, the tool being pushed and pulled the length of the board as a plow is driven through a field. This same implement was used for different purposes, such as plowing a groove in the sill and an opposite one in the plate of a house, the studding and the girts being set in 2 inches from the edge of the sill, the boarding of the house being put on perpendicularly, the groove in the upper plate being twice the depth of the one in the sill, so that the boards could be shoved up far enough to allow the other end being set over to drop back into the groove in the sill. A few hand made wrought iron nails would be driven through the middle of the boards into a single girt to stiffen them and keep them from slipping out of place, with perhaps occasionally one driven through the lip of the sill or girt. Not infrequently a horse was attached to the plow, instead of the extra man or men, as the labor was so exceedingly hard and tiresome. This allowed a thick chip to be taken out and much more rapid work than if all done by hand power. In the old house where I was born in New England there are still stored away as curiosities two of these old plows, one of them a mammoth concern with an iron guiding lip and with a strong iron strap clear around the wooden part, terminating in a staple in front, to which a horse was always attached when it was in use. These toools, with some others equally antique, including pod augers, hand saws and a pit saw, were the properties of my great-grandfather, who was one of the leading carpenters and builders of his day in New England.

In the house, the floors of which I have partially described, I will say further that the attic floors were made entirely of flitches split from the middle of oak logs, which, if I remember rightly, were nearly all of the common red species of the Northeast. None of the slab pieces were used in this upper floor, but all were split to about a uniform thickness of 4 inches. They were very straight and were hewn to an even thickness at the ends and through the center, so as to lay perfectly flat upon the beams on which they rested. After they were laid and pinned down with dry chestnut pins, they were evidently dressed all over on both sides with an old fashioned adz, after which they were apparently further dressed with a hand plane and were then quite as smooth as a modern oak floor. Every piece was grooved and they were put together with a loose tongue. The under side of this attic floor was adzed and afterward hand planed, because it made the ceiling of the room below. Through these rooms ran heavy oaken beams, mentioned before. The plates on which the roof rested projected into the rooms somewhat over the smaller hewn timbers which composed the wall. These old attic floor boards are still in excellent preservation, although, the rooms having been used as sleeping places for several generations, they have become somewhat worn. The split and hewn planks, as I have been told by my grandfather, were laid somewhat green, while the movable tongues were very dry. This allowed the planks to shrink upon the tongues, holding them with a vise like grip and making the floor dust and almost water tight, although the oak planks have shrunk apart somewhat so as to show rather wide cracks in places down to the tongues.

(*To be continued.*)

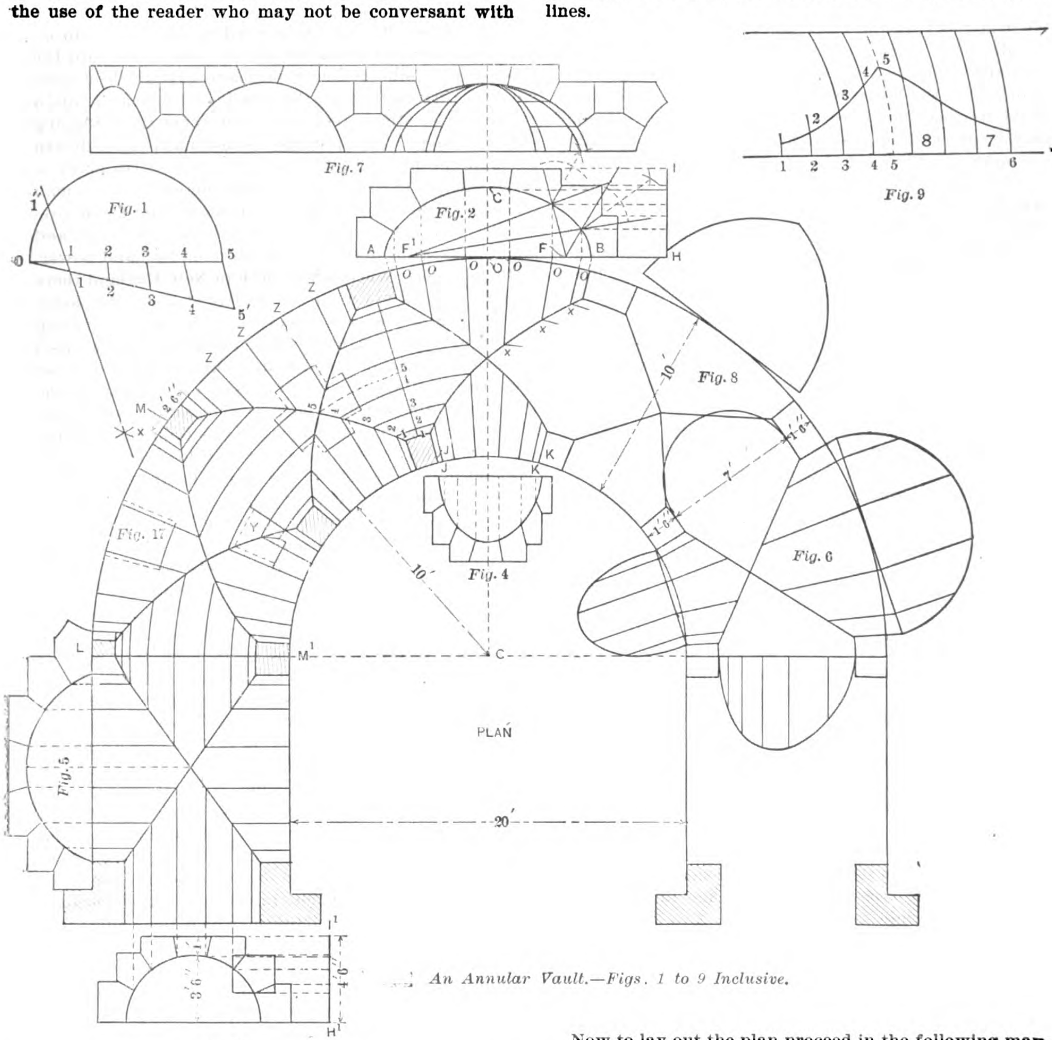
A NEW fire proof building composition, the principal ingredients of which are shellac and asbestos, has been discovered in Germany and patented in this country. The advantages claimed for it are cheapness of raw material, hardness and lightness of weight. It is non-combustible, and can be handled about as readily as wood.

AN ANNULAR VAULT.

IN this issue we take up a ceiling the plan of which is circular, its name being derived from the fact that it is inclosed by parallel curves, making the work more difficult, but at the same time more interesting. This kind of plan can be used for passageways around domes, mausoleums and vaults. It is also shown to a great extent in the plans of old cathedrals, forming a circular aisle around the apse. It is intersected by cross arches, which divide it into several bays.

As there are several problems in geometry used in laying out this piece of work, we will explain them for the use of the reader who may not be conversant with number of parts, and these divisions connected with the center will give the center line of piers, so that their thickness can be laid out on the plan.

The second step is to find the joints of an elliptical arch. In Fig. 2 is shown a semiellipse the transverse axis of which equals A B and the conjugate axis O C. With A C or C B as radius and C as a center establish the points F¹, F on the line A B. Divide the ellipse into the number of arch stones required and connect each of these divisions with lines drawn from F¹ F. Bisecting the angle formed by the intersection will give the joint lines.



An Annular Vault.—Figs. 1 to 9 Inclusive.

them. The first is to divide a line into any number of equal parts, or a line may be divided proportionately by the same method. Fig. 1 is a scale drawing of the inner semicircle of the plan, which we wish to divide into five bays, 0 5 representing the width of nave, which is 20 feet. From 0, at any angle, draw a line of indefinite length, and space off on this the number of parts, which may be of any length. Connect 5 5′, and from 4, for example, draw a line parallel to it. Take the distance 4 5, and space off 0 5′, as shown, which will divide the line into the number of parts required. From 0 and 5 as centers, with the radius 0 5, describe arcs intersecting at *x*. Now from *x* through 1 draw a line prolonged till it touches the semicircle at 1″, then the space 0 1″ carried around will divide the curve into the desired

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Now to lay out the plan proceed in the following manner: Having the dimensions, lay off the width of nave, also the inner semicircle with radius of 10 feet—the distance between the inside curve and outside curve being equal to 10 feet—then with a radius of 20 feet describe the outside curve. Next draw a line parallel to the inside straight line the same width, which will be the width of aisle. Proceed to lay out the bays by the method explained in Fig. 1. When this is done we are ready to work in the detail for the purpose of getting the size of stone and patterns required to work the different stones. On each side of the division lines mark off half the width of outside piers, as shown at M, the whole width being equal to 2 feet 6 inches. To the right of the diagram will be found the other sizes required to finish—namely, the thickness, 1 foot 6 inches, the space between piers in the passage being 7 feet, all as shown.

Fig. 3 is the annular arch and by it we find the size of the arches, Figs. 2 and 4, the sizes being marked on, and the joints drawn from the center need no explanation other than a careful examination to thoroughly understand them. In the square bay it will be seen the lines are the same as a plain groin, the method of working them having been explained in an earlier issue. Fig. 5 is formed by drawing lines from Fig. 3 to touch the groin line plan and raising lines from every point on it, then transferring the hights from Fig. 3, being careful that all points correspond and are in their right places.

Before drawing the annular arch soffit lines we will construct Fig. 2, which is necessary to enable us to find the intersecting points in plan by which to draw the curved line of the groin. Make the line A B equal to the curved line A C B, then O C equal to the hight of Fig. 3. Next draw a true ellipse and find the joints as before explained. The several divisions of the arch will be at every point the same hight as Fig. 3, and can be found by erecting a line perpendicular to A B, as H I, and then taking the different hights of the arch stones from Fig. 3, as shown by a corresponding perpendicular line, H^1 I^1. This will give the developed face patterns which will be used in finding the cutting lines on the outside face stones. Fig. 4 represents the inside developed face patterns, which are found by making the straight line J K equal to the curved line J K immediately above it. Erect perpendiculars at the several hights, making them correspond with the outside face patterns, or H^1 I^1 of Fig. 3.

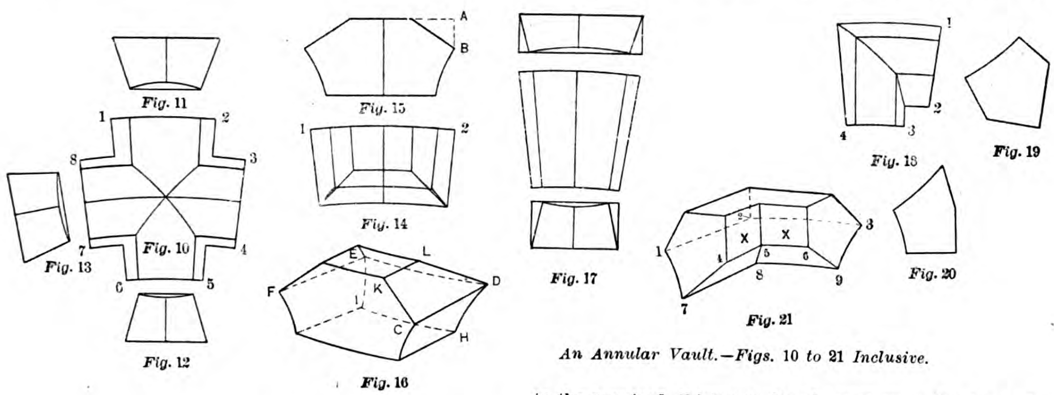
We are now ready to draw the lines on the plan to mark the angle lines and the lengths of stones. From the center of the plan C, with the different radii taken from the line L M^1, draw curved lines around the plan, and from Fig. 2 drop lines to touch the outside face at *o*, *o*, *o*. From these points draw lines to converge to the center C of the plan, and where the lines intersect at *x*, *x*, *x* draw a curve through. The other bays can be done the same way. Divide the lengths of stone to suit, so that they will break joint. Fig. 6 shows a bay with the groin lines straight in plan, which are drawn first, the outside arch being the basis for drawing the inside and cross arches. It will be noticed that the inside arch is stilted or raised to bring it to the same hight as the outside one. The cross section is also the same hight, making a peculiar shape on account of the intersection of the groin lines not being in the center. The working of a bay of this kind is the same as will be explained in the other.

A partial elevation of the outside is shown in Fig. 7. To draw this raise lines from the soffit points Z, Z, &c., of the plan, then the hights taken from H I, Fig. 2, and where they intersect will give the points to draw the soffit lines. To find the joint lines and spacings drop lines from Fig. 2 and locate them on the plan. Raise lines from these points, and from the corresponding points on H I draw lines to intersect, which will be the points of the elevation.

A bay with straight groin lines and meeting in the center is shown in Fig. 8. The annular arch shows a semicircle, but can be a Gothic pointed arch if required. From this we produce the other elevations, keeping in mind that to raise the other face curves all points must be the same hight. It is required in the working of the angle or groin stones to have a developed soffit pattern, the method of making which is entirely different from a straight arch.

In Fig. 9 are shown the patterns of the soffit. Make 1 6 equal the stretchout of soffit of Fig. 3, marking the joint points, as 1, 2, 3, 4, the center line of soffit being 5. From 5 on the developed line make 5 5 equal to 5 5 of the plan of the bay at the left of the center bay and draw the curved line 5 5. Next make 4 4 equal to 4 4 of the plan and draw that curve. Now make 3 3 equal to 3 3 of the plan. From that center draw a curve, and so on with the different soffit lines. After all the curves are drawn take the distances 1 1, 2 2, 3 3, &c., from the plan and transfer them to Fig. 9, as shown. Then draw curve through the several points. The other half is done the same way.

In working the different parts, first take the key which is shown enlarged in Fig. 10. This has all the lines marked upon it, the curved lines of the soffit being notched, so that when it is applied the lines can be marked. The pattern gives the length and breadth, the hight of key and the thickness. Having the stone parallel



An Annular Vault.—Figs. 10 to 21 Inclusive.

to the required thickness, lay the pattern on the top and mark the outside lines. Then cut the joints 1 2, 3 4, 5 6, &c. Draw a square line from the center on each joint, so that the pattern on the soffit side can be properly applied for the purpose of getting the lines in the right place. After all the lines are marked on correctly cut the beds. The annular beds will be conic surfaces.

In order to cut the soffit proceed as follows: First make a developed mold for each end of the cross section, which can be done by following the method of finding Fig. 2. Find the stretchout of 1 2 and 5 6, then raise a pattern equal to the hight of key, as shown in Figs. 11 and 12. The mold for the annular end is taken from the key of Fig. 3. The next work will be the double springer of the outside. Let Fig. 14 be an enlarged plan pattern for the stone, with all the lines marked upon it. Fig. 15 is the developed face pattern taken from Fig. 2, while the sketch, Fig. 16, shows the stone in a finished state. First work the bottom bed good and true, then apply the plan pattern, marking on all the lines required; next the curved face 1 2 and scribe the center line upon it. Apply the face mold, Fig. 15, making the center line come over the center line on the stone and the bottom flush with the bottom bed, then work to the hight. Apply the plan pattern and scribe the lines thereon. Now work drafts around the stone the distance A B from the top, as in Fig. 15. Upon the drafts scribe a hard line, as C D, D E, E F of Fig. 16. These lines being marked we next work the soffits. The annular side is to be worked first. Work a draft along H I, and with a templet taken from Fig. 3 work the soffit between H I and D E with drafts cut crosswise. Now take the pattern marked 7 from Fig. 9 and mark the curved lines D H and E I of Fig. 16. This will give the cutting or intersecting line to cut the cross soffit, which must be done in the direction of the center of the plan. The top beds can then be cut. The bed C D K L and the one opposite drafts in the same direction as the soffit and will be a twisted surface, but the annular bed must be cut across the direction as its soffit, it being a conic surface. The double springer on the inside is cut by the same method.

Fig. 17 is the front stone of the key course, no more explanation being necessary than to state that the top only need be worked and on it draw the lines. Next work the two ends, not forgetting to draw the center lines on the ends. Now apply the developed key pattern taken from Fig. 2 for the front and the pattern, Fig. 12, for the back, as that joints against the key proper. Cut to the lines, holding the straight edge in the right direction.

The working of an angle will be the last work. Fig. 18 is an enlarged pattern taken from Y of the plan. First work the top so that the lines can be marked upon it, putting every line in its place. Next work the joints 1 2 and 3 4, then the check, as shown roughly in Fig. 21, marked X. Now apply the joint molds, Figs. 19 and 20. Fig. 19 is taken from Fig. 3 and Fig. 20 is made as before explained. Now work drafts around the nosings 1, 2, 3, as shown; then draw the hard lines. Draw the lines 4, 5, 6 in the check, then the lines 7, 8, 9, and we are ready to cut the soffits. Take the annular one first, with a templet taken from Fig. 3. After this is cut take No. 8 from Fig. 9 and apply to give the angle line to cut the cross soffit, which must be cut in direction of the center of plan. The bed is to be cut in the same way as the soffit. If the reader has followed closely the directions given in this and the previous articles he will be able to lay out and superintend any kind of groin, no matter what may be the shape.

GEOMETRY FOR MASONS.

ALTHOUGH the simpler operations in preparing blocks of stone for building purposes may be performed by a careful use of the tools provided, none of the intricate forms required in the details of architectural construction can be successfully worked out or produced with certainty, so as to avoid the clumsy wasting of material, without application of the elementary rules of geometry. The square, the straight edge, will indeed enable the mason to reduce his blocks to level faces, and to render these parallel or rectangular, as may be desired, but they will not enable him to strike out correct curves, to determine the alterations produced in regular or irregular figures by their transference to planes at various angles. For these and indeed nearly all the problems he will be required to solve, in working out each portion of the general designs upon the individual block, the mason must refer to the rules of practical geometry; and in proportion to his own practical acquaintance with them will he be able to apply, and, if necessary, combine them, so as to arrive at the particular solution he requires. For measuring and laying down angles, says an English writer, the mason uses a bevel; which consists simply of two legs or sticks, jointed in the manner of a 2-foot rule, but so that each leg may pass freely over or within the other, and thus form acute or obtuse angles with it. They should work rather stiffly, or have a clamp screw for fixing the bevel to any desired opening, without danger of disturbance. Some bevels are furnished with an arch, on which the degrees of the circle are graduated, and by which any desired angle may be correctly ascertained. Besides the compasses for describing circles, the trammel is a useful instrument, by which the mason describes ellipses for arches, &c. This consists of two pieces of wood fixed together at right angles to and crossing each other. These have slits cut nearly throughout their whole lengths, in which two pins or studs, attached to a separate stick or piece of wood, may be moved along. The studs are capable of adjustment in their relative positions on the piece to which they belong. A pencil or pointer at the other end of this piece will describe true ellipses, the proportion of the axes of which depends on the position of the studs. Besides the square for setting out right angles up to 2 or 3 feet in length of side, the long square or level is used in trying long lines. This is provided with a plumb bob, or weight of lead or brass. &c., suspended by a string, for indicating when the upright part of the level is vertical, and the long frame, which is fixed truly at right angles with the upright part, is consequently truly horizontal or level. This instrument is sometimes furnished with a spirit level, by which a horizontal level may be ascertained independently of the plumb bob. For testing the uprightness of the work a plumb bob is used, which consists only of the bob or weight, suspended by a string from the top of a strip of wood. This strip is of exactly parallel width throughout, and the point of suspense of the bob and the gauge mark below are exactly in a line with each other, and equidistant from the edges of the strip. Particular sectional forms, to which many blocks have to be prepared, are the most readily and truly multiplied by using molds or templates. Zinc is a very suitable material from which to cut these templates. An exact correspondence in form of the surfaces which, when combined, are jointed together, and requiring to coincide, is thus secured, the only thing necessary to secure this being that the mason shall mark the outline of his template or pattern correctly upon the leveled surface of the block, and direct his chisel accordingly.

Ancient Saws.

Saws were used by the ancient Egyptians, and one that was discovered, with several other carpenters' tools, in a private tomb at Thebes, is now preserved in the British Museum. The blade, which appears to be of brass, is 10½ inches long and 1¼ inches broad at the widest part. The teeth are irregular, and appear to have been formed by striking a blunt edged instrument against the edge of the plate, the burr, or rough shoulder, thus produced not being removed. A painting copied in Rosellini's work on Egyptian antiquities represents a man using a similar saw, the piece of wood which he is cutting being held between two upright posts. In other representations the timber is bound with ropes to a single post, and in one, also copied by Rosellini, the workman is engaged in tightening the rope, having left the saw sticking in the cut. In an engraving given in the third volume of Wilkinson's "Manners and Customs of the Ancient Egyptians" a saw is represented of much larger dimensions, its length being, by comparison with the man, not less than 3 or 4 feet. It does not appear that the Egyptians used saws worked by two men. The invention of saws was variously attributed by the Greeks to two or three individuals, who are supposed to have taken the idea from the jaw bone of a snake or the back bone of a fish. There is a very curious picture among the remains discovered in the ruins of Herculaneum, representing the interior of a carpenter's workshop, with two genii cutting a piece of wood with a frame saw, and on an altar preserved in the Capitoline Museum at Rome there is a perfect representation of a bow saw, exactly resembling, in the form of the frame and the twisted cord for tightening it, those used by modern carpenters. From these remains it is evident that these forms of the instrument were known to the ancients.

DESIGN FOR A FARM HOUSE.

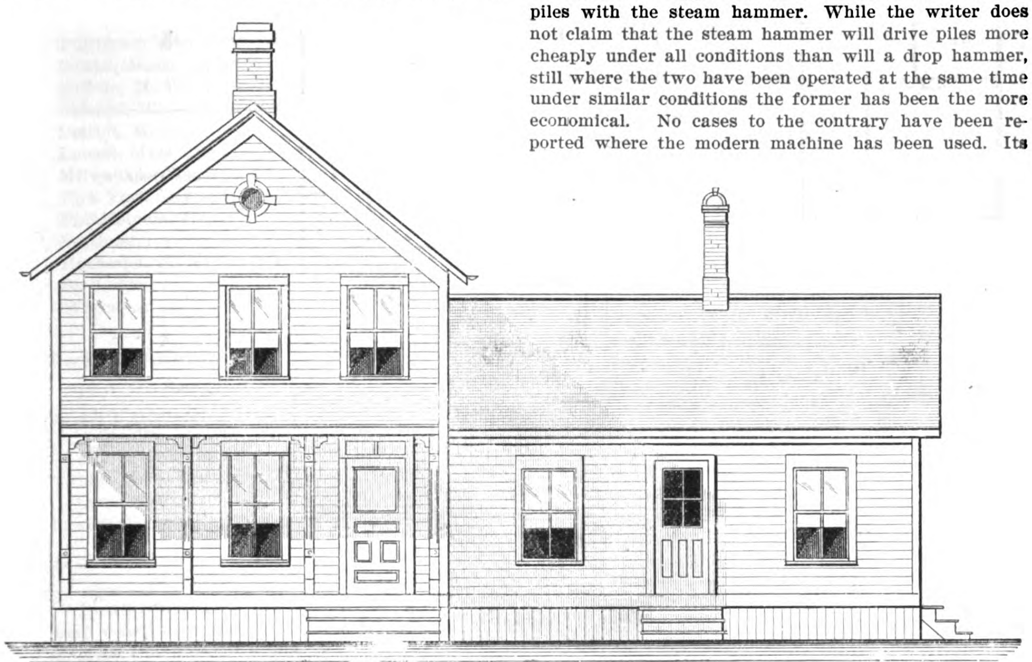
THE elevations and floor plans which we present herewith relate to a farm house erected last summer for David A. Teller, just south of Rensselaer, N. Y. The house was built to take the place of one destroyed by fire on June 15, and has on the first floor a hall, parlor, sitting and dining rooms, kitchen, pantry, china closets, two bedrooms and clothes closet, while an extension at the rear contains wood shed and sanitary closet. The second floor is divided into three sleeping rooms with commodious closets and a storeroom. The building is of balloon frame, the timber employed being hemlock. The sills and bearing beams are 4 x 8; the first and second floor beams 2 x 8, placed 16 inches on centers; ceiling beams, 2 x 6; rafters, 2 x 6, placed 20 inches on centers; outside studding, 2 x 4, doubled at all openings; plates, 2 x 4, doubled; collar beams, 2 x 4, and furring, 1 x 2, placed 16 inches on centers.

The frame is covered with 1 x 10 hemlock sheathing boards, on which is laid 1 x 8 pine novelty siding with building paper between. The roof is covered with 1 x 10 hemlock sheathing boards on which is laid building felt, this in turn being covered with 18-inch shingles laid 5 inches to the weather. The piazza columns are of 5 x 5 inch pine, gained and chamfered, while the roof has 2 x 6 dressed spruce rafters covered with 1 x 5 spruce flooring with the smooth side down. The porch floor is of 1 x 6 white pine, blind nailed.

The floors of the house are of 1 x 5 spruce, blind nailed, the first story having a sub-floor of 1 x 10 hemlock boards covered with building felt. All casings are of whitewood, 4½ inches wide, with corner and base blocks.

The exterior and interior of the building, except the floors, have two coats of Brooklyn white lead and linseed oil of color to suit. All tin work has two coats of metallic paint, while the exposed brick work and chimneys have two coats of Venetian red.

The building here shown was erected in accordance with plans prepared by Architect John F. Lape of Rensselaer, N. Y., at a cost of $1350. The carpentry work was done by William J. Harsha of Bath-on-the-Hudson; the mason work by William Martin & Son; the painting by George Ostrander, and the plumbing and tin work by James Gray, all of Rensselaer, N. Y.



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

Design for a Farm House.—John F. Lape, Architect, Rensselaer, N. Y.

Cost of Pile Driving with the Steam Hammer.

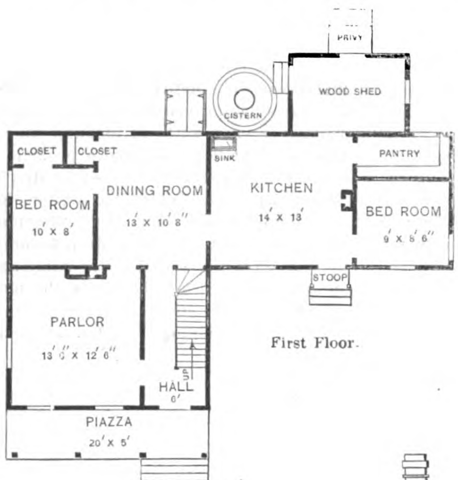
Some very interesting data relative to the above mentioned subject was presented in a paper by E. N. Pagelsen, read before the Engineering Association of the South, and published in their transactions. Among other things the author says:

Many formulæ have been given at various times, by experts, to determine the cost of driving piles with the drop hammer, under various conditions and into different soils, but experience has proved them to be very unreliable. This being the case with an old and universally used machine, it must be considered a problem of the future to suggest formulæ for the cost of driving piles with the steam hammer. While the writer does not claim that the steam hammer will drive piles more cheaply under all conditions than will a drop hammer, still where the two have been operated at the same time under similar conditions the former has been the more economical. No cases to the contrary have been reported where the modern machine has been used. Its greater first cost is, of course a large factor to be considered, and often prohibits its use where it otherwise would be selected. A very good example of the work of the two kinds of machines is that done in the driving of piles for the foundation of a large gas holder in New York City. With a 2500-pound drop hammer, four piles were all that could be driven in a day or ten hours, while a steam hammer drove 13. They were each 70 feet long, 8 inches in diameter at the point, and 15 inches at the head. A total of 800 were driven, at a cost of $2 each.

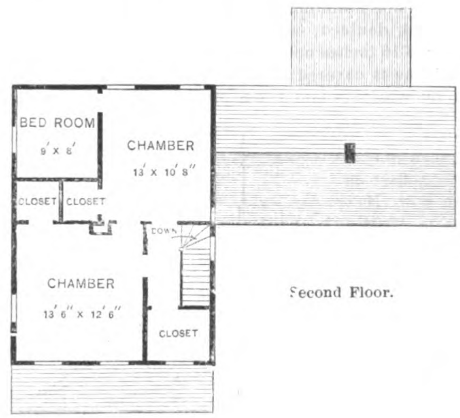
In New York Harbor the drop hammer drove 15 piles per day of ten hours, often breaking or otherwise damaging them, while the steam hammer averaged from 40 to 45 without damage. The piles were 50 feet long, driven 24 to 26 feet into gravel and hard pan. A total of 1800 were driven, at a cost of 80 cents each.

In Puget Sound the steam hammer averaged nearly 200 piles per day where the drop hammer could not put in over one-fifth that number, and even then many were damaged. The same crew did the work with both. These piles are 100 feet long, of Oregon fir, measuring but 8 inches in diameter at the point, and are driven butt end down for strength. They are used in the fishing industry. In this case the heavy blow of the drop hammer caused the pile to spring sidewise, often to split, while the many lighter blows of the steam hammer jarred the piles down. In the following cases no comparison can be made directly, but engineers can recall instances in their own experience which may be used. In Chicago, 40 Norway pine piles were driven 45 feet deep every ten hours at a cost of 55 cents each. Another firm drove from 60 to 65 piles, each 45 feet long, 15 feet deep into hard sand each day at a cost of about 30 cents each. In both cases they were driven for foundations.

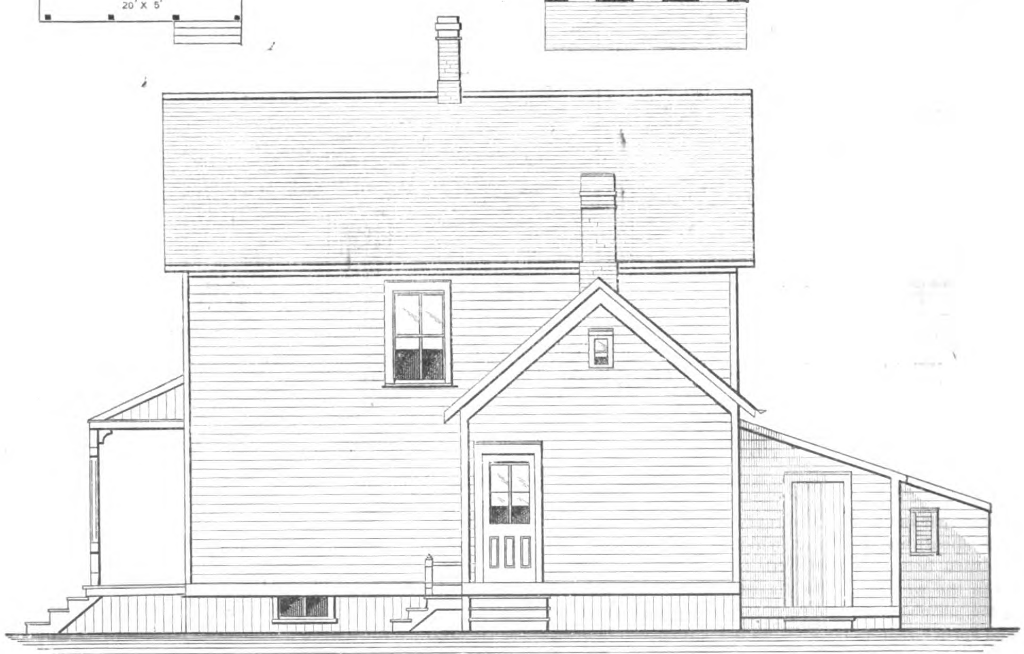
driven 15 feet deep. Total number of bents was 141, and four piles to a bent were driven at an average cost of 85 cents each. The hammer moved in pendulum leaders, driving the piles at quite an angle. The hammers used in the above cases were made by a local firm, and, with one exception, were of the following dimensions: Total weight, 9000 pounds; weight of striking ram, 4800 pounds; stroke, 42 inches., and about 60 blows per minute; the coal consumption is about 2500 pounds per ten hours. The engineer can do his own firing. The crew needed is the same as for a drop hammer. The hammer used on Puget Sound was somewhat lighter: Total weight, 6100 pounds; weight of ram, 3000 pounds; stroke, 30 inches, and about 70 blows per minute. The parties using this hammer claim that the blows are somewhat too heavy for the long piles, and advise a



First Floor.



Second Floor.



Side (Right) Elevation.

Design for a Farm House.—Floor Plans —Scale, 1-16 Inch to the Foot.—Side Elevation.—Scale, ⅛ Inch to the Foot.

A New Orleans firm reports the cost of driving 6000 piles for wharf construction, with a floating driver during three months as follows:

	August	September	October.
Average number per hour....	3 05	4.31	3.7
Average length per pile in feet .	70	68	73
Average cost per pile driven, in dollars	1.70	1.14	1.28

The same firm used the same hammer for driving bents for a railroad trestle. The driver moved forward on the bents as fast as they were capped. The rate was 11 bents per day, piles varying from 20 to 45 feet, and lighter and much faster hammer. It seems that in this case in particular the short interval between the blows does not give the soil time to settle around the pile, which is prime advantage in using the steam hammer.

IT is said that a moving staircase will be one of the novel features of the Paris Exposition. It will consist of an endless belt in perpetual motion, upon which it will be necessary to step to be transported from floor to floor.

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

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Twelfth Annual Convention of the National Association of Builders.

To all Constituent Bodies of the National Association of Builders:

The twelfth annual convention will take place at Milwaukee, Wis., beginning Tuesday, February 7, 1899.

Constituent exchanges are entitled to representation in accordance with the Constitution, as follows:

ARTICLE VI.

REPRESENTATIONS AT CONVENTIONS.

In all conventions and meetings of this association each constituent body shall be entitled to delegates, as follows: One delegate at large, who shall be the director chosen at the preceding annual convention, and one delegate in addition for each 50 members or fractional part thereof consisting of 10 or more, upon which membership the per capita tax fixed at the preceding convention shall have been paid.

All delegates to conventions or meetings must have credentials from the associations they represent in form approved by this association.

Each delegate shall be entitled to one vote, and may be represented by an alternate.

Issued by order of the
EXECUTIVE COMMITTEE.

Transportation.

CONTINGENT UPON THE ATTENDANCE OF ONE HUNDRED OR MORE PERSONS BY RAIL.

A reduced fare, at the rate of one and one-third fare for the round trip on the "certificate plan," has been conceded to delegates and others attending the twelfth annual convention at Milwaukee, February 7 to 10, inclusive, 1899, by the following railway passenger associations: Eastern Division of the Western Passenger Association, the Trunk Line Association, Central Passenger Association, and the New England Passenger Association.

All constituent exchanges of the national body are within the territory controlled by the passenger associations named, and are entitled to the reduction upon the fulfillment of the following conditions:

Each person attending the convention must purchase within three days, Sunday excepted, before the opening of the convention a first-class ticket at the regular rate from the point of departure to Milwaukee, obtaining therewith a certificate of such purchase from the local ticket agent. This certificate, upon being signed by the National Secretary and indorsed by the representative of the passenger associations at the convention, will entitle the holder to a return fare over the same route by which he came at one-third of the regular rate.

Tickets for return journey will be furnished only or certificates procured not more than three days before the meeting assembles, and will be available for continuous passage only; no stop-over privileges being allowed on tickets sold at less than regular unlimited fares. Certificates will not be honored unless presented within three days after the date of the adjournment of the convention. It is understood that Sunday will not be reckoned as a day. In no case will the reduced rate for return ticket be granted without a certificate properly signed and indorsed as above, and no refund of fare can be obtained because of failure to secure certificate at point of departure.

NOTICE.

All persons attending the convention are requested to secure certificates whether or not they intend to avail themselves of the reduced rate, as the certificates are the evidence of attendance upon which the passenger associations base their concession.

All persons are cautioned that certificates by which reduced return fare is obtained must be used only by original purchaser, as the National Association will be obliged to refund an amount equal to full return fare for every ticket found in the hands of any person other than the one entitled thereto. Should the National Association be compelled to refund any sums of money for tickets improperly used, the local exchange whose member has broken these conditions will be expected to reimburse the National Association.

Programme of Builders' Convention.

Place of meeting and general headquarters will be at the Builders and Traders' Exchange, Grand avenue and Fifth street.

Tuesday, February 7, 1899.

MORNING SESSION.

Address of welcome by Mayor of the city of Milwaukee.

Address by the Governor of Wisconsin.

Address by President of the Milwaukee Exchange.

Address by the President of the National Association.

Appointment of Committee on Credentials.

AFTERNOON SESSION.

Report of Committee on Credentials.

Roll call.

Appointment of Committee on Time and Place of Next Convention and Nomination of Officers.

Annual Report of Secretary.

Annual Report of Treasurer.

Presentation and Reference of Resolutions.

Wednesday, February 8.

There will be no session of the convention

Thursday, February 9.

MORNING SESSION.

Address, "Architecture," H. C. Koch.

Address, "Lien Law," Herbert Kinne.

Address, "Manual Training," Frank W. Kendall.

Addresses by Ex-Presidents, "The Usefulness of the National Association and the Value of Organization Among Builders."

Report of Committee on Resolutions.

Friday, February 10.

MORNING SESSION.

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

Election of officers.

Unfinished business.

Miscellaneous.

Moving a Tall Steel Chimney.

A tall steel chimney stack of the Meriden Curtain Fixture Company, at Meriden, Conn., which had been thrown nearly 1 foot out of plumb by the settlement of its base, was recently not only restored to a vertical position, but removed bodily a distance of 15 feet horizontally. The stack was of riveted steel ⅜ inch thick, and 100 feet high. It stood 16 feet above the ground, on a pair of 72-inch horizontal boilers, with an 8-inch wall between them, under the center of the stack. In planning, says the Providence *Journal*, for the straightening and removal, ten braces were first riveted to the base plate and the stack, and the boiler, which had settled, was blocked on four jack screws. Two pairs of steel girders, 28 feet long, were placed underneath the base plate and the stack was brought to a vertical position by jacks under each end of the girders. The girders extended from a wall about 2 feet outside of the boilers to a new brick foundation, 5½ feet square and 16 feet high, the intermediate distance being filled in with false work to prevent springing while the stack was passing. Two yellow pine shoes 5½ feet long were inserted between them and the base plate of the stack. The top of each shoe was beveled at the ends in a peculiar manner. At one side of each end the bevel was begun 18 inches from the end, and on the other side 24 inches, so that when the two shoes were properly arranged they could take bearing only under the edge of the stack, and strains on the thin outer edges of the base plate were thus avoided. Iron brackets were clamped to the tops of the girders to serve as reaction pieces, and jack screws were set horizontally between them and the ends of the wooden shoes and base plate to push the stack along on the girders, which were lubricated with oil and soft soap. Each jack was worked by two men, who advanced the stack ⅛ inch at every stroke and moved it to the new position in three hours. The guys that were already attached to the stack were considered too weak to be relied on and no use was made of them in the moving, the base being kept so level that the stack was never more than 6 inches out of plumb. The work of removal was accomplished by five men in two days.

Hints to Draftsmen.

Draftsmen, as well as others, have their little kinks, and the publishing of these kinks often helps others. A practical draftsman gives the following simple suggestions, which will likely prove useful to some reader: In mixing up inks the process is very much expedited by heating the dish and water in which it is mixed before commencing. It often happens in the summer that the flies walk over a tracing and eat off the ink in a very provoking manner. The use of vinegar instead of water will prevent this. In making a tracing the cloth will take the ink much better if it is rubbed over with chalk. Tracing paper that has been rolled up may be straightened out effectively and expeditiously by drawing it over the edge of a table or drawing board, holding it down meantime with an ordinary three-cornered scale. Where there are a large number of drawings made and kept, a great deal of trouble and confusion can be avoided by making all the drawings on extra standard sizes. If a size of 16 x 24 inches be adopted, then the next larger size would be equal to two of these, or 24 x 32 inches. This enlarging or reducing may be carried as far as the circumstances require, but it is altogether best to do it by the doubling or halving process if possible. One of the advantages of standard sizes of drawings is that they may be kept in a case of drawings, the size of which is made to accommodate the standard sizes determined upon.

Metallizing Wood.

A process for metallizing wood, invented by M. Rubbenick, is described in the French journal, *Les Mondes*, as follows: The wood is immersed for three or four days, according to its permeability, in a solution of caustic lime, at a temperature of from 75 to 90 degrees C. From there it is placed at once in a bath of hydrosulphate of calcium, to which, after 24 or 36 hours, a concentrated solution of sulphur and caustic potash is added. This bath lasts about 48 hours, at 35 to 50 degrees. Finally the wood is treated for 30 to 50 hours to a bath of acetate of lead, also at 35 to 50 degrees. It will be seen that the process requires considerable time, but the result is surprising. After having been dried at a moderate temperature the wood thus prepared shows, when polished, a brilliant metallic luster. This luster can be hightened still more by rubbing the surface with a piece of lead, tin or zinc, and then polishing it with a glass or porcelain burnisher. The wood surface then assumes the appearance of a genuine metallic mirror, and is very solid and strong.

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Carpentry and Building

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NOVELTIES.

Designs of Grille Work.

Grille work is so extensively employed at the present day that it is to be found in a great variety of places, and forms a feature of the interior finish of the cheaper as well as the more expensive dwellings. This class of work is made a specialty by a number of leading concerns, prominent among which are the Foster-Munger Company of West Twentieth and Sangamon streets, Chicago Ill., who have brought out a large number of attractive designs, two of which we illustrate in this connection. One of these, shown in Fig. 1 of the engravings, is intended to be used as a store grille and to be set at the inner edge of a recess in a store front forming the background for a show window. Any other lettering than that shown in the engraving can be substituted according to the line of business to which it is desired to direct attention. The work is made up to 4 feet in width, and can be supplied either unfinished or finished in oil, as desired. In Fig. 2 of the engravings we show another style of grille, intended for interior decoration, and which will look well in a variety of locations. The manufacturers state that most of the grille work which they are supplying is of oak, although very often the specified wood is that which will match the finish of the room. This, of course, can readily be done when a sample piece of the room finish is sent to them. The sawed portions of the grille are worked from thoroughly kiln dried hardwood and are intended to finish not over ¾ inch thick, so as to give a light effect. None of this line of work is carried in stock, but is made to order in sizes to suit the opening for which it is intended. The company also give attention to veneered front doors, of which they turn out a great variety of patterns. One of the most important changes in door making which has recently taken place is the use of the dowel in place of mortise and tenon. Formerly all stock doors were made with mortise and tenon, but now all the Western stock factories are said to be making the dowel door, which is referred to as much stronger than the old style doors, while the joints never open under any test. The company claim that the dowel constructed doors are so strong that a stile cannot be taken off from one of them.

Novelties.—Designs of Grille Work.—Fig. 1.—A Store Grille

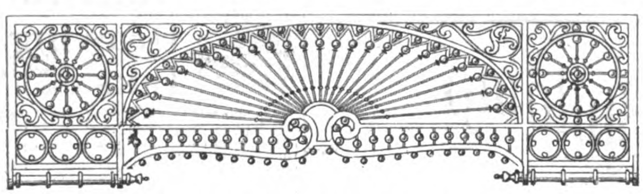


Fig. 2.—Grille for Interior Decoration.

The Schlicht Chimney Top.

At a recent meeting of the Franklin Institute Paul J. Schlicht of Brooklyn, N. Y., dealt with what he calls a new process of combustion, the invention being based upon the discovery made by him a few years ago that if in the top of a smokestack or chimney a tube with a diameter of about 70 per cent. of the inside diameter of the flue be inserted in such a manner that it extends a short distance below and a short distance above the top of the stack, the products of combustion will all pass out through this tube. At the same time a current of fresh air will pass into and down the stack between the tube and the inner surface of the flue, and this air current will, after being once started, find its way to the combustion chamber. Thus two currents are made to pass in opposite directions in the same stack or flue, one of combustion products going up and out, and the other of air going down and in. The air thus introduced is heated in its passage down the stack. The inventor accounts for this double current by the fact that there is always a minus pressure around the periphery of an ascending column of products of combustion, and the air once having been allowed to come to this area of minus pressure, follows it to the combustion chamber. The inventor has made several modifications of this system, introducing the air current at the side of the flue instead of at the top, when the conditions demand this change, but the same principle applies to all. The result of the introduction of the air in a heated condition, from the top of the fire instead of in the ordinary way through grate bars, ashes and all the accumulations in the bottom of the combustion chamber, is that the combustion is more complete. When the Schlicht device is in use the ash pit doors and draft openings are all closed tightly, and smaller, and consequently cheaper, coal can be used.

The Automatic Door Catch.

An ingenious device intended to be used with screen doors has been brought out by the Automatic Door Catch Company, 135 and 137 Lake street, Chicago, Ill., and is illustrated in Fig. 3. The catch is shown attached to the door casing at the opening side of a screen door with its arm projecting over the door. It is a well-known fact that all screen doors will warp or spring out at the upper or lower corner at the opening side, after being hung a short time. This catch can be placed anywhere along the casing at which it may be necessary to bring a pressure on the door to force it entirely shut. The coiled spring shown in the cut is of great strength, and holds down the arm, which projects over the door. When the door is opened it presses against a rubber wheel on the end of the arm and throws the arm over past the center, where it stops until the door is again closed. As the door closes it strikes a trip on the bottom of the catch which immediately throws the arm over against the door to hold it shut. This catch obviates the use of a hook and eye, or a button or any other device to hold the door shut which requires the use of hands every time a door is opened or closed. The catch is finishd in dead nickel or antique copper, and is packed a dozen in a box.

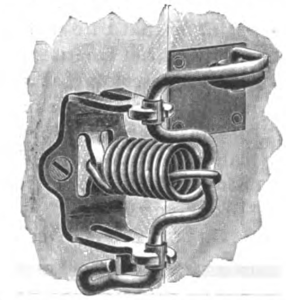
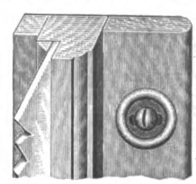


Fig. 3.—The Automatic Door Catch.



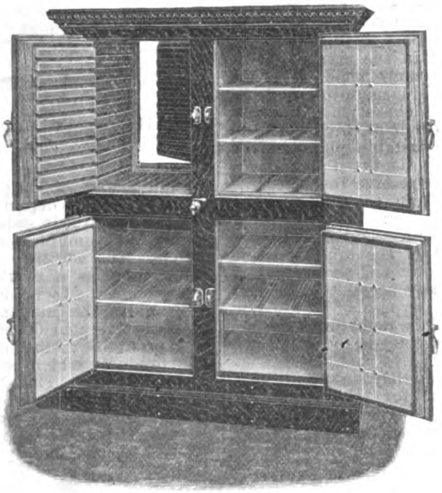
The Ives Stop Adjuster.—Fig. 4.—View of Adjuster with Section of Window Sash.

The Ives Stop Adjuster.

Hobart B. Ives & Co., New Haven, Conn., are now marketing their Ives stop adjuster, as shown full size in Figs. 4 and 5. It was patented in June of last year, and is designed to allow for compensation by holding stop beads on window and sliding door frames at any point made necessary by wood shrinkage or expansion, so that a reasonably close joint is made to prevent rattling or binding as well as to keep out cold drafts and dust, an adjustment being quickly made at any time by loosening the screws and moving the beads as required. The adjuster is made variously of steel, bronze and brass metals in a total of

Fig. 5.—Bottom View of Adjuster.

20 kinds and finishes. It is stamped from one piece of solid metal, with a thick bed that will not bend in tightening the screw and a thin flange to admit of a close adjustment of screens, and also to prevent the screw drawing it into the wood. The solid ribs will drive into the hardest bead or stop and prevent the adjuster turning in either direction. In appearance it is neat and ornamental, affording a quick and simple adjustment of the shrinkage or expansion of stop beads. In applying it a ½-inch bit is used. The makers will send free on application a mounted sample to architects and builders.



Novelties.—Fig. 6.—The McCray Special Tile Lined Refrigerator.

The McCray Special Tile Lined Refrigerators.

The McCray Refrigerator & Cold Storage Company, 63 Mill street, Kendallville, Ind., are building special re-

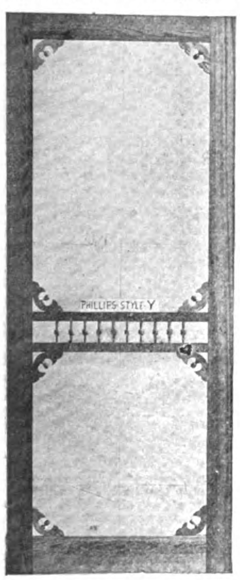


Fig. 7.—Style Y Screen Door.

frigerators to meet the specifications of architects so as to form a part of a building while it is being erected. The accompanying illustration, Fig. 6, presents a view of a refrigerator of this character, which was built for a residence in Cleveland, Ohio. The refrigerator is 48 inches wide, 28 inches deep, and 63 inches high, and is lined throughout with tiles so that it can be very easily cleaned. The ice chamber has a door in the rear to enable ice to be placed in it from the porch, thus avoiding the necessity of the iceman entering the house. This particular refrigerator is provided with a coil of block tin pipe in the ice chamber, which is terminated with the faucet seen in the center of the front, the pipe being connected with the city water service, thus providing a continuous supply of cold drinking water. The air circulation in these refrigerators is stated by those who have used them to be perfectly satisfactory, insuring the economical consumption of ice as well as making all parts of the interior perfectly cold.

Style Y Screen Door.

The A. J. Phillips Company, Fenton, Mich., among their new patterns this year are offering the Style Y screen door, represented in Fig. 7 of the accompanying illustrations. This door is made up in pine, either natural finish or painted with two coats of good paint. It is offered with 3 or 4 inch stiles and ⅞ or 1⅛ inches thick. The illustration is rather too small to show the turned beads in the maple spindle balls and in the turned "drops" set in each of the eight corner brackets. The company are intending to patent the design.

The Star Scroll Saw.

The Millers Falls Company of 93 Reade street, New York City, have put on the market the Star scroll saw, illustrated, in Fig 8 of the engravings. It has been brought out, the makers state, to supply the demand for a machine of a little higher grade than the Rogers saw manufactured by them. The peculiar advantages of the Star over the Rogers saw are referred to as follows: The method of hanging the arms, to give them free and easy movement; in adjustment of the arms, so that they may be kept parallel with each other; a heavier drive wheel for heavier work; two balance wheels, one each iron and emery, the extra weight of the emery wheel to give steadiness to the motion; a chuck for holding drill points. It is pointed out that the emery wheel is fastened by adjustable clamps, which can also be used for holding various other sizes of emery wheels, grindstones, buffing wheels, &c. The table is nickeled and the general finish of the saw is the same as other machines made by the company. The saw weighs net 37 pounds and boxed 55 pounds.

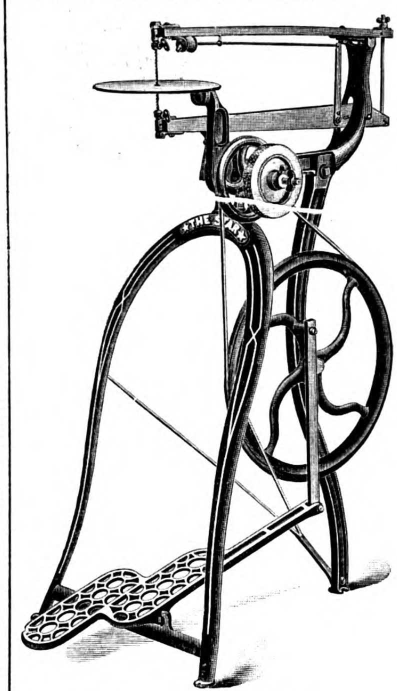
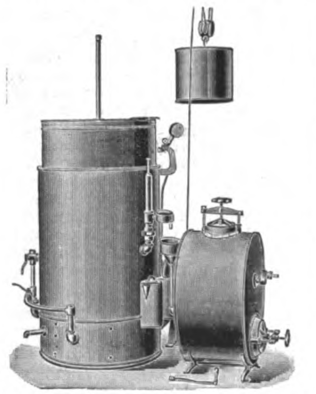


Fig. 8.—The Star Scroll Saw.

The Bell Acetylene Gas Generator.

The excellence of the light produced by acetylene gas and the ease with which acetylene gas generators are managed by the owner or servants is fast making this system of lighting popular. Many different machines working on different plans have already demonstrated their practicability. In Fig. 9 of the accompanying illustrations we show the Bell acetylene gas generator, manufactured by Almy, Bell & Almy of Rochester, N. Y., in various sizes, the smallest machine having a capacity for supplying ten lights. The firm regularly make machines having a capacity up to 100 lights, but can furnish machines of a larger capacity when needed for lighting large buildings or towns and villages.

The Bell acetylene gas generator consists of a round metal box inside of which is a smaller box with perforated sides which rotates upon an axle. In the inside box with perforated sides the charge of carbide is placed. The rotating movement of the carbide chamber is caused by a weight acting upon a shaft which carries a small gear wheel connecting with a gear wheel on the box. The movement of the shaft is caused by the rise and fall of the gas holder. The rotary movement causes the ash from the carbide to fall through the perforations into the ash chamber below. The connection between the gas holder and the generator is made tight by a water seal. The bottom of the holder is a condensation chamber and water chamber to govern the pressure of the gas, which may be generated and put into the holder, this method of construction doing away with all valves or other mechanical appliances for shutting off the gas, so that the generator can be charged or the ash removed at any time without having a single valve to open or close. In operation after the generator is charged with carbide the ash holder in falling opens a valve which takes some water from the holder, letting it fill a siphon cup,



Novelties.—Fig. 9.—The Bell Acetylene Gas Generator.

which when full siphons this measured quantity of water into the tunnel by the side of the generator, thus letting it run through the water seal into the carbide, this measured quantity of water being just enough to unite with the carbide and fill the holder with gas if no lights are burning.

When lights are burning, as the gas which is generated from one supply of water is consumed the holder falls and rotates the cylinder and fills the siphon chamber, so that another quantity of water is brought into use for gas generation. It is pointed out that their large generators are so constructed as to pass through an ordinary door or window. The generator is of the dry type, so that the hydrated lime is dry when taken out of the generator, making it less offensive and easier handled than when moist. The condenser is said to have sufficient capacity to produce gas which reaches the burner clean, cool and dry. The machines are of such weight as to enable them to be easily handled. A relief valve is provided for use when charging the machine. By delivering the water from the holder tank to the carbide an occasional refilling is necessary, which keeps the water from becoming foul. Already a large number of these machines have been placed in churches, residences, public buildings, factories and workshops, where they have demonstrated that a very superior light can be produced at a very moderate cost.

New Flag Stick Machine.

Doubtless there are many readers who are not familiar with the manner in which flag sticks, dowels, chair splines, &c., are made, and will therefore be interested in the description and general view of a machine employed for this purpose, which we present herewith. As may be seen from Fig. 10, the machine is compactly built, and is particularly arranged for the class of work named, while at the same time it may be utilized for a variety of purposes, such as small moldings, surfacing two sides, &c , by simply substituting other heads. The arbors supporting the cutter heads are $1\frac{3}{16}$ inches in diameter where the heads are applied, and are located one above the other in the table. The machine, as shown, carries on these cutter arbors two special heads fitted with solid milled circular cutters for making the round rods used for flag sticks, dowels, skewers, &c. The heads are held in position by hexagon nuts, and are made to carry two knives each, the knives fitting into circular grooves on the inside. These grooves are placed in such a position as to give the required clearance for the cutters to prevent burning. A special set of cutters is necessary for each diameter of rod. The lower cutter head and frame are adjustable vertically and laterally by means of hand wheels. There are two large feed rollers in the table, and necessary spring and pressure bars to retain the material in its place. The pressure shoe over the lower cutter head is made of metal and shaped to match the style of the cutter. After the cut of the lower head there is an adjustable plate in the table, on which is fitted a shoe of similar face to receive the pieces as they are fed from the machine, in order to always insure their being fed in a straight line. The pressure bar before the cut of the upper head is made to swing over and away from it so as to give ready access to the head, either for the purpose of removal or adjustment. This machine is being introduced to the trade by J. A. Fay & Co., 513-533 West Front street, Cincinnati, Ohio, and they state that there is a large demand for the kind of stick this machine is designed to work. A great many factories are therefore putting in one of the machines for the purpose of utilizing the scrap material which otherwise would go to waste.

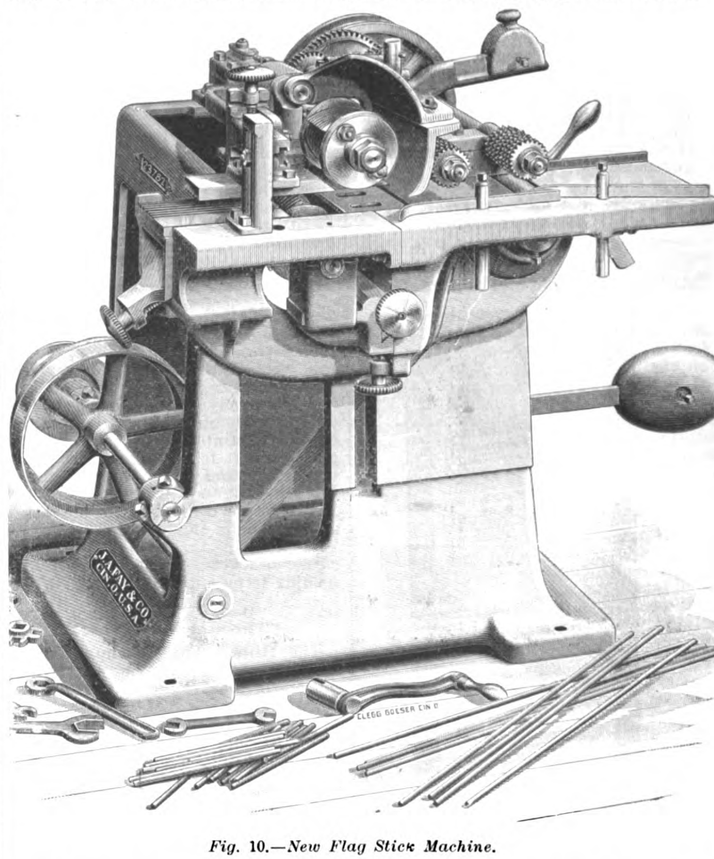


Fig. 10.—New Flag Stick Machine.

Improved Bit Brace Jaw.

The Peck, Stow & Wilcox Company, 27 Murray street, New York, and Southington, Conn., have improved the form of their tempered steel jaws for a number of their bit braces, as illustrated in Fig. 11. The main modification is the introduction of teeth which so fit each other as to give a much stronger hold on the bit shanks and prevent them from turning in the jaw.

Tar and Asphalt Coated Roofing Papers.

A new department which has recently been added to the works of the Cambria Steel Company, Johnstown, Pa., will put on the market tar and

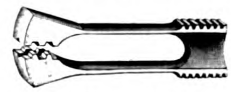
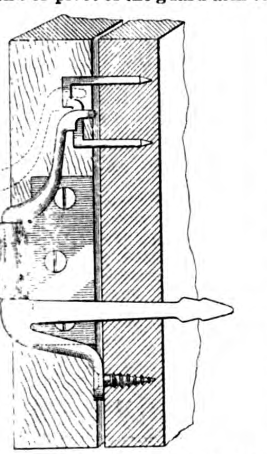


Fig. 11.—Improved Form of Bit Brace Jaw.

asphalt coated roofing papers, the idea being to have the department in operation by March 1, in order to catch the spring and summer trade in that article. The addition of this department comes as a result of the construction of the by product coke plant at Franklin, the company having been for some time considering the best and most profitable method of utilizing the side products which come from their new coke ovens. The paper itself will be purchased ready for coating, the process contemplating the use of the partially distilled tar from the coke ovens in coating the paper and also the use of the residual pitch from the complete distillation for paving purposes in connection with asphalt and gravel. In view of this new departure the firm of N. West & Co., Pittsburgh, has been absorbed by the Cambria Steel Company, and the Pittsburgh plant will be removed to Johnstown and its capacity doubled.

Pineo's Hinge Guard.

A few months ago we illustrated and described in these columns a patent hinge which is being placed upon the market by J. H. Pineo, 8 Hurd road, Brookline, Mass., and since that time he has brought out a hinge guard the use of which prevents blinds from being lifted off their hinges. The device is especially intended for blinds that are hung with the common hinges, which, as is well known, are frequently blown off or accidentally lifted from their supports. In Fig. 12 of the accompanying illustrations we show the manner in which the hinge and guard operate. It will be seen that a little is cut or clipped from the top of the pintle in order to allow the lower end or pivot of the guard arm to



Novelties.—Fig. 12.—Pineo's Hinge Guard.

drop into the sleeve of the hinge plate. In this position the upper end, which works on the staples or guide, drops below the locking shoulder, making it impossible to lift off a blind in any position. When it is desired to remove a blind it is only necessary to raise the upper end of the guard arm outward, as indicated by the dotted lines in the engraving. The hinge guard is made of malleable iron, galvanized, and therefore will not rust. The manufacturer claims that the guard is easily attached to the common hinge without disturbing it, and that blinds may be easily hung with them by entering the upper hinge first, the lower one being clipped or cut with bolt clippers. The guards can be put on from the window, thus doing away with the necessity of staging, they being placed on the bottom hinges for convenience.

TRADE NOTES.

W. J. BURTON & Co. of 164 Larned street West, Detroit, Mich., are making extensive additions to their office, which have been found necessary in order to accommodate their increasing business.

S. C. JOHNSON, Racine, Wis., manufacturer of fine parquetry floors and floor finishing materials, has issued a beautiful catalogue giving in colors a large number of the designs in hardwood flooring which he is prepared to furnish. The designs consist of borders in great variety, strips used in widening borders, designs for centers and plans for entire floors. The combinations are almost endless, showing great versatility in originating. Special circulars have also been prepared which treat of floor finishing compounds, wax, &c., which are the result of long experience in the care of hardwood floors.

"A NEW IDEA IN METAL CEILINGS" is the title of a neatly printed 16-page pamphlet which reaches us from the Berger Mfg. Company of Canton, Ohio. "The new Idea in metal ceilings," says the company, "is the true idea. In decoration, as in architecture, design and fitness are fundamentals that should always be considered. Whatever artistic style is selected should be adhered to throughout. Moreover, it should be appropriate to its architectural surroundings. Therefore to properly define, develop and classify the decorations employed and thereby facilitate the carrying out of fundamental decorative principles is in brief the new idea in metal ceilings ushered in by Berger's Classified Designs." The illustrations which are presented show some of the styles of ceiling which the company are prepared to furnish, these designs being classified in a way to render them interesting and attractive. Each classified design, the manufacturers state, conforms throughout to a definite artistic style. At the same time a variety of patterns in each class is provided, thus permitting a wide range of effects by means of the different combinations which can be made.

THE J. A. FAY & EGAN COMPANY, Cincinnati, Ohio, announce to their friends in the trade that they have disposed of their Chicago branch to the firm of Manning, Maxwell & Moore of New York City, who have been appointed exclusive sales agents for the Chicago territory of all wood working machinery of both the J. A. Fay & Co. and the Egan Company departments, the sale dating from November 1, 1898.

WILLIAM CONNORS of 669-675 River street, Troy, N. Y., is sending out with his compliments a calendar for 1899, which is patriotic in the character of the design with which it is embellished. It is in the shape of a poster with metal strips at top and bottom, the upper half being devoted to prominent reference to American Seal Paint. The design represents Uncle Sam standing with right hand extended and a satisfied smile on his face, pointing to a group of vignettes representing President McKinley, Rear Admirals Dewey, Sampson and Schley and Generals Miles and Shafter. The leaves constituting the calendar proper, and which are attached to the lower portion of the poster, are printed in white letters upon a deep blue ground, thus rendering them conspicuous at a distance. Mr. Connors extends an invitation to attend the Industrial Fair to be held in Troy the week beginning February 20, and he will be glad to have his friends call at his booth, No. 36, and receive an Industrial Fair souvenir.

THE L. S. STARRETT COMPANY of Athol, Mass., the well-known tool makers, have recently commenced operations on a frame storehouse one and one-half stories in hight, which will give them increased business facilities. The work will be done by their own force of carpenters as soon as the foundations are completed.

WE ARE INDEBTED to the Stanley Rule & Level Company of New Britain, Conn., and with warerooms at 107 Chambers street, New York City, for samples of some literature which they have been distributing among the trade. Among the matter is a page to be inserted in their 1898 catalogue on which they illustrate plane irons which are now furnished with corrugated bottoms, trammel points, adjustable block planes and improved marking and mortise gauges. Stanley's iron block planes No. 100 are also illustrated. For the convenience of the trade a little pamphlet has been issued, devoted especially to Bailey's adjustable planes and other improved labor saving tools of interest to the carpenter and building mechanic. The last page of the pamphlet is devoted to illustrations showing the manner of using what is known as "Stanley's Odd Jobs," a convenient device which comprises, in reality, ten tools in one. In combination with an ordinary carpenter's rule it may be used as a tri-square, miter square, tee square, marking, mortise and depth gauges, spirit level and plumb, beam compass, miter level and inside square for making boxes and frames. The company issue under recent date a circular in which they refer in humorous vein to this tool, which they intimate should have a place in every carpenter's kit.

WILLIAM P. WALTERS' SONS, 1233 Market street, Philadelphia, Pa., issued for the holiday trade a very attractive pamphlet illustrating and describing various sizes of tool chests which they are offering, together with an enumeration of the tools which each contains. Attention is also given to tool cabinets, tool sets in boxes, amateur carving tools, carpenters' shoulder chests, work bench outfits, benches of various kinds, combination tools, scroll saws, lathe attachments, scroll saw designs, hand drills, engines, model machine shops, cutlery, &c. The pamphlet is printed in two colors, is bound in attractive covers, and bears the title, "Our Holiday Suggestions for Pleasure and Profit."

"THE YANKEE TOOL BOOK" is the title of a very neat little pamphlet of a size convenient to carry in the pocket which has just been issued by North Brothers Mfg. Company, Philadelphia, Pa. As might naturally be supposed from the title, the matter contained within its covers relates to the Yankee tools manufactured by the concern named. Prominent among these are the Yankee ratchet screw driver No. 10, the Yankee spiral ratchet screw driver No. 30 and the Yankee automatic drill No. 40. The screw drivers, it will be recalled, were illustrated a short time ago in these columns, their construction and operation being clearly pointed out. With regard to the Yankee automatic drill the manufacturers state that it is especially serviceable for carpenters, cabinet makers, &c., for boring wood for various purposes, the claim being made that holes can be bored in hard or soft woods without splitting. Simply pushing the handle down revolves the drill and a spring pushes the handle back to its place. The chuck is referred to as being of new design, and as much stronger than any now used in connection with such tools. The entire length of the tool, inclusive of the drill, is 10¾ inches. The last page of the little pamphlet shows a number of drill points which are used in connection with the Yankee automatic drill.

IN their interesting and attractive circular entitled "Draft Without a Chimney," the B. F. Sturtevant Company of Boston, Mass., tell why their tall chimney has been taken down, how draft is now produced, and how an annual fuel saving of nearly $1000 is secured.

"PENCILINGS" is the title of an illustrated pamphlet distributed by the Joseph Dixon Crucible Company, Jersey City, N. J., in the interests of their pencils for draftsmen and artists. The pamphlet tells the story of the lead pencil in a very interesting way, and illustrations in black and white and also in colors add very much to the attraction of the little publication. Incidentally full particulars of the Dixon pencils are given, and after reading the text one is fully persuaded of the merits of these world renowned drawing implements.

THE increasing use of sheet metal for decorative purposes and in the way of ceilings and siding lends added interest to the many new designs which are being offered the trade by the various manufacturers of these goods. The Canton Steel Roofing Company of Canton, Ohio, direct the attention of architects, builders and house owners generally to the fact that they are in the market with a varied line of metal ceilings adapted to meet numerous requirements, and in another part of this issue they make an announcement which refers to goods of this character.

REFERRING to the item that has been lately traveling about the country concerning the sign in the possession of the Western Society of Engineers, on which the words "Harper's Ferry," painted in black, stand out in relief through the erosion of the surrounding wood, due to the fact that the black paint was more durable than the other paint on the sign, the Joseph Dixon Crucible Company, Jersey City, N. J., speak of the merits of graphite paint and quote William Hooper of Ticonderoga, N. Y. He says it is his belief that ground graphite mixed with pure linseed oil will prove the most durable of coverings, and mentions a case of a large iron casting which has been in his mill yard for over 30 years painted with a single coat of this paint. When the casting was broken up he said the paint looked quite fresh. He explains this on the ground that after the oil has disappeared the graphite adheres to the surface the same as the graphite in a lead pencil will adhere to the surface of paper.

CHARLES A. STRELINGER & CO., 96-110 Bates street, Detroit, Mich., are distributing a very interesting little catalogue of tools and tool chests, which are intended to meet well defined requirements. The tools in the different assortments are selected with a view to the greatest amount of usefulness for the various purposes for which they are intended. The company state that they have been putting up tools and tool chests for about 12 years, since which time their trade in this line has constantly increased so that they are compelled to put it into a special department. Illustrations are given showing the style of tools in the sets furnished, while a number of pages enumerate the articles which are given in each set. The manufacturers state that on all full sets of tools, whether with or without chests, they prepay freight to all points in the United States east of the Rocky Mountains and to points west of this they make an allowance to equalize freight. They do not pay charges on any goods sent by express.

THE season is rapidly approaching when building operations are likely to show a marked degree of activity, and builders will be casting about for supplies of various kinds in connection with their work. They will therefore be interested in the lines of skylights and other sheet metal work which are being offered by the E. Van Noorden Company, 383-387 Harrison avenue, Boston, Mass., and who call attention to their productions in another part of this issue. The company manufacture their skylights of galvanized sheet iron, sheet copper or brass, the method of construction being simple and involving two important principles, namely, great strength and lightness. In the company's catalogue these skylights are illustrated and described in such a manner as to render their construction readily understood by the builder, and there are also shown designs of ceilings, wainscoting, siding, roofing, shingles, finials, cresting, gutters, eave trough, &c. The company also make a specialty of copper work for buildings, which is executed in the most substantial and workmanlike manner.

—FOREIGN HUSBAND (whose wife is going to remain longer): "Gif me two dickets. Von for me to come back, and von for my vife not to come back."—*Punch.*

—"WHY do you fellows call that mountain 'Catfish Hill?'" asked the tourist.

"Because," said Pieface Bill, "it can't be scaled."—*Cincinnati Enquirer.*

—ONE THING SURE.—"Who was it first said, 'Time flies?'"

"I don't know, but you can bet it wasn't anybody who had made an engagement to meet his wife downtown at a certain hour. Time drags upon such occasions."—*Cleveland Leader.*

Carpentry and Building

WITH WHICH IS INCORPORATED

The Builders' Exchange

VOL. XXI. No. 3 NEW YORK, MARCH, 1899. Ten Cents a Copy. One Dollar a Year

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Ives, H. B. & Co.
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Sash Weights.
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Raymond Lead Co.

Sashes, Doors and Blinds.
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National Saw Co.

Saw Jointer.
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Saw Sets.
Taintor Mfg. Co.

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Academy of Architecture and Building.

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Mesker & Bro.

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Burton, W. J. & Co.
Cortright Metal Roofing Co.
Garry Iron & Steel Roofing Co.
Montross Metal Shingle Co.
Thorn Shingle & Ornament Co.
Van Noorden, E. Co.

Shingle Stains.
Cabot, Samuel.

Shutters. (See Blinds.)
Kinnear & Gager Co.

Skylights.
Kanneberg Roofing Co.
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Folsom Snow Guard Co.

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Keystone Stained Glass Works.
Wallis, A. H.

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Wood Working Machinery.
American Wood Working Machine Co.
Barnes Tool Co.
Barnes, W. F. & John.
Cordesman, Meyer & Co.
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Fay, J. A. & Co.
Fox Machine Co
Marston, J. M. & Co.
Park, L. F.
Place, Geo.
Seneca Falls Mfg. Co.
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Witherby, Rugg & Richardson.
Yerkes & Finan Wood Working Mch. Co.

Woods, Ornamental.
Albro, E. D. & Co.

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CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

DAVID WILLIAMS COMPANY, - PUBLISHERS AND PROPRIETORS
232-238 WILLIAM STREET, NEW YORK.

MARCH, 1899.

The Convention of Builders.

The action of the delegates to the twelfth annual convention has placed the National Association before the builders of the country in a position which offers renewed demonstration of the fact that the welfare of the fraternity as a whole is the sole object of its existence. Feeling that the pioneer work had been largely accomplished, and that the time had arrived when the cost of carrying on the work of the association in the usual manner was operating against an increase in membership. the secretary recommended that the part of his work which has been the main source of expense be abandoned, and that the cost of membership be restricted to 25 cents or less per capita. It was the general feeling among the delegates and visitors to the convention that the practical removal of the item of cost would permit the ultimate affiliation of nearly all exchanges in the country, and that the great increase in personal interest thus created would in a large measure compensate for the elaborate work heretofore carried on from the secretary's office. The resolution permitting any member of any constituent body to discuss all matters before the conventions will, it is believed, extend debate and increase the thoroughness with which subjects of importance are considered, and will also stimulate attendance at the meetings. The abandonment of the custom of elaborate and expensive entertainment which has prevailed in the past, and which had grown to disproportionate importance, will go far to re-establish the real position of the association as an organization intended primarily for work, and at the conventions of which the entertainment should be entirely subordinate. The changes in the manner of conducting the work of the national body, which are now being inaugurated, completely remove the causes that have operated to prevent increased membership and furnished the only reasons for the withdrawal of exchanges that have resigned. The general feeling among those attendant upon the convention was one of hopefulness, and it was universally believed that the association is about to enter upon a period of widening influence and steadily increasing usefulness.

Limiting the Hights of Buildings.

For some months past a special committee of the Board of Trade and Transportation has been making a careful study of the question as to whether some regulations were not necessary to restrict the hights of buildings in New York City. This committee has recently completed its report, and has forwarded a letter, with a draft of a proposed ordinance covering this question, to the Board of Public Improvements. The ordinance provides that on the wider streets and avenues of the city no building hereafter erected shall exceed 200 feet in hight, and that no building used as a hotel or apartment house shall exceed 165 feet in hight, these measurements being from the level of the curb to the highest point of the cornice, or roof beams, of the building. It is provided that justly proportionate lesser hights shall govern the erection of structures on the narrower streets and avenues. Provision is further made that in every building erected to a hight of 137 feet and over there shall be two separate stairways leading from the ground floor to the roof, one of which shall be remote from the elevator shaft, and that in all buildings now in existence, or hereafter to be erected 137 feet or over in hight, there shall be provided and maintained a fully equipped auxiliary fire plant that shall, in all respects, be satisfactory to the fire department of the city. Nothing contained in the ordinance is intended to be construed as affecting, so far as hight is concerned, buildings already erected or in course of erection, and for the erection of which there has been submitted to the Superintendent of Buildings a detailed statement in writing of the specifications, together with a full and complete copy of the plans conforming in all respects to the existing rules in the Department of Buildings, provided, however, that work on such buildings shall have been actually commenced within sixty days from the taking effect of this ordinance.

Organized Capital and Labor Abroad.

There seems to be some possibility of a great war in England of organized capital against organized labor in the future. The British trades unions have taken up the challenge of the employers in forming a league for protection against strikes by organizing a Central Federation of Labor almost exactly on the lines of the Employers' League. The association was started a short time ago at a great meeting in Manchester, attended by representatives of many branches of labor from all parts of the United Kingdom. So far as present knowledge goes the Federation has not secured the adhesion of some of the great trades unions, and many of the labor leaders oppose the plan as tending to do away with the autonomy of the unions. But the centralization scheme appears to have the support of a large majority of the union workmen. It is reported that the Federation starts with a membership of six hundred thousand and a large annual revenue assured. One interesting and encouraging feature of the Manchester Congress is that the speakers all deprecated strikes.

Anniversary of Franklin Institute.

Technical journals of every class may well congratulate the Franklin Institute of Philadelphia on being 75 years old on February 5. Founded by men who had known Franklin's intimates, it has kept pace with the telegraph, the ocean cables, the Pacific Railroad, the mighty tunnels, the long distance telephone and the Roentgen rays. It has never committed itself to any sensational novelty, which sprang up and withered like Jonah's gourd, but has calmly tested and experimented until its rank as a scientific body is held in high esteem throughout the world. By its scientific investigations, exhibitions, lectures, reports, drawing classes and mathematical school, it has endeavored to promote the useful arts and to aid inventors. In all these things it has been highly successful, but it has never exploited its good work from the housetops to gain the applause of the thoughtless.

The value of its library to manufacturers, inventors and professionals can hardly be estimated. It is no slight honor to have held the first exhibition of American manufactures, to have gathered innumerable facts bearing on weather phenomena, to have been among the pioneer students of boiler explosions, and to have won the plaudits of the scientific world by an electrical display which gave the first great impetus to the development of the electrical arts in the United States. The Franklin Institute ha· won these laurels, and many others can rightly be placed upon its brow. So far from resting on a previously earned reputation, it is always at work; and it is now united with the Commercial Museums in preparing for an industrial exposition.

Photography for the Architect.

A great deal is heard of photography in its application to medicine and surgery, of the assistance which it renders to the astronomer and the microscopist; by many others than specialists it is employed to obtain records of old buildings, curious towns and picturesque bits of landscape. Yet comparatively few professional land surveyors and still fewer professional architects are alive to the help which it is capable of affording to them in their ordinary workaday business. That it is of such value the few who have employed it have proved without doubt, going so far as to say that for the surveyor, at least, a knowledge of photography is as essential as an acquaintance with the theodolite. . . . There was a prominent instance of the value of photographs as supplementary to a land survey a few months ago, says G. A. T. Middleton, when architects were invited to submit plans in competition for a new university at San Francisco. The site was an extraordinary one, at the foot of the Rocky Mountains, and rose no less than 700 feet in a trifle over a mile; and of this a plan was, as usual, supplied to intending competitors. On application, however, they were also provided with a scale model of the land and a series of photographs. These would undoubtedly have been more useful had they been panoramic, or even had the directions in which they were taken been more clearly indicated than was the case, but even as it was they gave a very good idea of the topography, and especially of the way in which the character of the land altered at its different altitudes, and of the views obtainable.

At first sight it is, perhaps, not quite so obvious how photography can be of value to the architect as to the surveyor. Yet it is so in even a greater variety of ways. In crowded cities particularly it is of the utmost importance before commencing building work to ascertain and record what is existing on the site and what is surrounding it before beginning operations, having regard to possible legal complications, actions from neighboring owners for infringements of rights of light and other easements, and many other eventualities; and in such cases the evidence afforded by photographs from well selected points of view and taken with suitable lenses, in conjunction with proper plans and models, is most important. By themselves, however, the value of photographs as evidence is liable to heavy discount in court, as many judges, and juries also, have become skeptical of the truthfulness of the impressions conveyed by them, owing to the occasional unscrupulous use of specially wide or narrow angled lenses, for purposes which are sufficiently obvious.

Of equal importance are photographs of shoring and underpinning work, and of all work which is to be covered over and about which disputes of one sort or another are by no means infrequent, owing, in the majority of cases, to the absence of evidence such as a photograph would supply; and almost invariably when bad work is condemned and ordered to be reinstated should the camera be used for the purpose of after reference if necessary. When work is being carried out at any such distance from the architect's office as to render personal constant supervision impossible, the clerk of works, by supplying photographs, can keep him in touch with what is going on and by their means a client can often be informed as to the progress of the building for which he is paying in a manner most satisfactory to all parties.

A Large Covered Reservoir.

One of the largest covered reservoirs in Southern California, if not on the Pacific Coast, is that which was recently completed at Pasadena. It measures 525 feet in length by 350 feet across its widest part, and varies in depth from 17 feet to 19 feet 8 inches. It is said to have a capacity of 21,000,000 gallons. It was originally constructed in 1875, but as in the summer months the warm rays of the sun cause a vegetable growth to accumulate in open reservoirs, it was decided to cover the reservoir in order to prevent this. In the present instance the cover is made of 1-inch Oregon pine boards, which rest upon 2 x 8 joist 6 feet part, these being supported by 4 x 10 girders. The girders in turn are supported by 2-inch iron pipe used as posts and set 18 feet one way by 15 feet 9 inches the other. The cover or roof is raised by about 2 feet above the rim of the reservoir, a wire screen covering the intervening space to afford ventilation.

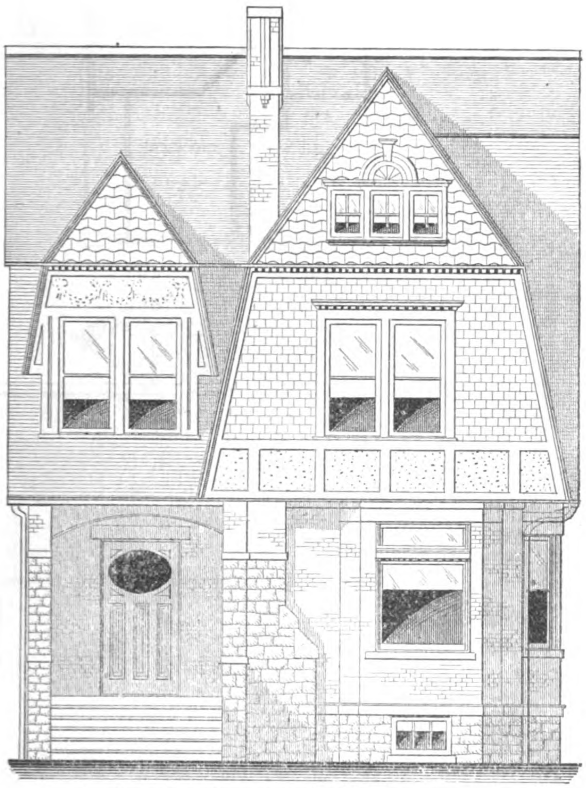
Finding Specific Gravity of Bricks.

In estimating the weight of any particular structure made of bricks it is quite a common thing to weigh half a dozen or so of bricks and multiply for cubic contents of the structure. This weighing, says the *British Clayworker*, may be done by the direct method or by ascertaining the specific gravity of the bricks. When the latter is carefully calculated it is the best method, but if it is not carefully ascertained (and it very rarely is) the results are of little real practical value. In the direct method of weighing the brick there are usually several uncertain factors. The brick having remained in the office for some time becomes dry, and will not, of course, weigh as much as when it was first received from the maker, unless the latter had previously kept it in a dry place. It is safe to assume that in the building it is better to estimate on a maximum basis. At the same time, if to gain that end the brick be saturated with water and then weighed, the result must be very unsatisfactory, as it greatly overestimates the normal weight under any circumstances if it is to be regarded as a unit in calculating the weight of any solid piece of brick work.

Very few people understand the way to take the specific gravity of a brick properly. If the brick is practically non-porous the result comes out right enough, but that is not very often the case. To take the specific gravity correctly the brick must first be well dried, not artificially, because that may lead to the formation of microscopic cracks. Then it must be weighed, either actually or relatively, as in a spring balance, or specific gravity steelyard. After that the brick may be immersed in water, taking care that one face of it just projects (about 1/8 inch) above the water. It should remain in the water for at least 24 hours, and longer if air bubbles still rise to the surface, and in fact until these latter cease to be formed. The brick is then fully saturated. If during the process the brick has disintegrated at all (as rubbers are wont to do) the water should be carefully decanted and the disintegrated particles weighed, the amount being subtracted from the gross dry weight. Now weigh the saturated brick in air, which will give the amount of water absorbed. Then weigh it in water and add the amount of the water absorbed to that weight. The weight thus ascertained must be subtracted from the weight in air, and the weight in air being divided by the product will give us the true specific gravity of the brick. The part of the work usually neglected is the addition of the amount of water absorbed to the weight in water; also experimenters habitually fail to leave one face of the brick above the surface of the water when testing for absorption.

COTTAGE IN A CINCINNATI SUBURB.

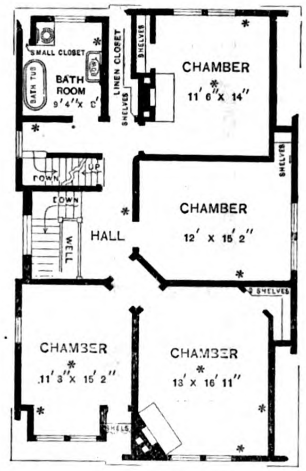
THE cottage which we illustrate this month is of brick and frame construction, and as may be seen from an inspection of the half-tone engraving which constitutes the supplemental plate it embodies in its architectural treatment some rather novel effects. The building is located in a charming sub-division of McGregor Park, Mount Auburn, one of the many beautiful suburbs of the city of Cincinnati, Ohio. The first story is of No. 1 red pressed brick with freestone trimmings, the exterior of the porch buttresses and columns as well as all exposed walls above ground being of blue faced rock range work in 5 and 6 inch courses, pointed up with colored cement mortar. The cellar walls are 7 feet high and 18 inches thick, with footings 6 inches deep. The cellar walls extend to the bottom of the



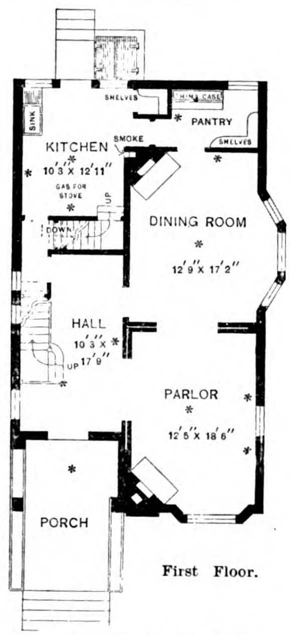
Front Elevation.—Scale, 1/8 Inch to the Foot.

Cottage in a Cincinnati Suburb.—Sweeney & Robinson, Architects.

first floor joist and have footings projecting 3 inches on the sides. In the front and side gables is a belt course of panels of cement mortar laid on Roebling's patent stiffened wire lath, above which are shingles as shown. The interior of the house is divided into ten rooms and bath, with stair hall of sufficiently liberal proportions to permit of its use as a reception room. The cellar is cemented and divided into spaces for laundry, vegetables, coal bins, &c. According to the architects' specifications all the lumber employed for the frame work is seasoned pine, while the joist, studding, rafters and sheathing are of hemlock. The girder is 10 x 10 inches; the first and second floor joist 2 x 10 inches, placed 16 inches on centers and well bridged; rafters 2 x 6 inches, also placed 16 inches on centers and well spiked to a 4 x 4 inch wall plate; ridge piece, 2 x 8 inches, double spiked; valleys, 2 x 8 inches; collar beams, 2 x 6 inches, and attic floor joist 2 x 8 inches, placed 16 inches on centers and well bridged. The sills for the outside walls are lapped at the corners, in long lengths, well spiked and carefully bedded in mortar. The studs are 2 x 4 inches by 20 feet, placed 16 inches on centers and doubled at all openings. The roof is covered with tongue and groove dressed sheathing boards on which is placed tar paper and Black Virginia slate. All outside walls, gables and projection of second story are covered with tongue and groove dressed sheathing boards on which is placed Sackett's No. 2 building paper, and cedar shingles of



Second Floor.

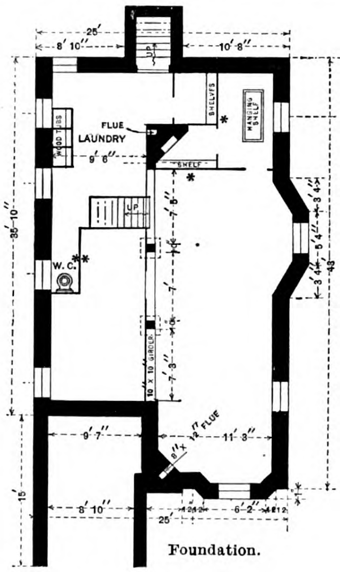


First Floor.

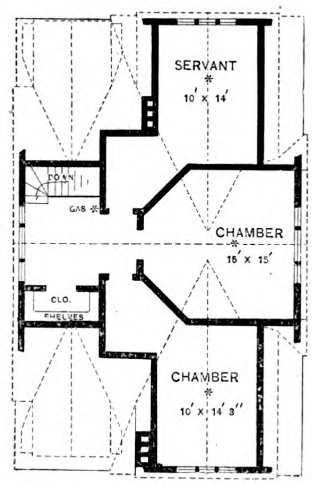
Scale, 1-16 Inch to the Foot.

pattern as shown in the elevations. The exterior trim, such as cornice brackets, corner boards, &c., is of white pine, while the soffit of the projection between the first and second story is of beaded yellow pine for varnishing. The plastering is of three coat work finished white and gauged with plaster of paris. The glazing of the first and second floors is of double strength Pittsburgh glass. The front parlor window, it will be noticed, is a single light, this being of plate glass with transom of stained glass, and there is a large window of leaded and stained glass which lights the main stairs.

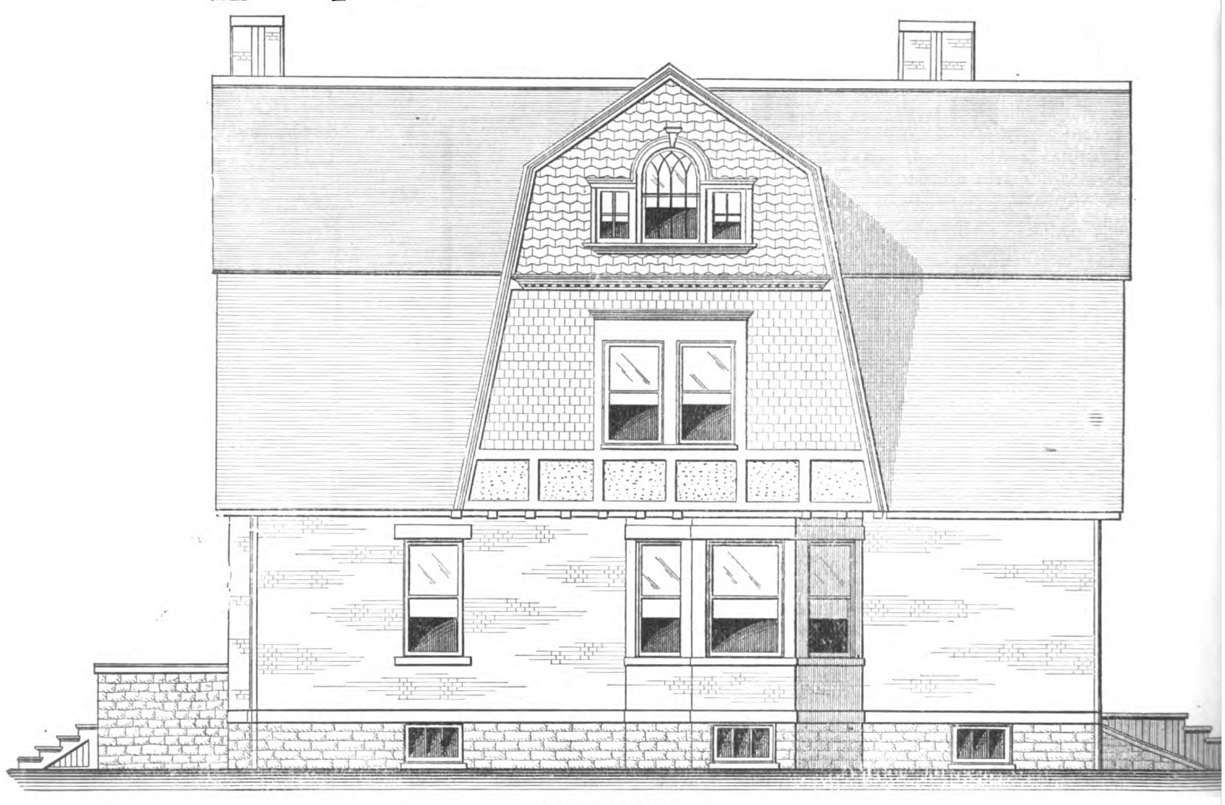
The stair hall or reception room has a hardwood oak floor, and the main stairs are finished in oak. All dressed inside wood work throughout the house is finished with one coat of shellac and two coats of best copal varnish. The bathroom is wainscoted 4 feet 6 inches high with beaded and fluted yellow pine having molded cap and floor strip, the finish being in oil. The plumbing



Foundation.



Attic with Outline of Roof.



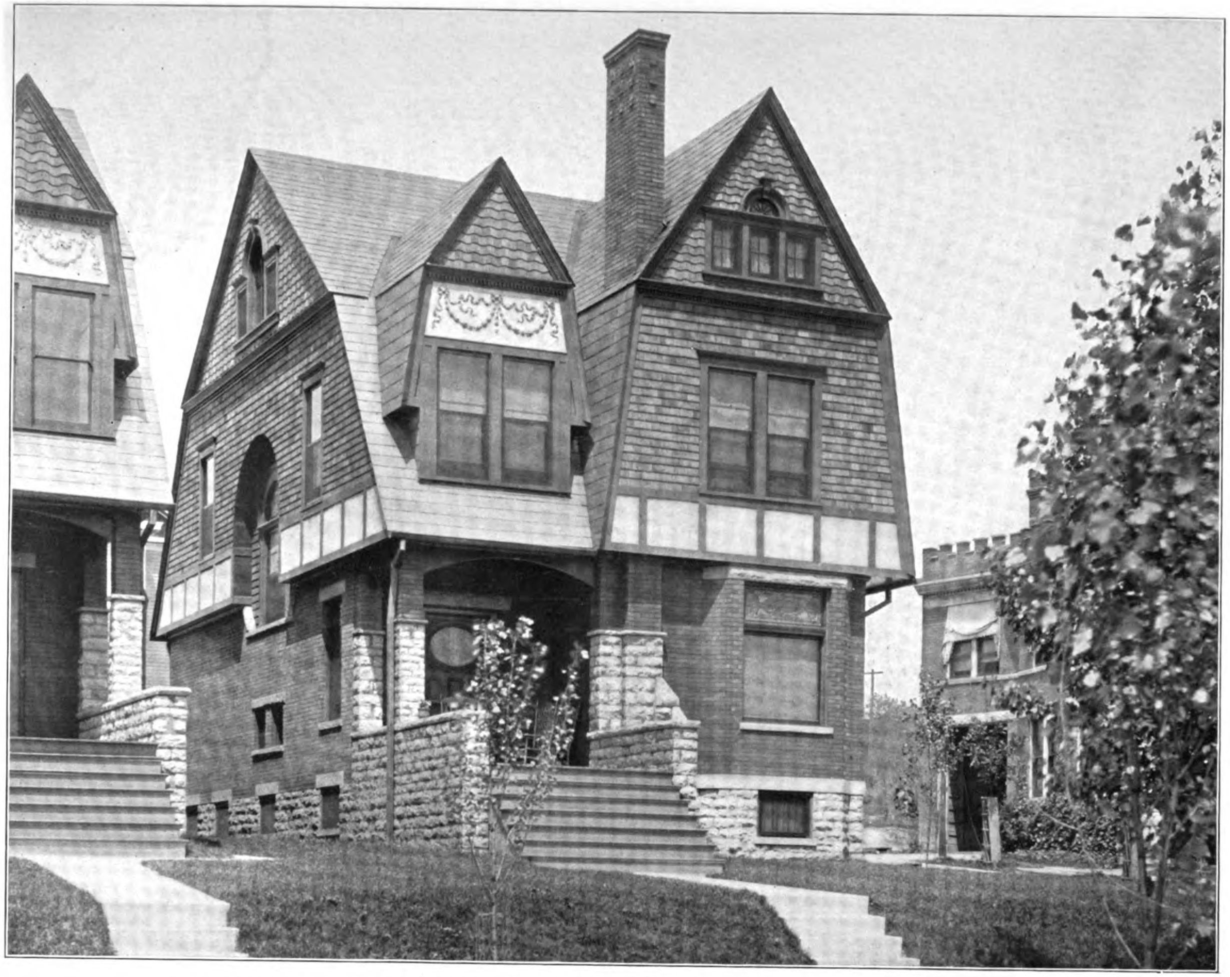
Side (Right) Elevation.

Cottage in a Cincinnati Suburb.—Plans.—Scale, 1-16 *Inch to the Foot.—Elevation.—Scale,* 1 8 *Inch to the Foot.*

is of the open type, the bathroom having marble top washstand, Corona iron porcelain enameled tub and Carlisle wash out pedestal closet, supplied from hardwood cased tank. The closet rests on a marble floor slab with the necessary flush, supply and vent pipes. The trimmings are nickel plated and the tub has plated combination bath cock, waste and supply.

The house is heated by furnace and is fitted with electric bells and speaking tubes. The gas fixtures are of handsome design in cast brass, the principal ones being lighted by automatic electric gas lighters. The cottage was built for William L. Stiess by Bofinger & Hopkins of Cincinnati, Ohio, in accordance with plans prepared by Architects Sweeney & Robinson of 540 Main street of the city named.

AN interesting story comes from Kansas of the discovery of unsuspected natural wealth. For years, near Mulvane, Kan., there was a large tract of what was known as "smoking prairie." It was good grazing



RESIDENCE OF MR. WILLIAM L. STIESS, IN McGREGOR PARK, MT. AUBURN, CINCINNATI, OHIO.

SWEENEY & ROBINSON, Architects. BOFINGER & HOPKINS, Builders.

SUPPLEMENT CARPENTRY AND BUILDING, MARCH, 1899

ground, but during rainy weather it smoked, and no one knew the cause until a stranger quietly bought the land and proved that he has secured a fortune. It appears that a natural cement, worth $10 a barrel, lay close to the surface in great quantities.

Creosoting Wood.

The subject of creosoting divides itself into three arts: The creosote, the method and the wood. Creosote is a substance which is contained in the second distillation of coal tar. The first distillation consists of light oils, the second creosote, and the third pitch. Tars differ greatly in their chemical constituents and in their products of distillation. The word creosote, therefore, has not an absolutely exact definition. The substance has no chemical symbol, as it applies to a fluid the constituents of which constantly differ. It is essential that creosote should be heavier than water, as light creosotes have never been satisfactory, and most of the failures attributed to creosote have really been due to the use of such oils. Creosote is expected to act in two ways. It introduces antiseptics into the wood; it also fills the pores with thick, gummy, insoluble oils and naphthaline. Therefore, a second distillate of coal tar, which contains antiseptics and gummy substances in sufficient quantity and of satisfactory quality, should be selected. It should contain over 40 per cent. of naphthaline, and as little pitch as possible. It may contain as much carbolic acid as is likely to be present in this distillate, which will not be over 4 or 5 per cent. Heavy oil of creosote is heavier than water and is sufficiently insoluble to remain in the wood for a long time. Creosote weighs from 8 to 9 pounds to the gallon.

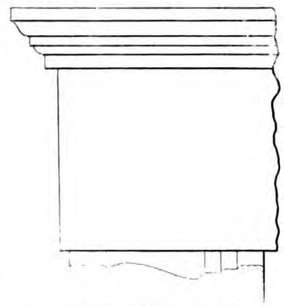
The method by which creosote is introduced into the wood is most important, but any method which will insure a thorough inpregnation will be satisfactory. The wood is first heated in a vacuum to remove the moisture. The heat is so manipulated as to vaporize the sap and coagulate the albumens of the wood. Heated creosote is then introduced and the condensation of the vapor in the wood causes a vacuum which, assisted by pressure, draws in the creosote. A gauge outside the tank indicates the subsidence of creosote as it passes into the wood. The process is stopped as soon as the specified quantity of creosote, usually from 10 to 16 pounds per cubic foot of wood, has been forced in.

Section of Wainscoting for Bathroom. —Scale, 3 Inches to the Foot.

Cap for Bathroom Wainscoting.—Scale, 3 Inches to the Foot.

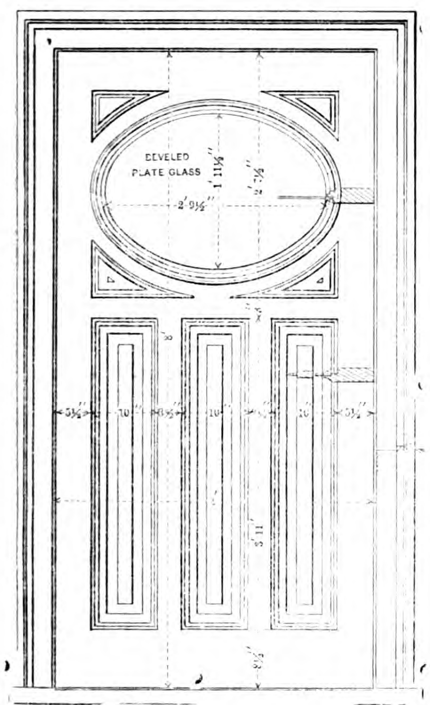
Base for Entire House Except Kitchen and Attic.

Base for Kitchen and Attic.

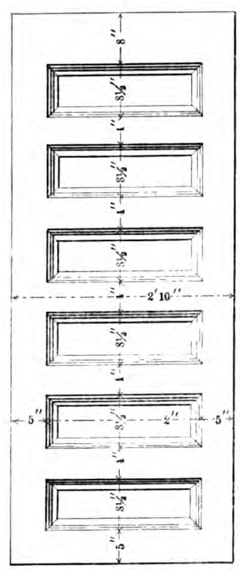


Detail of Inside Finish.

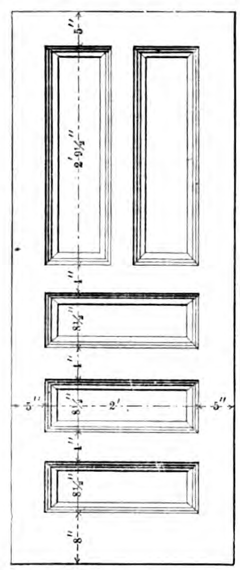
Scale, 3 Inches to the Foot.



Elevation of Front Door.



Doors on First Floor.



Doors on Second Floor.

Scale, ⅛ Inch to the Foot.

Miscellaneous Constructive Details of Cottage in a Cincinnati Suburb.

A curious instance of dwarfism in pines is recorded by C. E. Bessey of the University of Nebraska, who states that on Green Mountain, near Boulder, Col., he found in a crevice of the rock at the summit a pine tree less than 3 inches high and 1-5 inch in diameter. It had no branches, and bore a single tuft of needles at the top. Nevertheless, it showed 25 distinct annual rings, making it presumably 25 years of age.

ROUGH CAST WORK FOR BUILDINGS.

A MEANS often employed for increasing the ornamental appearance of buildings, especially those intended for dwelling purposes, is the use of rough cast work, which, when skillfully managed, is frequently very effective. In order, however, to prepare the outside of a frame building for rough casting, great care should be exercised to have the ground work dry and well put together. A well informed writer, in discussing the subject, states in a recent issue of the *Canadian Architect and Builder* that when possible the frame work should be erected on a stone or brick foundation, but where this cannot be done and where the building must rest on timber posts or piles, these should be put in the ground at least 4 feet, or deeper in places where frost would likely strike deep enough to lift the posts. These posts should not be more than 8 feet apart —6 feet would be much better—and they should be of good size, not less than 8 inches in diameter. Where posts are used, their tops should not be more than 6 inches above the ground grade, and they should be leveled off all round to receive the sills. While two tiers of 2 x 4 inch scantling—if bedded in mortar—would answer very well for the sills of a balloon frame on a stone or brick foundation, it will not do to make use of anything less than timbers having a 6 x 6 inch section for sills that are to rest on posts, as lighter timber would be apt to sag between the posts, to the detriment of the building, and the rough casting in particular.

Spacing the Studding.

The studding employed in building a balloon frame which is intended to be boarded inside and outside, need not be closer than 3 feet, but the boarding should be dry, the edges laid as close as possible, and the whole well nailed to the studding. It is not necessary that the boarding be nailed on diagonally, as is practiced in some communities, as horizontal boarding, if joints are kept tight and the whole well nailed, has all the advantages of strength and rigidity of diagonally laid boarding; besides, the former method is more economical in material and labor.

If the ground work is now ready to receive the lathing, in accordance with the foregoing, the first thing to do is to cover the whole boarding with one of the many kinds of building paper—it is suggested that "tarred" paper be used, though this is optional—wrapping it well around the corners, and around the studding and boarding at all the openings before the frames are placed in position. Much of the warmth of the house depends on the honest and thorough manner in which this papering is performed, therefore great care should be exercised in doing the work. Strips of lath may be nailed here and there on the paper to hold it in place until the lathing proper reaches it. The lathing should then be nailed on at an angle of about 45 degrees with the line of foundation. The laths should be spaced to about 1 inch apart and should be well nailed to the boarding. This will not only hold the paper rigid in place, but it will aid very much in strengthening the whole structure. Another tier of lath must then be nailed over the first lathing, and must be put on diagonally in a contrary direction to the first lathing. This should be well nailed to the other lath, thus bracing the building in the opposite way. When the work is well done, the walls will be quite rigid and immovable. It is considered by old hands the better way to leave out the window and door frames until after the first layer of lath is nailed on. This admits a "key" of the plaster to get in behind the outside casings, cutting off any chance for wind making its way into the house from behind the window or door frames. Of course, the second layer of lath would have to be fitted against the casings, which will require to be thick enough to receive lath and two coats of plaster. Water table, corner boards and cornice boards may be nailed in place over the paper before any lath is put on, but they must be sufficiently thick to receive two thicknesses of lath and two coats of plaster, or be padded out with band moldings, or, like the casings, have the thickness of a lath as furring behind them.

Rough Casting.

One of the main things to be considered in planting finished stuff on a building to be rough cast is to have all the work nailed well to the boarding and timbers. The first coat for this kind of work should consist of rich lime mortar, with a large proportion of cow's hair well mixed through it. The mortar should be made at least four days before being used, and longer if possible. The plasterer when applying the mortar should be sure to use pressure enough to force the mortar well into the keys or interstices of the lathing in order to give it good bonding. The face of the work must then be scratched to form a key for the second coat, which must not be put on before the first coat is thoroughly dried out. The mortar for the second coat is made the same as for the first coat, and is applied in a similar manner, with the exception that the wall must be sprinkled with clean water before the second coat is put on, in order to keep the second moist and soft until the "dash" or rough cast is put on. The dash, or rough cast, is composed of fine gravel, washed clean, and perfectly free from all earthy particles, and mixed with pure lime and water until the whole is of a semi-fluid consistency. This is mixed in a tub or pail, and is dashed against the wall with a wooden float about 5 or 6 inches square. While the plasterer throws on the dash, with the float in his right hand, he holds in his left a common whitewash brush, which he dips into the dash from time to time and then brushes over the mortar and rough cast, which gives them, when finished, a regular, uniform color and appearance.

For 100 yards of rough casting, finished as above described, the following quantities will be required: 1800 laths, 12 bushels of lime, 1½ barrels of best cow hair, 1¾ yards of sharp sand, ¾ yard of washed gravel and 16 pounds of cut lath nails 1¼ inches long. A quarter barrel of lime putty should be mixed with every barrel of prepared gravel for the dash.

The dash may be colored to suit taste by using proper pigments. To color 100 yards in any of the tints named herewith use the following quantities of ingredients: For a blue black, 5 pounds of lamp black; for buff, 5 pounds of green copperas, to which add 1 pound of fresh cow manure, strained, and mixed with the dash. A fine terra cotta is made by using 15 pounds of metallic oxide, mixed with 5 pounds of green copperas and 4 pounds of lamp black. Many tints of these colors may be obtained by varying the quantities given. The colors obtained by these mixtures are permanent; they do not fade or change with time or atmospheric variations. Earthy colors, like Venetian red and umber, soon fade and have a sickly appearance, and they tend to weaken the mortar. Buildings rough cast in this manner are warmer than when covered with siding or shingles, and are less expensive, quite as durable, and more fire resisting.

The twenty-first annual exhibition of the Society of American Artists will be held at their galleries in West Fifty-seventh street, from March 25 to April 29, inclusive. Original works in painting and sculpture not before publicly exhibited in the city of New York and which are approved by the Jury of Admission will be accepted for this exhibition. The jury for 1899 is a strong one, embracing the names of some of the best known artists and sculptors in the city.

Determining the Strength of Wooden Beams.

By F. E. Kidder, Consulting Architect.

It is the purpose of the writer to give in as clear and simple a manner as possible rules for determining the strength of wooden beams under different conditions of loading and supporting, also for determining the necessary size of beam to sustain a given load, together with the application of the same to the construction of wooden floors and girders. Many persons doubtless think that the strength of wooden beams is a matter of conjecture and not of mathematics, but except for a slight variation in the strength of the wood, due to different conditions inherent in the tree and also in the degree of seasoning, the strength of a given beam can be very accurately determined by simple calculations. Even with the variation due to the wood, it is possible to determine the maximum load that it is safe to put upon a beam, which is usually the information desired.

Before giving any rules, however, it will be well to consider some of the facts relating to the strength of beams. The strength of a beam depends upon its size and shape, its span; (or if a cantilever, the projection beyond the point of support); the kind of wood and its condition, and also the manner of loading. The following facts are also true of all rectangular wooden beams:

1. The strength of a beam decreases in the proportion that its span is increased. Thus the strength of a given beam, with a span of 10 feet, is one-half that of the same beam with a 5-foot span. With a span of 12 feet the strength will be five-sixths what it would be with a span of 10 feet. Or if we have a beam with a span of 20 feet and place a support under the center we just double the strength.

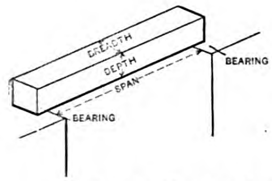


Fig. 1.—Showing Meaning of Terms Used.

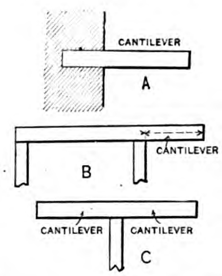


Fig. 2.—Some Forms of Cantilever Beam.

Determining the Strength of Wooden Beams.

2. The strength of a beam increases exactly as its breadth or thickness is increased. Thus a beam 2 inches thick is twice as strong as a beam 1 inch thick, provided the other conditions remain the same.

3. The strength of a beam increases in proportion to the *square* of its depth. A 2 x 8 inch beam will be four times as strong as a 2 x 4 inch beam, and a 2 x 12 inch beam will be nine times as strong as a 2 x 4 inch beam, the square of four being 16, and of twelve 144, or nine times as great.

It follows from the second and third paragraphs that the strength of a rectangular beam is in proportion to the product of the breadth by the square of the depth if the span remains the same. A knowledge of these facts is very important for the wise use of timber.

A beam 8 x 8 contains 64 square inches in cross section, and a beam 6 x 10 contains 60 square inches, yet their strength will be in the proportion of 512 ($8 \times 8 \times 8$) to 600 ($6 \times 10 \times 10$), the 6 x 10 beam being the stronger. The strength of a 6 x 8 inch beam on edge in proportion to the strength of the same beam laid flat wise is as $6 \times 8 \times 8$ to $8 \times 6 \times 6$, or 384 to 288.

Deep beams are also very much *stiffer* than shallow beams, the resistance of a beam to bending increasing in proportion to the *cube* of the depth. The stiffness therefore of a 2 x 12 inch beam and a 2 x 10 inch beam is in the proportion of the cube of 12 to the cube of 10, or 1728 to 1000. This property of stiffness is very important in floor joists, where the span in feet is usually greater than the depth in inches, but for shorter beams it need not be considered.

In speaking of the strength or stiffness of beams the *breadth* of the beam always refers to the thickness measured horizontally, and the *depth* to the hight of the beam as it sets in place, without regard to which is the larger dimensions. When a beam is supported at each end the distance between supports is called the span. The distance which the ends rest on their support is called the bearing.

Measure of Breadth and Depth.

In these articles the breadth and depth of the beam are always supposed to be measured in inches and the span in feet. The meaning of the terms referred to is clearly shown in Fig. 1 of the engravings. Beams are also sometimes supported at three or more points, in which case they are called continuous beams. These will be considered in their proper place. There is also the *cantilever beam*, or a beam fixed at one end. The cantilever portion of the beam is that which projects beyond the support. The other end may be fixed in a wall, as at A, Fig. 2, or it may be held down by its own weight and the load on it, as at B. A beam supported at the center only, as at C, is a double cantilever, each side being considered as a cantilever. All three cases are met with in building construction, although that shown at B is the most common.

There are also different ways of loading a beam, although loads are usually classed either as distributed or concentrated. A *distributed load* is one that is applied over the entire length of the span, and when the load is uniform, as in the case of a plain brick wall of uniform hight, the load is called uniformly distributed. Floor loads, although as a matter of fact not absolutely uniform, are generally considered as such. Floor joists resting on a girder may be considered as a uniformly distributed load, when the joists are not spaced more than 2 feet on centers. When they are spaced 4 feet or more on centers they should be considered as a series of concentrated loads.

A *concentrated load* is one that is applied at a single point of a beam, although in practice the "point" may be perhaps 3 feet long. An iron safe resting on the center of a beam 10 feet or more in length would be considered as a concentrated load. The end of a header framed to a trimmer is also a concentrated load, as is also a partition extending across a series of beams or joists.

The effect of a concentrated load applied at the center of a beam is just *twice as great* as if the load were uniformly distributed. When the load is applied between the center and the end the effect may be greater or less than that of a distributed load, according as the point of application is nearer to the center or to the support.

Live and Dead Loads.

Loads are also spoken of as "live" and "dead" loads. A dead load is one that does not move of itself, such as the weight of any kind of material or a brick wall, for instance. A live load is one that is constantly moving and quickly applied. Live loads that produce a decided impact or vibrations are nearly twice as destructive as those that remain perfectly still. The principal live loads met with in building construction are moving crowds of people, particularly if they move in regular time, as in dancing or marching; machinery and wind pressure. The strength of a beam subject to almost any of the different variations of loading may be determined with about the same degree of accuracy as if simply loaded at the center, but the calculations require a considerable knowledge of mathematics, so that only a few of the more common cases can be covered by simple rules. These we will now consider.

When considering the strength of beams we usually have either one of two problems to solve—namely, to find the strength of a given beam or to determine the necessary size of beam to support a given load. The same algebraic formula really answers for both, but for the benefit of those not proficient in algebraic equations we will give a simple rule for each question, and also for each of the common conditions of support and loading. When we have to determine the strength of a given beam all of the conditions are known, but when we wish to determine the size of beam to carry a given load we must guess at or assume one dimension of the beam and solve for the other. If our first guess gives a badly proportioned beam we must guess again, and do the problem over again a second time. The quantity which represents the strength of the wood or the resistance of the fibers to breaking is now commonly designated as "fiber stress." In text books written previous to the year 1885 the same quantity is called "modulus of rupture." This quantity, of course, varies with different woods, and has been determined by numerous experiments on beams of the different kinds of woods. For convenience in making calculations $^1/_{18}$ of the modulus of rupture is generally used for determining the breaking strength of wooden beams, and $^1/_3$ of this latter value for determining the safe strength.

In the following rules * this quantity will be represented by the letter *A*, the values of this letter for the different woods used in construction being given in the accompanying table:

Table 1.—Values of A, Used in Determining the Safe Strength of Beams.

Kind of wood.	A, in pounds.	Kind of wood.	A, in pounds.
Chestnut	60	Pine, Texas yellow	90
Hemlock	55	Pine, common white	60
Oak, white	75	Redwood	60
Pine, Georgia yellow	100	Spruce	70
Pine, Norway	70	Whitewood (poplar)	65
Pine, Oregon	90		

To find the strength of a rectangular beam, supported at both ends and uniformly loaded over its entire length.

Rule 1.—Multiply twice the breadth of the beam by the square of the depth and by the value of *A*, in Table I, and divide by the span in feet.

To find the strength of a rectangular beam, supported at both ends and loaded at the center.

Rule 2.—Multiply the breadth of the beam by the square of the depth and by the value of *A*, Table I. Divide the product by the span in feet.

To determine the size of a rectangular beam, supported at both ends and uniformly loaded over its entire length.

Rule 3.—Assume the depth of the beam. Multiply the span by the load, and divide by twice the square of the depth multiplied by the value of *A*. The answer will be the breadth of the beam.

Example.—A rectangular spruce beam having a span of 16 feet is required to support a uniformly distributed load of 3780 pounds; what should be the size of the beam ?

Answer.—We will assume 12 inches for the depth of the beam. The span multiplied by the load = 60,480. Twice the square of the depth multiplied by *A*, for spruce = $2 \times 12 \times 12 \times 70 = 20{,}160$. Divide 60,480 by 20,160 and we have 3 inches for the breadth of the beam, or a beam 3 x 12 inches will just support the load. If we assume 8 inches for the depth of the beam we shall obtain 6¾ inches for the breadth. One beam would have the same strength as the other, but the deeper beam would contain the least material and bend less.

To determine the size of a rectangular beam, supported at both ends and loaded at the center.

Rule 4.—Multiply the load by 2, and then proceed by Rule 3. That is, a load of 1000 pounds at the center will require the same size beam as a load of 2000 pounds distributed.

To determine the size of a rectangular beam, supported at both ends and carrying both a distributed load and a concentrated load at the center.

Rule 5.—Multiply the concentrated or center load by 2, and add the product to the distributed load, then proceed by Rule 3.

Example.—A hard pine girder of 12-foot span supports a distributed load of 18,000 pounds, and also a post at the center, which sustains a load of 9600 pounds; what should be the dimensions of the girder ?

Answer.—Twice the center load = 19,200 pounds. This added to the distributed load = 37,200 pounds. Assume 14 inches for the depth, and proceed by Rule 3. The product of the span by the load = $12 \times 37{,}200 = 446{,}400$. Twice the square of the depth multiplied by *A*, for hard pine = $2 \times 14 \times 14 \times 100 = 39{,}200$. Now 446,400 divided by 39,200 = 11⅜ inches, or it will require an 11⅜ x 14 inch girder to support both loads.

To determine what amount of concentrated load a given beam supported at both ends will safely carry at a given distance, N, *from the left support* (see Fig. 3).

Rule 6.—Multiply together the breadth, the square of the depth, the span and *A*, and divide the final product by four times the product of *N* multiplied by *M*, both in feet. The result will be the maximum safe load in pounds.

Example.—A 10 x 12 inch hard pine girder, having a span of 14 feet, supports a post 4 feet from the left support; what is the maximum load that should be put on the post ?

Answer.—The product of the breadth, the square of the depth, the span, and $A = 10 \times 144 \times 14 \times 100 = 2{,}016{,}000$. If the span is 14 feet and *N* is 4 feet, *M* will be 10 feet. Four times the product of *N* by *M* = 160, and 2,016,000 divided by 160 = 12,600 pounds, the maximum safe load.

When the load is at the center this rule will give the same result as Rule 4.

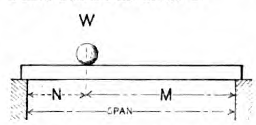


Fig. 3.—Diagram Illustrating Rule 6.

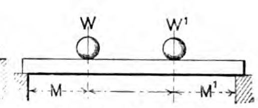


Fig. 4.—Showing Equal Loads Concentrated at Equal Distances from Supports.

Determining the Strength of Wooden Beams.

To determine the size of beam, supported at both ends, required to support a concentrated load applied at a given distance, N, *from the left support.*

Rule 7.—Multiply four times the load by the product of *M* by *N*, and divide the final product by the product of *A* times the square of the depth times the span. The result will be the breadth in inches.

Example.—What size of hard pine beam will be required to support a load of 12,600 pounds 4 feet from the left support, the span being 14 feet ?

Answer.—Four times the load multiplied by the product of *M* by *N* = 2,016,000. Assume 12 inches for the depth; then *A* multiplied by the square of the depth, and the product by the span = $100 \times 144 \times 14 = 201{,}600$, and 2,016,000 divided by 201,600 equals 10 inches, the required breadth. If we had taken 14 for the depth we would have obtained a breadth of 7 $^{84}/_{100}$ inches.

To determine the strength of a rectangular beam, loaded as in Fig. 4, M *being equal to* M_1' *and* W *equal to* W_1'.

Rule 8.—Multiply the breadth by the square of the depth and their product by *A*, and divide by four times *M* (in feet). The result will be the safe load at each point. It should be noted that in this case the strength is not affected by the span, if we neglect the weight of the beam itself.

Example.—What are the greatest safe loads a 10 x 12 inch hard pine beam of 12 feet span will support at a distance of 4 feet from each end ?

Answer.—$10 \times 144 \times A = 144{,}000$, which divided by four times $M = 144{,}000 \div 16 = 9000$ pounds at each point.

To determine the size of beam required to support equal loads concentrated at equal distances from the supports, as in Fig. 4.

Rule 9.—Assume the depth: Multiply four times the load at one point by *M* (in feet), and divide by the square of the depth multiplied by *A*. The answer will be the breadth of the beam in inches.

(*To be continued.*)

* In all of these rules the breadth and depth of the beam are to be measured in inches and the span in feet, the final result being in pounds.

ARCHITECTURAL ACOUSTICS.*

THE whole room may be mapped out into regions in which the sound is loud and regions in which it is feeble. When there are many reflecting surfaces the interference is much more complex. When the sound changes in pitch, the interference system is entirely altered in character. These are not merely theoretical considerations. A room in the Harvard Physical Laboratory has been partly mapped. This room, known as the Constant Temperature Room, is of the simplest possible character. The four walls, the ceiling and the floor are plain—there being no windows, and the door being flush with the wall. This room has been of great service during the past three years as a place in which to try preliminary experiments on a small scale before passing to the more complicated conditions of a large hall. One occurrence in this room will illustrate the point under consideration. The source of sound was a middle C organ pipe blown by a steady wind pressure. The observer, on changing the position of his head by 10 or 12 inches, could hear the note change in the most positive manner from middle C to the C an octave above. The explanation is simply this: The organ pipe did not give a single pure note, but gave a fundamental middle C accompanied by several overtones, of which, in this case, the strongest was the octave C. Each of these notes has its own interference system, and near the observer the region of silence for one system happened to coincide with the region of reinforcement in the other, and *vice versa*. Thus the observer in one position heard the fundamental note, and in the other the overtone. The confusion that this phenomenon is capable of producing in the complex and rapidly changing sounds of the human voice is evident. Such is the pathology of "interference;" but I am unable to propose a cure for it that would be generally applicable, although in the case of one hall it was possible to relieve somewhat this particular difficulty. Until recently it seemed possible to formulate a general line of procedure, but this now seems doubtful.

Absorption.

The third phase of the problem, while in many ways not so intricate as the last, deserves careful consideration, because in it lie the most frequent and needless failures. Sound, being energy, once produced in a confined space, will continue until either transmitted by the bounding walls or transformed into some kind of energy, generally heat. This process of decay is called absorption. Thus, in the lecture room of Harvard University, in behalf of which this investigation was undertaken, the absorption was so slight, and the residual sound was audible so long after the source of sound had ceased, that it was quite impossible, by speaking loudly or gently, to make oneself understood at the other side of the room. Even a very deliberate speaker would utter 12 or 15 syllables during the audibility of one. With a large audience present it was not so bad, but was still intolerable. Such a misfortune as this may arise from two causes. If it occurs in a room when the audience is small the prominence of the defect may be due to the absence of sufficient absorbing power in the material and the furnishing of the room; if the defect continues when a large audience is present it arises also from a failure to have so shaped the room as to adequately employ the great absorbing power of an assemblage of people.

The preceding suggestions have been on the supposition that the architect could control his design by acoustical considerations alone. This is, of course, not the case. The artistic appearance of the hall, adherence to conventional forms—as a lofty ceiling in a church, adequate and pleasing lighting by day and by night, adequate and uniform ventilation—all make demands at times incompatible with acoustically ideal conditions. A hall having proved faulty under trial, it may become necessary to diagnosticate the case and prescribe the remedy. There is no simple treatment that can cure all cases. There may be inadequate absorption and prolonged residual sound; in this case absorbing material should be added in the proper places. On the other hand, there may be excessive absorption by the nearer parts of the hall and by the near audience, and the sound may not penetrate to the greater distances. Obviously the treatment should not be the same. There is such a room belonging to the university known locally as Sever 35. It is low and long. Across its ceiling are now stretched hundreds of wires and many yards of cloth. The former has the merit of being harmless; the latter is like bleeding a patient suffering from a chill. In general, should the sound seem smothered or too faint, it is because the sound is either imperfectly distributed to the audience or is lost in waste places. The first may occur in a very low and long room, the second in one with a very high ceiling. The first can be remedied only slightly at best, the latter can be improved by the use of reflectors behind and above the speaker. On the other hand, should the sound be loud but confused, due to a perceptible prolongation, the difficulty arises from there being reflecting surfaces either too far distant or improperly inclined. The most immediate remedy in this case is covering these surfaces with some absorbent material—curtains or hair felting. The lecture room referred to above may be taken in illustration. Hair felting ¾ inch thick was placed in the fourteen vertical rectangular places beside the windows, covered with thin tinted asbestos paper, and protected by wire guards. Hair felting 1½ inches in thickness, similarly protected, was placed in the seven vertical, semicircular offsets in the dome, while the platform was covered with carpet doubly lined.

* Continued from page 32, February issue.

Saws of the Ancients.

Saws were used by the ancient Egyptians, and one that was discovered, with several other carpenters' tools, in a private tomb at Thebes, is now preserved in the British Museum. The blade, which appears to be of brass, is 10½ inches long and 1¼ inches broad at the widest part. The teeth are irregular, and appear to have been formed by striking a blunt edged instrument against the edge of the plate, the bur or rough shoulder thus produced not being removed. A painting copied in Rosellini's work on Egyptian antiquities represents a man using a similar saw, the piece of wood which he is cutting being held between two upright posts. In other representations, says Harry Hems in one of the London architectural papers, the timber is bound with ropes to a single post, and in one, also copied by Rosellini, the workman is engaged in tightening the rope, having left the saw sticking in the cut. In an engraving given in the third volume of Wilkinson's "Manners and Customs of the Ancient Egyptians," a saw is represented of much larger dimensions, its length being, by comparison with the man, not less than 3 or 4 feet. It does not appear that the Egyptians used saws worked by two men. The invention of saws was variously attributed by the Greeks to two or three individuals, who are supposed to have taken the idea from the jawbone of a snake or the backbone of a fish. There is a very curious picture among the remains discovered in the ruins of Herculaneum, representing the interior of a carpenter's workshop, with two genii cutting a piece of wood with a frame saw, and on an altar preserved in the Capitoline Museum at Rome there is a perfect representation of a bow saw, exactly resembling, in the form of the frame and the twisted cord for tightening it, those used by modern carpenters. From these remains it is evident that these forms of the instruments were known to the ancients.

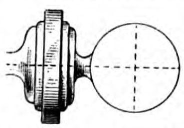
THE ART OF WOOD TURNING.—VIII.

BY FRED. T. HODGSON.

THE beginner will now see how he may be able to make any kind of circular moldings that come within the range of his lathe. The shape of the molding must, of course, be governed by the shape of the molding with which it is to connect. In the example given in Fig. 51 we have adopted the simplest form, a torus, which is simply a part of a circle less than half round. The face may be finished with a tool of reverse shape similar to the one shown at E, Fig. 42 (January issue), or it may be worked off with a square ended tool. A perfect understanding of the manner of making this simple molding will enable the beginner to make any other molding, no matter what may be its profile. Thick bolection moldings may have the back rebate made on them while in the lathe, this being accomplished by removing the rest and placing it in the position shown in Fig. 47, when a narrow tool the width of the rebate may be used to cut out the surplus wood until the proper depth and width of rebate are obtained. In the formation of bolection moldings it is sometimes desirable to leave standing the main part of the wood outside of the outer member—that is, instead of cutting in a rebate the molding is formed on the surface of the wood, all the inside superfluous wood being removed while that outside the ring is allowed to remain, and is then dressed down until it is of the same thickness as the stiles and rails of the panel work for which the bolection molding is intended. This will be better understood by an examination of Fig. 51, where the dotted lines indicate the portion that must be left on the finished molding. Where the work is intended to be finished after this method, all four corners must be left as indicated by the dotted lines. This is probably the better way to make bolection moldings, as the whole corner is then one solid piece, and it is an easy matter to so adjust the corner pieces that the rebate on the straight molding will work in properly. We hope we have made this matter clear, but as it is a very important one, we shall be pleased to clear away any mists if advised of them through the Correspondence columns of the paper.

Having said all that is deemed necessary of plank way turning to initiate the beginner in the art, we will now direct attention to the turning of articles on end wood, such as small knobs, checkermen, hollow cups and similar work. Where small knobs, terminals or spheres are to be turned the stuff is "chucked" or screwed to the chuck, Fig. 45, with the end of the stuff projecting over, as shown in Fig. 52, where a piece of finished work is represented. It will be seen that, like plank way turning, only the head block of the lathe is used, the tail block with its back center being pushed back to the end of the bearers or else taken off the lathe altogether. As this kind of work is only held in its place by the grip of the conical screw in the face plate the operator must be careful and not let his gouge or chisel dig into it, else the work will be thrown out of the lathe altogether and spoiled, or a new center made in it to take the screw. The tools must be kept in good order—sharp and not too thick. While the cut shows a sphere only, it must be understood that any turnable shape of ornament may be made by this method of chucking. In turning drawer knobs or similar work the stuff may be left long enough to make two or three pieces of finished work, and the one on the end may be finished and cut off before the second one is started. Then finish the second and then the third, when the surplus wood may be taken off the chuck and another piece screwed on for further work.

In Fig. 53 is shown the manner of turning a cup or other hollow ware. The block is screwed to the chuck, and in this case wax is applied at the junction to reinforce the conical screw and prevent the work from being thrown out of the lathe. This application of wax is seldom, or never, resorted to by the turner in ordinary work, but where the material is ebony, ivory, boxwood or other expensive material the wax may be necessary to insure the safety of the work, though there are many special forms of chucks much more effective than wax which may be employed to hold the work in position. In making hollow work it is always best before starting to bore a hole with the gouge to scoop it out. This hole may be bored either with a gouge held opposite the center with the hand, as shown in Fig. 54, or it may be bored with an auger bit before being chucked. In either case the operator must take care that he does not bore too deep and spoil the stuff.



[Fig. 52.—Turning Small Knobs

Fig. 53.—Hollowing Out with a Chisel in Turning a Cup.

Fig. 54.—Position of the Hand in Boring a Hole.

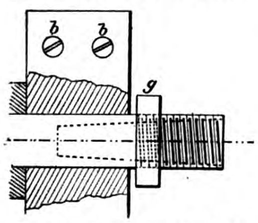


Fig. 55.—Hollow Mandrel and Screw.

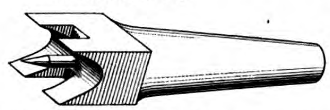


Fig. 56.—General View of Spur Chuck for Wood Turning.

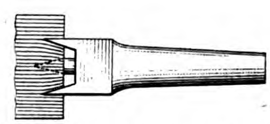


Fig. 57.—Side Elevation, Showing the Compression of the Grain.

Art of Wood Turning.

We have stated that there are many special kinds of chucks designed for special and general purposes, and, as the mandrel on our lathe is so designed that any chuck having a female thread similar to the one shown in Fig. 45, February number, may be used, it will be in order to describe some of these chucks and their uses. We present in Fig. 55 the working end of our mandrel, showing the threaded screw on which the chucks are to fit. As before stated, the inside of this mandrel is tapered as shown by the dotted lines, and the chucks intended to fit this mandrel are made the exact taper and may be put in or taken out at will. We show two chucks in Figs. 56 and 57 which are intended to fit mandrels like the one described. These two chucks and the chuck head shown in Fig. 58 were published and described in the September issue of *Carpentry and Building* for 1882, and are admirably adapted for the purpose for which they are intended. F. H. Richards, the gentleman who submitted the designs, says of them: "In the accompanying sketches I show a spur chuck for use in wood turning that is specially designed for holding small pieces of soft woods without splitting them. It will be noticed in Fig. 56 that the four spurs are parallel on their outer surface, while their inner surfaces are of such a slant as to give them the requisite strength. This form causes the compression of the wood between the spurs, as shown in Fig. 57, but does not spread the portion of the wood outside the spurs. This tool I have had in use, to a limited extent, for many years, and others have also employed it. I believe, however, it will be new to many of the readers of *Carpentry and Building*, who will find it a valuable device for the purpose. It will be found specially desirable for use by pattern makers, its particular advantage being that it does not split the wood."

The chuck head shown in Fig. 58 is adapted for holding two pieces of stuff in the lathe while being turned. This chuck is evidently an efficient one, and the pintle in the center, being a trifle longer than the spurs, as may be seen in Fig. 57, enables the wood to be centered with ease, as this pintle acts as a guide for that purpose. In Fig. 59 is shown an ordinary prong chuck. This may be so made as to screw on the mandrel, or it may be made with a taper stem and slide in the taper chamber the same as shown in Fig. 56.

A taper fluted chuck, which is sometimes found more

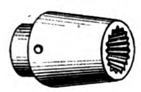


Fig. 60.—Taper Fluted Chuck.

Fig. 58.—Cutter for Holding Two Pieces for Turning.

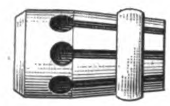


Fig. 61. — A Barrel Chuck.

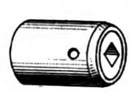


Fig 63.—A Square Hole Chuck.

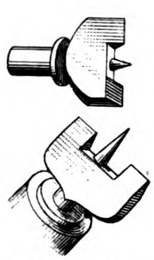


Fig. 59.—Views of Prong Chuck.

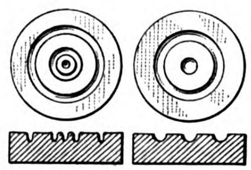


Fig. 62.—Face and Section of Checkermen.

Art of Wood Turning.

convenient to use than the prong chuck, is illustrated in Fig. 60. This is a sort of self centering affair, as the end of the piece to be turned may be pointed a little and when forced into this chuck by the screw in the tail block it will be gripped firmly enough to be wrought in the lathe, and at the same time will be properly centered. It is made of metal—iron or brass—and has a conical fluted aperture in front. The flutes are about ¼ or ⅜ inch in diameter, and have an axis, formed by the original cone of the chuck, of about 1-16 inch in width between each, and these tend to grip the work firmly so long as the tail screw is pressed against the work firmly.

In Fig. 61 is shown a rather expensive chuck, but one the workman will find extremely useful in hundreds of cases when fine turning is required. This is called a spring chuck or a barrel chuck, and its use is to hold small pieces of stuff in the lathe while being turned or polished. It is practically self centering and easy to adjust. The drawing shows a chuck with six grooves, but the number is immaterial, some workmen using those in which there are only two grooves, but it is much better to have four, as then the stuff to be turned can be held much better. Chucks of this kind may be made of some of the hard woods, sound boxwood being the best material, if made of wood, and, as shown in the drawing, holes should be bored at the termination of the grooves. This not only lessens the liability to split, but also, by decreasing the amount of material near the butt end, makes the chuck more flexible at that point—a desirable quality. In order to insure the jaws bending near to the butt end the interior of the chuck should be hollowed out when the holes are bored. This method of reducing the substance of the wood is a better method than that of making very large holes, because it reduces the strength in the right direction and does not make the chuck weak, as would be the case if there were large holes. It is better to combine the hollowing out with small holes at the end of the grooves.

The outside of the chuck should be turned slightly conical, so that the metal ring when forced on it closes the jaws somewhat, thereby gripping the work that may be placed within them. The range of motion in the jaws of this form of chuck is not very great, therefore it is necessary to have several sizes of them so that different sizes of work can be executed if desired. In order to keep the wood from splitting, an iron ring is sometimes shrunk on the tool at the butt end.

It is important that the slip ring which binds the chuck together be as true as it can be made, for otherwise the various sections of the chuck would be brought together unequally and the work held in them will be eccentric. The inside of the ring should be slightly rounded in order to prevent it from catching and cutting into the surface of the chuck. When using it the material to be turned must first have the end rounded off, so that it will pass into the jaws when the ring is slipped down to the end where the work is to enter. When the wood is forced into the chuck the ring is pressed on to it with as much force as can be applied with the bare hand, and if this is not sufficient to hold the work rigidly the ring may be driven slightly with some wooden instrument, but in every case care must be taken that the ring be driven equally all round and that the chuck and ring revolve true when in the lathe.

Chucks of this kind are used for turning small work on the end of the revolving piece of work that is held in their grasp, such as small knobs for drawers or doors, checkermen similar to those shown in Fig. 62 and other similar work. These chucks are self centering, so that anything that has its end turned true and the end is small enough to enter the chuck will be true when within its grasp.

Many times it is necessary to have an auger bit or other boring tool put in the lathe to revolve rapidly in order to do various kinds of work quickly. In cases of this kind a chuck with a square hole will be wanted, similar to the one shown in Fig. 63. The hole in this chuck is made tapering, and is cut through the whole length of the chuck in order to accommodate any reasonable length of square tang the auger or boring bit may have. Carpenters having a lathe with this attachment and a set of Forstner bits will be in a position to execute some fine ornamental work for shelf cresting or for ornamental panel work, and do it rapidly. The little hole shown in the illustration is intended to give an opportunity for loosening the bit, in case it should get fast in the square socket. The tang of the bit is not supposed to reach further than this hole, and if a small steel punch be driven down this hole it is supposed to start the bit, when it can easily be withdrawn. The other end of the chuck is threaded so that it may be screwed on to the mandrel of the lathe.

To restore to their original appearance antique pieces of furniture which have become unsightly on account of too frequent varnishing or besmearing by unskilled hands, the following method is suggested by an English writer: Take equal parts of strong alcohol and good oil of turpentine and heat this mixture in a bottle by placing it in hot water. With this warm liquid paint the article, whereupon the old varnish will dissolve at once. The varnish is removed by scraping and wiping, and the spreading, scraping and cleaning is repeated as often as necessary until the surface has become entirely clean again, so that the object may be rendered glossy or dull as desired. This process is especially recommended, since it does not change or attack the color of the wood, as is often the case if lye is used.

THE FLOORS OF OUR GRANDFATHERS.*

SOMETHING like a hundred years after this old house was built, sawed flooring, dressed and matched by hand, became the fashionable thing, and the then occupants of the house had such a floor of pine boards laid over the lower old oak one. These sawed flooring boards were not like the modern floor, narrow strips all one width, but were made of widths of boards just as they came from the old up and down saw mill of the day, and ran all the way from 8 to 16 inches in width; nor were they always sawed with parallel edges, but in some instances with several inches of taper. They were probably sawed and stored away in the attic for a couple of years before they were used, so that they would be absolutely bone dry, for it is a fact that they have shrunk but little during the hundred years since they were laid. They were planed on one side by hand until they were all of one thickness, then plowed like the old oak planks underneath them and laid with a portable tongue.

By the way, this strip was not called by that name in those days, nor even when I was a boy; but I cannot recall just at this time the term that was applied to it. The same thing was used for many other purposes and probably is to this day, in making water tanks and for similar work where thick stuff is used, and an especially strong and heavy joint is required. I would say that in the living room of this old house the pine floor has been partially renewed two or three times, the last time with common modern pine flooring of 6-inch strips, dressed and matched by machine instead of by hand, although some of the original floor still remains. The floors in the other two rooms are still the old hand made, wide pine flooring, on top of the oak that was laid so long ago. The old oak floors in the attic have never been covered with anything except mats and carpets.

For a long time after saw mills came into vogue in this country, and probably up to within the last 60 or 70 years, the majority of floors were made of boards of irregular widths, and until long past the beginning of the present century but few were matched even after the plan here described, as only the wealthy could afford to pay for the tedious hand work necessary to make a good job; but those unmatched floors were always made of two thicknesses of boards, with the joints well broken, and as the boards were generally sawed and stored away under cover from one to two years before use, such floors were usually quite tight.

Floors Made Double.

It was the custom then to make all the floors in the house, upper and lower, double, instead of only the lower ones, as is now generally the case. It is quite probable that the first floors of sawed lumber laid in this country were of plank pit sawed from the log by hand. More than one such floor is still in existence in the old Eastern States and in portions of Canada. New Brunswick and Nova Scotia can probably show a large number of them in some of the old towns. I have in mind at least one such house still standing in Massachusetts, where not only the floor boards but the boards for the entire covering of the house were pit sawed. The builder of this house was his own carpenter. He and his sons sawed out the boards, hewed all the timbers for the frames, split and shaved the shingles and made the few wrought iron nails used, the labor consuming all their spare time from their farm work for several years. Some of the hand sawed floor boards are still in use in that old house, which is a pretty comfortable home today, having been somewhat modernized in its exterior to suit the times.

As late as during the Forties it was no uncommon thing in the old Eastern States for flooring to be made of boards of all widths, from 5 inches up to 12 inches, and perhaps wider, which were dressed and matched entirely by hand on the premises by the carpenters putting up the building. Even as late as during the Fifties this was not an uncommon thing in country places away from the cities and larger towns. In fact, until the invention of the Woodworth rotary planer, which occurred somewhere along during this latter period (the exact date of which I have not at hand), all finishing lumber, including flooring, was hand dressed.

After the invention of this planer it was a long time before machine matching was done, the boards being planed by machinery and matched by hand. The first surfacing planers were so imperfect and so unskillfully operated that when a really fine floor was wanted, no matter what the width of material, the surface was hand smoothed after the boards had passed through the machine, and generally after the hand matching had been done. In those old days a set of matching planes was as much a part of a carpenter's outfit as his hammer and hand saw.

Looking back to those days with their laborious process of matching, it is no wonder carpenters and joiners encouraged the use of as wide boards as possible for flooring, ceiling and wainscoting. Indeed, it is not to be wondered at that many floors were laid without any matching, which was an actual fact, not only in the country, but in nearly all the cities, for some years after the surface planer was invented. To make a good floor without matching, it was usual to make it double, of thoroughly dry stock for both floors, with the edges of the boards simply jointed and the joints well broken. With well made, smooth joints such floors did very well, and there are plenty of them still in use in the older portions of the country. In the house where I was born, which was a very large one and a very good one for its day, there is not a single matched board in any of the upper floors or in the kitchen floor, only the parlor and hall floors, with possibly the best chamber, being hand matched.

* Continued from page 45, February issue.

Persian Carpenters.

The art of carpentery, as understood in this country, can hardly be said to exist in Persia, the greatest efforts in this department being there confined to the construction of flat roofs of inconsiderable span; and this might be expected, from the circumstance of timber being there exceedingly scarce. For forming roofs a sort of poplar is generally employed, but for other purposes oak, chestnut, plane, and the other kinds of hardwood are used. J. Robinson, who speaks from actual experience, says that the hard timber, as sold in the bazaars, is all of small scantling, as it has to be brought from the forests on the backs of mules or camels. In accordance with the invariable custom of all Eastern artisans, the carpenter sits upon the ground while at work. Instead of a bench, a strong stake is driven down before him, leaving about 10 inches above the ground, and upon this he rests his work and keeps it steady with his feet. The facility with which the work is executed in this position has always been a matter of surprise to European workmen. In the royal arsenals English tools are used, and a better system of working has been introduced under the superintendence of British officers; but in the native workshops the workmen are still to be seen squatting on the ground; and, being used to this position from infancy, and their tools being formed to work with more efficiency when used in this way, any alteration is scarcely to be expected. Their principal tools are the frame saw, adze, planes, hammer, nails and a few smaller tools.

IN the matter of cleaning stone and brickwork a writer in one of the English journals suggests using a scrubbing brush and a solution of water mixed with 8 ounces of spirits of salts to 1 gallon. He states that this will bring out the work as bright as new.

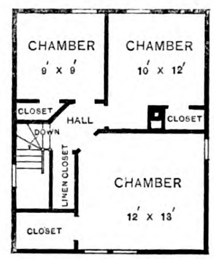
COMPETITION IN $750 HOUSES.

FIRST PRIZE DESIGN.

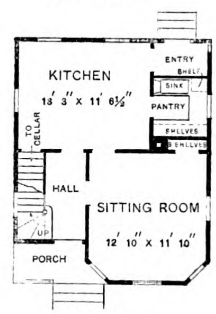
THE first of the series of competitions in low cost frame houses announced in the issue of the paper for December last came to a close by limitation on January 31, after which the sets of drawings submitted were referred to the committee of architects and builders having in charge the matter of an award of prizes. This committee having completed its labors and rendered its report in the XXVth Competition, being that for $750 houses, it gives us pleasure to lay before our readers the design entitled under the terms of the contest to the first prize. The results of this competition are gratifying not alone in the number of designs submitted, but also in the character of the work shown and the widespread interest manifested, as evidenced by the fact that nearly every section of the country was represented.

In reaching a decision the committee of award found, by referring to the conditions in the December issue, that there were several items with each of which it was imperative the drawings should comply before they could properly be considered. These requirements included a front and one side elevation, plans of each floor, including foundation or cellar, and a selection of constructive details embracing both exterior and interior finish. Each set of drawings was to be accompanied by a brief specification outlining the construction of the building with indications of the materials to be employed. The conditions also demanded an estimate in detail under the headings of "Excavation," "Mason Work," "Carpenter Work," "Plastering," "Painting" and "Tinner's Work." Still further, each estimate was to be accompanied by a certificate from some responsible builder stating that he would be willing to erect the house indicated by the drawings and specifications for the amount named in the estimate. Finally, it was required that the device or *nom de plume* employed by each contestant should be placed upon a sealed envelope containing the real name and address of the competitor.

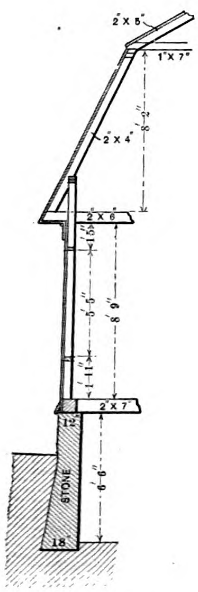
The first work of the committee of award was, therefore, to examine the various sets of plans, with a view of ascertaining if all had complied with the requirements named, and such as did not were at once laid aside as not entitled to consideration. Although the requirements of the competition were stated in clear and explicit terms, there were a number of designs which failed to fully meet the conditions. In one case there were no details of exterior finish; in another the floor plans showed no chimney for the kitchen—a most important consideration in a house of this kind; another was deficient in head room for the stairs; still another showed a well equipped bathroom with plumbing fixtures, although the specifications read "no plumbing," and to include which in the estimate would have made the cost of the house exceed the stipulated price. Several sets of plans were thrown out because there was no envelope containing the name and address of the author, these being written on the drawings and specifications, and showing at a glance by whom they were prepared. As an example coming under the latter head, it may be stated that one competitor entered three sets of plans, two of which, at least, would have stood an excellent chance of favorable consideration, had it not been for the fact that the author's name and address appeared on every sheet. Probably the greatest number, however, failed from what must have been a careless interpretation of the requirements touching the question of estimate. In many instances competitors lumped the figures for the different classes of work, instead of giving



Second Floor.



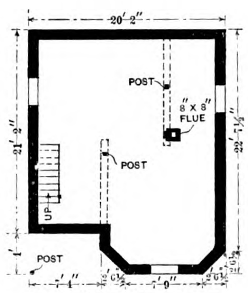
First Floor.



Section.

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

Competition in $750 Houses.—First Prize Design.—Miss Laura E. Kingston, Worcester, Mass.



Foundation.

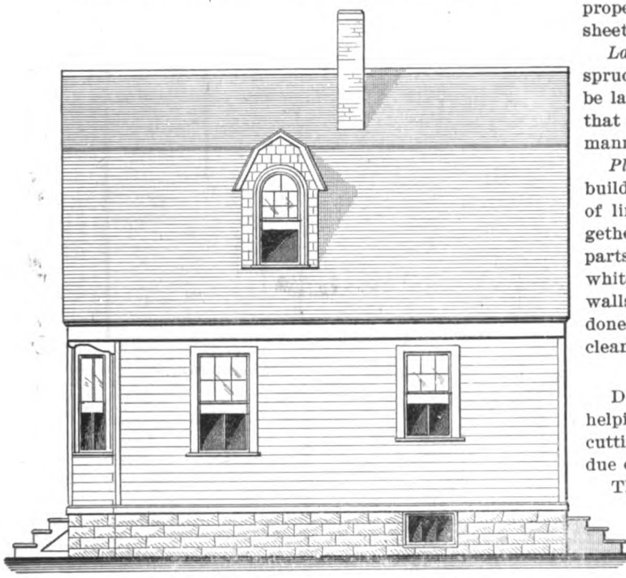
Scale, 1-16 Inch to the Foot.

them in detail under the various headings as called for by the advertised conditions, this failure resulting in the plans being thrown out by the committee.

In considering the many designs submitted in the light of the requirements of the competition, the committee report that Miss Laura E. Kingston of 518 Main street, Worcester, Mass., is awarded the first prize of $60; E. R. Rice of 430 Seventeenth street, Denver, Col., is awarded the second prize of $40, and Charles E. Sargent of Ware, Mass., is awarded the third prize of $25.

There were several designs deserving of special mention, but which under the terms of the competition were not entitled to a prize.

In connection with the set of plans receiving the first prize we present herewith the specifications and estimate of cost in detail, but will defer for a time the publication of the second and third prizes in order to give greater prominence to the first prize designs in the other competitions.



Side (Right) Elevation.

SPECIFICATIONS.

General Conditions.

Each contractor is to provide the materials and labor necessary for the proper execution of the work described, shown or reasonably implied in the drawings and specifications for his parts of the work. All material to be of good quality of its kind and workmanship to conform to this class of building, and to the satisfaction of the architect.

Each contractor is to set out or have set out his own work correctly. He must verify and follow figures in preference to scale measures. In case of doubt as to the meaning of any part, he must refer the same to the architect before proceeding with the work.

Batter Boards.—Set proper batter boards and mark out the building accurately.

Excavation and Foundation.

Excavation.—Take off the loam and sod from site of house and 6 feet in width all around and lay aside for grading. Excavate the cellar to a depth of 3 feet 6 inches below present grade. The trenches for walls to be excavated 3 inches below cellar bottom and footing for chimney and piers to be 8 inches below cellar bottom.

The earth taken from cellar to be graded up about building with loam and sod spread on top as directed.

Foundation Walls.—To be built according to drawings of good flat stone, well laid and bonded together. The part below grade to be laid dry with inner face to a line, and flush pointed. That part shown above ground to be laid in cement mortar with outside joints ruled. The top to be 12 inches thick down to grade, then widen out to 18 inches at bottom. The chimney and pier stone to be at least 6 inches thick. All parts of wall and footings to be at least 4 feet below finished grade and 3 inches below cellar bottom.

Mason Work.

Chimney.—To be built of good merchantable brick, to have an 8 x 8 flue smoothly plastered inside from bottom to top, on outside from first floor to roof boards. To have proper thimbles for each room, a stone or iron cap, and sheet lead built in at roof for flashing.

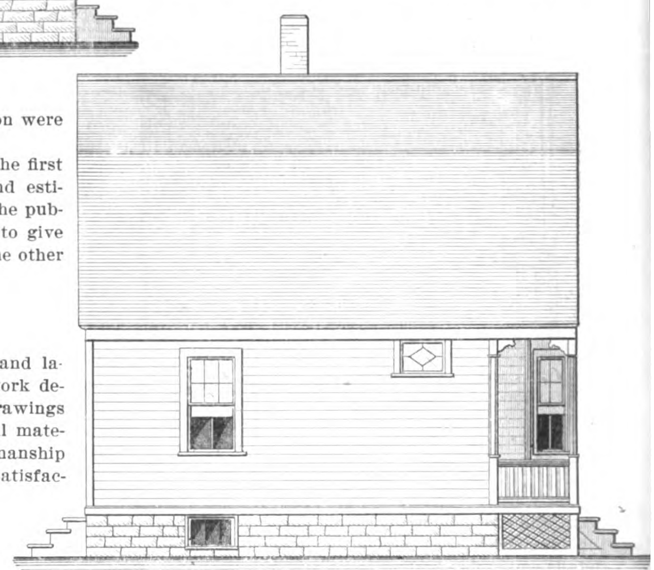
Lathing.—Lath all the parts to be plastered with good spruce lath full thickness, at least 1½ inches wide and to be laid about ⅜ inch apart. To be free from all defect that will stain plaster. Joints to be broken in proper manner, and all well nailed to each and every bearing.

Plastering.—The walls and ceilings of the entire building above basement to be plastered with one coat of lime, sand and hair mortar. To be well worked together and made at least four days before using. All parts to be well worked onto the lath and smoothed up in whitewash. Fill plastering down to floors on outside walls, and up to grounds and beads. The work to be done true, even, and straight and all parts of building cleaned up at completion.

Carpenter Work.

Do all work in connection with the carpentering and helping others employed under this contract. Do all cutting and fitting for and after other mechanics, using due care not to weaken any timbers in so doing.

The framing work is to be done in the usual style for such a building, all done in the best manner, placing crowning side of joist up and studding all one way. The timber to be of spruce free from all imperfections and of good merchantable quality. The sills to be 5 x 7, girders in cellar 6 x 8, first floor joist 2 x 7, second floor joist 2 x 6, outside studs 2 x 4, steep rafters 2 x 4, and inside studding 2 x 3, all 16 inches on centers. Rafters on flat part of roof 2 x 5 and ceiling joist 1 x 7, all 24 inches on centers. Furring for ceilings ⅞ x 2, put on 16 inches on centers. Joist of first floor to be gained into sill and on top of girders. Second floor joist to rest on top of ledger boards on partition plates. All partitions to have sill and cap same size as studding. Truss over all openings where necessary.



Side (Left) Elevation.

Competition in $750 Houses.—First Prize Design.—Elevations.—Scale, ⅛ Inch to the Foot

Put double joist under main cross partitions and joist to be bridged with ⅞ x 2 inch stock well nailed.

Plastering Beads and Grounds.—Put beads on all corners and ¾-inch grounds at all openings and bottom of all partitions.

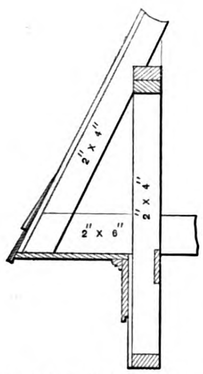
Boarding.—The exterior walls, all roofs and bottom floor in first story to be covered with ⅞ hemlock or spruce boards. Those for siding and floors to be laid close together and well up to all openings and corners. Those for roof to be laid from 2 to 3 inches apart. All to be well nailed to each bearing with at least 2 nails.

Second Story Floor.—The floor in second story to be paper, well lapped, before any finish, clapboards or shingles are put on.

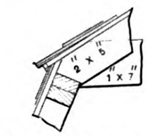
Roof Shingle.—To be well shingled with a good quality 16-inch cedar shingle, laid not more than 4¾ inches to the weather, with at least two nails to each shingle more than 3 inches wide. Shingles to have joints well broken. Do all flashing with good painted tin. Saddle boards to be pine, 6 inches wide.

Exterior Finish.

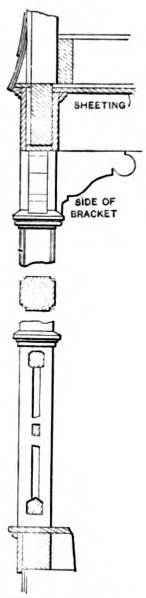
To be made from weather seasoned No. 2 Western pine, as per details. Porch floor to be matched No. 1



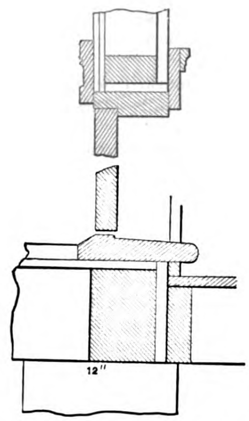
Detail of Main Cornice.—Scale, ½ Inch to the Foot.



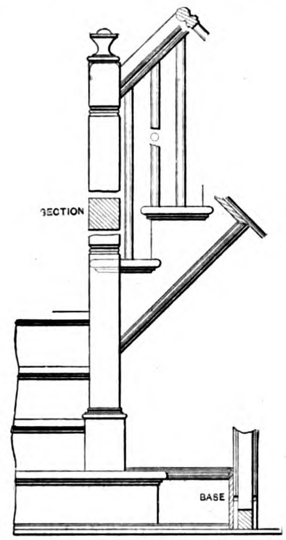
Upper Part of Gambrel Roof.—Scale, ½ Inch to the Foot.



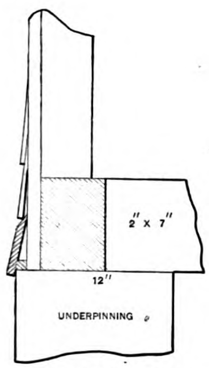
Section through Porch.—Scale, ½ Inch to the Foot.



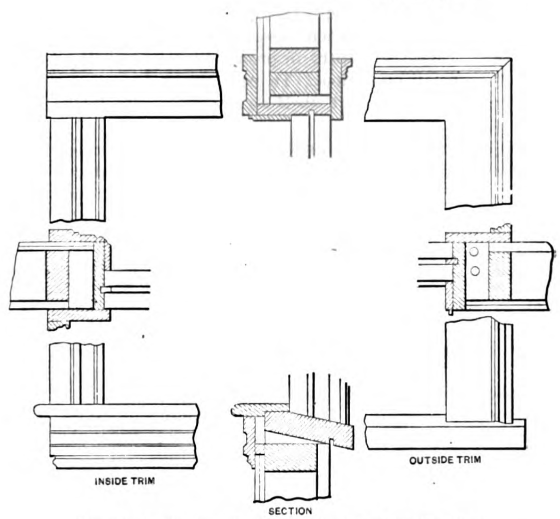
Details of Outside Door Frame.—Scale, 1 Inch to the Foot.



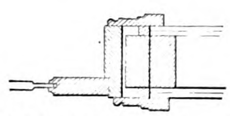
Detail of Main Stairs.—Scale, ½ Inch to the Foot.



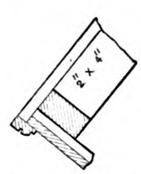
Detail of Water Table.—Scale, 1 Inch to the Foot.



Details of Window Finish.—Scale, 1 Inch to the Foot.



Detail of Inside Door and Finish.—Scale, 1 Inch to the Foot.



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

Competition in $750 Houses.—First Prize Design.—Miscellaneous Constructive Details.

done with a single thickness of narrow matched spruce or pine, well driven together with joints even on top.

Clapboarding.—The side walls, except otherwise specified, to be covered with 5-inch spruce clapboards laid not more than 4 inches to the weather, with flush close joints, all well nailed in place.

Side Shingle.—The gables and sides of dormer window to be shingled with clear butt 16-inch cedar shingles, laid not more than 5 inches to the weather, well nailed, with joints even on bottom.

Paper.—The side walls and space between sheathing over porch to be covered with good quality of sheathing spruce not more than 5 inches wide, well driven together and well nailed. Ceiling to be ¾ cypress or N. C. pine, with small molding in angle. The columns, brackets and balustrade as per details. Steps to have ⅞ risers, 1½ treads and 2-inch stringers.

Frames and Sash.—The cellar windows to have 2-inch plank frames and 1¼ pine sash hung at top. Other frames to have 2-inch stool, ⅞ jambs and casings, with ¾ x 1½ molding around outside of casings. To have weight pockets and sash pulleys.

Sash.—The above frames to have 1¼ pine lip sash glazed with No. 2 glass well fastened in place, and to be well fitted in frames and hung with weights and cord. Stationary sash in hall to be filled with colored glass.

Exterior Doors and Frames.—Frames to be made of 1¾ pine with 2-inch hardwood thresholds, ⅞-inch casings and moldings like frames. Front door to be 1¾ inches thick, flush molded, with glass in top part. Rear door to be 1½ inches thick, bevel edges, with glass in top part. Outside door to be hung with three hinges.

Flashing.—Do all flashing necessary to make the job complete and weather tight.

Interior Work and Finish.

All to be as shown by drawings or described in specifications. To be made from good clear sound dry No. 2 stock of either pine, whitewood or cypress. All to be put on after plastering, to be put in place with neat close joints, and all doors and moldings to be stock make and pattern.

Doors.—To be 1¼ inches thick, of size marked, with four panels, and have ¼-round on edges of rails, stiles, &c.

Frames.—To be 1¼ inches thick, rebated for thickness of doors. To be set plumb, true and even.

Door and Window Casings.—Each to have ⅞ x 4½ side and 1 x 5 top molded casings. Stools to be ⅞ inch thick, rebated for outside stool, with ⅞ x 4 inch aprons. Window tops ½ inch thick, with molded edges, put in with screws.

Base and Molding.—Each room to have 8-inch bevel base. Sitting room and hall to have 1¾-inch molding on top.

Closets.—To have narrow base and casings, wardrobe strips with coat hooks and one shelf. Put wardrobe strips and hooks in rear entry.

Floors.—The top floors in kitchen, entry and pantry to be ⅞, tongued and grooved, well seasoned native hard pine, not more than 4 inches wide, free from shakes or knots. To be laid crosswise of lining floor and blind nailed. Top floors in other parts of first story to be square edged planed spruce. All top floors to have paper under and cut down between base.

Sink.—To be set in pantry in proper frame, closed up under with small cleat door. To be a board over back 14 inches high, with 6-inch shelf on top. Put drip shelf at end.

Pantry.—To be fitted up as shown with broad counter shelf, sheathed under, with two cleat doors and place fitted for flour barrel. Over broad shelf to be four shelves 12 inches wide. The one at top to extend all around room. Over sink shelf to be three cleats with hooks for tinware.

Sitting Room Closet.—The sitting room closet to have three 12-inch shelves.

Shelves.—The sitting room to have a shelf 6 inches wide, 1⅛ inches thick, 3 feet 6 inches long, set on bronze brackets, and the kitchen a shelf 5 x ⅞ inches by 2 feet 6 inches, set on japanned brackets.

Stairs.—To be built on three plank stringers cut out to the required dimensions for risers and treads. Front ones to have posts, rails and balustrade, as per detail, 1-inch treads with nosing and scotia under and ⅞-inch risers. Cellar stairs to be built of spruce or hard pine.

Hardware.—The contractor is to allow $20 to be used by owner to purchase the hardware for door and window trimmings, small hinges and catches, wardrobe hooks and base knobs and screws for same and window stops. This does not include nails, brads or screws for other purposes.

Plumbing.

To be a 20 x 30 x 5-inch cast iron beaded iron sink with patent cesspool set up in pantry. To waste outside into a small stone drain with 1¼-inch lead waste pipe, to be supplied with water through brass bib cock and ½-inch galvanized iron pipe.

Painting.

Exterior.—The outside work, except otherwise specified, to have two good coats of pure lead and linseed oil paint. The gables and dormer window shingles to be stained with one coat of oil stain, all of such colors as directed.

Interior.—To have two coats of pure lead and oil paint colored as directed, or one coat of stain and one coat of good varnish, as the owner wishes.

Estimate of Cost in Detail.

EXCAVATION AND FOUNDATION.		
Batter boards	$2.00	
60 yards excavation	15.00	
28 perch of stone, laid dry	28.00	
12 perch of stone, laid in mortar	24.00	$69.00
MASON WORK.		
1050 brick	13.65	
Cap, thimbles and flashing	2.50	
5,500 lath, put on	19.80	
375 yards of plastering	37.50	73.45
CARPENTER WORK (INCLUDING ROOF).		
3,350 feet spruce frame	$46.90	
520 feet matched spruce for second story floor	10.40	
2,658 feet hemlock boards	33.22	
Grounds and beads	2.35	
10,000 cedar shingle	32.00	
450 clapboards	13.50	
Exterior and porch finish	21.50	
Outside steps	5.50	
Basement frame and sash	3.60	
14 window frames, sash, weights, &c	39.90	
2 outside frames	3.25	
2 outside doors	8.00	
220 feet top spruce floor	4.40	
244 feet hardwood floor	6.10	
23 sides door finish	12.65	
14 sides window finish	9.10	
14 interior door frames	8.40	
14 interior doors	19.60	
280 feet base	11.20	
70 feet base molding	.88	
26 feet chair rail	.52	
Pantry finish	2.67	
Sink finish	1.35	
Closet finish	4.00	
Shelves	2.50	
Stairs	15.75	
Nails and paper	14.75	
Hardware allowance	20.00	
Carpenter labor	165.00	518.99
Plumbing		19.50
Painting		55.00
Incidentals		14.06
Total		$750.00

The builders' estimate was signed by Charles A. Colburn of 354 Pleasant street, Worcester, Mass.

A Unique Pumping Arrangement.

A novel method of securing water for a dairy has been adopted by a man in Texas, and which demonstrates a principle in natural history seldom employed in exactly the manner described. The well from which it was desired to obtain water was bored to a depth of 90 feet, but no water was found, the top of the well being about 45 feet higher than the surface of Lytle Creek. The dairyman, however, utilized the well which had been sunk by placing at a depth of about 80 feet a valved cylinder connected at the bottom with a "U," and making a siphon of the double row of pipe that was connected with the cylinder. At the top of the well one pipe was connected with the pump and the other with 800 feet of pipe that runs from the well along the surface of the ground to the creek. This entire length of pipe was then filled with water to expel the air and set the siphon at work. It took a barrel and a half of water to fill the pipe, but as soon as that was done the pump worked like a charm. The pipe works on the combined principle of the siphon and the pump. The water must go down 80 feet in the well before it comes out at the pump spout. A windmill will be attached to the pump rod, and the mill will both pump water and grind feed for the dairy cows.

It is stated that the dwelling of Sir Christopher Wren is now a national school in Botolph lane, London. The house still contains a finely carved wooden staircase, but his private chapel has become a warehouse, with a window over the ceiling. Near by stands the church said to have been designed by his daughter, and which is peculiar in that the stone of which it is built remains white to some extent in spite of all the city smoke.

CORRESPONDENCE.

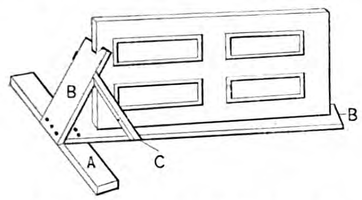
Reading Plans.

From YOUNG READER, *New Berlin, Pa.*—I hear some of the older mechanics frequently talking about "reading plans." I would like to know just what is meant by being able to read a plan.

Answer.—It is being able to understand all that is indicated on a drawing. The ability may be acquired by a little practice under the guidance of a person thoroughly familiar with architects' drawings.

A Convenient Door and Window Holder.

From D. M., *St. Paul, Minn.*—In looking over some old copies of *Carpentry and Building* I observed numerous sketches of convenient door holders, and for the benefit of interested readers I send herewith a drawing of a holder such as is used in this locality. It may also be used when fitting sash. Referring to the sketch, A represents a piece of 2 x 4 about 2 feet 6 inches long, B B are ⅞ x 8 inches wide and C, the brace, is ⅞ x 2 feet 3 inches long.



A Convenient Door and Window Holder.

Deadening Party Walls.

From J. H., *Brandon, Manitoba.*—Will you or some of the readers of *Carpentry and Building* be good enough to tell me of an effective means of deadening the noise between houses which are separated only by a party wall—that is, how can this be done when the wall is first being built?

Note.—There are various methods of accomplishing what our correspondent desires, the plan best to be employed depending somewhat upon the circumstances of the case. In general it may be stated that air spaces are an effective remedy for deadening the sound, and if the partition between the houses is formed of studding it might be divided into two or possibly three narrow air spaces. Back plastering is also effective in such cases. If expense is not too much of a consideration some of the deadening materials now on the market, such as Cabot's "Quilt" and mineral wool, will serve a very good purpose. If, on the other hand, the party wall is of brick it should be at least two or more bricks in thickness with an air space between. With these suggestions we present the question to our readers, and shall be glad to have them describe how they would remedy the trouble of which our correspondent complains.

Making Blue Prints.

From FREDERICK REISSMANN, FOREMAN, *West Point, N. Y.*—I inclose herewith a receipt for making blue prints which may interest some of the readers of the Correspondence department. I have found it to make better prints than any other receipt I have ever seen printed or before used. It gives a beautiful blue-black ground with pure white lines. The exposure is from one and one-half to two minutes for a tracing, and for a negative, if not too dense, from three to four minutes in ordinary sunlight. The prints should be washed for about five minutes in running cold water. The solutions employed are two in number, the first consisting of 1 ounce of green citrate of iron and ammonia dissolved in 4¼ ounces of water, and the second is ⅜ ounce of red prussiate of potassium dissolved in 4¼ ounces of water. Keep the above separated, and in dark bottles until ready to use, when equal proportions of both are mixed together. Apply to the paper with a soft sponge. If a greater quantity than indicated above is required increase the various ingredients in the proportions mentioned.

Strength of Floor Joist.

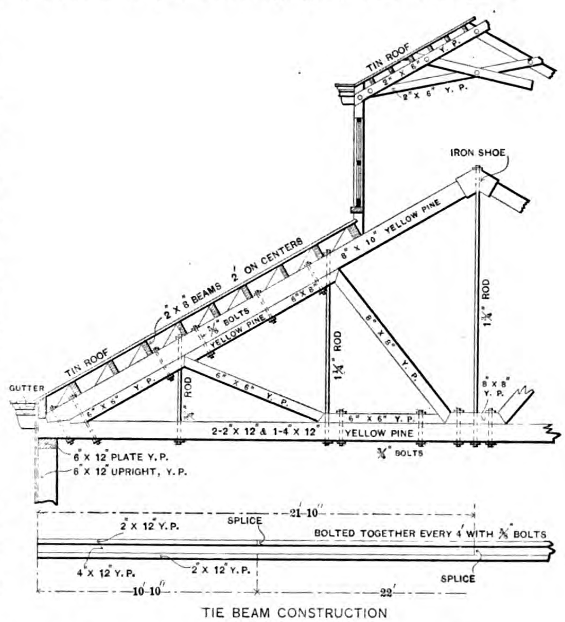
From G. J., *Hersher, Ill.*—I would like to ask "S. W. J.," Huntington, Ind., who presents an interesting article on the strength of floor beams in the January issue, what would be the value of the constants for woods other than hard pine, which could be used in connection with the formula he gives and also what would be the constants for some of the metals and structural steel. I am young at the building trade and have no doubt that the information will interest others as well as myself.

Black Lines and Figures on an Ivory Rule.

From A READER, *Denver, Col.*—Some time ago a correspondent signing himself "F. C. R." of San Francisco, Cal., made inquiry about black lines and figures on an ivory rule. In reply to his request, I would say that I have an ebony rule inlaid with ivory. Some of the scales are back from the edge so that in use it is necessary to take the measurements with the dividers, and in doing this the marks or ink have been worn from the rule. I took the small blade of my knife and sharpened the point, then took the cork from my bottle of drawing ink, and by drawing the point across the quill to ink the blade I re-marked the lines so that they look as well as the others. I think if our friend "F. C. R." will try the same plan he will be satisfied with the results.

Roof for an Armory.

From GEORGE W. B., *Long Island City, N. Y.*—In answer to "A Man from Northern Ohio," I send a sketch showing a style of roof truss which, in my estimation, will satisfactorily answer his purpose. The drawing is so clear that it explains itself, and therefore requires very little comment. I have placed a tin roof over the building for the reason that the under finish of a tin roof is much more satisfactory, so far as appearances go, than the usual one of shingling lath and shingles. I would increase the hight of the side walls from 14 to 18 feet, and would put on a ventilating roof, as shown, in order to add to the appearance of the building.



Roof for an Armory.—Form of Truss Suggested by "George W. B."

Softening an Oil Stone.

From F. E. D., *Holyoke, Mass.*—In reply to the inquiry of "G. P. O.," Dubuque, Iowa, in the December issue of the paper, I would recommend boiling the oil out of the oil stone. I would further recommend using half lard and kerosene oil on the stone and to wipe it every time it is used.

From J. M. B., *Monroeton, Pa.*—I would say to the correspondent who recently inquired what to do about an oil stone which he claims will not cut by reason of its having become hard and glazed, that he try boiling it in strong lye for at least two hours. The lye should be made from hardwood ashes.

Carpenters' Squares Finished in Colors.

From O. L. W., *Dallas, Texas.*—In reply to "Engineer," New Haven, Conn., will say that a friend of mine has been using a square such as he mentions, blued, or really black, with white lines and figures, for the last three years, and it is in very fair condition to-day. While the black is wearing off in places the figures remain remarkably plain. They were evidently cut deep into the metal and filled with something durable—claimed to be aluminum. The square has several advantages over the bright ones, in that it is easily read in dark places and is not so trying to the eyes in bright sunlight, neither does it rust quickly. The bluing seems to be the same as they use on fire arms, which we all know does not rust until the color is worn off.

Plans for a Lime House.

From J. S. H., *Wilmington, Del.*—I would like to see published in the columns of *Carpentry and Building* the plans for a cheap lime house, having a capacity of one carload. I want the house so constructed as to keep the lime as long as possible.

Note.—We trust those who have had experience in work of this kind will submit plans for the benefit of the correspondent making the inquiry as well as for others who may be interested.

The Building Contractor and His Estimates.

From BENJAMIN FOX, *Allston, Mass.*—How much longer are building contractors to spend so large a proportion of their time in "estimating"—in reality taking off quantities ? A large proportion of the estimates submitted are for the benefit of the speculators. I refer to speculators who intend paying what they agree to, not to the kind who have no intention of paying their bills; I do not see that it matters to them at what price they let their work. Ten to 15 estimates will be invited in order to ascertain if a certain amount of work can be had for less than cost, assuming that among the contractors there will be at least one who will make an error or omission in compiling the estimate, of which error or omission the speculator purposes taking advantage by giving that contractor the job. Not the speculator alone, but nine out of every ten average business men are willing to benefit by the mistakes of others. It is all very well for some one to say, "that is the builder's outlook; he should estimate correctly." That is the point to which I am coming. Let us eliminate the chance of error and omission and at the same time save ourselves from too much work for nothing.

Considering, in the present state of close competition, the number of jobs on which it is necessary to estimate in order to secure one, it is next to impossible to give the requisite time to the taking off of full quantities, abstracting and billing that is needed in order to submit an intelligent estimate on each job figured. Therefore the work is hurried, details are not gone into, items are lumped or guessed at with the possibility, and I might almost say probability, of mistake or omission. I honestly believe more jobs are won by mistakes than by close and accurate figuring. Take, for instance, a house job of $12,000 to $15,000. Suppose ten men estimate on it. Even in a superficial way it would take, say, five hours, which means of course for the ten men 50 hours' time. The result is ten different bills of quantities, ten men figuring on a different basis, the man figuring his items correctly and closest in price perhaps losing the job on account of having a greater quantity of stock than another, who has omitted to take off some portion of the work.

Now as to the remedy: Let there be furnished by the architect for the owner a bill of quantities taken off by an experienced and recognized registered quantity surveyor. This is a profession by itself and one that needs a man's entire time to study in order to become proficient, and one not to be picked up, as it now is, while learning the rudiments of the building business. This quantity surveyor will, say, spend ten hours taking off the job, the cost of this to be paid by the successful contractor. Copies of this bill of quantities are to be furnished to the contractors with the plans and specifications to be used for reference. All will then be figuring on the same basis, each contractor will put his price per square, perch, M, piece, yard or whatever it may be, and work out the total. This excludes the possibility of dispute as to what was included in the contract, and the successful contractor when awarded the job, having submitted his itemized estimate, would form a basis as to charges for any work which might be added to or deducted from the original contract.

It seems to me that this would be most satisfactory to all parties concerned in any honest building transaction. For the architect, it removes the most unpleasant part of his work—the disputes as to what is included in the contract; for the owner, he can see exactly what he is getting for his money, and is not, as is often the case, wondering all the time if he is not being "done," for he usually considers this to be the case when called upon to pay "extras."

For the builder it has every advantage—a great time saver where so many jobs have to be estimated on in order to secure one, for he has the satisfaction of knowing that he is figuring the exact amount of work on which his competitor is figuring and the exact amount of work which he will be called upon to perform should he be awarded the job. He cannot have work forced upon him by that well-known clause: "This specification is intended to include everything requisite and necessary for the entire completion of the building, whether every item be particularly mentioned or not," which clause is a continual menace to him until he has received his last payment. The builder knows exactly what he is to receive for any additional work that may be ordered, and the same for any deducted. There can be no dispute between the general contractor and his subcontractors as to the amount of work to be performed by the said subcontractor, as the latter signs such sheets of the bills of quantities as belong to him. This is a big point. The owner looks to the general contractor only for the proper completion of all the work, the subcontractor being usually the man in a small way of business, who is less competent to take off the quantities than the general contractor, and is therefore liable to mistakes. If he makes one and it is at all serious he, being only a small man, throws up the job, and of course the general contractor has to complete it, taking the cost out of his profits if there be any left after his own mistakes, and if not he is compelled to take it out of his pocket. The advantage to the subcontractor of the bills of quantities being furnished is so evident that I need not here enlarge upon it.

I cannot understand why the United States should be so much behind England in this respect. There quantity surveyors are regarded as indispensable, and in my early experiences in a London office I have known cases where reputable builders have absolutely refused to estimate without such bills of quantities. The only one whom I can see this system could possibly injure is the man to whom I referred in the beginning, the man who lives by other people's mistakes, and as I am writing this from the builder's point of view and not from the other side, I cannot waste any words of sympathy on a man who is certainly not a friend to the builder.

In order to arrive at the above greatly desired state of affairs my suggestion is that the various architectural societies, institutes and the builders' exchanges meet and discuss the pros and cons of the question, although for my part I cannot see where there are any cons in the case, and when all see it in the same light surely the rest is easy.

Lengths and Cuts of Rafters for Porch Roof.

From L. N., *Grenell, Iowa.*—I send herewith a sheet of drawings in answer to the inquiry of "D. B.," St. Thomas, Ontario, who asked in the December issue of the paper with regard to the lengths and cuts of rafters for a porch roof. The information which will be found on the diagram is sufficiently explicit, I think, to serve all practical purposes, and I therefore refrain from extended comment.

Preventing Show Windows from Sweating.

From J. F. B., *Osage, Iowa.*—In looking over the last volume of *Carpentry and Building* I noticed in one of the early issues an inquiry from "J. M. F.," Middletown, Del., relative to a means of preventing windows from sweating. In this section we are generally troubled with their freezing. In answer to the request of the correspondent, I would say that a few years back I put up some store fronts, and in order to ventilate them I placed a cold air ventilating register in the panel below the outside plate window and another register in the show window platform. I boxed them so that they would have a good draft, and then bored holes in the top sash rail, making 1½ or 2 inch holes, to give the same capacit as the register. I had another set of sash inside, so as to inclose the space from the store heat. This has worked with entire satisfaction, but if any of the correspondents can suggest an improvement on the scheme I should like to hear from them, because I have lived in small cities for the last 12 years and do not see the improvements which are being made, as was the case when I traveled all the time, as I used to do when I was younger than I am now.

Cobblestone Foundations and Piers.

From J. D., *Alameda, Cal.*—Will some of the many readers of the paper give me, through the columns of the Correspondence department, points on cobblestone foundations and piers? I would like to know the best manner of laying the stone, the amount of cement required, &c.

Method of Treating Tracing Cloth.

From E. A. V., *Salt Lake City, Utah.*—In the article entitled "Hints to Draftsmen," published in the February number of the paper, chalk is recommended for treating tracing cloth in order that it may better take the ink. I would like to call attention to carbonate of magnesia for the same purpose, this being a material which, I think, is much to be preferred. I use it by rubbing two pieces together until a sufficient quantity has been powdered to treat the cloth being used, and then brush it over the cloth with a flat camel's hair brush—one about three inches wide being well adapted to the purpose. This process prevents any streakiness in the blue print which it is possible for chalk to produce, owing to its greater density.

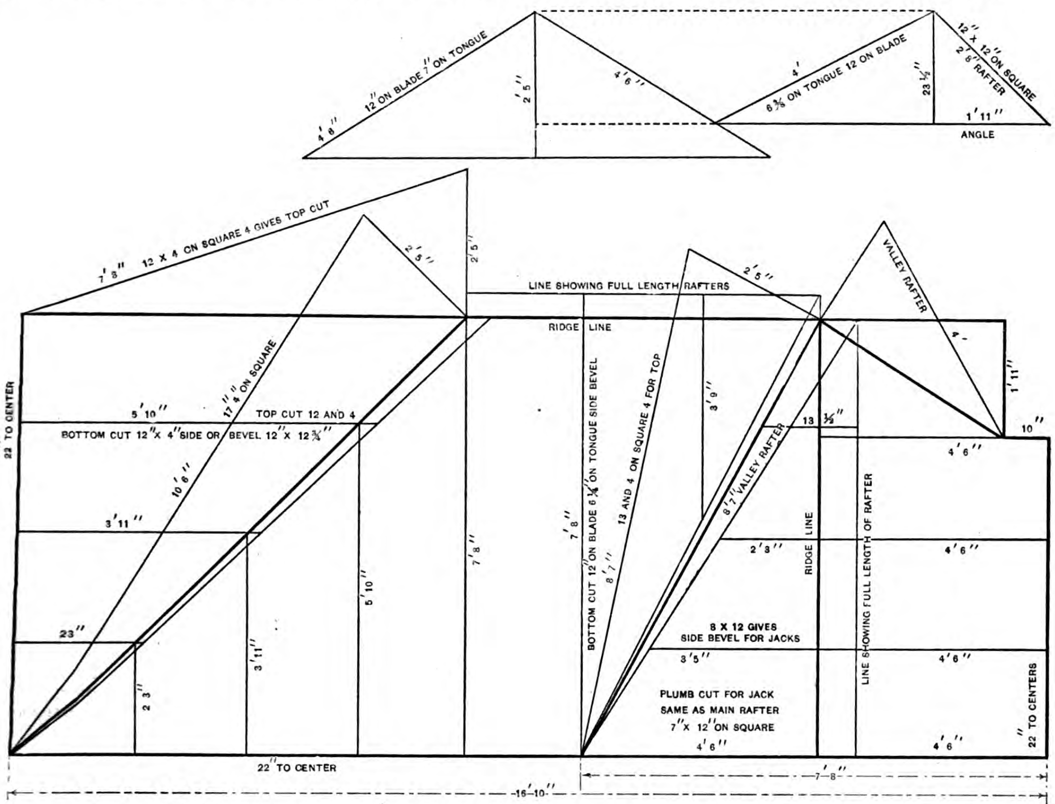


Diagram Submitted by "L. N." in answer to "D. R."

Lengths and Cuts of Rafters for Porch Roof.

Designs for Mantels.

From W. D., *Batesville, Texas.*—Will some of the readers please send for publication drawings of a neat mantel piece—something that is not very expensive and yet can be easily made?

Strength of an Oak Post.

From J. L. T., *Bremen, Ind.*—Will you please publish in the Correspondence columns of the paper the following inquiry: How much weight will an oak post 4 x 10 inches support, the post being 7 feet high and braced 3 feet from the bottom, the 4-inch way? I should like very much to hear from the author of those interesting articles on "Barn Framing in Western Pennsylvania."

Plans for Roof of One-Third Pitch.

From SAMUEL SCULLION, *Islesboro, Maine.*—I inclose herewith sketches showing my idea of roof plan for the house described by "A. S." on page 44 of the February issue of the paper. Fig. 1 represents the plan of the roof, Fig. 2 a front view and Fig. 3 a rear view.

From F. C., *Junction, N. J.*—In response to the inquiry of "A. S.," Lancaster, Ill., I submit for his consideration two sketches, Figs. 4 and 5. Of the two I regard Fig. 4 as making a much better appearance, although I would make it a one-half pitch instead of one-third pitch.

From G. H. D., *Charleston, S. C.*—In the February issue "A. S.," Lancaster, Ill., asks for a roof plan of one-third pitch, and as I take an interest in matters of this kind I made a pasteboard model, as I always do before designing a roof, and I reached two conclusions. I did not favor the first solution of the problem, as the roof formed two half, or nearly half, gables at the angle on the left side of the house, and this would not look well. I therefore advise "A. S." to use my second plan, which I show in Fig. 6. I always make my models to ¼-inch scale, as they are a great help in matters of this kind.

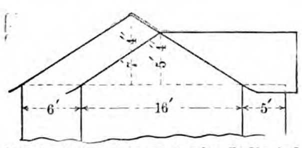


Fig. 2.—Front View of Roof as Indicated in Fig. 1.

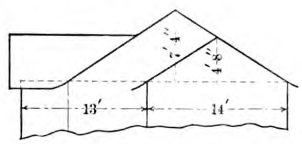


Fig. 3.—Rear View of Roof.

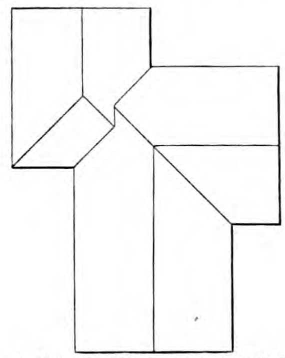


Fig. 6—Roof Plan Preferred by "G. H. D."

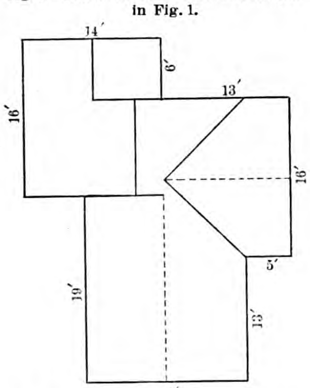


Fig. 1.—Roof Plan Suggested by Samuel Scullion

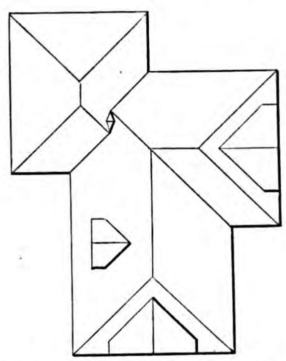


Fig. 4.—Outline of Roof Recommended by "F. C."

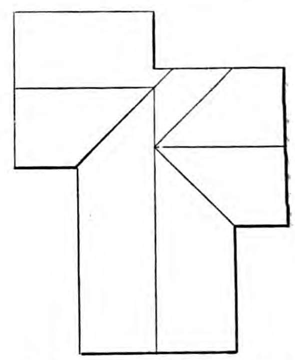


Fig. 5.—Alternate Plan Contributed by "F. C."

Plans for Roof of One-Third Pitch.—Contributed by Various Correspondents.

What Are the Requisite Qualities of an Oil Stone?

From OIL STONE, *Ohio.*—I am greatly interested in the question of oil stones, and would like to ask the readers of *Carpentry and Building*, more especially the carpenters, what kind of grit or grain an oil stone should possess in order to render it most suitable for sharpening tools, such, for example, as are employed in working hardwood. I would also like to have an explanation of the different grits required for tools to be used on soft wood. I am unable to find anything in print bearing upon this particular phase of the subject, and shall take it as a favor if the practical readers will give me the results of their experience in connection with oil stones for the purpose named.

Removing Oil Stains from Marble.

From V. D. E., *Iowa.*—I have a marble slab that has some white lead and oil on it, and would like to know what will take the oil stain out. The oil has penetrated entirely through the slab.

Answer.—As the oil has penetrated the slab the difficulty of removing the stain is greater and may take more than one application of any remedy that may be applied, and may make it necessary to polish the slab after it is found that the oil stain does not reappear from the inside after it has been removed from the surface. The white lead can be scraped off. To remove the grease the following method is given in a standard book of recipes: Stains in marble caused by oil can be removed by applying common clay saturated with benzine. If the grease has remained long enough it will become acidulated and may injure the polish. Boil ½ pound of soft soap in 1 quart of water very slowly until the water is reduced to 1 quart. Apply in the same manner as the saturated clay. Some time should be allowed before either application is washed off with hot suds. Another method is to cover the stained part with a paste made of quicklime moistened with a strong aqueous solution of sal soda for several hours; then remove the paste, wash the parts thoroughly and polish if necessary.

Filing Cross Cut and Rip Saws.

From W. F. W., *Warrensburg, N. Y.*—In the December issue "G. T." of North Adams, Mass., asks in regard to filing saws. In reply I would advise him to use for the coarser saws 5-inch metal saw files, Nos. 0 and 1, and 6 inch slim, blunt hand files, smooth cut. In my own experience I find that after I have used the metal saw files on the fine saws they answer a very good purpose on the coarser saws, as they make a good shaped tooth while giving a good cutting edge. In filing for other folks, however, I use a 6-inch slim, blunt hand saw file for coarse saws and have it filed toward the point, as a file will last longer that way, while at the same time I think the saw cuts better. I believe, however, that nine-tenths of the carpenters file toward the handle. The way one commences to file is generally the way he continues. I commenced filing toward the point, as it was not so hard on the file.

CONVENTION OF THE NATIONAL ASSOCIATION OF BUILDERS.

THE first session of the Twelfth Annual Convention of the National Association of Builders was held in the rooms of the Builders' and Traders' Exchange of Milwaukee, Wis., on Tuesday, February 7, the rooms being tastefully decorated with bunting and plants for the occasion. The attendance showed a representation from all exchanges in membership, and a large number of visitors were present from cities outside of the association and the membership of the local exchange. President Thomas R. Bentley occupied the chair and the meeting was called to order at about 11 o'clock.

Owing to unavoidable absence Mayor Rose was unable in person to welcome the visitors, and City Attorney Carl Runge appeared in his behalf, extending the hospitalities of the city to all in attendance. Mr. Runge made extended reference to the industries of Milwaukee, and his remarks were cordially received. The Governor of Wisconsin, who was scheduled to present an additional address of welcome, was also unavoidably absent, a letter explaining the cause therefor being read by the secretary.

President E. J. Roberts of the Milwaukee Exchange next extended the hospitalities of his organization, and assured the visitors of a cordial welcome, not only from the members of his organization but from the citizens of Milwaukee in general.

President's Address.

Following Mr. Roberts, the first regular business of the convention was the annual address of President Bentley of the National Association of Builders. He began by expressing his regret that the season of the year in which the convention was being held operated to prevent the delegates and visitors from seeing Milwaukee at its best. He enumerated the many features of the city which offered interesting and delightful entertainment to strangers during the warmer seasons of the year, but assured the visitors that all the hospitality it was possible to extend would be gladly offered to all. Continuing, he said:

"In this Twelfth Annual Convention we have come together for the purpose of discussing questions of vital importance not only to this association but to each and every member of the affiliated exchanges, as well as to members of organizations and exchanges which are not affiliated with the association. They all take the benefits of our experiences and deliberations. There is no disputing the fact that we represent one of the largest business interests of this vast nation. It is our aim to arouse in the minds of the builders of the country a full appreciation of the nobility of their calling. We are to consult together and exchange ideas. Ideas are what we are after—ideas rule the world—we will consider and adopt the good ones; criticise and exclude the bad ones, if possible. The members of this convention recognize the advantages of coming into contact and touch with each other from all sections of this broad land in these annual conventions, and I trust our endeavors will gain the respect and honor to which we are justly entitled."

OBJECTS OF THE ASSOCIATION.

As the basis for subsequent remarks and for the purpose of establishing the character and position of the association clearly in the minds of not only those present but of builders generally, President Bentley next quoted the purposes and objects of the National Association as follows:

This association is established for the purpose of uniting all associations of contractors in the building trades throughout the United States in an advisory body, the objects of which shall be: To formulate and define general principles which should underlie all the business operation of contractors in the various building trades; to disseminate the principles thus formulated to all contractors in the building trades for their information and education; to encourage the formation and maintenance of associations of contractors in the building trades on a wise and comprehensive basis, and through such association to secure the observance of uniform customs and practices founded upon the general principles aforesaid as nearly as local conditions will permit; to act as a central bureau of information for all constituent bodies of contractors and the individual members thereof on matters of general or individual concern to contractors in the building trades.

Continuing, the president said: "These are the fundamental principles of our association. The conduct of our business can be better determined by concerted action. For example, the position you hold to those you employ, and the position you occupy in relation to those by whom you are employed, can be thus (by concerted action) better determined. The best means to guard against unfair dealing or against such competition as, under the guise of reduced cost, lowers the standard of workmanship; the establishing of regular or uniform contract, the formulation of a specification which conveys the same idea to all who work by it, uniform lien laws, the best methods of training the youth of the country in mechanical arts—these are subjects which concern us all. In dealing with these questions as individuals we can accomplish little; dealing with them as an association, all that is reasonable and just can be accomplished. We particularly favor and recommend trade schools, also manual training in public schools." The president continued in this strain, detailing the various phases of the work of the association, and closed his address by expressing his gratification at the general prospect of a renewal of better general business conditions for builders. The president's address was very cordially received.

Committee on Credentials.

Next in order was the appointment of a Committee on Credentials, and, following the custom of previous years, the chair named the following gentlemen to act in that capacity: S. B. Sexton, Jr., of Baltimore, Md.; George Watson, Philadelphia, Pa.; Charles A. Vaughan of Worcester, Mass. Following the appointment of the Committee on Credentials the convention adjourned to meet at 2.30 p.m.

AFTERNOON SESSION.

The afternoon session was called to order promptly on time with President Bentley in the chair, the first in order of business being the report of the Committee of Credentials, which showed an attendance from nine cities as follows: Baltimore, Boston, Chicago, Lowell, Milwaukee, New York, Philadelphia, Rochester and Worcester, the number of actual delegates, exclusive of alternates, reported being 34.

Committee on Time of Next Convention.

Following the roll-call, President Bentley appointed the following named gentlemen as a Committee on the Time and Place of Next Convention and Nomination of Officers: Warren A. Conover, New York; Chas. W. Gindele, Chicago, Ill.; Lyman D. Willcutt, Boston, Mass.; Chas. H. Reeves, Philadelphia, Pa., and J. Herbert Grant, Rochester, N. Y.

Next in order was the secretary's report.

Secretary's Report.

In view of the thoroughness with which questions of organization had been discussed in previous reports, the secretary confined himself to a brief statement of work done since the last convention, showing that it had been pursued with unremitting energy and in the customary channels. Proceeding to that part of his report relating to recommendations for the future, the secretary said in substance:

A MATTER OF COST.

Experience has demonstrated conclusively, at last, that the principal if not the sole cause for the condition in which the association now finds itself, as regards its reduced membership, is the matter of cost. Leaving out of consideration the exchanges formerly members that have been abandoned because of internal defects, the number of exchanges still in existence that have withdrawn from the association because of the cost of membership, and the number of new exchanges that decline to join for the same reason is sufficiently large to warrant the belief that our membership cannot be materially increased until a method of maintaining the association without cost can be devised. The causes to which withdrawals have been ascribed in the past are no longer adequate, and our prospect is narrowed down to the sole question of expense as being the one upon which the whole future of the association depends.

Through the instrumentality of the National Association the experimental period of organization among builders has been passed. We have demonstrated the possibility of permaneny among local organizations, builders' exchanges, and we are now confronted by the question of permanency for the National Association. The pioneering, in a measure, has been done, and we are now at the place where the continuance of the association apparently depends upon such changes in its methods as will permit the intimate personal interest and active participation in its conventions and conferences of every builders' exchange in the country, large or small, and wherever located. New exchanges are being constantly set up and almost invariably they profit by all the work of the association, using its published advice and freely calling upon its secretary for assistance, until there exists a legitimate and natural constituency that has to all intents and purposes been created by the association, but from which it is at present debarred from securing even technical support because of the expense.

REDUCE PER CAPITA TAX.

Correspondence during the past year in relation to membership has determined more positively than ever that the present per capita tax of $3, or any amount approximating to it, is more than exchanges will pay, and that it is the question of expense which stands in the way of continuing our work upon present lines.

It is manifestly unfair to ask the few exchanges now remaining in membership to bear the entire burden of a work which is conducted to so great an extent upon the principle of building up better general conditions for the good of the whole, and for the direct benefit of so many constituencies of builders who, while gladly accepting the fruits of our labors as an organization, decide that they cannot associate themselves with us because of the expense.

It has been proven by our experience that the cost of maintaining an establishment with definite work and paid workers commensurate with the dignity of our position and the service we aim to render is too great, under present comprehension of the function and necessity of associated effort among builders, and under conditions surrounding the constituencies which must be relied upon to support such an organization as ours.

ELIMINATE EXPENSE OF SECRETARY'S OFFICE.

It would seem to be imperative for our future that we remove wholly the question of expense, or reduce it to some very small sum, sufficient to meet cost of a limited amount of clerical work, and of stationery, postage, &c., and to seek to accomplish the results we are now striving for through work done solely at the annual conventions; abandoning entirely, for the time, the expense now incurred through the secretary's office. There is little reason to doubt that all the principles for which the association stands would receive increasingly wide dissemination if the attendance at the conventions were large enough to compensate for the omission of the work now done throughout the year from the secretary's office.

This attendance cannot be had under existing conditions, but it is reasonable to suppose that the entire removal of any cost in connection with membership would be followed by an immediate increase in membership, and the ultimate accession of nearly every exchange in the country. The peculiar nature of the National Association, being free, as it is, from any elements which would create antagonisms, and existing, as it does, solely for the improvement of all business conditions affecting those connected with building in whatever relationship, leaves it free from any outside obstruction that would be likely to restrict a very material increase in membership if the question of cost were eliminated. If, for example, a majority of the exchanges now in existence were represented at any given convention, the experience of their delegates and their reports to their several organizations would go far to take the place of the work now performed by the secretary's assistant.

The abandonment of all the present causes for expense, the secretary's assistant, the publication of the *Bulletin*, the systematic mailing to builders' organizations throughout the country of large quantities of our printed matter, &c., and the consequent wiping out of all question of salary, the virtual obliteration of expense for printing, office expense, &c., would place the association upon a footing where the affiliation of new exchanges would be possible, and where the net result in extension of the principles of the association would be reasonably satisfactory.

I therefore advise that the paid establishment heretofore maintained be abandoned, and to meet the small necessary expense for clerical work, stationery and postage to which I have referred, that an assessment be levied by the Executive Committee on each constituent body, in amount sufficient to meet said expenses, but such assessment in no event to be greater than 25 cents per capita of the membership. I recommend that hereafter the duties of the secretary be understood to be only those customary to such an office, and not the extended duties of the past 12 years.

CHANGE OF POLICY.

In view of this change of policy it would seem desirable also that the system which has heretofore been followed in relation to place of meeting should also be altered. Up to the present time it has been the custom to hold the conventions in the city in which the president resides, electing each year a second vice-president with the intention of holding the convention in the city of his residence after electing him successively first vice-president and then president. This custom has limited the term of service of the president to one year, and a large part of that year has been consumed in preparations for the entertainment of delegates to the convention, the whole charge and expense of which has been borne by the exchange in the city in which the meeting is held. This feature of the annual meetings should be abandoned because of its hampering effect upon the president; and particularly because it entirely prohibits the possibility of the convention being held in any of the cities in which the smaller exchanges are located.

Entertainment has been so lavish in the past that none of the smaller exchanges could entertain a convention without great hardship both of comparison and expense.

THE COMING PRESIDENT.

In view of these facts I would also recommend, first, that the president to be elected at this convention be selected with particular reference to securing some one thoroughly familiar with the principles and work of the association, whom it would be possible to re-elect from year to year, so long as his services met with the approval of the exchanges composing the association; and, second, that future conventions be held in cities in which the association has no representation; and that if any special entertainment is arranged at the time of conventions, its cost shall be defrayed by those who participate therein.

The secretary's report was enthusiastically received, notwithstanding the fact that the main recommendations contained therein came in the nature of a surprise to a large majority of those present. On motion of Mr. Walsh of Baltimore the secretary's recommendations were referred to the Committee on Resolutions.

Treasurer's Report.

The treasurer, Mr. George Tapper of Chicago, next made his annual report, which showed an almost entirely exhausted treasury, there being about $100 on hand, with liability for office rent still unpaid.

Committee on Resolutions.

The chair next appointed the following gentlemen as a Committee on Resolutions: Stephen M. Wright, New York City; Ira G. Hersey, Boston, and J. J. Quinn, Milwaukee.

Reports of Exchanges.

Next in order were reports from constituent exchanges; Baltimore, Boston, Philadelphia and Worcester presenting theirs at this time.

An interesting discussion followed the report from the Philadelphia exchange in relation to the trade school maintained by that organization. A question from the floor elicited from Mr. Watson, who presented the report, the statement that not only was there no opposition to the trade school on the part of the labor unions of Philadelphia, but that the school had received from its early history their cordial support, the workmen contributing as far as lay in their power to its success. This was welcome information, apparently, to many of the delegates, who had been led to suppose that the opposition of labor unions offers an insuperable barrier to the establishment of trade schools by organizations of employers. It was developed that this opposition could be easily surmounted by the establishment of a school similar in purpose to that in Philadelphia, which graduates not journeymen but apprentices who are prevented from coming into competition with journeymen until such time as they have acquired the skill necessary to the performance of a journeyman's work.

The Brickmaker and Builder.

An invitation had been extended to the presidents of other national associations of a character similar to that of the National Association of Builders to address the convention on the relation of their particular branch of the trade to builders generally, and in response thereto a paper was presented by Mr. D. V. Purington on behalf of the president of the National Brickmakers' Association touching the relations between the brickmaker and the builder. Mr. Purington was unavoidably absent, and his address was read by the secretary. Mr. Purington reviewed the experience of brickmakers and builders generally from the time when both were of local and comparatively insignificant importance in the general business community, until they occupy a position equal to that of any other commercial pursuit. He dilated interestingly upon the vicissitudes of both, and in a semi-serious vein depicted their interdependence and the general need of harmonious conditions to produce the results most desirable for both. Mr. Purington's paper was listened to with manifest interest, and was heartily applauded. On motion from the floor a vote of thanks was extended to Mr. Purington for his able and interesting address.

Auditing Committee.

The session closed with the appointment by President Bentley of F. M. Harris of Philadelphia and Wm. N. Young of Boston as a committee to audit the report of the treasurer.

THURSDAY, FEBRUARY 9.

The last session of the convention was held on Thursday morning, the business assigned to it being transacted in time to admit of the consideration of that previously allotted to Friday morning. President Bentley called the delegates to order at 10.30 a.m., and after the roll-call the secretary read the report of the Auditing Committee, stating that they had examined the reports of the treasurer and found the same to be correct.

Address on Architecture.

First in order was the address on "Architecture" by H. C. Koch of Milwaukee. Mr. Koch began his remarks by expressing his gratification at being asked to address the convention, and expressed it as his opinion that the National Association of Builders had done much to assist in the establishment of the position of the builder upon a higher plane than he had hitherto occupied in the public mind. Continuing, he said:

Through your efforts and combined action, you have reduced the number of the peculiar class of individuals styling themselves "general contractors." I emphasize the name "general contractors," because to my mind this name is very ambiguous; in most cases it means a master builder who is a practical mechanic, while in some cases it means an individual who is no mechanic, a sort of building broker or dealer in false pretenses, who secures and peddles all the sub-contractors' bids he can get, which is his only method of estimating, then adds up the lowest sub-bids, and sometimes reduces the aggregate 10 per cent., so as to be certain of being the lowest. After being awarded the contract he again visits the various sub-contractors with the intent of getting lower figures, after exposing the figures of others, and finally combines with those sub-contractors that belong in his class. The work progresses in the same character as that of the contractor, and therefore before the structure is half finished its rottenness is brought to the surface. The local press then takes a hand, magnifies facts, condemning all contractors and architects, and thus public opinion is sometimes formed.

But this class of general contractors are not the only individuals that have polluted the reputation of honorable master builders; there is another class of individuals equally if not more guilty than the peculiar "general contractor" and known as "designing architects," that enter all competition with elaborate colored perspectives on a large scale, in their way promising the most expensive construction and finish, who often meet with success when they have a "tenderfoot" or questionable committee to deal with, provided the structure can be built within the appropriation. The so-called working plans are drawn to a scale of ⅛ inch to the foot. The specifications consist mainly of the general phrase "as will be directed," or "as shown on the plans." Very little is shown on the plans, and the term "as will be directed" is so elastic that it either makes or breaks the contractor, and when the structure is said to be completed the contractor retires with the reputation of a rascal or a fool, either one of which will not elevate the reputation of master builders or architects. I have referred to the peculiar general contractor and the "designing architect" for the purpose of impressing upon you that the reputation and interests of honorable and reliable master builders, as well as those of the competent and honorable architect, are identical and mutual; as no builder, however competent he may be, can erect a structure with credit to himself, after the plans of an incompetent or unreliable architect, and *vice versa*, and I suggest the assertion that it is very essential to the master builders as well as the architects of this country to relieve each other from the peculiar class of individuals which a portion of the public may call colleagues. Both are a menace to your reputation, which your association is endeavoring to elevate. It is often said that the builder only carries out the ideas of the architect, which may be true in some instances, but in many cases where complicated problems in construction and erection present themselves the architect often seeks and adopts the ideas of the experienced master builder. In architectural and technical schools the theories of construction are taught to the embryo architect, but such theories were evolved and deduced from the practical experiments of the mechanic. Several years ago, while on a visit to the Massachusetts Institute of Technology, I became very much interested in the details of construction of the various building trades that are taught there, and complimented Professor Chandler on the thoroughness of the method, illustrated in the detail plates published by him. He informed me that the credit for the method of construction belonged to the masters of the various building trades of Boston, whom he had consulted, and that he considered them superior to ordinary office methods of even the prominent architects, and hence their adoption in the regular course of architecture in the Institute. I consider this the highest compliment that can be bestowed on the ability of the master builders of this country.

Mr. Koch's address was listened to with undivided attention, and frequently interrupted with bursts of hearty applause.

Lien Law.

Next in order was an address on "Lien Law" by Herbert Kinne of Milwaukee, an attorney who has had the lien laws of Wisconsin and the other States under consideration for some time on behalf of the Builders and Traders' Exchange of Milwaukee. Mr. Kinne gave an extended consideration of the subject, and commenced his address by laying down as a premise the fact that the great army of mechanics, artisans, laborers and builders who, by means of their industry, ingenuity and skill have reared the mighty edifices of our country should receive just compensation for their labors when finished. "You as builders," he said, "are aware of the fact that in the execution of every building contract there are many persons either directly or indirectly interested, and no law is just which does not secure to all the full measure of their rights."

In reciting the history of lien law Mr. Kinne made the statement that Great Britain, from whom our laws were chiefly taken, did not recognize the right of lien to the contractor or laborer upon the building of the owner, but the Continental States of Europe, particularly France and Spain, whose laws were based upon and taken from what is known as the Civil Code, did recognize this right of lien upon the building or edifice of the owner for the labor and materials actually employed therein. At an early date after the formation of the general Government and at about the beginning of the present century, the Legislature of Pennsylvania enacted a law affording to the contractor, or person who should perform labor upon a building, the right of lien thereon for his work or labor employed. Soon thereafter New York enacted a lien law, and in the course of time other States, as they have been admitted into the Union, have followed their example. In this early legislation no right of lien was recognized or afforded to any person except those whose contract or engagement was directly with the owner. In other words, none but the principal contractor was given the right of lien.

SUB-CONTRACTOR'S LIEN.

In referring to that which he denominated as the "Sub-Contractor's and Material Man's Lien," Mr. Kinne said that legislation had taken a wide scope and is anything but uniform. It has apparently grown from nothing, in the beginning, to the most frightful proportions at the present time. The reasons assigned for it are equally as plain and cogent as those affording to the principal contractor the right, yet in practice, as it now exists in many of the States, it is or may be productive of the most glaring frauds which designing men are capable of perpetrating upon the owners of properties, and incidentally destructive of the best interests of the building trades. Pennsylvania was the first State to enact into law the rule affording to the contractor and material men whose contract to furnish materials was not directly with the owner the right of lien, upon certain conditions. New York soon followed, and it appears that these two States have furnished the models upon which subjequent legislation upon the subject is based. They are radically different, the difference being that the Pennsylvania act recognized the right of the sub-contractor or material man to the lien to the extent of the amount of the contract price of the building only. The early rule in New York, however, gave to the sub-contractor or material man the right of lien upon the building, regardless of the state of accounts between the principal contractor and the owner. Thus, under the latter rule, if a contract price was $1000 and the owner had paid $900, and materials had been furnished or labor performed for the principal contractor for which he was not paid, amounting to $600, the owner might be required to pay the same, or the premises sold to pay the additional $600, thus making the building cost $500 more than the owner had agreed to pay. Between the two foregoing theories upon the subject, the legislation of the several States has been swinging for nearly a hundred years, until it reached the condition in which it is at present.

In referring to the condition indicated under the last named rule, the late Chief Justice Campbell said: "It strikes at the foundation of all property in land. There is no constitutional way for divesting a man's title except by his own act or default; here his own act is not required, and his freedom from default is no defense to him; he may pay in full in advance or otherwise for all he has contracted for. He may contract for a house built in a certain way and of certain materials, and may have to pay for what he has never bargained for, and what his building contractor has no right to put off upon him. The original contract plays no part in the matter, except as a fact which binds no one and has no significance. Such a gross perversion of all the essential rights of property is so plain that no explanation can make it plainer."

STIMULUS TO THE BUILDING TRADE.

After presenting a number of examples bearing upon and illustrating the injustice of lien law operating under the rule last referred to, the speaker continued: "If the laws of the several States upon the subject of the sub-contractor's lien were so framed that the owner and all concerned in the matter might be known at an early stage of the execution of the contract, and all the rights justly and equitably protected, it would, no doubt greatly tend to stimulate the building trade. There would be but one class only that would suffer—namely, that class of irresponsible, incompetent and dishonest contractors who do not intend to pay their bills, but leave their creditors to secure their pay by virtue of a lien upon the premises of the owner. If the rule should be adopted requiring the owner to receive a proper notice in advance, this class of contractors would have to get out of the business and leave the field open to those who can and will pay their honest debts as agreed. Thus will the owner be benefited and likewise the material man and sub-contractor, for the reason that they will receive the fruits of their labor, or pay for the goods delivered according to agreement, and not be required to secure their right by protracted litigation in the courts in their efforts to enforce the rights and remedies now afforded them by virtue of the sub-contractor and material man's lien."

Referring to the function of the association in relation to this subject, the speaker said: "The subject of the lien is one for the legislatures of the several States to regulate, and, like all other legislation, should be as uniform as possible. To secure this end it seems to me that organizations of this kind should determine for themselves what is best and urge the legislatures of the several States to adopt a uniform and just rule upon the subject."

The speaker was received with evident marks of interest, his address during its entire length being listened to with the closest attention. It was also evident that the matter was one of immediate concern to all present, and that Mr. Kinne's presentation of the subject afforded general satisfaction.

Manual Training.

Next on the programme was an address on "Manual Training," by Prof. Frank W. Kendall, superintendent of the Stout Manual Training School at Menomonie, Wis., a gentleman who has devoted many years to the consideration of the question in its larger aspects, and whose experience singularly fits him to present the subject interestingly and comprehensively. Professor Kendall presented his subject in the form of a narrative of the experience of the pupil in the manual training school at Menomonie from the beginning to the end of his or her career, illustrating with great clearness and distinctness the exact relation of each successive step in the progress of education to the ultimate development of what he termed the "educated" youth. The speaker made clear the value of "all round" education, which should beget not only manual skill but education of all the senses, mental and physical, looking to the production of a well balanced, well educated man or woman at the end of the school life, emphasizing particularly the fact that each step from the kindergarten to graduation was preparatory for the better understanding of each succeeding step and for the better fulfillment of all the obligations of life at the time of graduation.

Professor Kendall's manner of presenting his address was such as to hold the undivided attention and interest of all present, notwithstanding the fact that the subject was not in the ordinary sense intimately connected with the business of building, and at the close of his remarks, which were extemporaneous, he was greeted with hearty applause. In moving a vote of thanks to the three speakers, Secretary Sayward took occasion to remark that the addresses just delivered were among the most interesting that had been listened to by delegates to any convention of the association since its institution. The

Secretary laid considerable emphasis upon the value of such educational work as was typified in these addresses, pointing out the fact that if for no other reason the National Association had justified its existence in making it possible through its annual conventions for its members to receive the information and inspiration contained in addresses such as those to which they had just listened. He stated also that the Master Builders' Association of Boston would take pleasure in printing the three addresses in full and in sufficient quantity to supply all who might desire copies of the same. A vote of thanks was extended to the Boston association for this action.

Value of Organization.

Next on the programme was an address by ex-presidents on the "Usefulness of the Association and the Value of Organization Among the Builders." The only two ex-presidents present were John S. Stevens of Philadelphia and Ira G. Hersey of Boston, both of whom responded, and both of whom availed themselves of the opportunity to express briefly their conviction as to the value of the work of the association and the future before it under the change of administrative methods proposed by the secretary. Their remarks in relation to the usefulness of the association and the value of organization among the builders were in the vein of the published recommendations of the association throughout the preceding years of its existence.

At this point the delegation from the Mechanics and Traders' Exchange of New York asked the privilege of printing the report of the secretary in full for the benefit of constituent bodies, and others who might desire the same, which permission was granted, accompanied by a vote of thanks.

Report of Committee on Resolutions.

Next on the programme was the report of the Committee on Resolutions, which was presented as follows by Stephen M. Wright, chairman:

Resolved, That, until otherwise ordered, all salaried services and all publications involving expense be, and hereby are, abandoned. That the expenses necessary to correspondence, such as typewriting, stationery, &c., be met by appropriations to be made by the constituent bodies, upon request of the Executive Committee; said appropriations not to exceed an amount equal to 25 cents for each unit of membership in said constituent bodies.

Resolved, That, until otherwise ordered, the place of meeting for conventions be left discretional with the Executive Committee. That said places of meeting when practicable, shall be in localities where there is no constituent body, and, inasmuch as our convention should be primarily and mainly for purposes of business, and improvement of conditions under which the building business is conducted, that wherever any convention is held, no constituent body shall be permitted to bear any expense incident to any form of entertainment for delegates or visitors to said convention.

Resolved, That the persons chosen as president, vice-presidents, secretary and treasurer be selected with particular reference to securing the services of those familiar with the principles and work of the association, and without reference to the locality in which conventions are to be held.

Resolved, That, in addition to the regular delegates provided by the constitution, any member of any constituent body shall be allowed the privileges of the floor at conventions, and shall be permitted to discuss any questions regularly and duly before said conventions. He shall be permitted to vote on any question which simply comprehends arriving at the sense of the meeting, but shall not vote on questions determining the policy or administration of the association.

Resolved, That all portions of the constitution in conflict with the resolutions already passed, or with this, be and hereby are suspended until the close of the next convention, and that the secretary be, and hereby is, instructed to prepare amendments to the constitution made necessary by these adopted resolutions, and present said amendments at the next convention for action, giving notice thereof. as required by article VIII of the constitution. (Signed)

STEPHEN M. WRIGHT, Chairman.
IRA G. HERSEY,
JAMES J. QUINN. } Committee.

On motion of M. B. Madden of Chicago, the report of the committee was amended by the adoption of the following additional resolution:

Resolved, That constituent bodies be instructed to select and consider questions which they believe to be of importance to their members and to the builders of the country generally, and that after such subjects have been considered, they be referred to the next ensuing annual convention of the National Association for further discussion and action.

The report of the committee as amended was adopted seriatim, each resolution being acted upon separately and the whole unanimously adopted.

Nomination of Officers.

At this point, the regular business of the Thursday session being completed, it was determined to proceed with that assigned for the closing session on Friday, and the next business in order was the report of the Committee on Time and Place of Next Convention and Nomination of Officers, which was presented by the chairman, Warren A. Conover, as follows:

To the Twelfth Annual Convention:

GENTLEMEN.—The resolutions already adopted having settled the question of time and place of the next convention, your committee have no report to present on that part of the duty assigned to it. As to the nomination of officers, your committee offers the following list for your consideration:

For president, John S. Stevens of Philadelphia.

For first vice-president, George Tapper of Chicago.

For second vice-president, Chas. A. Cowen of New York.

For secretary and treasurer, Wm. H. Sayward of Boston. (Signed)

WARREN A. CONOVER,
CHAS. H. REEVES,
CHAS. W. GINDELE,
L. D. WILLCUTT,
J. HERBERT GRANT.

On motion, the retiring president was instructed to cast one ballot for the officers as named in the report of the committee. President Bentley cast the vote as instructed, and the officers were declared elected as named. Each of the newly elected officers briefly addressed the convention, thanking the delegates for the honor conferred upon them and the organizations they represented, and all were unanimous in the opinion that the change inaugurated in the method of conducting the association presaged an immediate and steady increase in membership and influence for the association.

Resolutions of Thanks.

The following resolution was presented by J. Herbert Grant of Rochester, and unanimously adopted:

Resolved, That the thanks of this convention be extended to the Milwaukee Exchange for its generous entertainment, and to the individual members of that body and their ladies for their unremitting attention and kindness; and further that we give hearty thanks to the press, the Mayor and to the corporations and individuals who have in so many ways added to the profit and enjoyment of our stay in the Cream City.

Resolved, That the thanks of the delegates be extended to all retiring officers for their efforts in behalf of the association.

Board of Directors.

Next in order was the naming of the directors for the ensuing year, these being as follows:

Baltimore, Md.	S. B. Sexton, Jr.
Boston, Mass.	Lyman D. Willcutt.
Chicago, Ill.	Chas. W. Gindele.
Lowell, Mass.	W. H. Kimball.
Milwaukee, Wis.	James J. Quinn.
New York City	Warren A. Conover.
Philadelphia, Pa.	Geo. Watson.
Rochester, N. Y.	H. H. Edgerton.
Worcester, Mass.	B. C. Fiske.

On motion of John S. Stevens, it was voted that new exchanges obtaining membership between now and the time of the next convention be instructed to appoint a director to serve between the time of their admission and the ensuing convention.

Retiring President Bentley thanked the delegates very cordially for their kindness and consideration to him during the year, and especially throughout the convention.

On the close of President Bentley's remarks the Twelfth Annual Convention of the National Convention adjourned *sine die.*

Entertainment.

Members of the Builders and Traders' Exchange of Milwaukee individually and collectively spared no pains to provide a most enjoyable visit to all in attendance from the moment of their reception to that of their departure. Committees were assigned for the entertainment of the various delegations, and all were unremitting in their efforts to provide for the comfort and pleasure of their guests. The special features of the entertainment were a theater party to visitors and members of the exchange on the night of Tuesday the 7th; a trolley ride to a number of the principal breweries and manufacturing concerns of Milwaukee, and luncheon on Wednesday; a reception and smoker at the West Side Turner Hall and a banquet to the ladies of the visiting delegations on Thursday night.

During the entire convention the exchange held open house in the "Marble Hall" on the top floor of the building owned and occupied by the organization. The "open house" consisted of an elaborate lunch and unlimited quantities of the beverage which has made Milwaukee celebrated. All delegates and visitors were enthusiastically unanimous in hearty appreciation of the hospitable manner in which they had been entertained, and were unstinted in their praise of the efficiency with which the several features of entertainment were carried out.

VARIOUS COMMITTEES.

The Executive Committee, having in charge all matters pertaining to the entertainment of delegates and visitors, consisted of Henry Ferge, chairman; E. J. Roberts, treasurer, and H. S. Pelton, secretary. The special committees were:

RECEPTION AND SMOKER.

Chas. A. Sercomb, John Bonnett,
Robert Rom, Geo. Posson,
F. Luenzmann.

REFRESHMENTS.

H. Wallschlaeger, Jr., J. E. Hilgen,
A. L. Kiefer.

THEATER.

George Rohn, John Petersen,
H. Seelman.

CARRIAGES.

Paul Riesen, R. E. Tabbert,
L. Hoffman.

ENTERTAINMENT OF LADIES.

L. A. Clas, D. W. Cutter,
J. P. Sherer.

LADIES' COMMITTEE ON ENTERTAINMENT.

Mesdames Clas, chairman; Roberts, secretary;

Bentley,	Pelton,	A. Bentley,
Cutter,	Hays,	Sanders,
Sherer,	Ferge,	Whitnall,
Riesen,	De Vere,	Strachota,
Rediske,	Wallschlaeger,	Luenzmann,
Gross,	Rohn,	Meyers.

Entertainment at Chicago.

The Builders' Club of Chicago extended an invitation to all delegates and visitors passing through that city on their way to the convention, to make the rooms of the club their headquarters while in Chicago, and tendered them a banquet on the evening of Saturday, February 4. The banquet was an elaborate affair, and one that was thoroughly enjoyed by all present, the rooms of the club being tastefully decorated, the *menu* excellent and the *post-prandial* exercises happily conceived. The delegates from New York and Baltimore being unable to reach the city in time to attend the banquet, were entertained at lunch on Monday, February 6.

Law in the Building Trades.

ASSUMPTION OF RISK.

Where one employed by a party who had taken a contract to tear down a building was injured by the falling of part of the frame, on the knocking out of a stud, which he did to weaken the structure, he cannot recover for the injury, as it was incident to the work of which he had assumed the risk.—Nourie *vs.* Theobald (N. H.) 41 Atl. Rep., 182.

CONSTRUCTIVE PAYMENT.

Where a building contractor gave his subcontractor an order on the owner for the amount due the subcontractor, which order was expressed to be in full satisfaction and settlement, and was accepted by the owner, it operated as a payment by the latter.—Beach *vs.* Wakefield (Ia.) 76 N. W. Rep., 688.

SET OFF MUST BE SAME CONTRACT.

In an action for plastering a house, where the owner pleaded a counterclaim, alleging damages on account of contractor's unskillful workmanship in constructing the foundations for the house, it must be shown by the owner that the contract for building the house and such foundation were parts of the same contract with that for the plastering, or it could not be set up in same action.—Allison *vs.* Skinner (Okl.) 54 Pac. Rep., 471.

CONTENTS.

—"Is there no balm in Gilead?" cried the preacher. The druggist in the front pew moved uneasily and rubbed his eyes. "All out of it at present," he murmured gently; "but I can give you something just as good." Afterward he slept more peacefully.—*Puck.*

—BERTHA: "Do you believe in love at first sight?"
Ethel: "I believe there are persons one is more likely to love before one has had time to get acquainted with them than afterward."—*Boston Transcript.*

Carpentry and Building

WITH WHICH IS INCORPORATED

The Builders' Exchange

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To all other Countries,	1.25 Per Year.

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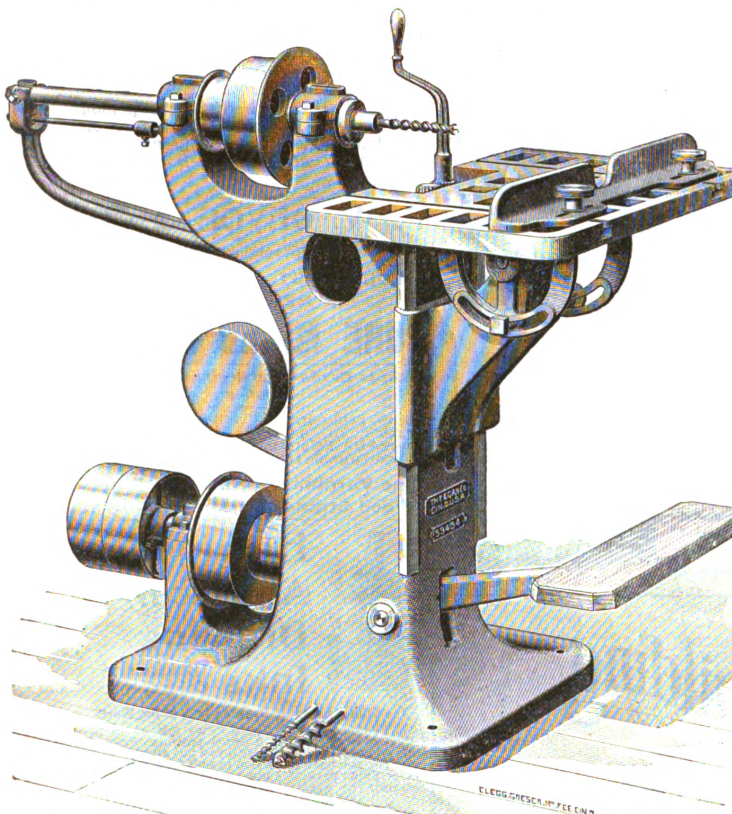
ENTERED AT THE POST OFFICE, NEW YORK, AS SECOND-CLASS MATTER

NOVELTIES.

Horizontal Boring Machine.

A new and improved horizontal boring machine which has recently been put on the market by the Egan Company, 221-241 West Front street, Cincinnati, Ohio, is shown in Fig. 1 of the engravings. In its construction the frame is cast in one piece, thus giving it great solidity and strength. The table is raised and lowered by means of a handle which can be instantly removed. The face of the table is slotted and the fence can be set so as to bore miters or do any angle boring, routing and similar work. The mandrel is of stiff steel and the depth of hole to be bored can be regulated by a patent stop, the depth varying from ⅛ up to 12 inches. The treadle and weight work on a fine leverage and make a very quick run. The manufacturers state that the machine can be handled and changed so quickly as to render it adapted for all classes of work, and with either heavy or light bits. The machine here illustrated is one of the latest achievements of the large corps of experts which the company have had engaged for a year past in designing improvements in existing machines and evolving new ones.

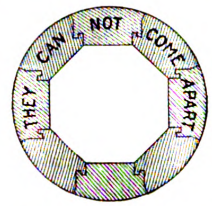


Novelties.—Fig. 1.—Horizontal Boring Machine.

THE BARNEY & REED MFG. COMPANY of 85 Water street, Boston, Mass., call attention in their advertisement in this issue to the Walda Sectional Window Weight, which is meeting with gratifying favor in the trade. This weight was used by Norcross Bros., builders, in the new Southern Union Station, Boston, where 140 tons were required. The weight is made either round or square, and, it is claimed, permits balance to be obtained without ever having the pocket over 10 inches in length.

Wooden Columns for Architectural Work.

A method of constructing columns for architectural purposes and possessing features of interest to architects and builders is that adopted by Hartmann Brothers of 428 Lincoln avenue, Mount Vernon, N. Y. The columns are constructed by means of what is known as Koll's patent lock joint and are said to be fast taking the place of solid shafts. In the accompanying illustrations we present a general view, Fig. 3 of a fluted column with capital, together with cross sections of round, Fig. 2, and octagonal columns, Fig. 4. These columns may be made of any length or diameter, either in hard or soft wood, at a cost, the manufacturers state, much less than the old style of built up or solid columns. When made of hard wood such as quartered oak, quartered sycamore or other hard wood, the grain can be matched so that the quarter grain shows all the way around; an advantage, it is claimed, that is not possessed by the solid column. The manufacturers also refer to their columns as being superior to the solid columns, especially for exterior work, and that they are being specified by leading architects in different parts of the country.



Wooden Columns for Architectural Work.—Fig. 2.—Cross Section of Round Column.

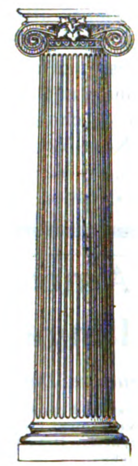


Fig. 3.—View of Fluted Column.

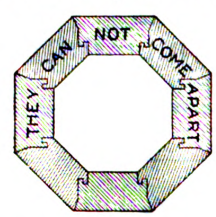


Fig. 4.—Cross Section of Octagonal Column.

Supplies for Roofers.

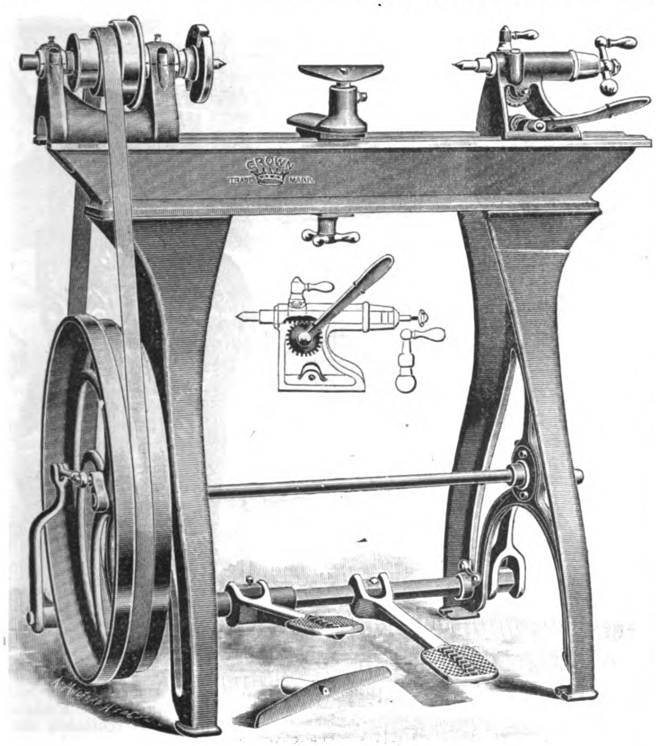
The No. 8 catalogue recently issued by the Kansas City Roofing & Corrugating Company, Kansas City, Mo., for the year 1899 conveys information about a very extensive assortment of goods in which many of our readers are interested. The title page describes this concern as the only house in the West carrying a heavy stock and full line of corrugated iron in all sizes, and adds a further statement concerning their promptness in all business dealings. The earlier pages of the pamphlet give tables of sizes and weights, an index and telegraph cipher; then follow illustrations with information about corrugated iron, showing its different kinds and applications. A variety of sheet metal [illegible] work is next illustrated, such as sheet steel pressed brick, rock faced brick, rock faced stone, iron weather boarding, &c. Next comes roofing of various kinds, metal shingles, then crestings, finials, &c. Several pages refer to wire fencing, counter railings and the like. Conductor pipe and eave troughs are noted and a number of illustrations are given of cornices, window caps and lintels. Toward the end special emphasis is given to their well-known Donkey paint, which they describe as absolutely rust proof. An alphabetical index closes the volume, which is handsomely bound in green paper.

German Pattern Bits.

Goodell Bros. Company, Greenfield, Mass., for whom the Standard Steel Company, 94 Reade street, New York City, are direct representatives, have put on the market a line of German pattern bits, No. 444, which are made in sizes $\frac{1}{32}$ to $\frac{12}{32}$ inch, inclusive, increasing by thirty-seconds. The principal novelty in these goods, to which the attention of the trade is drawn by the manufacturers, is that they are a high grade bit, made of fine material and sold at a much lower price than a corresponding quality of German imported bits. They are nicely put up in straight sizes, one dozen in a box, and assorted $\frac{4}{32}$ to $\frac{8}{32}$, inclusive, in boxes of one dozen.

The Crown Hand Lathe.

A new hand lathe for foot or steam power, and having a broad heavy solid bed with two V-ways, has been brought out by the Seneca Falls Mfg. Company, 209 Water street, Seneca Falls, N. Y., and is shown in a general view in Fig. 5 of the engravings. It is known under the name Crown and has a 10-inch swing. It is designed for either wood or metal work, such as turning, boring, drilling, polishing, &c. The tail stock spindle has the manufacturers' improved combination lever and screw motion, which, it is stated, can be instantly changed from one to the other. The live spindle is made from a crucible steel forging 1⅜ inches in diameter; the bearings are phosphor bronze, with the company's improved end thrust ball bearing, which is claimed to greatly reduce friction in drilling; the centers are standard taper ⅛ inch to the foot, and the cone pulley is perfectly balanced, having three sections for 1¼-inch belt. The tail spindle is of steel 1 inch in diameter, with self discharging center and improved spindle locking device, which insures perfect alignment, while the tail stock has a bearing of 6 inches on the bed and is rigidly held in position by a cam locking arrangement. The machine has a plain hand rest with short and long T rests. The patent foot power consists of double treadles, with a walking motion, the treadles being movable and working independently of each other. Each is connected at opposite ends of the driving wheel shaft in such a manner as to produce a strong, positive and continuous power. The lathe can be started or stopped instantly and may be operated with both feet sitting or with one foot standing. The lathe is said to contain several patented features which are not found in other machines now on the market.



Novelties.—Fig. 5.—The Crown Hand Lathe.

Reissmann's Rafter and Polygon Gauge.

Not long since we called attention to the rafter and polygon gauge which has been introduced to the trade by Frederick Reissmann of West Point, N. Y., since which time the device has been improved in important respects and is now made of rectangular shape of heavy three-ply veneer, highly polished. In this shape the gauge is more serviceable than before and is better able to withstand the rough usage to which it is often likely to be subjected in actual work. By means of this gauge, an illustration of which is presented in Fig. 6 of the engravings, any angle or cut required in the construction of buildings and roofs can be readily obtained with accuracy. The tool is of wide scope and great practical utility, saving time for the skilled mechanic, while enabling the ordinary workman to frame roofs with absolute certainty. Among other things the rafter and polygon gauge will give the correct side and miter cuts for pentagon, hexagon, octagon, nonagon, decagon, &c.; the length of common, hip, valley and octagon hip rafters; the pitch, plumb and side cuts for the above named rafters; the side bevel of jack rafters against hip and valley rafters, as well as the side bevel of jack rafters against octagon hip rafters; the miter cuts for level planceer, gable planceer, crown molding, sheathing and shingles for hip and valley; the degrees from 1 to 90, and a scale representing 1 inch to the foot. In order to obtain any desired angle in the construction of buildings and roofs, it is only necessary to apply the tongue of an ordinary carpenters' sliding T bevel against the right hand edge of the gauge, then move the blade of the bevel so that its outer edge will coincide with the arrow pointing at O and the line from which the angle is to be taken.

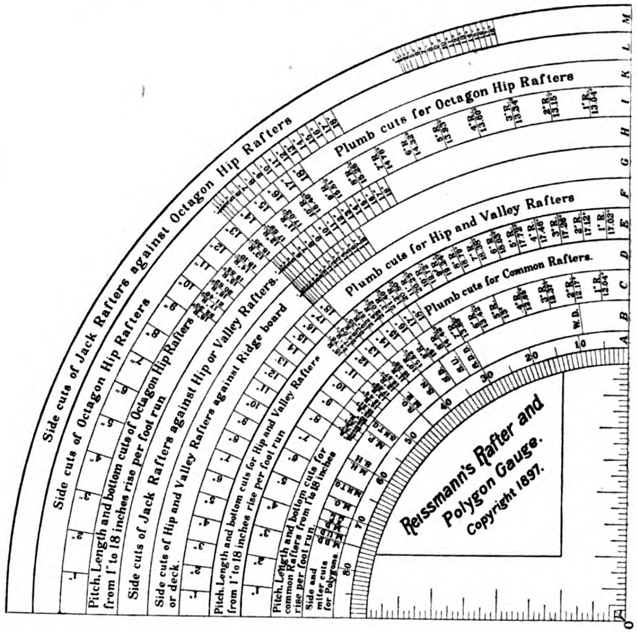
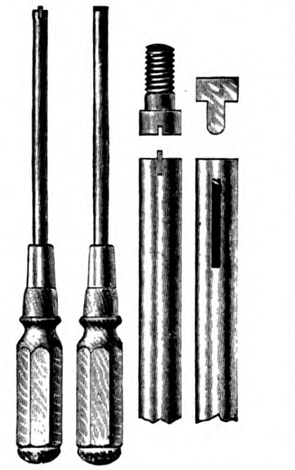


Fig. 6.—Reismann's Rafter and Polygon Gauge.

Mosely Folding Bathtubs.

A catalogue which reaches us with the name "Mosely" embossed on a brown ground, surrounded by a scroll design on a light blue cover, is the ninth that has been issued in the interest of the folding bathtubs and water heaters made by the Mosely Folding Bath Tub Company, Chicago, Ill. It consists of 36 pages, and shows the tubs in a variety of styles and finish. When not in use and folded up the tub presents the appearance of a handsome cabinet, and some have full length mirrors. When in position for



Novelties.—Fig. 7.—Various Parts of the Samson Screw Driver.

use others are provided with an instantaneous water heater adapted for gas, oil or gasoline. Some are arranged for use in small bathrooms to have connections with the regular hot and cold supply, but have the advantage that when folded a large space in the bathroom is available. To permit the use and enjoyment of their bathtubs under all conditions the company furnish a force pump and tank for use where there is no pressure supply. They make a variety of special fittings to render the use of the tubs more convenient, including a folding detachable waste for emptying the tub with a hose, a security waste and overflow, and a combination faucet for shower bath use. The catalogue also contains testimonials from those who have used them in public and private buildings where there was no pressure water supply.

Samson Screw Driver.

The Sawyer Tool Company of Fitchburg, Mass., are directing the attention of carpenters and building mechanics generally to their Samson screw driver, illustrated in Fig. 7 of the cuts. The features of this tool are referred to by the manufacturers as follows: It supports the blade up to the actual straining point; it supports the head of the screw so that it will not wabble; a wood screw can be started by striking the end of handle with the palm of the hand and screwed to place without touching the screw after once in position; the blade being parallel, it bears as much at the bottom of the slot as it does at the outside, thus preventing a heavy burr on each side of the slot, as is caused by tapered blades; as the blades and shanks of drivers run in regular sizes corresponding to the average sizes of wood and machine screws, the blade does not wear and mar the screw as it would with a tapered blade; a broken blade can be quickly replaced by a new one, extra blades being furnished with each tool. The blades can be supplied in ¼, 5-16, ⅜ and ½ inch diameters. The engravings show both screw driver complete and section of blade in two different positions, and illustrate how the detachable blade with parallel sides is inserted or replaced and easily removed if necessary.

Columbia Junior Single Drum Sander.

A four-roll single drum sander designed especially for polishing thin veneers and for use in small shops, box and furniture factories and other places where good work at high speed is a prime requisite, has just been placed upon the market by the Milwaukee Sander Mfg. Company, branch of the American Wood Working Machine Company, Green Bay, Wis. This machine, known as the Columbia Junior, is the first of its type the company have introduced and is shown in general view in Fig. 8 of the engravings. In its construction the sand cylinder has automatic paper tightener, is accurately ground, has hard surfaces and will take 30-inch sandpaper. One of the features, which is referred to by the manufacturers as of the highest importance and is patented by them, is automatic compensation of wear on top raising screw. Another feature is the separate regulation of the spring tension of every top feed roll, which enables the operator to increase the spring pressure of the feed rolls at will. In shops where sanders are used for a variety of purposes, a variable speed for the feed is very desirable, the device employed for this purpose in the Columbia Junior being such as to permit a change from 9 to 21 feet per minute. There is also an instantaneous feed stop and a brush, which are also important in a machine of this kind. The Columbia Junior is made in two sizes, 30 and 42 inches wide, to work up to 4 inches thick. The two sizes have tight and loose pulleys 12 x 8½ inches and make 650 revolutions a minute. The smallest size occupies a floor space 5 feet 3 inches by 3 feet 6 inches, while the largest size covers 6 feet 3 inches by 3 feet 6 inches. The American Wood Working Machine Company have salesrooms at 109 Liberty street, New York; 94 Pearl street, Boston, Mass.; 3101 Chestnut street, Philadelphia, Pa.; 330 Lyell avenue, Rochester, N. Y.; 45 South Canal street, Chicago, Ill., and Church and Basin streets, Williamsport, Pa. Those of our readers who are interested in the products of the company can save time by addressing the salesroom nearest to them.

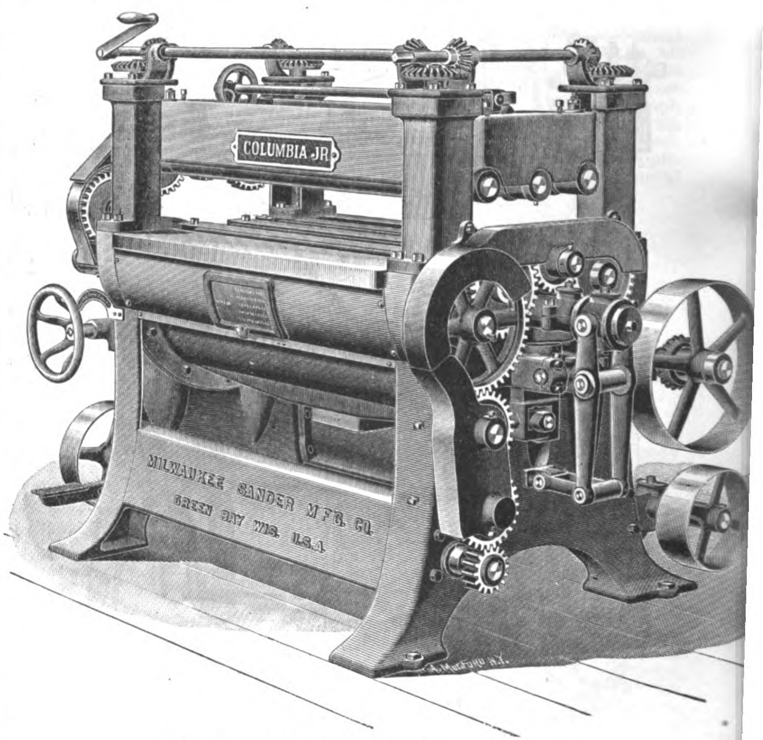


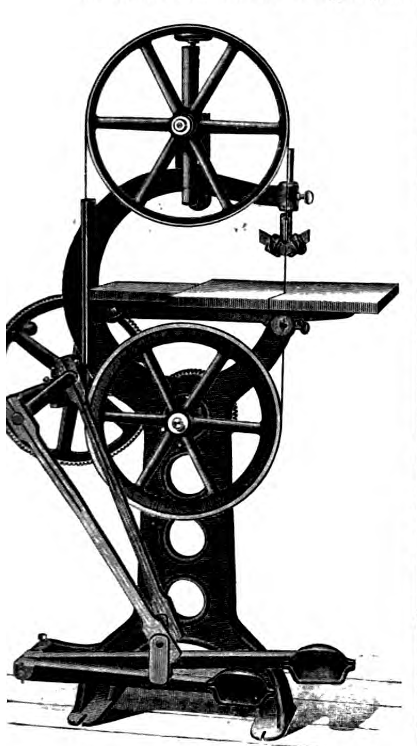
Fig. 8.—Columbia Junior Single Drum Sander.

Boys' and Youths' Complete Tool Chests.

C. E. Jennings & Co., 79 Reade street and 97 Chambers street, New York, have entered the market with a complete line of boys' and youths' tool chests, which they call Little Daisy and Gem. They are numbered 11 to 19, inclusive, and are listed, respectively, per dozen, complete with tools, $15, $22.50, $30, $45, $60 and $75, the last numbers being priced at $7.50, $10 and $15 each. The chests are made of chestnut, filled and varnished, have locked corners and stained moldings, a partitioned tray, lock and key, with substantial inside brass hinges. The chests vary in dimensions from No. 11, 18 x 8¼ x 7 inches, outside measurement, to 22 x 13 x 12 inches, inside measurement. The tools are useful even in the boys' chests, increasing in number and assortment until in the three larger chests for youths very excellent tools are put in. The No. 11 has 14 tools, including a brace, two bits, saw, hammer, hatchet, gimlet, try square, rule, screw driver, nail set, chisel, brad awl, together with pencil, sandpaper, nails and screws. No. 12 has 18 tools; No. 13, 21 tools; No. 14, 25 tools; No. 15, 30 tools; No. 16, 24 tools; No. 17, 30 tools; No. 18, 36 tools, and No. 19, 39 tools. The latter chest has two sliding trays and a drawer at the bottom; the tools are referred to as fine and every one warranted, this outfit being offered for a gentleman's chest and manual training use.

New Foot or Power Band Saw.

In this progressive age of machinery it might appear to some that foot power devices would gradually become unpopular, and doubtless to those who have always been accustomed to using power machinery the advantages of machines driven by foot power would not be readily apparent. To the thousands of mechanics who are doing their work by hand, however, and who are seeking devices for expediting their labors, the foot power band saw shown in Fig. 9 is likely to prove of more than ordinary interest. An inspection of the engraving will show that two treadles are provided, one for each foot, the idea being that the operator sit on a high stool while sawing. One of the treadles being on the down stroke all the time, the machine does not have to carry itself by its own momentum on the up stroke of the pedal, the result being a powerful and even motion. A handle is provided on the rear wheel for a second man to help turn in heavy work. The same machine can be arranged for belt power, or for combination foot and belt power. Although a small and comparatively low priced machine, the frame is cast hollow, making it extremely rigid and strong. The manufacturers make a specialty of small and medium size band saw machines, for both belt and foot power and have just issued a neat pamphlet describing five sizes of their band saws, together with other devices of interest in this connection. A copy of this pamphlet as well as further particulars regarding the machines can be obtained by addressing the Crescent Machine Company, 1 Front street, Leetonia, Ohio.



Novelties.—Fig. 9.—New Foot or Power Band Saw.

S. A. BISHOP, architect and superintendent, whose address for some time past has been Buffalo, has recently located his architectural office at 62 Main street, Batavia, N. Y., where he would like to receive catalogues, samples, &c., from the trade.

TRADE NOTES.

WE have been favored by the McCray Refrigerator & Cold Storage Company of Kendallville, Ind., with a copy of their No. 50 catalogue, which is devoted to some new designs of larger work than that referred to in our issue for last month. The goods shown in the catalogue under review embrace coolers adapted for grocers' and butchers' use, the styles varying for different requirements. Among the designs which may be mentioned as specially adapted for grocers' use are coolers or refrigerators having roll tops and divided into a number of sections, so that both butter and cheese may be kept in them; showcase refrigerators, both large and small, and refrigerators intended for the use of hotels, large families, restaurants, club houses and public institutions. The catalogue consists of 32 pages profusely illustrated and is bound in colored paper covers with side title in old gold.

"LEARN to Draw as an Accomplishment or for Self Support" is the title of a little 8-page folder which is being sent out by the International Correspondence Schools at Scranton, Pa. As a knowledge of ornamental drawing is one of the requisites for all trades and professions, what the little pamphlet has to say will be of interest to very many of our readers. Special reference is made to the requirements in this respect of architects, carpenters, masons, builders' clerks, wood turners, carvers, interior decorators, designers &c., as well as to the short course in ornamental drawing which the schools offer. There is also given a description of the drawing outfit sold in connection therewith.

W. F. & JOHN BARNES COMPANY of Rockford, Ill., describe their wood and metal working machinery in an attractive catalogue which they have issued for distribution among those interested in goods of this nature. In the line of wood working machinery which they are prepared to furnish may be noted circular saws of several sizes, band saws, forming machines, mortising and tenoning machines, scroll saws, lathes, &c. It is pointed out that during the past ten years great attention has been paid to improvements for driving light machinery, steam, water, gas, kerosene and electricity having all been utilized, but in the face of this there has been a large and constantly increasing demand for the foot power machinery made by this company. This fact in itself is one of the strongest arguments to show that these machines possess the advantages claimed for them by the manufacturers.

WE are indebted to E. S. Miragoli & Co., Ninth street and Cass avenue, St. Louis, Mo., for a copy of a catalogue which they have issued showing a variety of designs of plastic relief ornaments, which are intended for general relief decorations. The material used in the manufacture of these goods is prepared paper pulp molded and pressed in relief, thus making a light but tough and strong substance for ornamental decoration. It is said to be susceptible of any treatment at the hands of the decorators in distemper, oil, burnishing, in metallic effects or imitations of woods. It has a hard smooth surface and does not curl or blister, and the company state that it is not in the least affected by climatic changes. The material is especially adapted for use in private dwellings as well as for public buildings, churches, theaters, &c. The company state that they manufacture and keep in stock moldings and friezes from 2 to 30 inches wide, together with cove effects, ceilings and wall patterns, corners, centerpieces, &c., as well as a variety of patterns for using where ornamental work in relief is wanted. The designs shown are varied in character, the illustrations being well executed engravings which clearly indicate the details of the designs. In connection with the latter suggestions are offered on the mechanical work necessary for applying the plastic relief to the walls and ceilings, and there are also some remarks about the ceiling designs, which are sent complete and ready for immediate use, with full directions for putting in place.

THE EMPIRE FORGE COMPANY, Lansingburgh, N. Y., are offering the trade some boring tools which are especially adapted for making the mortises for sash pulleys. They are known as the Quad and the Quint, and are of such a character as to do the work with celerity and entire satisfaction. Those who are interested can secure circulars relating to these tools by addressing the company.

TOWER & LYON of Chambers street, New York City, are now manufacturing the Perfection rule gauge, which is the invention of Frederick Reissmann of West Point, N. Y. The gauge is of such a nature that it answers for a try square, sliding tee bevel, surface or depth gauge, bevel protractor, &c. It is of special interest to carpenters, builders, cabinet makers, draftsmen, sash and door men, picture frame makers, &c.

WE are indebted to J. A. Fay & Co., 572 West Front street, Cincinnati, Ohio, for a large poster which they have just issued calling attention to some of their leading lines of high grade wood working machinery. The poster measures about 25 x 30 inches, is printed in two columns on white paper and shows over 100 of the company's new machines for working wood. The company have had a special corps of expert mechanics and draftsmen at work the past two years, whose only duties have been to design improvements in existing machines and evolve new ones, and the company are therefore putting out many new constructions this season. We understand that those who desire a copy of this illustrated poster can secure one by addressing the company and mentioning *Carpentry and Building* as the place where they saw reference to it.

THE MURDOCK PARLOR GRATE COMPANY of 156 Boylston street, Boston, Mass., are introducing to the trade a composite laundry tub made in one, two and three compartment sizes, also a line of kitchen and pantry sinks. They are made of a composition of marble and Portland cement, without joints, obviating the possibility of leaking, and giving an article that is claimed to be practically indestructible and also impervious to water. These tubs will not become soaked with soapy water and cannot become offensive after use. The bottom is made with a pitch to the outlet, giving a quick flushing outflow, and the corners being made round cannot accumulate dirt. Another important feature is the overflow, which prevents damage when the water is carelessly left running. The material is hard and not affected by wringer screws.

THE rapid approach of the time when active building operations will be commenced renders of special interest the announcement made in another part of this issue by the L. S. Starrett Company, Box 65, Athol, Mass. This concern manufacture an extensive line of tools specially adapted for carpenters' and builders' use, including squares, steel rules, bevels, nail sets, dividers, levels, &c. The company have issued an attractive catalogue of 112 pages showing the various lines of goods which they manufacture, and copies can be obtained free of charge on application to the address given.

THE RAYMOND LEAD COMPANY, Lake and Clinton streets, Chicago, Ill., report a very gratifying increase in the demand from architects and builders for their compressed lead sash weights, which have established for themselves a wide popularity. These weights are made with wrought and malleable iron fastenings, being constructed under hydraulic pressure, thus securing great solidity and density of metal as well as a smoothness of finish, which, it is stated, is not found in ordinary cast lead weights. A wrought iron rod is run through the center, to which the malleable iron fittings are securely attached. These weights are said to be twice as heavy as iron, consequently saving one-half the space, which in many cases is an important consideration. The manufacturers state that each weight is "center balanced," thus making it hang perfectly true and plumb and obviating all friction and noise. The weights are so made that two or more may be linked together in case of necessity, this form proving very convenient for placing in and removing from pockets with small openings, as well as rendering them very convenient for handling and shipping. The company manufacture a great variety of sizes, ranging in weight per lineal foot for the round variety from 3½ pounds to practically 62 pounds, while the square form of weight ranges from 5 pounds to a little over 69 pounds. Special sizes and shapes are made to order on short notice.

AMONG the many attractive calendars which have been issued for the 12 months of 1899 that recently sent out by N. W. Ayer & Son of Philadelphia, Pa., is likely to attract more than passing attention. It is intended for hanging upon the wall, and the figures are of such a size that they can be readily seen at a considerable distance. The calendar is of the poster type, the leaves having the several months occupying fully two-thirds of the space. The remaining one-third is devoted to an attractive panel running across the poster at the top and carrying in colored letters a *fac-simile* of the firm's signature with an indication of the lines of advertising in which they are engaged. A very desirable feature is a counting house calendar for 1899 and the first six months of 1900. We understand that the edition is limited, but while they last a copy can be obtained, post paid, by sending 25 cents to the publishers.

THE NEW JERSEY ZINC COMPANY, 52 Wall street, New York City, present an announcement in another part of this issue which is likely to interest builders, house owners and others making use of paint. It starts out with the intimation that experience has demonstrated the fact that "zinc white in the finishing coat adds greatly to the durability of the paint," and then the company state that further investigation will convince the reader that combination paints based on zinc white and containing only pure linseed oil cost less, look better and last longer than any "straight" paint. In fact, they say zinc white and pure linseed oil are the essentials of good paint, whether for priming or for finishing. The company have issued a pamphlet entitled "The Paint Question," which they will send free to any one sufficiently interested to make application.

— Unless All Signs Fail.—"The expressman has just called at the Twickenhams' next door and left a football, a wheel, two baseball bats, a package of sweaters, a pair of spoon oars and a bundle of golf sticks."

"Then their daughter must be home from college and her education finished."—*Life.*

— Seeing the Fine Points.—The dexterity of a modern virtuoso's fingers made a deep impression on an old farmer who was among the audience at a "piano recital." Clapping both hands suddenly down upon his knees, he was heard to exclaim: "I'd give a hundred dollars to have that man pick peas for me."—*Life.*

Carpentry and Building

WITH WHICH IS INCORPORATED

The Builders' Exchange

VOL. XXI. No. 4 NEW YORK, APRIL 1899. Ten Cents a Copy. One Dollar a Year

Classified List of Advertisers.

Alphabetical Index to Advertisers.

CARPENTRY AND BUILDING

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THE BUILDERS' EXCHANGE.

DAVID WILLIAMS COMPANY, - PUBLISHERS AND PROPRIETORS.

232-238 WILLIAM STREET, NEW YORK.

APRIL, 1899.

The Building Outlook.

The reports which have reached us from the leading centers of the country indicate the prevalence of a widespread feeling among architects, builders and dealers in building supplies that the coming season will be one of the most profitable for many years. A general hopefulness seems to exist that an unusual volume of business will be done throughout the country generally, and in certain localities sufficient work has already been planned to warrant a very satisfactory beginning. It is likely that a large amount of private capital will be invested in building operations, which, in combination with the vast sums appropriated for public buildings, will reach an enormous aggregate. The United States Senate Committee on Public Buildings and Grounds recently made favorable reports on public building bills providing, among other things, to increase the limit of cost of the building at Omaha to $1,800,000, as well as for the erection of new buildings at Elgin, Ill.; Eau Claire, Wis.; Annapolis, Md.; Elmira, N. Y.; Newport, Vt.; Columbus, Ga.; Fitchburg, Mass.; Joliet, Ill.; Elizabeth City, N. C., and Lawrence, Mass., aggregating a cost of very nearly another million dollars. The carrying out of these provisions will give employment to a large number of men in all branches of the building trades and will aid materially in stimulating the general prosperity in those sections. It is gratifying to note that at the time of writing no strikes or lockouts of any great significance are threatened, and there appears to be little reason to expect any serious complications with workmen in the building trades at the opening of the season. The effect of the steady extension of arbitration and joint action on questions of common concern by employers and workmen seems to be daily manifesting itself in more harmonious relations between capital and labor.

Local Building Operations in 1898.

While directing attention to these very gratifying indications of improving conditions, it may not be wholly without interest to briefly refer to the extent of building operations conducted in the city of New York during the year just closed. The statistics for this period show a larger number of buildings projected than was the case in 1897, but the estimated cost is less by nearly eleven millions of dollars, these changes being due largely to the increased number of structures erected for dwelling purposes, combined with the enormous shrinkage of capital invested in office buildings. The records indicate that of the 3624 buildings for which plans were filed last year with the department, 1874 of them were flats and tenements, estimated to cost $45,607,050, as against 1597 buildings in 1897, involving an estimated expenditure of $35,536,800. In the case of private dwellings there were 1069 projected during the 12 months ending December 31 last, costing $8,925,750, as compared with 1327 structures, costing $10,084,220, the year previous. The greatest change in the year's figures is found in connection with structures classified under the heads of office buildings, hotels, stores, churches, &c. In 1898 plans were filed for 163 such, estimated to cost $15,287,520, while in the year previous the number projected was 250, involving an outlay of $35,826,485. In the case of what may be termed miscellaneous buildings, stables, shops, &c., there was comparatively little change as regards the amount of money invested, the figures being 518 buildings, estimated to cost $2,973,711, last year, as against 342, costing $2,221,335, in 1897. It is interesting to note the increase in the better class of flats and apartment houses as indicated by the figures under review. For example, on the west side of the city above Fifty-ninth street the estimated cost of the new buildings of this character is placed at $12,051,500, as against $8,132,000 in 1897, yet the number of these buildings projected was practically the same in both years. Some idea of the rapidity with which that section of the city lying above the Harlem River and known as the Borough of Bronx is being supplied with buildings intended for dwelling purposes may be gathered from the statement that last year there were 770 flats and tenements projected, estimated to cost $10,323,650, as compared with 586, costing $7,382,800, during the 12 months of the previous year. In the city of Brooklyn the statistics for last year show very little change from 1897, there having been 3844 buildings projected, costing $15,665,888, while in 1897 there were 3655, costing $15,800,361. Of the former 1439 were brick and 2405 were frame structures, while in 1897 there were 1684 brick and 1971 frame buildings erected.

Exhibition of Arts and Crafts.

The growing interest which has in recent years been manifested in this country in the application of artistic principles to industrial and ornamental products is likely to be well demonstrated at the coming exhibition of the Society of Arts and Crafts, to be held in the city of Boston from April 4 to 20, inclusive. It is the hope of the management that this exhibition will in no small degree mark a turning point in the attention which has been given to the industrial arts in that center and its environs. In the selection of objects for the exhibition particular attention will be given to the relation between the form of an object and its use, as well as to the harmony and fitness of the decoration put upon it. Another important feature is the rule by which recognition is to be given to the individual designer or craftsman, or both. We understand that no exhibits will be considered when sent under a firm name, unless the name of the individual designer or craftsman is also given, the obvious purpose of this being to accord recognition to those employed in the industrial arts. Those having the exhibition in charge include many of the best known Bostonians interested in the fine and applied arts, together with a large constituency of craftsmen. Some of the different departments in which the exhibition will be arranged are Metal Work, Cabinet Work, Modeling and Carving, Pottery and Glassware, Stained Glass and Decoration, Printing, Bookbinding, Engraving and Artistic Photography, Embroidery and Leather Work, Designs for Carpets, Wall Papers, &c. A circular has been issued by the Society giving the rules governing the exhibition and general plans for the year, copies of which can be obtained from Secretary Henry L. Johnson of 185 Franklin street, Boston, Mass., to whom application should also be made for general information relating to the exhibition.

A New Office Building.

Operations are soon to be commenced upon an office building which will tower 18 stories above the street level, and which will be located on Broadway, New York City, only a short block from the scene of the conflagration of December 4 last, when the modern fire proof office building or skyscraper, as it is often called, was subjected to one of the most severe tests it has probably ever experienced. The new office building will have a frontage of 52 feet on Broadway and extend along Chambers street for a distance of 96 feet. It will be of fire proof steel skeleton frame construction, and will cost in the neighborhood of $700,000. The first three stories of the facade will be of Bedford stone, and the upper 15 stories of gray brick, trimmed with terra cotta. The plans for the building are in the hands of Architect Cass Gilbert of Boston, and the contracts for the erection of the structure have been awarded to the George A. Fuller Company of this city. The building is to be completed within a year, and it is expected that the work of tearing down the old buildings now occupying the site will be commenced the first of May.

Exposition of Electrical Appliances.

At a meeting held in Brussels a short time ago by the Belgian Society of Electricians it was decided to open next May, in the new Post and Telegraph Office, Place de la Monnaie, Brussels, an exposition of all kinds of electrical devices applicable for domestic use. The society aims to make this a complete exhibition of the various uses to which electricity may be applied in the household. Besides illuminating appliances there will be included small motors for operating dumb waiters, cleaning and polishing shoes, running sewing machines, operating sad irons, &c.; also electric heaters and cook stoves, bathroom appliances, electric cooking utensils, domestic telephones—in fact, all appliances operated by electricity in the realm of domestic economy. Foreign manufacturers are invited to co operate, and all information regarding the exposition can be obtained from M. Emile Cosset, president of the Belgian Society of Electricians, 26 Rue St. Jean, Brussels, Belgium.

Convention of Brick Manufacturers.

The thirteenth annual convention of the National Brick Manufacturers' Association was held, according to previous announcement, in Columbus, Ohio, during the first week of February. A large representation was present, and a number of very interesting papers dealing with matters pertaining to the brick making industry were presented and discussed. A paper, entitled "Commercial Side of the Brick Question," by T. P. Plumridge of St. Louis, Mo., brought out many expressions of opinion regarding the standard size of brick, the discussion resulting in the adoption of resolutions emphasizing the position taken by the association some years ago in regard to the desirability of a uniform size of pressed and common brick. The size adopted for common brick was 8¼ x 4 x 2¼ inches, and for pressed brick, 8⅜ x 4 x 2⅜ inches. The association also adopted, as a standard size of Roman brick, 12 x 4 x 1½ inches, and for a Norman brick, 12 x 4 x 2⅜ inches. In a rather brief paper William Morrell of Gardiner, Maine, told what he knew about brick making, following which were papers on "A New Method of Testing Paving Brick," by Gomer Jones, City Engineer, Geneva, N. Y.; "The Evolution of Paving Brick," by H. A. Wheeler; "Brick Making as a Profession," by J. F. Smith, Omaha, Neb., and "The Utility of Clay as a Roofing Material," by Charles T. Harris of Alfred, N. Y. This paper was of unusual interest, and it is possible that in the near future we may present some extracts from it. "A Plea for Uniform Terra Cotta Specifications" was the subject of a paper by V. H. Kreigshaber of Atlanta, Ga., while "Modern Methods of Drying Brick" were discussed in a paper by James W. Tester, Montreal, Canada.

An interesting feature of the convention was the exchange of greetings between the brick manufacturers and the National Association of Builders, who were in convention at the same time in Milwaukee, Wis.

The new officers elected for the ensuing year were W. D. Richardson of Shawnee, Ohio, as president; F. B. McAvoy of Philadelphia, Pa., as first vice-president; W. H. Hoagland of Cayuga, Ind., as second vice-president; W. G. Titcomb of Providence, R. I., as third vice-president; T. A. Randall of Indianapolis, Ind., as secretary, and J. W. Sibley of Coaldale, Ala., as treasurer.

One of the events of the week was the reorganization of the Ohio Brick, Tile and Drainage Association, the following officers being elected: President, J. W. Everall; vice-president, W. C. Wilson; secretary, E. F. Darnell, and treasurer, W. B. McClure.

Straightening a Steeple.

A curious form of construction was found in connection with a church in Newmarket, Ireland, when an attempt was made to straighten the steeple, which had become decidedly crooked. The men who attempted to take down the steeple found that it could not be done except in one piece, as the stones of which it was built were hermetically bound to each other with a combination of molten lead and sand which rendered it absolutely impossible to separate one stone from another, the whole spire being, as it were, one solid block.

On further and closer inspection it was found that the entire building was erected in a similar manner, no other mortar or binding substance of any kind being used save the sand and molten lead.

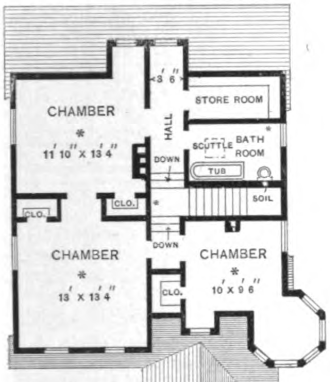
This form of construction was, it appears, much practiced in Ireland a century ago. A huge iron shaft runs through the top portion of the spire, on which the stones were slipped like rings and irrevocably fastened with lead and sand. Under the circumstances the idea of taking down the tower had to be abandoned, but it speaks well for the ingenuity and skill of the men having the contract to straighten the crooked spire to say that, by methods known best to themselves, they succeeded in pulling and fixing the steeple in its original perpendicular position.

GOVERNOR ROOSEVELT has appointed as State Architect George L. Heins of the firm of Heins & La Farge of New York City, well known in connection with the Cathedral of St. John the Divine now in course of erection on Morningside Heights.

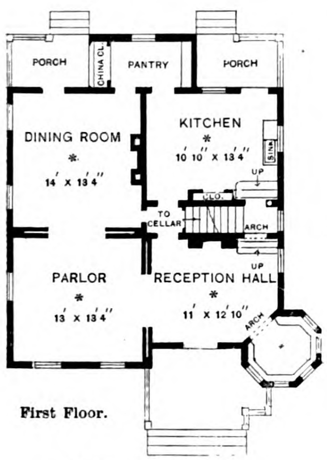
THE proceedings of the thirty-second annual convention of the American Institute of Architects, which was held at the Arlington Hotel, Washington, D. C., in November last, have just been published by the Board of Directors under the direction of the Committee on Publication and Library. The matter makes 162 pages of the size which has characterized previous publications of the institute, the editing of the work having been in the hands of Alfred Stone, who, up to the last meeting, was for many years secretary of the institute. In addition to the proceedings are given the names of officers and committees; a list of the professional members—fellows and associates; a list of chapters comprising the institute and obituaries of members who have recently died. The volume is complete in its way and constitutes a valuable addition to the architectural literature of the day.

FRAME COTTAGE AT PEKIN, ILL.

WE present herewith the floor plans, elevations and some of the details of construction of a two-story frame cottage erected not long since at Pekin, Ill., for John Rust. The general appearance of the completed structure is shown in the half-tone engraving which forms our supplemental plate, while the interior arrangement is indicated by the floor plans. It will be seen that on the first floor there is a large reception hall, from which the other apartments may be readily reached and from which also rise the main stairs. At the left as one enters is the parlor and beyond it the dining room, the two being separated by sliding doors. The kitchen is at the right of the dining room, communication between the two being established by means of a commodious pantry fitted with closet, shelving, &c. An interesting feature is the combination stairs which are reached directly from the hall and also from the kitchen, the first landing serving for both. Another noticeable feature is the tower at the corner, which serves as a cozy nook on the first floor and gives a good outlook from the chamber on the floor above. On the second floor are three sleeping rooms, bathroom and a good sized storeroom.



Second Floor.



First Floor.

Scale, 1-16 Inch to the Foot.

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

Cottage at Pekin, Ill —Herbert C. Chivers, Architect, St. Louis, Mo.

From the architect's specifications we learn that the house is built in a very substantial manner, with cellar 7 feet in the clear and 9-inch walls of brick. The walls above grade are of selected material and laid in red cement mortar. The tower has a substantial foundation to the grade line, above which to the window sills of the first story the frame is covered with sheet metal in imitation of rock face. The basement is divided into four spaces by means of wood partitions. The sills and the first and second floor joist are 2 x 10 inches, placed 16 inches on centers. The entire outside walls of the house are covered with pine flooring, on which is laid rosin sized building paper. For the first story the covering is 4-inch siding, and for the second story 6-inch pine dimension shingles. The roof is covered with 1 x 6 inch fencing and white cedar shingles.

The interior is finished in yellow pine left natural. The house is painted a green tint with white trimmings, the design having been selected as well adapted for an elevated suburban site. The heating is by means of hot air, and the plumbing includes closet, tub and fixtures complete. The house cost, ready for occupancy, $1700, this price covering mantels, plumbing, cistern, &c.

The cottage here shown was designed by Herbert C. Chivers, architect, Wainwright Building, St. Louis, Mo., the builder being H. E. Rust of Pekin, Ill.

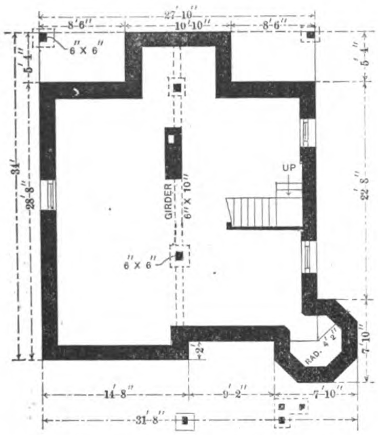
Furnace Heating in the South.

It is only within the past few years that furnace heating in the South has become recognized as a prominent factor during the winter months in the warming of modern residences, churches, schools and public buildings. While for years, says a writer in a recent issue of *The Metal Worker*, the open fire place, grates and Baltimore heaters held sway for their cheerfulness, yet during the excessively cold spells, when the temperature often falls below the freezing point, much inconvenience is felt from the lack of sufficient heat to comfortably warm the apartments occupied, to say nothing of the constant care in supplying fuel to keep the fires glowing.

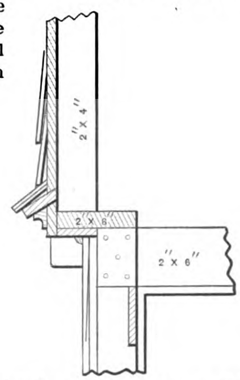
While it is a fact that the climatic conditions of the Cotton Belt States are most delightful during the winter months, yet the keen, crisp atmosphere at a freezing temperature is as piercing to the residents of the South as a zero temperature is to the residents of the Northern States. Inasmuch as many manufacturers and business men from the North are taking up their residence in the South, erecting modern homes for their families, naturally the question of heating attracts their attention to past experiences in the North, whereby furnaces have come into popular favor in the South by reason of the fact that with a central fire the warm air can be circulated throughout all of the rooms to be warmed, without the many objections raised against this system of heating in the severe climate of the North, where strong prevailing winds greatly interfere with the uniform circulation of warm air heating in large buildings or modern residences without the aid of fans or blowers.

While perhaps not as large furnaces nor so strong a fire is required in the South as in the North by reason of the milder climate, yet there is no time from October until April that some heat is not needed, and for this reason heating system rests the responsibility of maintaining a high standard of proficiency, not always obtained by his brother mechanics of the North, where in many sections furnace heating has greatly suffered at the hands of inexperienced workmen and excessive competition, to the extent that oftentimes too small furnaces, pipes and registers are used without an adequate supply of fresh air, which has enabled steam and hot water heating to penetrate a field once largely controlled by furnacemen.

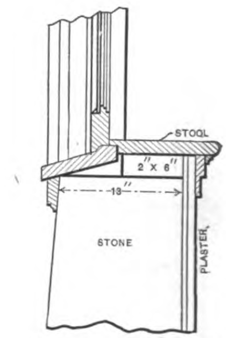
Then, again, the question of fuel is an important con-



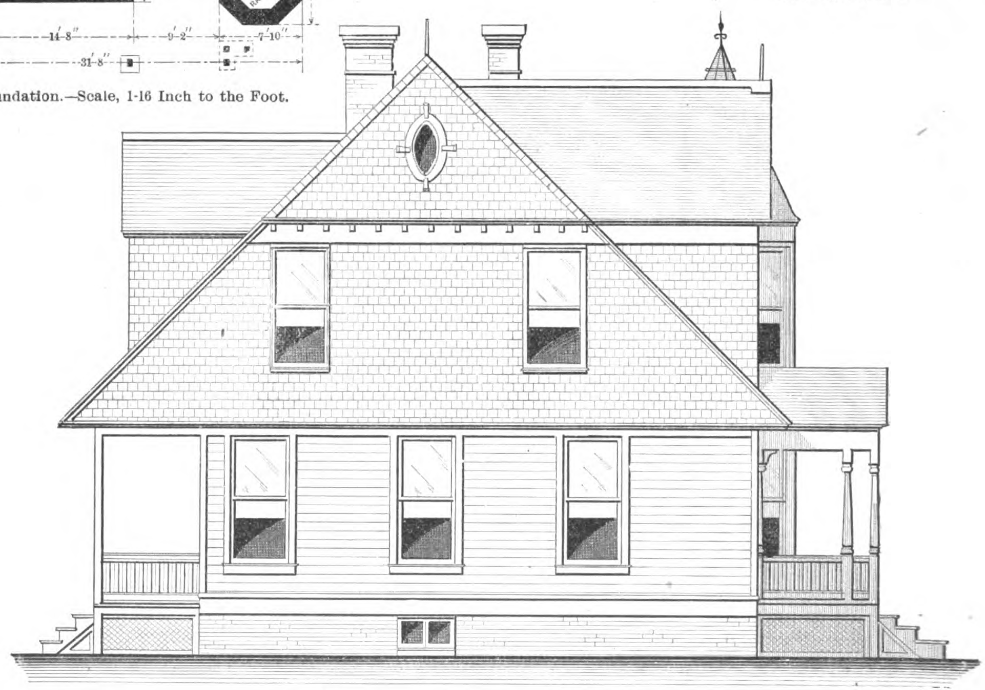
Foundation.—Scale, 1-16 Inch to the Foot.



Detail of Dentil Cornice in Side Gable.—Scale, ¾ Inch to the Foot.



Section through First Story Window Sill and Stool in Tower.—Scale, 1¾ Inch to the Foot.



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

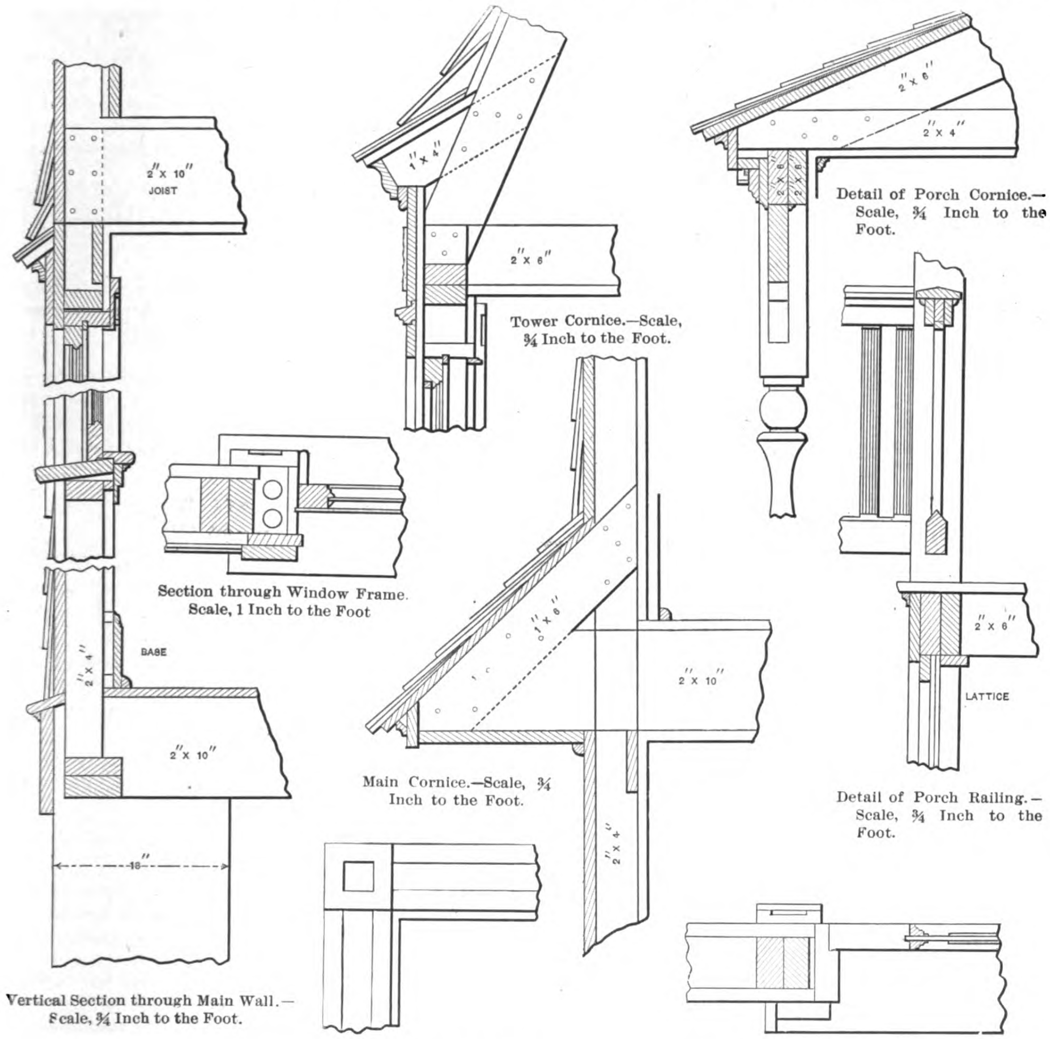
Cottage at Pekin, Ill.—Miscellaneous Details, Foundation Plan and Side Elevation.

none of the most approved methods in furnace heating should be neglected—viz.: Furnaces of sufficient heating capacity to avoid superheated or red hot surfaces, hot air pipes and registers sufficiently large to carry a large volume of moderately heated air, and particularly an ample supply of fresh air to insure a free circulation of pure warm air throughout the rooms to be heated. While furnace heating in the South has many decided advantages over steam and hot water, except perhaps in the larger office buildings and hotels where power plants are in use, nevertheless upon the skill of the superintendent or mechanic who is intrusted with the placing of the sideration, inasmuch as the principal fuel of the South is semi-bituminous coal, while much gas coke is used in the larger cities. Where soft coal is principally used, great care should be exercised in selecting a furnace specially adapted to burning soft coal, as many of the hard coal furnaces of the North would be absolute failures in the use of soft coal in the South.

INFORMATION about ourselves that we pick up abroad is at times very interesting, especially in some of the English papers. One of the latest instances of the kind is an item in an English technical journal relating to heating in America. It points out that in Colonial days the wood fire was the scource of heat, followed by stoves using anthracite coal, the closing sentence stating that "in all modern houses nowadays the hot water system has been adopted." Hot air furnaces and steam heaters are completely ignored.

Slate for Roofing.

Slate, says a well-known writer, should always be laid with a certain lap—that is, each course should cover the next but one below it to a certain extent, just the same as shingling, and the amount of surface covered should not be less than 2 inches on the length of the third slate. Thus, there will be a certain width of slate exposed to the weather, this width growing less as the lap of the slate increases. The weathering or gauge for any kind of slating is found by deducting the lap from the length of the slate and then halving the remainder, thus: In the case of counters the slate being laid with a 3-inch lap, the weathering will then be $\frac{20 - 3}{2} = 8\frac{1}{2}$ inches, the counters being 20 inches long. Each course of slate "breaks joint" with the one below it. The average weight of ordinary slating may be taken at 700 pounds per square of 100 superficial feet. The valleys of slated roofs are generally laid with lead, as this metal is superior to tin or galvanized iron for the purpose, the lead being turned up the roof on each side of the valley sufficient to drain away all water. Hip rafters are often covered with sheet lead, which is the best method, or finished with thick, saddle back slates finished on top with some sort of an ornamental roll, which is cut to fit over the angle. Slate does not absorb water, and as it is hard and close grained and smooth on the surface it can be laid safely at as low a pitch as 22½ degrees, and its lasting qualities are very great; and, everything taken into consideration, it is a very much cheaper roofing material than shingles in the end. One fault of slate is that it will not resist a very great heat, and is often dangerous on that account, as a fire in an adjacent building may be so hot as to start slates breaking and falling on the heads of onlookers, even if the buildings are 30 or 40 feet apart. With the exception of tiles, slates make the prettiest of roofs, if the pitch is not too low, but it seems to be one of the faults of our designers to make their slate roofs much too low in the pitch, owing, no doubt, to reasons of economy. To look well a slate roof should never have less than one-third pitch, and as much more as circumstances will permit.



Tower Cornice.—Scale, ¾ Inch to the Foot.

Detail of Porch Cornice.—Scale, ¾ Inch to the Foot.

Section through Window Frame. Scale, 1 Inch to the Foot

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

Detail of Porch Railing.—Scale, ¾ Inch to the Foot.

Vertical Section through Main Wall.—Scale, ¾ Inch to the Foot.

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

Detail of Front Door and Frame.—Scale, 1 Inch to the Foot.

Miscellaneous Constructive Details of Cottage at Pekin, Ill.

Determining the Strength of Wooden Beams.—II.

BY F. E. KIDDER, CONSULTING ARCHITECT.

We have now covered all of the cases of loading for which a simple rule can be given. To find the size of a beam to support several loads applied at different places, without determining the bending moment, the beam should be considered as made up of as many thicknesses as there are loads, and the thickness necessary to support each load calculated, using the same depth for each thickness; the sum of the thicknesses will be the breadth of the beam.

Example A.

To find the size of beam necessary to safely support the loads shown in Fig. 5, the wood being Oregon pine.

Answer.—It will be necessary to consider this as three beams, placed side by side, and each loaded as in Fig. 3. We will assume 12 inches for the depth of the beam. Then by Rule 7 the thickness required to support the load A will equal $(4 \times 2500 \times 4 \times 12) \div (A \times 144 \times 16) = 480{,}000 \div 207{,}360 = 2.31$ inches.

Thickness for load $B = (4 \times 3000 \times 7 \times 9) \div (90 \times 144 \times 16) = 756{,}000 \div 207{,}360 = 3.64$ inches.

Thickness for load $C = (4 \times 2500 \times 10 \times 6) \div (90 \times 144 \times 16) = 600{,}000 \div 207{,}360 = 2.89$ inches.

Total breadth of beam $= 2.31 + 3.64 + 2.89 = 8.84$ inches, or it will require a 9 x 12 inch beam to support the three loads.

Example B.

The girder shown in Fig. 6 supports a partition over its entire length and heavy floor beams, placed at equal distances of 4 feet from the supports and from each other. The partition supports a flat roof; its own weight and the weight of the roof supported by it is 16,000 pounds. The weight coming on the girder from each of the beams is 6000 pounds. The wood is long leaf Georgia pine. What should be the size of the beam?

Answer.—As the girder is symmetrically loaded, its size can be determined by two operations. The load at the center is equivalent to a distributed load of 12,000 pounds.* We have then to determine the size of beam to support a distributed load of 28,000 pounds, and the size of beam to support loads of 6000 pounds 4 feet from each support. The first should be determined by Rule 3** and the latter by Rule 9. We will assume 14 inches for the depth of the beam. The thickness of beam required to support a distributed load of 28,000 pounds is, by Rule 3, equal to $28{,}000 \times 16$ divided by $2 \times 14 \times 14 \times 100 = 448{,}000 \div 39{,}200 = 11\frac{1}{2}$ inches.

The thickness required for the loads at A and C is, by Rule 9, equal to $4 \times 6000 \times 4 \div 14 \times 14 \times 100 = 5$ inches. The thickness required for all of the loads will be $11\frac{1}{2} + 5 = 16\frac{1}{2}$ inches, or the beam must be $16\frac{1}{2}$ x 14 inches. If it were practicable to obtain a beam 15 or 16 inches deep, it would be better to use the deeper beam. Thus if we had assumed 15 inches for the depth of our beam we would have obtained 10 inches for the thickness required for the distributed and center loads and $4\frac{1}{4}$ inches for the loads at A and C, or $14\frac{1}{4}$ inches for all of the loads.

When it is necessary to support as great loads as in the above example by wooden beams, it may be necessary to make the breadth greater than the depth, and in such a case the beam may be built up of two or more pieces of the same depth, placed side by side and bolted together. There is no objection to building up girders in this way, and in fact such a girder is often better than one made of a solid stick; but wooden girders should not be built up by spiking or bolting two or more timbers *one on top of the other*, if it is possible to obtain planks of the full depth. Compound girders made by placing one timber above another may be built so as to obtain about three-fourths of the strength of a solid timber, but it requires a particular system of keying and bolting, which is expensive, and requires careful calculation.

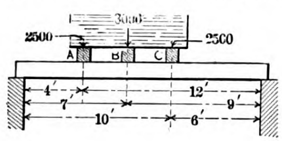


Fig. 5.—Beam Supported at Both Ends and Irregularly Loaded.

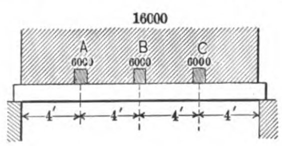


Fig. 6.—Girder Supporting Partition and Heavy Floor Beams.

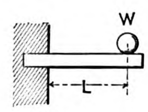


Fig. 7.—Cantilever Beam Supporting Load at its Outer End.

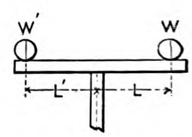


Fig. 8.—Another Form of Cantilever.

Determining the Strength of Wooden Beams.

Cantilever Beams.

*To determine the maximum safe load for a beam of known dimensions, loaded and supported as in Fig. 7 or Fig. 8.**

Rule 10.—To find safe load, W, multiply the breadth of the beam by the square of the depth, both in inches, and this product by the value of A, and divide by $4 \times L$, in feet.

Example.—What is the safe concentrated load for a spruce beam, 6 x 8 inches, fixed at one end, the point of application of the load being 6 feet from the support?

Answer.—Safe load equals $6 \times 8 \times 8 \times 70$ divided by $4 \times 6 = 26{,}880 \div 24 = 1120$ pounds.

The beam will have the same strength whether loaded and supported as in Fig. 7 or as in Fig. 8.

To determine the size of beam to support a given load applied at a fixed point from the support, as in Fig. 7 or Fig. 8.

Rule 11.—First assume the depth. To find the breadth, multiply four times the load, in pounds, by the distance L, in feet, and divide by the square of the depth multiplied by the value for A.

Example.—What size of spruce beam will be required to support a load of 1120 pounds, applied 6 feet from the support?

Answer.—Assume 8 inches for the depth of the beam. Then the breadth will be equal to $4 \times 1120 \times 6$ divided by $8 \times 8 \times 70 = 26{,}880 \div 4480 = 6$ inches.

Cantilever Beam with Distributed Load.

To determine the maximum safe distributed load for a cantilever beam of known dimensions.

Let W = the amount of the load, in pounds, and L the distance in feet that the load extends from the support, as in Fig. 9. If the beam is supported at the center, as in Fig. 10, W should equal the load on each side of the support.

Rule 12.—To find the safe load, W, multiply the breadth by the square of the depth and the product by the value for A, and divide by two times L (in feet).

To determine the size of beam required to support a

* See Rule 4.

** In all of these rules the breadth and depth of the beam are to be measured in inches and the span in feet, the final result being in pounds.

* For the beam in Fig. 7 the distance L should always be measured from the support to a line passing through the center of the load, and in the case of the beam in Fig. 8 the product of W and L must equal the product of W' and L', or if W equals W' then L must equal L'.

*known load, uniformly distributed on the beam, as in Figs. 9 and 10.**

Rule 13.—Assume the depth. To find the breadth, multiply twice the load by the distance L (in feet), and divide by the square of the depth multiplied by the value for A.

Strength of Cylindrical Beams

Rule 14.—To find the safe load for a cylindrical beam, as a log, first find the strength of a square beam (loaded in the same way) whose sides are equal to the diameter of the round beam, and divide the answer by 1.7. If the beam tapers slightly, as in the case of the trunk of a tree, measure the diameter at the center of the span.

Example.—What is the safe center load for a spruce pole 12 inches in diameter at the center and with a span of 16 feet?

Answer.—By Rule 2 we find that the strength of a spruce beam, 12 inches square and 16 feet span, equals $12 \times 12 \times 12 \times 70$ divided by $16 = 7560$ pounds. Dividing this by 1.7 we have 4447 pounds for the answer.

To determine the diameter of a cylindrical beam to support a given load at the center.

Rule 15.—Multiply the span by the load and the product by 1.7 and divide by the value of A. The cube root of the result will be the answer.

Example.—Find the diameter of a round spruce pole of 16 feet span to support a center load of 4447 pounds.

Answer.—$4447 \times 16 \times 1.7 = 120{,}958.4$. Dividing this by 70, the value of A, we have 1728. The cube root of 1728 is 12, the required diameter of the pole.

If the load is distributed, divide it by 2 and then proceed by the above rule.

Stiffness of Beams.

When the span of a floor or ceiling joist measured in feet exceeds the depth of the joist in inches, the beam or joist, if loaded to its full safe load, will bend more than is desirable, and often enough to crack a plastered ceiling supported by it. For this reason the size of floor joists that support plastered ceilings should be calculated by the rule for stiffness. This rule is based upon the principle of the deflection of beams, and involves a quantity known as the modulus of elasticity, which varies for different woods, and is determined by experiments upon the flexure or bending of beams under known loads. Simple rules for the stiffness of beams can only be given for the two cases of beams uniformly loaded over the entire span and of beams loaded with a concentrated load applied at the center of the span. The rules for these cases are as follows:

To determine the maximum uniformly distributed load for a rectangular beam supported at both ends that will not produce a deflection exceeding $\frac{1}{30}$ inch per foot of span.

Rule 16.—Multiply eight times the breadth by the cube of the depth, and the product by the value for E (Table II), and divide by five times the square of the span.

To determine the maximum center load for a rectangular beam supported at both ends that will not produce undue deflection

Rule 17.—Multiply the breadth by the cube of the depth, and the product by the value for E, and divide by the square of the span.

To determine the size of beam to support a given distributed load without producing undue deflection, the beam being supported at both ends.

Rule 18.—Assume the depth. Multiply five times the load by the square of the span, and divide by eight times the cube of depth times E. The answer will be the breadth in inches.

To determine the size of beam to support a given center load without producing undue deflection, the beam being supported at both ends.

Rule 19.—Assume the depth. Multiply the load by the square of the span, and divide by the cube of the depth multiplied by E. The answer will be the breadth in inches.

Table II — Value of E, *to be Used in Rules* 16 19.

Kind of wood.	E, in pounds	Kind of wood.	E, in pounds.
Chestnut	72	Pine, Texas yellow	120
Hemlock	80	Pine, common white	82
Oak, white	95	Redwood	60
Pine, Georgia yellow	137	Spruce	100
Pine, Norway	100	Whitewood (poplar)	95
Pine, Oregon	110		

Example I.—What is the maximum distributed load that a 2 x 12 inch spruce beam, 16 feet span, will support without undue deflection?

Answer.—Apply Rule 16. Eight times the breadth times the cube of the depth times $E = 8 \times 2 \times 1728 \times 100 = 2{,}764{,}800$. This divided by five times the square of the span or $1280 = 2160$ pounds, the answer.

Example II.—A white pine floor joist of 18-foot span has to support a uniformly distributed load of 1440 pounds; what should be the size of the beam that the deflection may not be excessive?

Answer.—We will try 10 inches for the depth of the beam, and use Rule 18. Five times the load multiplied by the square of the span $= 5 \times 1440 \times 324 = 2{,}332{,}800$. Eight times the cube of the depth $\times E = 8 \times 1000 \times 82 = 656{,}000$, and $2{,}332{,}800 \div 656{,}000 = 3\frac{1}{2}$ inches, the breadth.

If we use 12 inches for the depth we will have $2{,}332{,}800 \div 1{,}133{,}568$, which gives 2 inches for the breadth, showing that a 2 x 12 joist of 18-foot span has the same stiffness as one $3\frac{1}{2}$ x 10 inches, although the latter beam contains nearly 50 per cent. more lumber than the former.

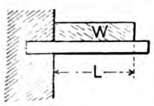


Fig. 9.—Load Extending from the Support.

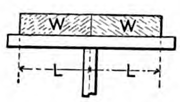


Fig. 10.—Beam Supported at the Center.

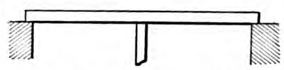


Fig. 11.—Continuous Girder of Two Spans.

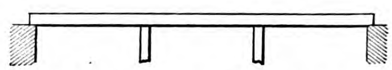


Fig. 12.—Continuous Beam of Three Equal Spans

Determining the Strength of Wooden Beams.

Continuous Beams.

A continuous beam is one which extends over three or more supports.

The formulæ for determining the strength and stiffness of such beams are too elaborate to be reduced into simple rules, but it is worth while to know how the strength and stiffness of such beams compare with the strength and stiffness of a single span.

The *strength* of a continuous girder of two spans, Fig. 11, is the same as if the girder were cut over the support, when the load is distributed over the full length of the beam, but when the load is applied at the center of each span the strength of the beam is increased $\frac{1}{3}$ (one-third) by making it continuous over the center support, provided that the spans are equal. If the spans are unequal the increase in the strength will be less.

The *stiffness* of a continuous beam of two equal spans is more than doubled by having the beam continuous over the center support, whether the load is distributed or concentrated.

In the case of a continuous beam of three equal spans, Fig. 12, the strength is increased $\frac{1}{4}$ (one-fourth) when the load is distributed, and $\frac{2}{3}$ (two-thirds) when

* The beam shown in Fig. 10 has the same strength as that shown in Fig. 9. provided that the distance L is equal in the two cases; *i. e.*, it makes no difference whether the cantilever end is supported by being fixed in a wall or by being balanced by an equal load on the other end of the beam.

equal loads are applied at center of each span, and the *stiffness* is increased about 90 per cent. in both cases. It is therefore desirable to make beams continuous whenever practicable.

When beams are made continuous over three or more supports the points of greatest strain are those which come over the center supports or support, hence the beam should not be cut into at those points.

Bearing of Beams on the Wall or Support.

The transverse strength of a beam is not affected by the distance that the end of the beam extends onto the support, but the bearing must be sufficient that the beam will not pull off from the support when it is loaded, or that the bottom fibers of the beam will not be crushed by the load. This latter consideration is one which should be considered in the case of short beams loaded to their full capacity. Every wooden beam should have a bearing area—that is, the product of the breadth of the beam by the bearing, Fig. 1—equal to the load divided by 1000 for hard pine or oak, 500 for spruce and 400 for soft pine.

Thus a 10 x 12 inch white pine beam, of 8-foot span, might be safely loaded with 21,600 pounds if the load were uniformly distributed. Then the beam should have a bearing area = 21,600 ÷ 400, or 54 square inches. As the breadth of the beam is 10 inches, the bearing should equal 54 ÷ 10, or 5.4 inches. For floor joists a bearing of 4 inches is usually ample, and for girders a bearing of 6 inches is usually sufficient; 4 inches, however, should be considered as the minimum bearing, unless the beams are securely tied in place.

SUGGESTIONS FOR STONE TURNING.

To turn hard stone and granite work requires special and expensive tools and steam power. Bath stone is very often required to be worked in a circular form, and sometimes very good and elaborate moldings are wanted. In articles such as small columns for portions of pulpits or fonts, or gallery fronts for church work, and for balustrades for bay windows or tops of houses, a great deal of labor is often expended in working, by hand, and principally with a rasp, small and delicate moldings. The result is never very satisfactory. Much time is spent with but little result. All these things can be turned in any common lathe, and with very little knowledge of turning. It does not require any great practice, as is the case in learning to turn wood.

The stone which lends itself most readily to the turner's art, says John Dormer, in one of our English exchanges, is either Corsham or Farleigh, both being varieties of what is known as Bath stone. Of these two kinds Farleigh is the softest and easiest turned, but is not suitable for either very large or very small moldings. If used in large pieces, such as, say, 2 feet diameter and 1 foot 6 inches thick, its weight is such that it needs very careful handling or it will get flushed. Flushed is a trade term used by masons, and simply means that a small piece will break out of the edge or off a corner if the weight is allowed to rest for only an instant on these parts.

If used for small work it cannot be turned very thin, or, being soft and brittle, it will break in two pieces. For moderate sized pieces and for inside work it is very suitable. By moderate sized pieces I mean anything from 9 inches high and 4 inches diameter up to 2 feet high and 9 inches or 12 inches diameter.

I have repeatedly seen stone balusters 1 foot 6 inches high and 6 inches diameter, with 12 moldings on them, put in the lathe (a treadle lathe) after being roughed out to an octagon form and finished complete in half an hour each. To work one of these by hand would take a good mason over three hours. An ordinary wood turner's lathe with a rough T rest and socket is all that is required.

Tools Required.

For tools, some old three-square files are required. The best thing to do with these is to soften them first by putting the ends into the fire until they are of a dull red color, then throwing them into the ashes to cool gradually. The reason for this is because the stone cuts the tools away very fast, and if they were hard it would mean that you would have to pay frequent visits to the grinding stone to sharpen them. By having them somewhat soft they cen be filed up in a minute or so without leaving the place at all. Simply lay them face down on the rest and file away the back. Having, say, three files softened, file one to a point like a V, another to a rounding edge like a gouge, and the other to a square edge. Many moldings can be worked with these three simple tools.

A chisel is also wanted, say an inch carpenter's chisel, such as every mason has with him in constant use. Also an old worn out plane iron for finishing the straight parts with. The stone by itself will not run in the lathe, as the material is not hard enough to hold the centers. To obviate this difficulay get two square nuts suitable for an ordinary ⅝-inch bolt and let one into each end of the stone in the center. It is necessary that these nuts fit the stone fairly well without shaking about. Then bore with a common drill a ½-inch hole about 1½ inches away from the nut on one end. Drive a plug of wood into this and turn a stout screw partly into the wood, leaving about an inch standing out. This is to meet the carrier on the lathe and to drive the stone around. Oil the other end before putting it in the lathe, and then put it in position and screw up moderately tight. Then begin the work by using the V-shaped tool first, and bring it down to a circular form all along and get your ends nearly to the size required when finished. Now set it out. This is done by having a piece of thin wood like a lath. A lath would do, but it is better for being planed. Lay this lath on your drawing and mark off each member by making a line where the quirks come for the beads, and where the edges come for the hollows. Square these lines across the lath; make the marks plain, as the stone dust soon rubs out faint ones. Hold this stick up against the work and revolve it slowly, and pencil off the lines as you have them on the stick. Now, with your V-tool, mark in these and sink away with the gouge tool any parts that are wanted smaller. If you have a lot to cut away you need not trouble to turn it all away to dust; simply run the gouge into the work in a series of grooves about ½ inch apart and then stop the lathe and gently tap the remaining pieces with the side of the tool, and you will find they will break off with just no trouble at all. Don't run your grooves as deep as you want to go by about ⅛-inch, as they may pluck a little. Pluck is another trade term, and is used to describe what happens when a mason takes off too much with his chisel, and the chisel or other tool, being unable to cut so much, tears it out and deeper than is wanted. So be careful and don't have plucks. When the stone is roughed out into nearly its proper form sharpen the tools and take a light cut for the finishing one. It is also necessary to shift the rest nearer the work after cutting so much away. The rest should be from ¼ inch to ½ inch away from the largest part. It need not be straight along. One end can often be placed pointing inward toward the work. The main thing is to keep near enough so as not to have a slip. When a slip is made, the point of the tool catches in the work and tears out more or less. The handle generally comes up in a hurry, very often being stopped by the turner's chin or some part of his face. However, these little mishaps all have their uses and tend to make one careful. Finish the squares and little fillets with the chisel, taking care to have the corners sharp; for any long rounds, or for the shaft, or for flat bands, the old plane iron will be useful. Now, with a piece of coarse sandpaper, go over the work and take off just the rough marks left by the tools. Don't do much with this, or the beads will be flat and the sharp arrises lost. Then, last of all, cut down with the V-tool your shoulders or ends, as the case may be. Go down as far as you can, and undercut just a little. Then carefully remove the work and see how much superior it is to any possible work done by hand.

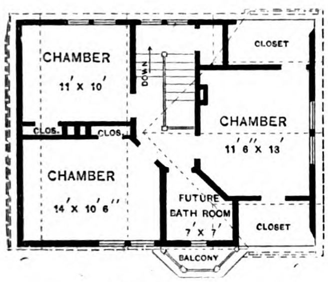
COMPETITION IN $1000 FRAME HOUSES.

FIRST PRIZE DESIGN.

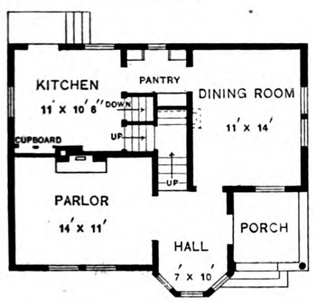
THE committee to which were referred the designs submitted in the competition for $1000 houses, being the XXVIth in the series conducted by this journal, having completed their labors and made their report, we take pleasure in laying before our readers the results of their deliberations. This competition, like the one preceding, gave evidence of a widespread interest on the part of patrons of the paper, the designs submitted being varied in character and representing widely separated sections of the country.

The conditions governing this competition, and published in the issue for December, were the same as those given last month in connection with the contest for $750 houses; accordingly the committee made it their first duty to ascertain if all the designs submitted had complied therewith. A careful examination revealed the fact that a number had failed in this respect, and they were at once thrown out as not entitled to consideration. Several contestants submitted drawings of merit, but failed to furnish estimates in detail; others placed their name and address upon each sheet of the drawings, instead of in a sealed envelope with a *nom de plume* or designating device on the outside, as stipulated. In one instance a design was submitted in which no provision for heating the principal room was made, while in another a fully equipped bathroom was indicated and which if installed in the house would carry the cost beyond the limit fixed by the competition. In still other instances the estimates as given footed up more than $1000, which, of course, caused the drawings to be thrown out.

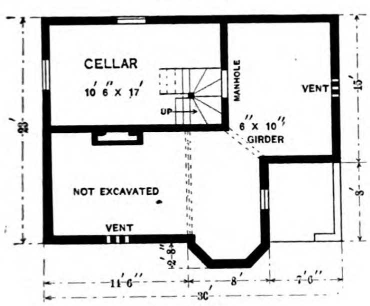
The committee report that after giving due regard to all the requirements of the competition, the drawings submitted under the *nom de plume* of "Boz," by E. R. Rice, 430 Seventeenth street, Denver, Col., are entitled to the first prize of $90; the drawings marked "O. F. No. 2," submitted by C. B. Chappell, Charlottetown, Prince Edward's Island, are entitled to the second prize of $50, and the drawings submitted under the *nom de plume* of "Vent," by Frank J. Grodavent, 415 Power Building, Helena, Mont., are entitled to the third prize of $35.



Second Floor.

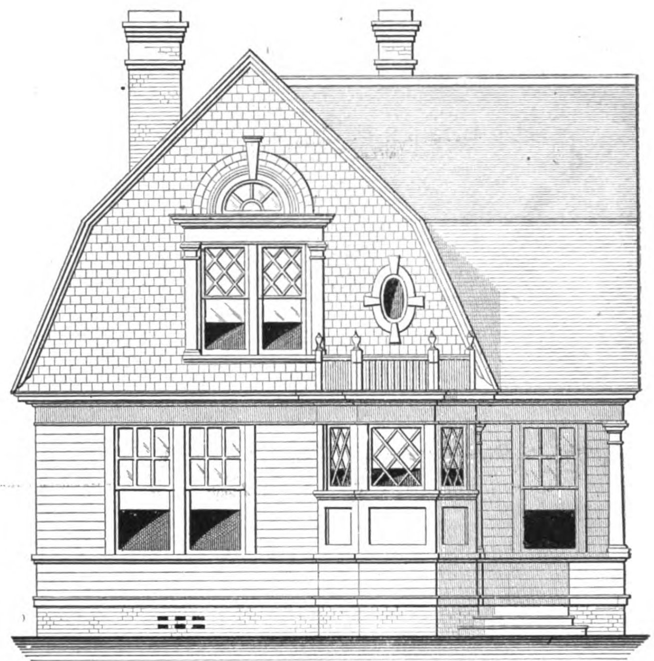


First Floor.



Foundation.

Scale, 1-16 Inch to the Foot.



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

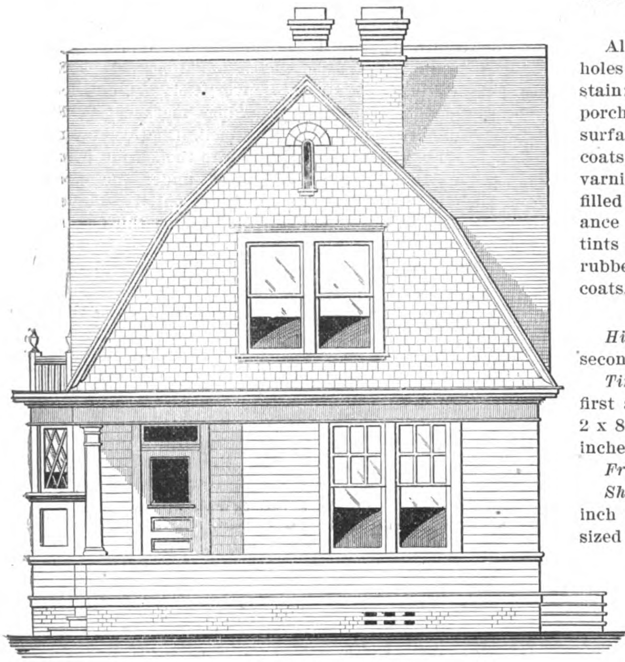
Competition in $1000 Frame Houses.—First Prize Design.—E. R. Rice, Architect, Denver, Colorado.

We have pleasure in placing before our readers the first prize design, in regard to which the author, in a letter to the editor, says:

In submitting studies for competition XXVI, I would like to add a few explanatory remarks. The $1000 house is one which seldom finds its way to an architect's office, and your journal is to be commended for its efforts to raise the standard of this class of houses. There is no reason why a cheap house should not have a convenient plan and an artistic exterior, and I have rather enjoyed working at the problem. The arrangement which I have adopted is compact and convenient, and there is little waste room. The combination stair, while not new in idea, is a rather novel one of its type, and the two landings make a very easy ascent. The pantry shelves recessed under stair start high enough to give head room for cellar stair.

It is reasonable to suppose that a person building a house of this kind will at some future time become prosperous enough to want a bathroom, and I have provided a room which may be used for that purpose. This is a feature which should be incorporated in all cheap houses, but which is often omitted.

For the exterior I have adopted the gambrel roofed colonial style as giving greater individuality at less expense than almost any other. The main features are the porch, covered by the main roof, the hall bay and the front gable window, which, though not very expensive, gives tone to the design.



Side (Right) Elevation.

My idea was to lay siding rough side out and stain a dull red. Gables cedar shingles, left natural; roof either reddish brown or moss green; all trimmings cream white. This color scheme has been kept in view in the designing of all features.

As to materials, brick being exceedingly cheap in this locality (red brick in the wall averaging from $5 to $6), I have used it for the foundation walls. Other materials used are of a fair average quality, suitable for a house of this class. Respectfully submitted, "Boz."

As being of further interest in this conection we present in full as furnished the

Specifications.

EXCAVATION.

Excavate the cellar as per plans, to give a clear depth of 6 feet 6 inches, also all trenches for dwarf walls 24 inches deep. Refill around walls when directed and remove all superfluous dirt from premises.

BRICK WORK.

All brick to be hard burned red brick, laid in rich gray lime mortar, and joints well slushed. Plaster chimneys smoothly inside. All exterior exposed brick laid in red mortar. Carry ash pit to cellar bottom, with 12 x 18 inch galvanized iron door. Leave vents where shown, covered with wire netting.

PLASTERING.

Lath first and second stories throughout with good pine lath. Plastering, two-coat work, hard finished. Plaster to floor and jambs in all cases.

TIN WORK.

All tin good brand IC. Tin top of bay with 14 x 20 inch, flat seams. Valley tins 14 inches wide, painted both sides. Flash around all chimneys, window heads and breaks in roof. Put up gutters as per details, of No. 26 galvanized iron, with 3 x 4 inch corrugated conductors of same, with 24-inch elbow at ground.

PAINTING.

All materials used to be of the best. Putty all nail holes; shellac all knots. Siding will have two coats oil stain; roof same. Gable shingles left natural. Oil porch and kitchen floors two coats. Prime all outside surfaced wood work as soon as put up, and paint two coats lead and oil—cream white. Staircase filled and varnished two coats. Kitchen and pantry wood work filled and varnished two coats spar varnish. All balance interior wood trim to have three coats paint, in tints as directed. Fill and varnish mantel three coats, rubbed to flat finish. Stain as desired. All iron two coats.

CARPENTER WORK.

Hights.—Cellar, 6 feet 6 inches; first story, 9 feet; second story, 8 feet.

Timber.—Sills, 6 x 6 inches; girders, 6 x 10 inches; first and second story joist, 2 x 10 inches; porch joist, 2 x 8 inches; ceiling joist, 2 x 6 inches; studding, 2 x 4 inches; rafters, 2 x 4 inches.

Framing.—All framing done in best manner.

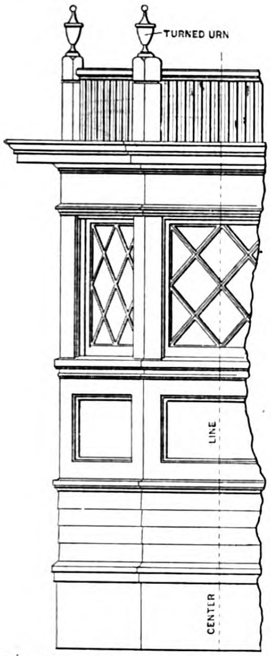
Sheathing.—All exterior walls and roofs will have ⅞-inch S. I. S. native sheathing, covered with red rosin sized building paper.

Rear Elevation.

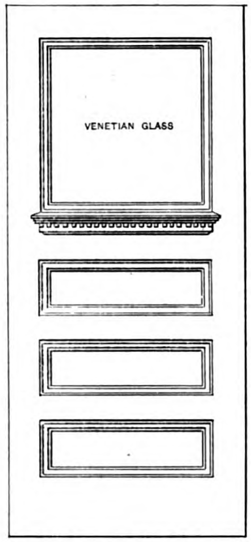
Competition in $1000 Frame Houses.—First Prize Design.—Elevations.—Scale, ⅛ Inch to the Foot.

Siding.—Cover first-story walls with 6-inch lap siding, laid 4½ inches to weather, with rough side out. Miter at angles.

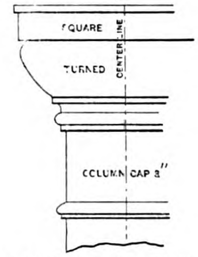
Shingles.—Cover roof with cedar shingles, 4¾ inches to weather. Cover gables with same, 6-inch square butts, 6 inches to weather. Case up all cornices, water



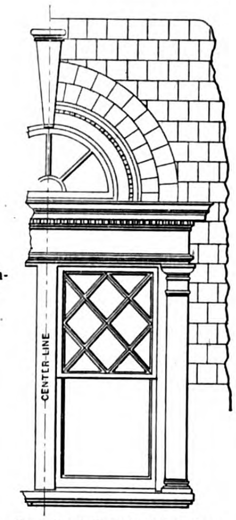
Detail of Bay Window in Hall.—Scale, ¼ Inch to the Foot.



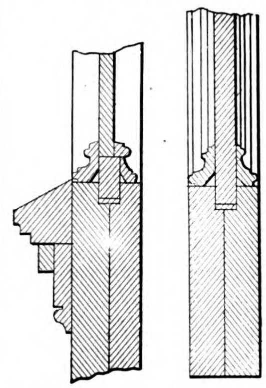
Elevation of Front Door.—Scale, ½ Inch to the Foot.

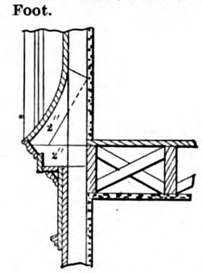


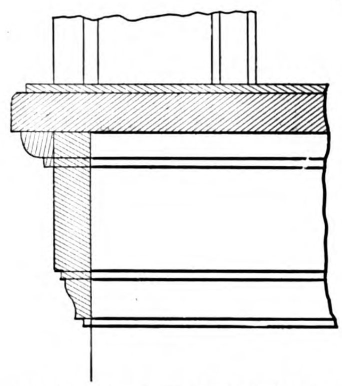
Detail of Column in Front Gable Window.—Scale, ¾ Inch to the Foot.

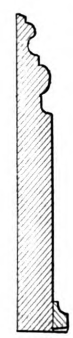


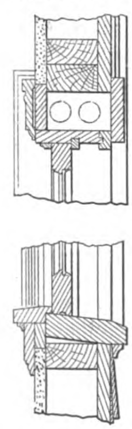
Detail of Front Gable Window.—Scale, ¼ Inch to the Foot.

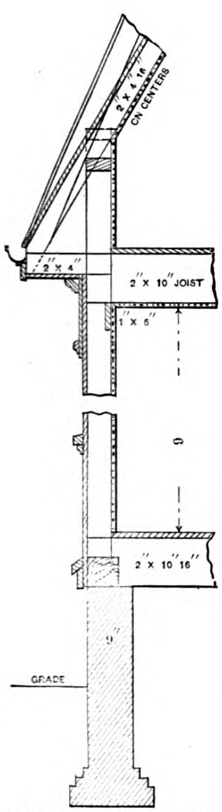

Sections of Front Door.—Scale, 3 Inches to the Foot.


Gable Cornice.—Scale, ⅜ Inch to the Foot.

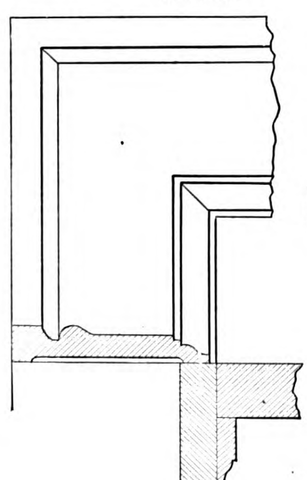

Detail of Window Stools.—Scale, 3 Inches to the Foot

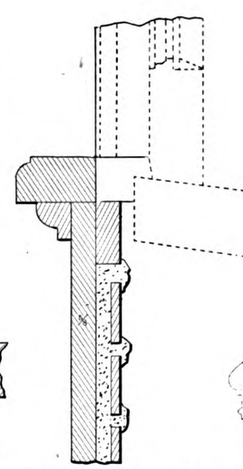

Section through Base.—Scale, 3 Inches to the Foot.

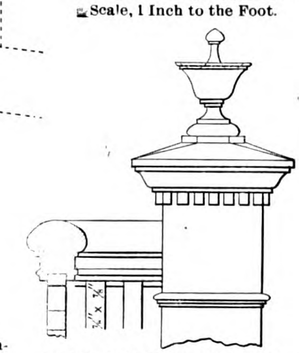

Detail of Window Frames.—Scale, 1 Inch to the Foot.



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


Detail of Inside Finish.—Scale, 3 Inches to the Foot.


Detail of Kitchen Wainscoting.—Scale, 3 Inches to the Foot.


Detail of Stair Newel and Rail.—Scale, 1½ Inches to the Foot.

Miscellaneous Constructive Details of First Prize Design in Competition for $1000 Frame Houses.

table belts, window frames, &c., with clear, dry pine. All as per details.

Porch.—Porch post of redwood, turned with 2-inch hole in center. Carry frieze around inside of porch. Cover ceiling with ⅝ x 3 inch beaded ceiling.

Windows.—All window frames for two-light windows will be box frames. All others will have sash hung on hinges. All sash 1⅜ inches thick, glazed with double strength glass; cellar single.

Doors.—Front door as per details, 1¾ inches thick, molded panels; upper panel Venetian glass. The two doors in dining room will be five cross panels, molded; balance four-panel ogee, B. stock. First-story doors, 2 feet 8 inches by 6 feet 8 inches; second-story, 2 feet 6 inches by 6 feet 6 inches; all 1⅜ inches thick.

Floors.—Lay floors throughout with ⅞ x 4 inch Texas Star flooring, selected for kitchen. Porch floor, ⅞ x 3 inch quartered Texas, laid in oil.

INSIDE FINISH.

All inside finish as per details, of dry white pine, except kitchen, which will be Texas pine. Wainscot kitchen to hight of window sills, as shown. Build cupboard in kitchen and fit up pantry with two bins, drawers and shelves, all as per details. Linen closet on stair landing will have floor 28 inches above landing. Fit up with five shelves, full depth. Other closets will have each two shelves and 6-inch cleat with hooks.

Stairs.—Build stairs as shown, with ⅞-inch risers and 1⅜-inch treads, of select Texas. Newels, rail and balusters as per details, of quartered Texas. Put up 2½-inch hanging rail from angle newel to bottom, with 6-inch iron hangers. Cellar stairs to have ⅞-inch risers, 1⅛-inch hard pine treads. All stairs well supported on 2 x 12 carriages.

Mantel.—Build parlor mantel as per details, of clear poplar, with Chambers' sheet glass mirror, tile hearth and facing, and club grate with brick lining. Wreath and ribbon in Carton Pierre. Mantel finished by painter.

Hardware.—All windows and doors properly hung and trimmed. Front door will have steel butts and imitation bronze trim, with three-tumbler mortise lock, with night latch and three keys. All other doors will have one-tumbler mortise locks and imitation bronze trim.

FINALLY,

all work to be done in a thorough and workmanlike manner. Clean all windows and remove all rubbish.

Estimate.

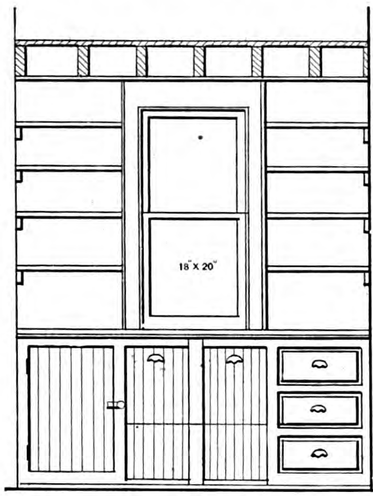
The estimate accompanying the design is as follows:

55 yards excavation, at 20 cents	$11.00
15,500 brick, laid, at $6	93.00
602 yards plastering, at 16 cents	96.32
Tinners' work	18.00
Painting	75.00
Total	$293.32

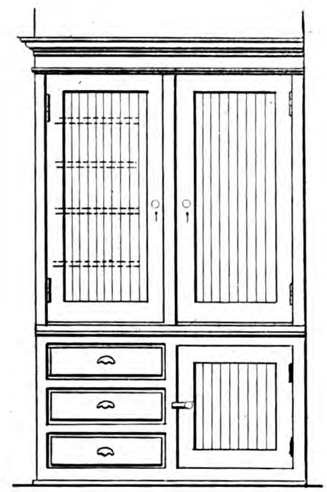
CARPENTER WORK.

6000 feet native dimension framing, at $12.50	$75.00
3000 feet native S. I. S. boards, at $14	42.00
Labor	45.00
14,600 shingles, at $2 50	36.50
Labor	18.00
1300 feet of siding, at $25	32.50
Labor	10.00
650 feet cornice, water table, belts, etc., at $25	16.25
Labor	15.00
1600 feet Texas Star flooring, at $15	24.00
Labor	6.00
350 feet of base and closet shelves, at $25	8.75
Labor	5.00
Front gable window, frame, sash, casing and labor	18.00
3 hall windows, frame, sash, casing and labor	12.00
13 windows, frame, sash, casing and labor, at $6	78.00
Pantry w., $4.50; oval w., $5; attic w., $3, 2 cellar	17.50
Front door, frame, hardware and labor	14.00
2 doors, frame, hardware and labor, at $7	14.00
14 doors, frame, hardware and labor, at $5	70.00
Kitchen wainscot	5.00
Kitchen cupboard	6.00
Pantry, finished complete	15.00
Front stairs	40.00
Cellar stairs	7.50
Front porch, complete	20.00
Back porch, complete	3.00
Nails, screws, etc , building paper, books, etc	20.00
Mantel, grate and hearth, set complete	25.00
Total	$992.32

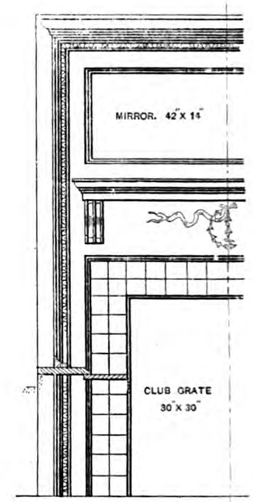
The builders' certificate is signed by Craft & Gilmore, 1613 Tremont street, Denver, Col.



Detail of Pantry Finish.—Scale, ⅜ Inch to the Foot.



Elevation of Kitchen Cupboard.—Scale, ⅜ Inch to the Foot.



Half Elevation of Parlor Mantel. —Scale, ½ Inch to the Foot.

Miscellaneous Constructive Details of First Prize Design in Competition for $1000 Frame Houses.

THE new fire proof curtain of the Paris Opera House, which is lowered after each representation and in the event of accident or panic, is made of aluminum plates, 3-32 inch thick, 13 feet long and 3 feet 3½ inches wide, representing a surface of 3229 square feet, while weighing 1.8 tons. A similar curtain made of iron would weigh over 5 tons.

THE plans have recently been completed for a home for the Army and Navy Club, the present quarters of which, at 16 West Thirty-first street, New York City, have become insufficient on account of the great increase in membership. The structure will be of brick with brown stone trimings, and will be seven stories in hight, surmounted by a roof garden. The plans were prepared by Lieut. William Cable of Cable & Lucas, 1181 Broadway, of this city, and call for a structure which it is estimated will cost in the neighborhood of $125,000.

WHAT BUILDERS ARE DOING.

THE builders at Atlantic City, N. J., are looking forward to a busy season. Several of the large hotels are being extensively improved and enlarged, one of the most notable operations being at the Hotel Traymore, where an immense wing extending toward the Boardwalk along Illinois avenue is being added. M. P. Wells & Co. are erecting an immense store and apartment house building for Bacharach & Sons, and work progresses rapidly upon William Stager's apartment house at Pacific and Kentucky avenues. Capt. John L. Young is erecting a new merry-go-round and hotel building at South Carolina avenue and the Walk, and the Moore Brothers have started operations upon a combined store, bathing establishment and hotel building fronting upon the Walk at Ocean avenue. Large and small cottages by the score are being erected all over the city, several of them to grace the newly made property west of the Seaview Excursion House. A 6-story steel and brick hotel building to face upon the Walk at Ocean avenue is in the wind, and a store and apartment house building at Delaware and Atlantic avenues is talked of. The builders as a rule are having a very prosperous season.

Boston, Mass.

The general feeling among builders in Boston is that the coming season will prove to be unusually active. The records of the building department show an improvement for January and February over the same months of 1898. The following committee has been appointed by the Mayor to examine into the organization, administration, system and methods of the Building Department, with the purpose of ascertaining whether deficiencies exist in it which should be remedied, and whether its services can be in any manner improved or perfected, whether by changes in the laws or ordinances or without such changes. The Mayor asked the Real Estate Exchange to recommend to him three lawyers, the Boston Society of Architects three architects, the Master Builders' Association three builders, and the Boston Board of Fire Underwriters three of its members: Neil McNeil of the Master Builders' Association, Herbert Jaques of the Boston Society of Architects, Osborne Howes, representing the Boston Board of Fire Underwriters, and William F. Wharton the Boston Real Estate Exchange.

A unique method of acquiring possession of a building for which the owner failed to pay the contractor was recently adopted by a Boston builder. After frequent attempts to collect money due for labor and materials, the contractor sought the customary relief of the lien law only to find that the alleged owner had mortgaged both land and house for their full value, his equity being far less than the amount of his obligation to the contractor. The contractor, after consulting with his attorney, determined to move the building to a plot of ground owned by himself without the alleged owner's knowledge. The work of removal began at 4 o'clock on a recent Friday afternoon and at 10.15 the house had parted company with its former site, and was *en route* for a new location. After carrying the building a couple of hundred feet it was left for the night under a guard. Saturday the work of moving was resumed, and it was taken to its ultimate destination.

Bridgeport, Conn.

The annual meeting of the Bridgeport Master Builders' Association was held in February and the following officers were elected for the ensuing term: President, David C. Mills; first vice-president, Marcus E. La Forge; second vice-president, Gerhard Drouve; secretary, William S. Dowling; treasurer, Joseph M. Sanger; Board of Managers—L. H. Mills, H. M. Purdy, R. W. Whelan and C. H. Botsford.

The secretary's and treasurer's reports were read and showed the finances of the association to be in a prosperous condition. According to the usual custom, an enjoyable entertainment followed the close of the business meeting.

Buffalo, N. Y.

The outlook for building in Buffalo during the coming season is very favorable. The Builders' Association Exchange has elected the following officers for the ensuing year: President, John W. Henrich; vice-president, George E. Frank; treasurer, F. T. Coppins; secretary, John C. Almendinger; Trustees—John Carter and John C. Watson; Arbitration Committee, B. I. Crooker, A. A. Berrick and John Feist. Mr. Coppins and Mr. Almendinger were unopposed, but in choosing the other officials there was considerable rivalry.

The annual report of the association which owns the building occupied by the Exchange shows capital stock $75,000; debts, including capital stock, not to exceed $170,000; assets at least $175,000.

Chester, Pa.

The indications are that there will be considerable building in Chester next season. It is understood that arrangements have been made by L. N. Wood & Bro., Samuel Hewes, the builder, and a third party, to erect 10 houses near Second and Broomall streets this spring. The houses are to have all modern conveniences, with buff brick fronts, and are to be finished in first-class style, so that they will be desirable and attractive homes for the better class of mechanics. These new houses will be convenient for those who work at the Hetzel, Logwood and the Tidewater mills. There are several other building operations under consideration. Among them is a block of four fine houses by Robert Howarth on Edgmont avenue, near Twenty-first street.

Chicago, Ill.

It is reported that there prevails among the builders of Chicago a feeling that the coming season will be the best since the year of the World's Fair.

There is prospect of a rupture between the carpenters and contractors on April 1. The carpenters' Executive Council for Chicago and vicinity has prepared a new agreement for the coming fiscal year, and has placed the minimum wages for journeymen carpenters at 42½ cents per hour, an advance of 5 cents over the present scale. The new agreement also provides that six hours shall constitute a night shift, the wages for six hours' night work to be equivalent to those for eight hours of day work. Under the present arrangement eight hours is a shift, night or day.

By deciding that a contractor for sewer work must demonstrate his ability to execute his contract without delay, the Board of Local Improvements recently upheld the Bricklayers' Union and the Contractors' Association of Sewer Builders in their fight against sewer contractors who are not members of the Contractors' Union.

The Builders and Traders' Exchange has elected the following officers for the ensuing year: President, Charles W. Gindele; first vice-president, George Jackson; treasurer, I. D. Richards; Directors—James A. Hogan, William H. Alsip, S. S. Kimbell, E. A. Thomas, James Sinclair. Inspector of election, J. A. White.

The Carpenters and Builders' Association has elected the following officers: President, Murdoch Campbell; vice-president, W. A. Harris; secretary, John F. Neagle; treasurer, Cesaire Gareau; Directors—John Ramcke, W. Irving Clark, John Dick, W. H. Behel, Alex. M. Ross, T. A. Collins; Arbitration Committee—T. A. Dungan, Frank E. Doherty, Murdoch Campbell, W. F. Behell and John Dick.

The Masons and Builders' Exchange has elected the following officers for 1899: President, David Coey, Jr.; vice-president, George Williams; secretary, B. G. Robinson; treasurer, Henry Appel; Board of Directors—Thomas E. Courtney, M. F. Powers, T. A. Dungan, Abner Price, John McBeth, Henry Snyder, H. D. Moreland, W. L. Hoffman, J. J. Gibson and Thomas Keating; Committee on Material—John C. Thompson, C. W. Gindele, T. J. Raycroft, A. Lanquist and W. S. Joslyn; Committee on Arbitration—James Bloomfield, B. F Bowman, A. J. Koch and John Kinnare.

Cincinnati, Ohio.

The members of the Builders' Exchange of Cincinnati are moving in the direction of obtaining more definite specifications from the architects. A strong effort is to be made to require full specifications for estimating and complete detail drawings for all work to be performed.

The outlook for building in Cincinnati is more promising than it has been at this season for several years past.

Cleveland, Ohio.

The Cleveland Builders' Exchange has leased the entire third floor of the new Chamber of Commerce Building and will establish a permanent builders' exposition in it. The plan of the third floor as laid out is conveniently arranged for the purposes of the exchange. The exchange will have a large assembly room, a large committee room, specification room, and a smoking room, besides offices. The remainder of the floor, consisting of 40 exhibition rooms, containing all told 3000 square feet of floor space, will be rented to firms engaged in the building business. Each of these firms will make use of the room for exhibition purposes, exhibiting their wares. A glass front to these rooms makes possible a beautiful display. The following firms have already rented space for exhibition purposes: Cleveland Hydraulic Pressed Brick Company, Cleveland Window Glass Company, Cleveland Stone Company, E. W. Fisher Company, Cleveland Builders' Supply Company, J. A. Reaugh & Sons, Glidden Varnish Company, Cleveland Varnish Company, A. T. Osborne Company, Warren Chemical Mfg. Company, T. R. Gilchrist, Vermont Marble Company.

A hopeful feeling as to the outlook for the coming season prevails among Cleveland builders, and it is stated that there is already enough new work planned to give the year a good send-off.

The union carpenters, numbering about 2000, have announced that they will demand a minimum wage of 30 cents per hour on April 1 and will strike if the employers refuse to concede the advance.

Columbus, Ohio.

The members of the Columbus Builders and Traders' Exchange have taken up the question of a proper building law for the city. The city has been suffering, it is said, for a long time from the inefficiency of the law, and the exchange has appointed a committee consisting of one member from each branch of the building trade represented in the organization to prepare a new law and move for its adoption.

Des Moines, Ia.

The Carpenters' Association of Des Moines, as a result of a joint conference with the Carpenters' Union, has agreed to an eight hour day at 30 cents per hour. Early in the year the workmen asked for increased wages and shorter working hours, and after joint consideration in a most satisfactory series of meetings between the employers and the workmen the result mentioned was obtained.

Present indications point to the resumption of the activity among builders during the present year that prevailed during the more prosperous years of the past.

Detroit, Mich.

It is reported that the outlook for building in Detroit during the coming season is not as hopeful as could be desired. The amount of work in sight is relatively small, and there appears to be no positive tendency toward new undertakings of any magnitude. It is reported that both material and labor are cheap at present and that there will probably be little change until there is a decided increase in the demand.

The Builders' Exchange have elected the following officers for 1899: President, Richard Helson; vice-president, John Finn; secretary, George H. Clippert; treasurer, James Meathe; superintendent, Benjamin F. Guiney; Directors—E. Austin, Sr., John Lenane, Henry Houghton, Robert Hutton and William S. Piggins.

Lima, Ohio

The builders of Lima have recently organized an exchange similar in nature to those composing the National Association. T. W. Hullinger is secretary, and he writes that the new organization is considering the desirability of joining the national body.

Milwaukee, Wis.

The Milwaukee Builders and Traders' Exchange has elected these officers for the ensuing year: President, E. J. Roberts; first vice-president, P. L. Petersen; second vice-president, H. S. Pelton; treasurer, John Langenberger; secretary, Matthew Quinn; assistant secretary, B. F. Sanders; Directors for three years—E. Hilgen, Nicholas Ehr, E. T. Doyn, E. F. Whitnall.

A committee of members has drafted a set of resolutions to be presented to the next Legislature, asking for a revision of the lien laws.

The Builders and Traders' Exchange has granted a conference with representatives of the Building Trades Council, which will make a demand for an eight-hour day, and that only union men be employed. The Executive Board held that by the willingness of the union men to confer with the builders they have taken a conciliatory stand and that it now depends upon the builders to establish peace for the coming season of building operations.

Newark, N. J.

The fifteenth annual meeting of the Builders and Traders' Exchange was held recently at their rooms, 22 Clinton street, and the following officers were elected: President, J. D. Higbie; vice-president, Hugh Kinnard; treasurer, A. C. Courter; secretary, W. W. Schouler; Board of Managers—George S. Clark, George D. Merritt, Thomas O'Connor, Thomas Boyle, W. G. Weaver, A. H. Vreeland, J. W. Shaw, F. K. Pruden, Frank Marsh, William J. Hughes, J. C. Morgan, H. Woodward. The meeting was followed by a banquet to which all the architects of Newark were invited and many were present.

The Master Masons' Association has elected Charles S. Cooper president William H. Tinney vice-president, John J. McGrath secretary, John W. Shaw financial secretary, and George S. Clark treasurer.

New Bedford, Mass.

At the annual meeting of the Builders' Exchange of New Bedford officers for 1899 were elected as follows: President, Z. B. Davis; vice-president, William B. Janney; secretary, Martin H. Sullivan; treasurer, Charles S. Paisler; Directors—Arthur E. Buffington, Charles G. Randall, E. F. Penney, James H. Murkland, Charles E. Peirce.

The exchange starts on its ninth year in a very prosperous condition, having a large membership and a substantial balance in the treasury.

At the regular February meeting of the exchange a delegation from the newly organized exchange at Fall River was entertained, the business part of the meeting being followed by a supper at which several pleasing addresses were made.

New Haven, Conn.

The Builders' Exchange of New Haven has elected the following named officers for the ensuing year; President, James A. Fogarty; vice-president, F. A. Curtis; treasurer, J. Gibb Smith; secretary, C. Elmer Dibble; Trustees for three years—James E. Todd and Frank L. Stiles.

New York, N. Y.

If one may judge from present prospects there is likely to be a very active season in the building trades in and about New York City. Architects' offices are busy with work and the records of the Department of Buildings are showing a decided increase from month to month in the number of plans filed.

The Mason Builders' Association of New York at its fifteenth annual meeting elected the following officers: President, John J. Tucker; first vice-president, Warren A. Conover; second vice-president, Charles T. Wills; treasurer, Walter S. Harrison; secretary, Charles A. Cowan; Executive Committee—Henry M. Tostibin, P. J. Brennan, J. Cockerill, P. Gallagher and James Livingston.

The Building Trades Club at the annual meeting held in its rooms in the Townsend Building, Broadway and Twenty-fifth street, elected the following officers for the ensuing year:

President, John L. Hamilton.	First Vice-President, Warren A. Conover.
Secretary and Treasurer, William K. Fertig.	Second Vice-President, Francis M. Weeks.

Managers for Three Years,

Stephen M. Wright,	Isaac A. Hopper,
Ronald Taylor,	Leonard K. Prince,

Alphonso E. Pelham.

Efforts are being made by various building trades organizations and other societies interested to secure the passage of the bill introduced in the New York Legislature to repeal what is known as the Tobin law. This law provides that all granite and stone used in State, county or municipal buildings shall be shipped here in the rough and cut after it has passed the border line of the State. It was passed in 1893, and its repeal is desired on the ground that it will not only save contractors trouble and worry to which they are now subjected, but will also save hundreds of thousands of dollars to the taxpayers. It is also stated that its repeal will revive the use of granite in the public buildings in the city and State.

Omaha, Neb.

Secretary W. S. Wedge of the Omaha Builders and Traders' Exchange reports that the present prospect for building is better than it has been for a number of years past. Practically no speculative building has been done in Omaha for the last year or two, and everything looks favorable for a good year. There seems to be a feeling among builders that the recent exposition has been a benefit to their interests.

The exchange recently tendered a "smoker" to its members and their friends. E. Benedict told of the late Chinese raid and R. W. Richardson related his latest stories. C. R. Cushman was present with a phonograph, which furnished a number of popular musical selections. The members were then invited into an adjoining room, where sandwiches and punch were served, and afterward cigars were passed. Boxes of taffy, by order of the board, were presented to J. H. Harte, E. G. Hampton and Secretary Wedge, as they were not users of the weed. After refreshments an hour was spent in story telling and in having a good time.

At the annual meeting the following officers were elected: President, A. J. Vierling; vice-president, J. Fred. Smith; treasurer, W. C. Bullard; secretary, W. S. Wedge; Directors—E. G. Hampton, C. W. Morton, Thomas Herd, John Rasmussen, John M. Dow and John Harte.

Philadelphia, Pa.

The outlook for contractors and builders in Philadelphia when spring opens and operations are resumed is most favorable.

The report of the Bureau of Building Inspection for the year 1898 shows that there were 8237 permits issued, embracing 13,197 operations, the estimated value of which was $21,865,555. In comparison with the year 1897 there was a decrease of 75 permits, 1740 operations, and $4,050,215 in estimated values. Permits were issued for 5100 dwellings, at an estimated cost of $11,685,850, a decrease from the year previous of 2081 dwellings, and a decrease in value of $3,584,265. The falling off in dwellings represents about 88½ per cent. of the total decrease of the year.

The annual meeting of the Master Builders' Exchange was held recently at the exchange. The report of the Board of Directors embodied the reports of the various committees, and showed the organization to be in a very satisfactory condition. The assets are $162,398.04 and the liabilities $140,543.29, leaving a balance in favor of the exchange of $21,854.75. The floating indebtedness was reduced $1781.25, and a fine $500 electric light plant installed. The exhibition department was recorded as showing a marked improvement on former years. The election to fill the seven vacancies that annually expire in the Board of Directors resulted in the choice of the following for three years in their respective classes: R. C. Ballinger, Joseph E. Brown, John J. Byrne, William S. P. Shields, Peter Gray, William B. Carlile and W. J. Collins.

The following officers have been elected for the ensuing year: President, John Atkinson; vice-presidents, Peter Gray, John S. Stevens, William Conway; treasurer, Charles S. Reeves; secretary, William Harkness.

A large dwelling operation, consisting of 40 houses, to cost in the neighborhood of $160,000, will be started in Germantown as soon as the weather permits. John J. Brown, a contractor and builder, of Germantown, is now receiving estimates for the erection of a part of the houses. Architect T. Frank Brown made the plans for the proposed structures, and those for which Mr. Brown is taking bids will be erected for J. Elwood Henry.

The Bricklayers' Company recently celebrated the completion of its one hundred and ninth year with a banquet at the Master Builders' Exchange. Previous to the dinner there was a business meeting, at which the following officers were elected: President, Franklin M. Harris; vice-presidents, Michael Magee, Charles P. Hart; treasurer, John W. Miller; secretary, William J. Gillingham; Measuring Committee for one year—Henry Eimwechter; for three years, Charles P. Hart, George W. Payne, John C. Atkinson, William Smith, Jacob R. Jordan.

Portland, Maine.

The Builders' Exchange had a very interesting meeting and excellent supper at their rooms in the First National Bank Building on the evening of March 1. The supper was the first feature of the evening, after which President J. C. Ward called the meeting to order and Frank Redlon read a valuable paper in regard to the meeting of the National Exchange lately held in Milwaukee, which he attended as a representative from the Portland Exchange. The paper was received with marked approval and it was voted that the Portland organization join the National Association.

San Francisco, Cal

The building prospects on the Pacific Coast at the opening of the present year were considered much more encouraging than they were a year ago. Then the exceedingly dry winter caused many to withhold improvements, and the indications of an early war with Spain tended to demoralize the building industries. According to a recent issue of the

Building News and Review, the prospects for the season now opening are decidedly promising, and, taking everything into consideration, there is every reason to feel satisfied with the outlook. According to the usual monthly summary given by the journal named, the value of the buildings projected for January of the present year was considerably in excess of that for the corresponding month a year ago, although showing a marked falling off as compared with January, '97 and '96. All through the Pacific Slope the news as regards new buildings is said to be more encouraging and prices of building materials are tending upward, this of itself being an encouraging feature, as it is seldom if ever that prices rise when work is scarce.

St. Louis, Mo.

The annual election of officers of the Builders' Exchange of St. Louis resulted in a tie between Henry Fairback and L. B. McFarland and the naming of the following gentlemen to fill the other offices: First vice-president, Joseph P. Kelly; second vice-president, T. E. Cavanaugh; Directors—H. G. Gillick, Thomas Kelly, John M. Doyle, T. P. McKelleget, J. H. Dawes and John A. Lynch; Arbitration Committee—H. A. Boeckler, W. S. Simpson, A. Leiseke, Julius Seidel, Jere Fruin, Ph. Dauernheim, Henry Schmitt, H. Heagen and L. Kennah; Committee of Appeal—John M. Sellers, W. H. Swift, William A. Rutter, C. S. W. Cobb, Joseph Winkle, George Sauerbrunn, George M. Simpkins, C. C. Jackson and Henry Kiel.

At a postponed meeting Mr. McFarland was elected president.

Scranton, Pa.

The Builders' Exchange of Scranton has elected the following officers for the ensuing year: President, Conrad Schroeder; vice-president, Thomas H. Spruks; junior vice-president, Frank Carlucci; secretary, B. F. Laudig; treasurer, George W. Finn; Directors for two years—Luther Keller, John Benore, Charles C. Lord, H. C. Hinman, H. A. Kaufhold and Frank Carlucci; director for one year, Charles Rarrick.

Toronto, Ont.

At the recent annual meeting of the Toronto Builders' Exchange the following officers were elected for the ensuing year: President, Henry Martin; first vice-president, Thomas Christie; second vice-president, James B. Thomson; treasurer, David Williams; auditors—Fred Holmes and George Clay; Directors—Thomas Cannon, Jr., Joseph Russell, James Crang, George Duthie and John M. Gander.

A committee was appointed to procure a suitable testimonial to David Williams, who has been treasurer of the association for the past 21 years.

Utica, N. Y.

The following officers have been elected for the ensuing year by the Builders' Exchange of Utica: President, William Fisher; vice-president, F. G. Weaver; treasurer, Joseph Wicks; secretary, H. Lancaster; trustee, three years, John S. Jones.

On March 1 the exchange gave its tenth annual banquet to the members and their friends.

Champaign, Ill.

The builders and dealers in builders' supplies of Champaign are taking steps toward the formation of an exchange. S. P. Atkinson, John B. Weeks and Curt Bainum are prominently identified with the movement.

Washington, D. C.

The report of the building inspector of Washington for January showed that permits were issued for a total of $154,776 in new buildings. Contractors are looking forward to a good season, it being claimed that there is more than the average amount of work for this season of the year already planned.

Wilmington, Del.

The Builders' Exchange of Wilmington recently elected the following officers: Frank A. Mitchell, president; F. C. Simpson, first vice-president; Herman Devinney, second vice-president; Joseph S. Hamilton, third vice-president; William H. Foulk, secretary, and William Davidson, treasurer. President Mitchell appointed a special committee, composed of A. L. Johnson, Calvin I. Swayne, F. C. Simpson, William H. Foulk and Joseph S. Hamilton to canvass the membership of the exchange for the purpose of obtaining their views on how to make the organization more effective, and to generally make improvements which will benefit builders.

Wichita, Kas.

Wichita builders are anticipating one of the busiest seasons in the history of the city. The amount of new work already planned and ready for operations, together with a large amount of work projected for the near future, make the prospect very promising.

York, Pa.

The statistics of the city engineer's office of York for 1898 show that it was one of the greatest building years in the history of the city. In all 122 permits were granted for dwelling houses alone. An unusual amount of remodeling was also done during the year, and four permits were issued for churches. During the year two shirt factories and a large addition to the extensive plant of the York Mfg. Company were built and a permit for another paper mill was secured. Besides these several factories have been erected on Norway Park, suburb, which is only a short distance east of the city. The year 1898 also marked the beginning of the construction of a new court house.

CHIMNEYS AND THEIR FLUES.

THERE is a large measure of truth in the statement that nearly three-fourths of all the fires that occur in dwelling houses as well as in many other buildings have their origin in defective flues. This percentage could be greatly reduced if the builder would exercise a little more care in the construction of his chimneys and the proper distribution of the wood work around them. Chimneys should be built from foundation to coping clear and independent of any wood work. Where the stack passes through a floor or roof, the trimming timbers should work clear of the brick or stone work at least 1 inch, and the roof boards and flooring should clear the stack nearly as much. The slate or shingles will of necessity be close to the brick work, but should be so put as not to interfere with the chimney's settling—for all chimneys will settle a little—for should the roof covering prevent the upper part of the chimney from settling along with the lower part, the stack will break at the line of junction with the roof, and the crack may be large enough to admit sparks and smoke, and the house may take fire from this cause. The same argument applies to the floor; the wood work must be kept clear of the chimney. In discussing this subject a writer in the *Canadian Architect and Builder* says that no flue should be less than 8 x 8 inches, or the length of one brick square in the clear, and this size should be maintained from bottom to top, regularly built—not contracted at some points and expanded at others. The walls adjacent to the flue should be laid close, and every joint of the bricks slushed or entirely filled up with mortar.

The inside of the flue should be well pargetted or plastered with mortar that will adhere to the bricks; simple lime and sand mortar will not be effectual, although used in common, if not almost universally. When the flue becomes heated, which it will at times, common mortar will peel and chip off and leave the joints exposed for the admission of smoke and fire, and at points where the wood work, such as flooring or timbers supporting the same, approaches too near the brick work of the flue, it will ignite, and the fire will extend between the floor and ceiling along the joists, and have control of the building before it is visible to outsiders or inmates of the house, and the building is either seriously damaged or entirely destroyed for the want of a little care and attention in the construction of the flue.

Pargetting mortar should be made with a portion of cow's hair in it, in about the same proportion as used in mortar intended for the first coating of wall plastering. Horse manure, in about the same proportion as cow's hair, thoroughly mixed with the lime and sand mortar, makes a very effectual pargetting, and when well put on will remain as long as the flue lasts. As a further safeguard, at the intersection of floors and roof the thickness of the flue walls might be swelled out so as to give a thickness of walls at these points of not less than 8 inches. There is no constructional difficulty in this, and the chimney would be rendered doubly safe.

A perfectly safe flue may be made by using ordinary glazed drain tiles of sufficient size for the flue, building them in as the chimney is being constructed. These may be obtained in suitable sizes, and T lengths can be had, which may be inserted in the flue, leaving the wing or third part to project through the wall for the reception of stove pipes, or for admission of air for ventilation purposes. A flue constructed with tiles in the manner suggested would be as near perfection as it is possible to build a flue.

THE ART OF WOOD TURNING.—IX.

By Fred. T. Hodgson.

IT frequently happens that the turner is called upon to execute one or more disks—that is, to do some work that is turned on both sides—as is often the case in pattern making and many other kinds of work. This requires a special chuck for the purpose, and one is shown in Fig. 64. It is very simple and inexpensive and answers the purpose in most cases; it is, of course, a sort of compound affair, being made in two parts, the movable part being screwed to the conical screw of the ordinary chuck. For some work this movable part may be made of hard wood, but for general use metal is better though costing more.

There are many other kinds of chucks, each one having its own purpose, but the ones illustrated and described in these papers are quite sufficient to answer all the ordinary conditions of plain turning, but should more be wanted to meet special work the operative will, if he is ingenious, be able to make the ones required.

A fully equipped lathe has a lot of accessories, many of them costly and intricate, but these are not required

We have given these few examples merely to indicate what can be accomplished on the lathe by skillful hands and suitable appliances, in order to "whet the appetite" of the young turner for higher things than plain turning. Many ornaments and moldings of various kinds may be obtained by a skillful adaptation of plain turnings. Rosettes and circular ornaments of a thousand different kinds may be formed according to the taste of the operator, and if he should be handy in the use of carving tools he should be able to turn out some fine original examples of carved rosettes. Often turned work in half "flitches" is wanted to represent half columns or other ornaments to plant on to plain work, or to drop into grooves to represent carved work. Planted turned work is frequently employed in the decoration of mantels, stair strings, newels, wainscoting and door heads, and for fittings about bay and oriel windows. Indeed, it may be used to advantage in almost any style of finish. The best way to prepare "flitched" turned work is by glueing the half pieces together with thin paper between

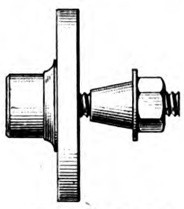


Fig. 64.—Chuck for Turning Disks.

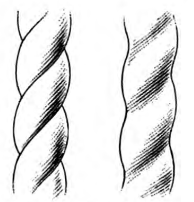


Fig. 65.—Solid Spirals.

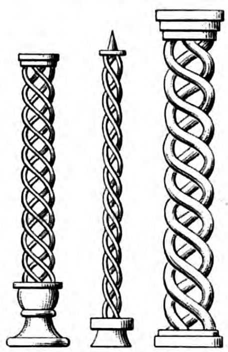


Fig. 66.—Open Twist Work.

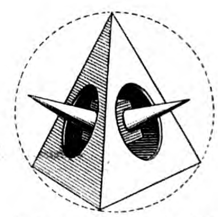


Fig. 69.—Pyramid and Star.

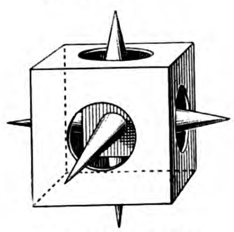


Fig. 67.—Cube and Star.

Fig. 68.—View of Star Separated from the Cube.

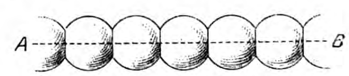


Fig. 71—String Bead.

The Art of Wood Turning.

until the turner is prepared to execute spiral work, such as shown in Figs. 65 and 66, which can be executed on the lathe by the aid of a few extra appliances. Besides these the lathe may be so arranged that many other forms of work can be done on it, such as eccentric and elliptical turning, spherical and puzzle turning, as shown in Figs. 67, 68 and 69. In Fig. 67 is shown a cube within a cube, on which is turned a star with six points. Fig. 68 shows the small cube and star as it would appear if detached from the larger cube. Fig. 69 shows a pyramid with a solid pyramid inside, having a pointed star wrought on it. These examples are all very well as exhibits of skillful manipulation, but they have little or no practical value except that in their formation the operator acquires a knowledge of the capabilities of his lathe of which he would not otherwise dream.

Another class of turning is what is termed "swash turning." This manner of turning gives to all the members on the work in hand a "rake" or inclination, which gives to the sections of the moldings an elliptical form. This is better illustrated in Fig. 70, which shows the balusters of a stairway "swashed turned," or turned at the same rake or inclination as the stair rail and string. This style of turning is quite common in Europe, but, with the exception of some examples to be found in our public buildings, it is seldom met with in this country. The author is of the opinion that in a residence erected for Mr. Hoe, of printing press fame, the balusters of the main stairway are "swashed turned."

them before centering them in the lathe. Suppose, for instance, we wish to have split in halves the string bead shown in Fig. 71. We take two pieces of stuff, a little larger in section than the half bead wanted, as shown to a larger scale in Fig. 72, and glue thin paper on the flat side shown at *a a*. Then take another similar piece of stuff and glue to the paper, clamp up and put in a warm place to dry. Now we have a square piece and of such a length as may be desired. This may be turned to shape as shown in Fig. 71, or any other shape that may be suitable to the work in hand. When finished the piece can readily be parted on the line A B, by inserting a knife blade in one end and tearing the paper asunder. Suppose we want a ball and angle or egg and bead molding for a bed mold of some kind to fit in a right angled corner, we may obtain it by following the instructions given herewith: In these cases instead of a "flitch" or half mold we only require a quadrant or quarter mold, so that one turning gives us four pieces. To prepare the stuff for the lathe we proceed as before in preparing the half, only that we may have the stuff wide enough to rip from it a number of half pieces. Glue the whole together with the paper between, and when dry rip saw the prepared stuff to the proper dimensions. Then dress the edges and glue together, placing paper between the joints as before, and putting them together in such a manner that the papered joints will cross each other as shown at S, Fig. 73. The juncture of the four quadrants must be as correct as possible, as this point must be the central axis around which the work is to be turned. In preparing the moldings for any particular piece of work it will be necessary to get the exact lengths required and to lay out the work so that the bulbs will miter together at the angles. This is very important, for should the miter come partly across the least diameter it would make a sorry job of the whole work. The necessity of being exact about the lengths applies to all moldings of this kind, no matter how long or how short the larger members of the turned work may be. If the molding is intended for a panel and the ends and sides of panel are different in length it will be necessary for the operator to turn the molding so that a bulb or long member will miter in the corners equally. It may so happen that the same division will answer, but the chances are that one division for the side will be required and another for the end. When this point has been decided and the whole length of the molding been determined the stuff may be placed in the lathe, care being taken that the central point or spur of the forked chuck enters the point S, at one end and the still center enter it at the other. The stuff may then be turned roughly cylindrical and the spaces for the various members marked on it, also the exact length required. This being done, the work may be finished in accordance with the design which, of course, provides that a large member of the molding shall be situated at each end of the stick.

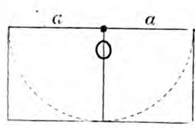


Fig. 72.—Half Section.

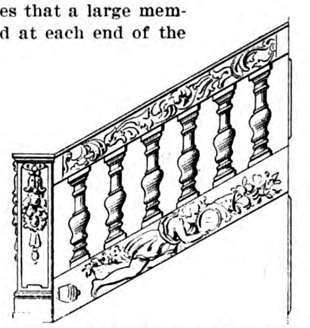


Fig. 70.—Swashed Turned Balusters.

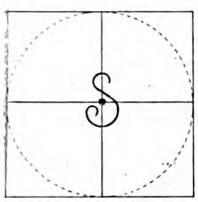


Fig. 73.—Section with four Quadrants.

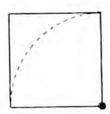


Fig. 74 —Quarter Section.

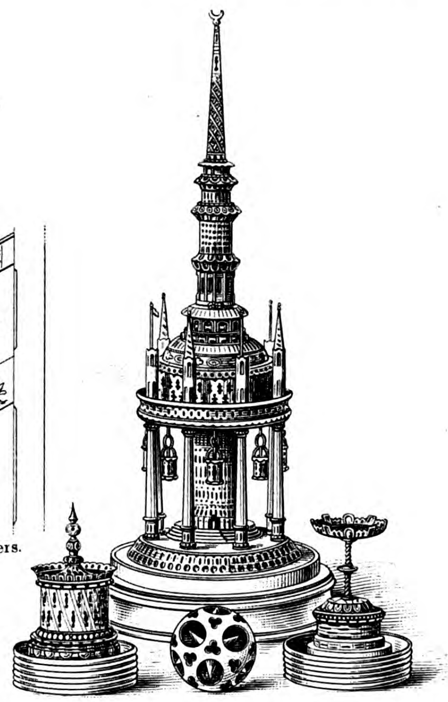


Fig. 75.—Examples of Ornamental Turning in Ivory.—About One-third full Size.

The Art of Wood Turning.

When the turning is completed take the piece out of the lathe and insert a knife or a thin chisel at one end of the work between the joints and the paper will split and allow the pieces to separate without much force being applied. Separate first the two parts, making the molding in halves or flitches, as shown in Fig. 72, then separate the sections into quadrants, as shown at Fig. 74, and you have the four moldings required.

The reader will readily see how this "kink" may be applied to many cases where half round or quarter round running moldings are required. In pattern making this kink is often employed in the making of cylindrical patterns that have a parting along their length, and for core points and many other things in connection with pattern making.

The glue used for this work should be of good quality, but rather on the thin side. Thick newspaper or other soft paper answers for the joints, and where the moldings are cut deep in the turning hard paper must be avoided, as in separating the molding will be likely to break, a circumstance that will be very annoying. After an opening has been made in the joint with chisel or knife a good thing to insert in the joint to separate the pieces is a saw blade, keeping the back edge of the saw against the unsplit paper until the whole falls apart.

We close these papers by giving an illustration of fancy turning in ivory, the work of an amateur, who seems to have been blessed with considerable skill, and much spare time. The several examples shown in Fig. 75 are one-third size and are certainly beauties in their own way. All of the work was done in the lathe, and is shown here merely to give the reader an idea of what can be done with that machine with the aid of a few extra attachments and skillful hands. Ornamental turning as illustrated in this paper may, at some future date, be treated at greater length.

Cure for Worms in Wood.

A writer suggests the following methods for treating wood which has been bored by worms. 1. Fumigate the wood with benzine. 2. Saturate the wood with a strong solution of corrosive sublimate. If used for carvings the color should be restored by ammonia and then by a weak solution of hydrochloric acid. The holes may be stopped with gum and gelatin, and a varnish of resin dissolved in spirits of wine should afterward be applied to the surface. 3. Whale oil and poisonous ointments have been found of service, the wood being carefully brushed before being operated upon. Still another plan is to dust the parts with pounded quicklime and then water them with ammoniacal liquor of gas works, when the ammonia will be instantly disengaged by the quicklime, and this is destructive to insect life.

THE plans for the group of buildings for the Exposition of American Manufactures, to be held next fall in Philadelphia under the auspices of the Philadelphia Commercial Museums and the Franklin Institute, have been approved and contracts for a portion of the work have been awarded. The proposed group of buildings will be about 400 x 900 feet in dimensions. They will be located at Vintage avenue and Thirty-fourth street, Philadelphia, on the site given by the city for the Museums. The group, although composed of four separate buildings, will form practically one structure, under a single roof, all the buildings being connected.

Comments on First Prize Design for $750 Houses.

The design which was awarded the first prize in the competition for $750 frame houses seems to have attracted attention in quarters where one would hardly look for the initiative to be taken in matters of this kind. On the editorial page of a recent issue of the *Sun* appeared the following rather caustic comments, which we reproduce in the hope that they will draw out an expression of opinion from those of our readers who may be interested in the question of house designing as well as in dwellings of low cost:

Some time ago our esteemed contemporary, the *Carpenter and Builder*, offered prizes for the best plans of a dwelling house not to cost more than $750. The first prize has been awarded to the plan drawn by a young woman of Worcester, Mass., and a very ingenious little house she has designed. It is a story and a half high, the half story being always desirable in small houses, and, aside from space, being treasured for its romantic appearance. A half story is supposed to give a little house something of the benediction of a real cottage and a thatched roof. Even the builders and real estate agents here pride themselves on half stories as a sure sign of "coziness." So a roof steep enough for a toboggan slide is always supposed to be "cozy." You not only may but will knock your head against something every time you go upstairs, but you have perpetual arnica in the reflection that "it's so delightfully cozy." Anybody who has ever lived in the country in a house with a steep roof will remember that his guests invariably collected bumps and said as they rubbed them apologetically, "it is so delightfully cozy." We know not what others may think, but as for us give us the steep roof and the cozy. But the longest person in the family should be made to sleep in a truckle bed as near the eaves as possible. It is no object to have a steep roof unless the rules are rigorously observed.

The Roof.

The prize $750 house has a steep roof, and is therefore acceptable. There is a beautiful pitch to it, so that there is a front bedroom or chamber, as it is always called in small houses, a bedroom so big that it seems a pity, and you feel like cutting it in two were it not that there are two small bedrooms or rear chambers behind it. These are not so large as Madison Square Garden, but they are comfortable and tight, provided the roof does its duty.

We have entered the house from the top because it was just as easy on the plan, and because it was right to salute the steep roof first. Going downstairs we find a hall, a parlor or sitting room, and a kitchen. There is no dining room, the sitting room being versatile. Or perhaps the kitchen is versatile. Or perhaps the front chamber can be used as a drawing room and the parlor as a dining room. You can have all sorts of fun in a small house, and all the joys of moving without the expense.

The Question of Plumbing.

There is no plumbing in this little house, but that would cost too much. Well, our ancestors got along tolerably well without plumbing, but it is handy, and even a $750 house seems a trifle incomplete without it. As compensation for plumbing there is a little covered porch or piazza into which the front door opens. Plumbing can be dispensed with, but a small house must have a piazza of some sort. Even the smallest family could not be at home in a small house without a piazza. And as more than compensation for all the plumbing in the world, there is a bow window for the parlor. What is a parlor without a bow window? The bow window may look out on nothing in particular, but it gives an air of moral grandeur to the little house. The gratified owner swears by that bow window. He is conscious that it is a distinction and a happiness. It may make the house a little cold in the winter, but what of it? Hasn't a little house as much right to be cold in the winter as an Italian palace? In spring and summer you ought to sit by that bow window. In short, a bow window is indispensable in a little house. It makes the house, and plumbing and all the brood of plumbers will not be missed.

The cost of the prize $750 house is estimated according to Worcester prices. In some parts of this town it would cost more. But this is a mere detail. Houses always cost more than the estimates, and even the builders of $750 houses must be prepared for trouble.

New Quarters of the Baron de Hirsch Trade School.

The Baron de Hirsch Trade School recently entered into occupation of its new home at East Sixty-fourth street and Second avenue, New York City, moving from the building at 225 East Ninth street, which the school has occupied for the past five years. The new building, which has been specially erected for the trade school by the trustees of the Baron de Hirsch fund at a cost of $150,000, is an imposing steel frame and brick structure, four stories high, with a frontage of 110 feet on East Sixty-fourth street. The school in its new quarters is equipped throughout with new machinery and tools of the most improved type for the instruction of the pupils in the trades of plumbing, carpentry, machine work and house and sign painting. The basement is furnished as a machine shop, and in one corner is a small forge where the boys can make some of their own tools. The second floor is devoted to the carpentry class, the third floor to the plumbing class, and on the fourth floor house and sign painting are taught. Complete models of bathroom and kitchen plumbing are mounted on platforms in the plumbing class room, which is also furnished with the necessary benches, gas furnaces and other equipments for the use of the pupils.

On the ground floor is a large lecture hall, where lectures will be given on general topics, as well as on theoretical and technical subjects connected with the different trades taught in the school. The first class of lectures will be open not only to the pupils but also to the public. Special rooms in the building are also devoted to classes in mathematics and mechanical drawing, each pupil receiving every week about three hours' instruction in these two branches. The school is open each day of the week, except Saturday and Sunday, from 8 a.m. to 5 p.m., and the full course of instruction in each trade occupies about five and a half months. This is considered a sufficient time in which to train the boys to become intelligent and capable helpers. The school does not attempt to turn out skilled mechanics. The average age of the boys in the school is between 17 and 18 years. None are admitted before 16 years. J. Ernest G. Valden is the superintendent of the school and has under him a staff of skilled instructors.

The Baron de Hirsch Fund was originally intended for the aid exclusively of Russian and Roumanian Jewish youths, but on account of falling off in the immigration of Jews from those countries Hebrew lads of all nationalities are now admitted to the school in the new building, where the space and facilities are so much larger than in the former somewhat cramped quarters. About 120 pupils are enrolled in the school at the present time. The building is lighted by both gas and electricity and power is supplied by two dynamos in a power house at the rear of the building.

ONE of the many architectural features of the World's Exposition to be held in Paris in 1900 will be a glass house or "luminous palace," some parts of which are already in process of construction. The principal *façade* in the form of an immense portico, its roof surmounted with spires and with a winged statue representing Light, will be supported by heavy columns. The ground floor, reached by a double flight of stairs, will be used as an exposition room, while to the right and left will be large glass basins overhung by grottoes of glass. In the interior of the hall will be five large openings in which will be represented the five divisions of the globe.

FRAME COTTAGE ERECTED FOR MR. JOHN RUST, AT PEKIN, ILL.

HERBERT C. CHIVERS, ARCHITECT, ST. LOUIS MO.

CORRESPONDENCE.

Grinding Machine Cutters.

From J. M. S., *Madera, Cal.*—What is the rule for finding the radius of the arc of the circle required on the cutting edge of the cutter shown in Fig. 1, this being intended for a sticker or panel raiser head, as illustrated in Fig. 2 of the sketches? It is supposed that the head in Fig. 2 is 4⅛ inches across on the dotted line A A, 6⅛ inches on the line B B, and 4⅞ inches on the line C C, the other end to taper to 3 inches on the line A A. How will I find the right sweep to grind it so it will cut level?

Filing Cross Cut and Rip Saws.

From S. A. M., *Parowan, Utah.*—I notice that "G. T.," North Adams, Mass., asks in the December number

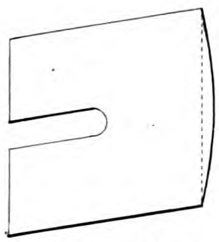


Fig. 1.—View of Cutter.

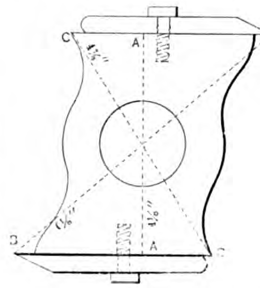


Fig. 2.—View of Head with Cutters Attached.

Grinding Machine Cutters.

of the paper with regard to the sizes of the files to use on saws having 9 and 11 teeth to the inch, also on a rip saw having six teeth to the inch. If the editor will allow me a little space I will endeavor to give some of my views on saw filing, although I am not an expert, being a young chip and self taught. In my judgment the best size of file to use on all hand saws is one which will just fill the teeth and no larger. The slim taper files are far the best for cross cut saws, my experience teaching me that saws should be jointed and the teeth brought to a uniform length. The saw should be rounding just a little from point to heel. Examine the set of the teeth and see that all teeth are set just alike. If any are set more than the others they will gouge and tear out the sides of the kerf, causing the saw to run hard and rough. If the saw is properly filed a very little set will answer, and the saw will cut faster and smoother than where there is too much set, even in green timber.

The next thing to be done is the filing. The files should be just large enough to fill the notch between the teeth, so that the points of both teeth being filed are in view all the time. They should be filed with the point of the file toward the point of the saw, as this gives the front of the tooth a good keen edge—much better than filing the reverse way. Care should be taken, however, not to bring the teeth abruptly to a point this way, as it is better to leave them a little blunt, and after they have been filed then go over the back of each tooth with the point of the file toward the handle, bringing each tooth carefully to a point, but at the same time do not allow the file to touch the front of the tooth. Do not file more than enough to bring the teeth to a point, as one more stroke of the file after the tooth is pointed is detrimental, and in some instances worse than leaving the tooth a shade blunt. The amount of pitch or hook given, also the amount of bevel, depends upon the timber to be cut. For soft wood such as pine the teeth should have more hook as well as more bevel than for the harder timbers, but the best results and the amount of hook necessary can only be determined through practice, and will vary with different men. When the saw is filed and in good working order the teeth will be of uniform length, size and shape.

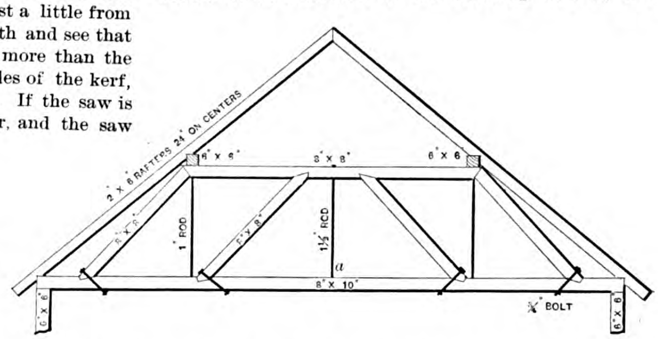
I always file cross cut saws so that by looking down the teeth from the end of the saw there appears to be a V-shaped groove running the entire length of the saw. By taking a common sewing needle and laying it in the groove, holding the saw at an angle, the needle will slide the entire length of the saw without running off the side. If the saw is not in a condition to permit this it will pay to rejoint it and file again, as a saw badly filed is very expensive to the carpenter as well as to the person for whom he is working. A great many carpenters keep their saws in a worse condition than any of the tools which they use. I do quite a little filing for the public, including other carpenters, and find that when saws are filed as above described they give the greatest satisfaction, and I have filed every way imaginable in order to get the best results. If the saws are kept in reasonably good shape the finer the cut of the file the better, as a fine file leaves a smoother edge than a coarse one, on the same principle that an oil stone will leave a finer and better edge than a grinding stone.

Design for a Five-Room School House.

From W. G. MUMMA, *Warrensburg, Ohio.*—I notice in the January issue the inquiry of "H. L. A." with regard to plans for a school house, but he does not state what kind of a building he wants, whether brick or frame; neither does he intimate what its cost should be. If he will give this information as well as other particulars likely to afford one a better idea as to what he requires, I may be able to do something for him, as I have designs of four, six and eight room school houses.

Roof for an Armory.

From R. M. B., *Alliance, Ohio.*—In reply to the inquiry of "A Man from Northern Ohio" in regard to a self supporting roof for an armory, I inclose a sketch of a truss which I have been successfully using on wide buildings. I have also used it in connection with bridges. The roof, I understand, is to be shingled and should be as indicated in the drawing—that is, 10 x 12 pitch. I frame the joist by placing an 8 x 8 timber between the trusses at the center and run the joist the same way as the rafter, spiking a 2 x 6 on the ends of the joist for a plate. I think this is the best plan for a truss for a light building.



Roof for an Armory.—Form of Truss Recommended by "R. M. B."

Designs for Cheap Brick Dwellings.

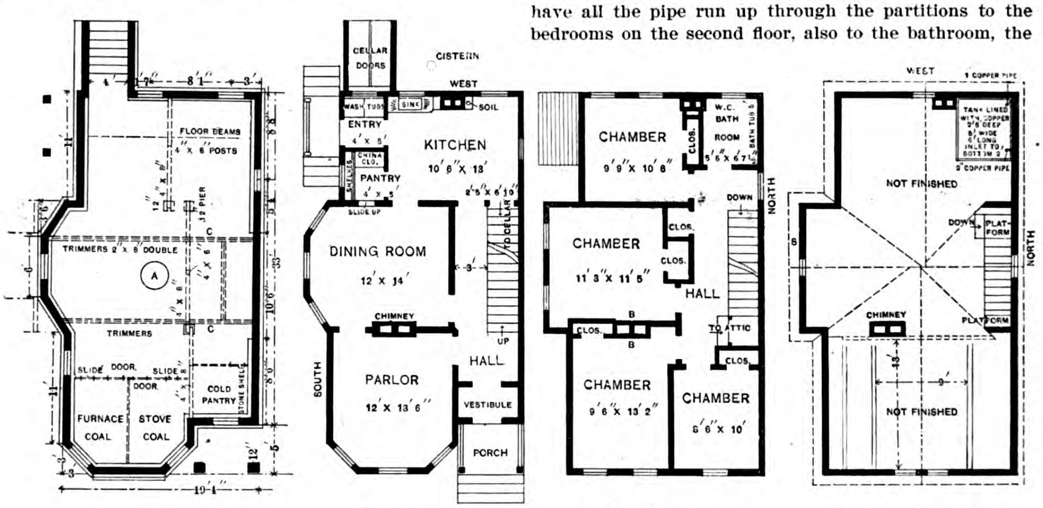
From W. H. C., *Edmonton, Northwest Territory.*—I should be glad to see published in the columns of the paper some designs of cheap brick dwellings, say, costing from $750 to $2000. I notice that the monthly plate is generally devoted to a frame building.

Note.—If those of our readers residing in sections of the country where brick houses of this character are common will forward drawings we shall be glad to publish them for the benefit of this correspondent and others interested.

Heating and Plumbing a House.

From N. H. D., *Newburg, N. Y.*—I come again for some information through the columns of the paper and inclose a set of floor plans, being those of the cellar, first and second stories, attic and roof, in the hope that some of the practical readers will answer the questions enumerated below.

1. How many feet of sheathing will it take to cover the roof, as indicated in the plan, or how many feet are there in the roof to be covered, the length of the roof at the rafter ends being 40 feet? The projection as shown by the dotted lines is 12 inches, except on the north side, where it is only 6 inches. The rafters on the gable marked "S" are cut by 9 and 12, the former being the level cut and the latter the plumb cut. The gable is 13 feet in width, as is also the gable on the north side. The front gable is 19 feet 6 inches wide and the gable at the rear, or the west side, is 18 feet 3 inches, and 12 and 12 will give the cuts for these rafters.



Foundation. First Floor. Second Floor. Attic and Outline of Roof.

Heating and Plumbing a House.—Floor Plans – Scale, 1-16 Inch to the Foot.

2. Will some reader give a rule for finding the amount of sheathing and shingles for the roof—one that is short and accurate being preferred?

3. This question relates to the plumbing and heating of the house shown by the plans. In its widest part through the hall and dining room the house is 21 feet 9 inches, the whole house being 38 feet deep. The first story has 9-foot ceiling and the second story an 8-foot ceiling, except in the bathroom, where the ceiling is 7 feet 6 inches. I desire the whole house to be heated by hot air. If a furnace is employed the chimney between the dining room and parlor can be omitted.

What is the best method of plumbing the house, depending upon the tank in the attic, the cistern and the well for the water supply? The tank in the attic is to be supplied by means of the gutter on the north side and from both cistern and well. The tank, in turn, is to supply the water closet, bathtub, range boiler and washtubs. The capacity of the cistern is to be about 1500 gallons.

4. What will make the best lining for a tank—lead, zinc or galvanized iron—copper costs too much? What would be the best pipe—lead or galvanized iron, and the best water closet to use?

5. Would it be advisable to connect the soil or waste pipe in the cellar or on the outside, the soil pipe coming down where marked in the bathroom and to be ventilated through the roof? The waste from the sink and wash trays is to be connected with the soil pipe and lead to a cesspool about 50 feet from the rear of the house.

6. What would be the best pump to employ to supply the attic tank with water from the cistern and well, if necessary; also at the kitchen sink? What size would be best for supply and waste? The overflow from the tank is to run into the leader and the latter into the cistern. Would a 4-inch leader be large enough?

7. What would be the best water closet supply, waste and soil pipes? How large a soil pipe should be used? How large should be the tile pipe to carry the waste from the soil pipe to the cesspool, and what would be the best shut off from gutter to tank?

8. What size hot air heater should be used for a house of the size indicated, two floors only to be heated, the cold air inlet being 8 feet from the ground?

9. Will some of the readers who have had experience in heating giving a sketch showing the sizes of pipe, registers, &c.? I prefer to have all the registers set above the base. Those in the parlor and dining room to be in the partition where the mantels are located and at B B in the two rooms on the floor above. Registers are to be placed in both halls. I would like, if possible, to have all the pipe run up through the partitions to the bedrooms on the second floor, also to the bathroom, the floor beams running north and south, as indicated at C C on the foundation plan. Would it be necessary to use metal where the heater pipes run up inside the partitions?

The plans which I inclose are intended for a narrow lot. I think they show a compact and convenient house and one which can be built at a moderate cost. I know of several houses somewhat similar in plan to this, but much larger, which when completed made a fine appearance; also two of the same size as this one, and they are neat and cozy. I understand, of course, that there is plenty of room for improvements which would make the house very costly. I hope the readers will give their opinions as to the arrangement of the rooms and shall be glad to have them suggest any material changes which in the light of their experience would prove advantageous. I may at some future time send the elevations and details for publication.

I consider that the best thing a carpenter can do when not otherwise employed is to spoil paper and sling ink, for by studying plans and details, with the help he can obtain from *Carpentry and Building*, he will shortly be able to plan a fair house, and at any rate familiarize himself with drawing. He can also work from plans to better advantage than one who takes no interest in such work. Let them draw their work on paper and note the difference in appearance as compared with the completed work.

Finding Strength of Girder Under a Hay Mow.

From C. M. J., *Ontario, Ohio.*—Will you please inform me through the Correspondence columns of the paper the size that the summer S, in Fig. 1, should be to support the joists and a mow of hay 18 feet high, the summer having a clear span of 16 feet, without braces? How close should the floor joists, 2½x8 inches by 16 feet, be spaced in the same floor? Please give size of the purlines P, P, Fig. 2, the rafters being 22 feet long, and the purlines placed under their center. The rafters are 2x6 inches, spaced 2 feet on centers, and cut over the purlines, the latter being 16 feet long between posts, with braces under, having 3 feet run. What are the rules governing the above?

Answer.—We submitted the above to F. E. Kidder, who says in reply: The questions asked can all be answered by the rules given in my article in the March issue, but the application of these rules to the above example may not be apparent to all. First, as to the summer. The first step is to find the load which it has to support. The floor area supported by the summer is found by multiplying its length by the distance between the centers of the span on each side of it—that is, one-half of the load from the joists on the left comes on the girder and one-half of the load from the joists on the right. In this case the span on each side is the same, hence the floor area supported by the summer $= 16 \times 16$, or 256 square feet. If one span were 16 feet and the other 14 feet, the floor area would be $\frac{16}{2} + \frac{14}{2} \times 16$, or 15×16.

The weight of the joists will be about 4 pounds per

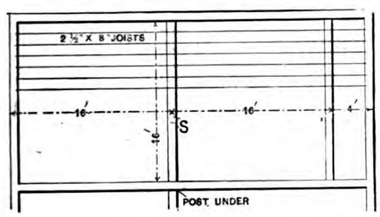


Fig. 1.—Plan View.

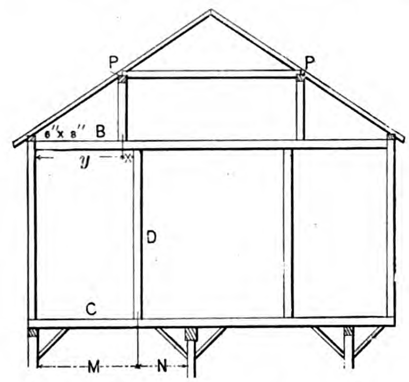


Fig. 2.—Elevation of Bent.

Finding Strength of Girder Under a Hay Mow.

square foot of floor, and 1-inch flooring boards will weigh 3 pounds more, making the weight of the floor 7 pounds per square foot. Each square foot of floor is also to support 18 cubic feet of hay. I do not know exactly the weight per cubic foot of hay in a mow, but in Colorado it is customary to figure 512 cubic feet of hay in a stack to the ton, which is about 4 pounds per cubic foot. At this rate our 18 cubic feet of hay will weigh 72 pounds, making the weight of floor and load 79 pounds per square foot. As the summer supports 256 square feet, the load will equal 256×79, or 20,224 pounds. To this should be added the weight of the summer itself, which we will assume to be about 480 pounds, making the total load 20,704 pounds.

Now the question is to find the size of beam having a span of 16 feet to support this load. As the load may be considered as uniformly distributed, the answer is afforded by Rule 3, page 60, of the March issue. As there stated we must assume or guess at the depth of the beam. We will try 14 inches. Then, by Rule 3 the breadth must equal $20{,}704 \times 16$ (the load by span), divided by twice the square of 14, multiplied by the coefficient for the wood. We will assume that the wood is to be Norway pine. Then we will have $\frac{20{,}704 \times 16,}{2 \times 196 \times 70}$ which equals 12 and a trifle over. The summer should therefore be 12×14 inches to be amply safe. If we had assumed 12 inches for the depth we would have obtained 16.4 inches for the breadth, which is not a good proportioned beam.

With regard to the distance the floor joists should be spaced on centers, it may be said that the *clear span* of the joists will not exceed 15 feet. A strip of floor 15 feet wide and 1 foot long will have to support, including its own weight, 15×79, or 1185 pounds.

Now, by Rule 3[1], we find that the safe distributed load for a beam 2½ x 8 inches, 15 feet span, of Norway pine, is equal to $\frac{2 \times 2\frac{1}{2} \times 64 \times 70}{15}$ or 1493 pounds. Then if the load per lineal foot of floor is 1185 pounds and the strength of the beam 1493 pounds, one beam will support 1¼ lineal feet of floor—*i.e.*, the beams should be spaced 15 inches on centers.

The purline P in Fig. 2 has to support all of the weight of the roof above it, and half way to the plate below, or three-fourths of 22 feet, or 16½ feet. As the purline is braced we need not take the full length for the span, but will deduct 2 feet from each end, calling the span 12 feet. The roof area supported by the purline will then be $16\frac{1}{2} \times 12$, or 198 square feet. The weight of the roof itself will be about 8 pounds per square foot, but we must allow considerable for wind and snow, so that 30 pounds per square foot may be considered as a minimum for the roof; $30 \times 198 = 5940$ pounds. Applying Rule 3, and assuming 8 inches for the depth, we obtain 8 inches for the breadth, or the purline should be 8 x 8 inches.

If the plate is tied so that it cannot be pushed out, or sprung, and the rafters are in one length, we can consider the rafters as supported at the ridge, and proportion the purline to carry the weight half way on each side only, or 11 x 12 feet in this case. The load at the ridge would then be carried to the plate by the rafters, and the purline will keep the rafters from bending. When the rafters are cut over the purline it is better to figure the whole weight on the purline.

The weight supported by the purline is transmitted by the post to the beam B, the larger portion is transmitted to the post D, and this again is supported by the beam C. A beam loaded in this way should be computed by Rule 7.

Dampness of Plastered Walls.

From H. A. F., *Port Antonio, Jamaica.*—Will some of the readers of the paper explain as fully as possible the cause of the dampness which seems to penetrate through a lath and plastered wall? The wall is covered with Adamant plaster, the rough coat having had mineral wool mixed with it. The paper was put on one month after it was finished, but after a lapse of ten months papering was tried again. In less than two hours, however, spots appeared and I am at a loss to know how to prevent them. I would state that the house has sheathing boards 1 inch thick, over which are shingles. The space between the sheathing boards and the plaster is 6 inches, filled in with mineral wool.

The plaster was mixed with pure rain water, the finishing coat being very fine. The paper that was put on is blue cartridge paper, but the paste was mixed with carbolic acid. When the dampness appears the paper becomes purple and for a while turns white. This, however, only happens in spots, but very large spots. The paper has been on now for about 10 months. Is it possible that the lime has too much alkali? Suppose varnish size is put on, will that prevent it? Is not burnt alum better to use in the paste? Should the old paper be removed before putting on the sizing? I shall be glad to have the readers discuss these questions in the next issue.

Note.—The questions raised by our correspondent open up an excellent field for discussion of an exceedingly interesting subject, and we trust our readers will come forward with expressions of opinion.

Plans for Roof of One-Third Pitch.

From C. E. E., *Boone, Iowa.*—In answer to "A. S.," Lancaster, Ill., I send two plans showing how the roof about which he inquires may be constructed. Fig. 1 represents a solution of the problem in which a deck is employed at the rear, while Fig. 2 indicates another method of construction.

Note.—We also have from "E. T.," Stanberry, Mo., solutions similar to those shown in Figs. 1 and 6 of the accompanying diagrams.

From C. O. M.—I inclose sketch of roof plan, Fig. 3, for the benefit of "A. S." of Lancaster, Ill. The partial elevation, Fig. 4, is sent in order to show the section of the wall above the line of the cornice.

From S. G. H., *Philadelphia, Pa.*—The inclosed drawing, Fig. 5, represents my suggestion for framing the roof of the house about which "A. S." inquires in the February issue of the paper. The general plan is all I supposed he wanted, so that is all I have sent.

From J. F. B., *Greenfield, Miss.*—I send a roof plan, Fig. 6, arranged for "A. S." of Lancaster, Ill. The only peculiar feature about it is a level valley 2 feet long at the intersections of the two valleys running down to the 6-foot projections.

From C. B. L., *Yorktown, Texas.*—The pencil sketch of a roof plan of one-third pitch which I send is in answer to the request of "A. L.," Lancaster, Ill., page 44 of the February issue of the paper. The roof could be built in many different ways, but I think the plan suggested in Fig. 7 will serve the purpose, as I consider it the easiest and cheapest way to solve the problem. The roof has three gables, one hip and five valleys.

Fig. 4.—Side View of Roof Shown in Previous Figure.

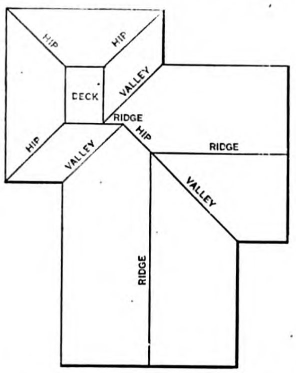


Fig. 1.—A Solution Offered by "C. E. E."

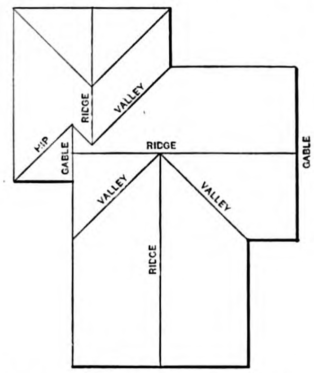


Fig. 2.—Another Method of Solving the Problem Suggested by the Same Correspondent.

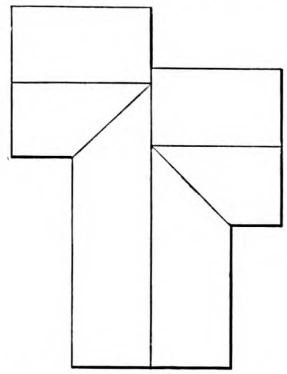


Fig. 3.—Plan Recommended by "C. O. M."

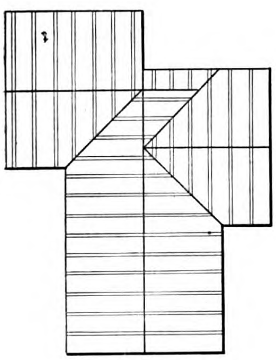


Fig. 5.—Method Suggested by "S. G. H."

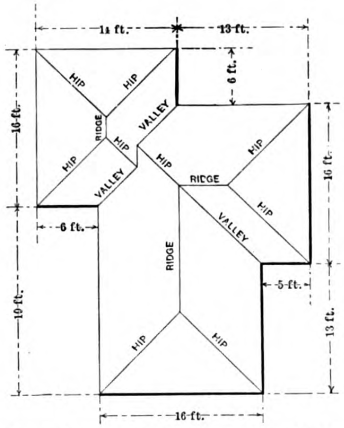


Fig. 6.—Plan of Roof Accompanying Letter of "J. F. B."

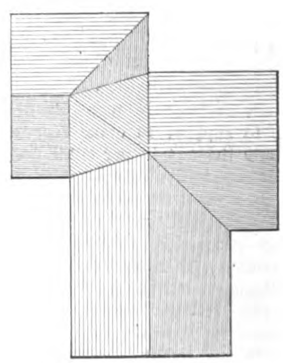


Fig. 7.—Solution of the Problem Contributed by "C. B. L."

Plans for Roof of One-Third Pitch.

Some Questions in Furnace Heating.

From J. M., *Washington, D. C.*—In reference to the case presented by "W. B." in the January issue, I think the answer given him is a good one and will partially remedy the trouble. He should make vertical pipe of a size that will be consistent with the size of the room to be heated and wrap the pipe with asbestos, taking care to have the asbestos positively tight around the pipe. Then he should put a sheet iron casing around it, with ½-inch air space between this casing and the asbestos wrapped pipe.

This casing should be made absolutely air tight where it connects with the wall of the building with putty and paint. A better way is shown in Fig. 1, which provides a sheet iron back against the building and for the circular casing to be connected with it by a lock seam. It is important to have the exposed pipe no larger than is necessary to heat the room with a lively current. Plenty of cold air supplied to the furnace and a good fire will do the rest. I have tried the above plan in several cases and, in fact, my chief business is remedying faulty burning apparatus.

From C. McG., *Rockford, Ill.*—I would advise "W. B." to make the horizontal pipe in the cellar 9 inches and cover it with asbestos. Then take a 3-inch pipe, as shown in Fig. 2, connected with the box between the joists just below the 7-inch pipe, which runs to the upper floor. Carry the 3-inch pipe back to the furnace and run through the casing at the top of the ash pit and turn the end up 6 inches with an elbow. The 3-inch pipe should run about 3 inches below the hot air to the furnace, and should be about 3 inches from the casing as it is carried down. If this plan is tried, the readers of *Carpentry and Building* would like to know the result. The outside wall is, of course, no place for a furnace pipe, but I think this will help to get out of the trouble reported.

From H. M. S., *Bayonne, N. J.*—I do not know that I can "come to the assistance" of "W. B.," Bridgeport, Conn., who asked information in the January issue, as it

make all turns so that they will be without any sharp corners, but smooth, to reduce the natural friction that comes in making a turn. Little attention is paid by many furnacemen as to where pipes are located on a furnace, particularly when a cone top is used. Any pipe that runs a long distance or has a great deal of work to do should be taken from the top higher up than the others are.

From B. R. W., *East Orange, N. J.*—In reply to "W. B.," I would suggest that he give the furnace a larger supply of air, then he will have hot air in abundance. If this does not produce the desired effect he should give further explanation of the conditions of the case. He should give the location of the furnace and the points of the compass, so as to show from what direction the cold air supply is taken and in what direction the different hot air pipes run.

What Causes Dampness of Brick Wall?

From A. P. H., *New Bloomfield, Mo.*—I am a reader of *Carpentry and Building*, and from the February and March numbers have obtained a great deal of valuable information. I desire to ask a question of the readers of the paper, which is this: I have a brick wall which be-

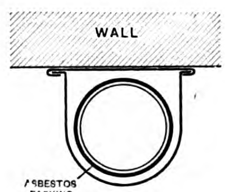


Fig. 1.—Section through Pipe, Showing Method of Casing It Suggested by "J. M."

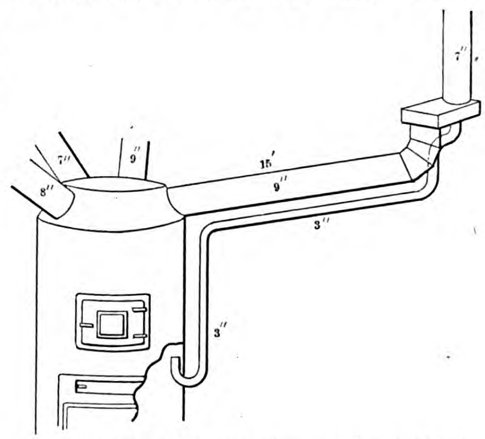


Fig. 2.—Furnace Attachment Suggested by "C. McG."

Some Questions in Furnace Heating.

R. L.

is difficult to advise in such matters without knowing more of the conditions that surround the case. However, I have had in some respects a similar experience with a furnace in my house, and possibly the course that I have pursued may give him a suggestion. When I first started up the furnace I found that one of the hot air pipes would not furnish any hot air, while all the others worked perfectly. I went into the cellar to see what was the trouble and found that all the pipes were hot except this one, which was cold. I have wrapped this pipe with several layers of fire proof paper, covering every part of its exposed surface. This prevented the cold air in the cellar from chilling it, as it was on the cold side of the cellar. It now works perfectly and gives out as much heat as any of the others.

From W. H. C., *Binghamton, N. Y.*—In reply to the inquiry of "W. B.," I would say that there is no reason, in my opinion, why that pipe should not heat if it is properly connected with the furnace and carried to the flue. An 8-inch pipe should be taken from the top of the furnace so that the rest of the pipes will not rob it of its share of the heat. It should be run with a pitch to the upright flue. Those who engage in hot air furnace heating should remember that hot air has one characteristic directly opposite to that of water. Water will run down hill; hot air will not. Hot air will flow freely when there is an upward pitch in the pipe or whatever carries it. I have been in the business for 30 years and put up 64 furnaces in 1897 and 49 the past year. These furnaces all operate, for the reason that I observe this one rule of providing an upward pitch in all of my pipes and

comes very damp and the paper gets moldy and will not stick to the wall. The plastering also crumbles. Will some one tell me the cause and give a preventive?

Test and Strength of Cement.

From W. W. S., *Brockton, Mass.*—Will some one give me the test for cement, and also tell me if there is any strength to cement after it has once set?

Roof Plan for a Hall.

From F. T., *Sumner, Ill.*—I would be glad to have some of my brother chips give in the Correspondence department of the paper a roof plan for a hall 24x50 feet in area with no supports through the center.

Circular Headed Window in Round Tower.

From J. W. C., *Vicksburg, Miss.*—I would like some of the carpenters to show in the Correspondence department how to lay out a window frame in a brick tower, say 6 feet in diameter, the window being of the same radius as the tower. The outside head is a semicircle. I once had a job of this kind and found it a knotty problem. I have been a constant reader of *Carpentry and Building* for the past seven or eight years, but I found nothing in any of the previous issues which threw light on this subject.

Note.—We lay this inquiry before our readers, suggesting to the correspondent that he may possibly obtain some valuable suggestions from the articles which appeared in the volume of the paper for 1892, more particularly the issues of August, September and October, in which was discussed at some length the subject of circular headed windows in curved walls.

Handsome Wrought Iron Grille

Some very handsome effects may be produced in wrought iron, the work being employed for a variety of purposes. A very interesting example of what may be done in this line is illustrated in the accompanying engraving, which represents a grille measuring 9 x 3 feet in size. It is made of hand hammered wrought iron and leaf work and is regarded by the manufacturers, the Ludlow-Saylor Wire Company of St. Louis, Mo., as a very artistic piece of work. The company have recently been turning out some excellent specimens of wrought iron work in the shape of elevator cars and inclosures, park and cemetery gates, vault doors, &c. The company are prepared to make original drawings for any class of artistic iron or brass work, and this department of their business is growing to large dimensions.

Seasoning Wood by Electricity.

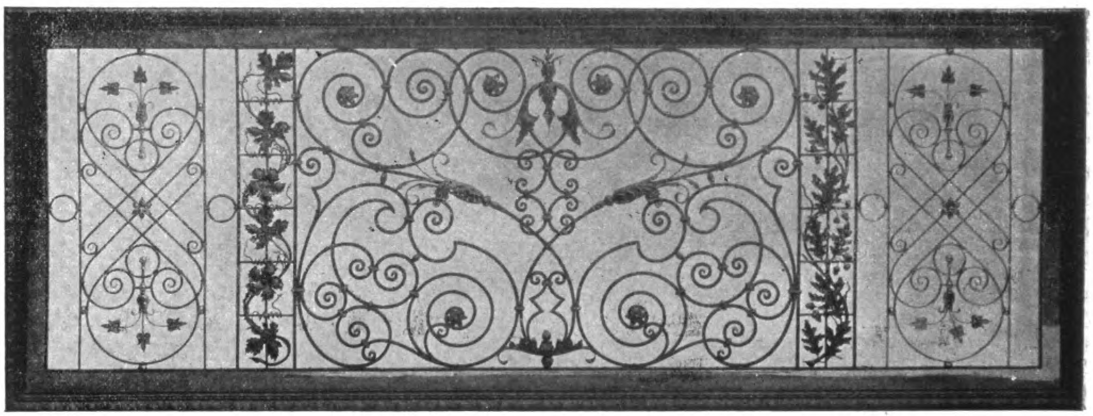
A model plant for seasoning wood by means of electricity, says the London *Times*, is now in operation at Johnson & Phillips' electrical works, near Charlton Junction, London, the system used being the Nodon-Bretonneau. The timber to be seasoned is placed in a large tank and immersed, all but an inch or two, in a solution containing 10 per cent. of borax, 5 of resin and ¾ of carbonate of soda. The lead plate upon which it rests is connected to the positive pole of a dynamo, and the negative pole being attached to a similar plate arranged on its upper surface, so as to give good electrical contact, the circuit is completed through the wood. Under the influence of the current the sap appears to rise to the surface of the bath, while the aseptic borax and resin solution takes its place in the pores of the wood. This part of the process requires from five to eight hours for its completion, and then the wood is removed and dried either by artificial or natural means. In the latter case a fortnight's exposure in summer weather is said to render it as well seasoned as storage in the usual way for five years. The current employed has a potential of 110 volts, the consumption of energy being about 1 kilowatt per hour for each cubic meter of timber, and the greener the wood the better, because its electrical resistance is less. The liquid in the bath is kept at a temperature of from 90 to 100 degrees F. Those who are introducing the process into this country from France do not profess to be able to give a complete explanation of its rationale, though they describe it generally as a case of electro capillary attraction, but they claim that its results are satisfactory, however surprising they may seem. They even state that some woods, such as the "maritime pine" of the south coast of France, which cannot now be properly dried, will, after their treatment, be found useful and serviceable for practical purposes.

Antique Oak Under Chicago.

It is stated by one of the Chicago papers that white oak logs which have been buried under the site of the city named for several thousand years have just been put to use. Prof. Ossian Guthrie, the Chicago geologist, who has studied the local strata and helped to unearth the remnants of some of these prehistoric trees, has come into possession of two toilet brushes, made from this ancient oak, that have surprised the manufacturer of imitation "antique" woods by the wonderful polish and color of which the genuine antique oak is capable. No precious woods that have ever been imported into Chicago are so marvelously beautiful as these specimens with which Professor Guthrie has been presented. Most of these prehistoric logs have been resurrected from their 7000-year old graves to be divided up among the museums and universities of the country. Walnut, willow, beech and most of the modern native woods have been dug up under these glacial deposits and alluvium of 70 centuries, but the white oak, the same tree evidently that flourishes in the parks to-day, has been preserved best of all. Some frightful cyclone appears to have bent and laid low the trees at first. The iron fibre is bent and twisted in nearly all of them at one particular spot in the trunk, and it is evident that this was the cause that first buried the giant forests under the sands and alluvium.

Some of these trunks have been followed by Professor Guthrie in the excavations for streets and houses for many feet. One trunk, in Sheffield avenue, was unearthed for 70 feet. Evidently this forest was the first growth after the glacial period. It lies close to the glacial clay, under the alluvial drift, at a general depth of 14 feet. The cyclone apparently laid the forest low, and the sand and drift were blown up from the lake and covered it. The water formed an air-tight capsule about the trunk and kept it from decaying. Of late years, however, the surface sewers have drained the water away from the trunks, and the bark and outer layers of wood have gone to decay. The iron fibre of the inner wood is still intact in most of them, however.

The wood from which Professor Guthrie's souvenirs are made was dug up near the corner of Calumet avenue and Thirty-ninth street, where many of the trunks are being chopped away in sewer excavating. No imitation antique wood has ever attained the singular beauty of this old oak. It is dark, almost a greenish black, the result of hundreds of years' discoloration by the surrounding water. The polish which it has attained is unlike anything ever seen by wood importers. The fibre of the wood was found almost as tough as fine wire in working it up. The usual process of "antiquing" is to steam and rub the dark color into the wood with bayberry wax, the latter imparting the greenish tint. This tint in Professor Guthrie's specimens has never been attained in the imitation antique, however.



Wrought Iron Grille.

MAKING A DRAWING BOARD.

EVERY young carpenter who desires to improve himself in the scientific part of his trade gives careful attention to drafting, and sooner or later builds for himself a drawing board or table, upon the accuracy of which depends the accuracy of much of the work which he performs, hence the necessity of having the very best of its kind. There is little excuse for a carpenter who has a poor drawing board, says a writer in one of our English exchanges. In the first place, as a fact, he should be able to build for himself a perfect article of the kind, and as this may be done in odd hours, without special cost to himself, he ought to have the use of such a piece of work for his own satisfaction. In the next place, a drafting board is something that he is likely to have occasion to build sooner or later on order, and therefore the experience that he gets from building one for himself is a desirable acquisition in a businss way.

To describe the construction of a drawing board, showing how to take advantage of the peculiarities of the wood that is used, will require such an investigation into principles and properties as will have an important bearing upon still other articles that carpenters are frequently called upon to construct. There is, however, nothing new to be presented in this case, and young carpenters who call the attention of their older mates to what follows, will, in all probability, be assured that there is nothing whatever new in it. Even so, it is still worth knowing, if you do not know it already. The drawing board that is made after the general directions which follow, we can assure the reader, will prove much more satisfactory in use than one that may be bought from shops or one that is hastily put together in the shop in a way to suggest the remark that any old thing will answer.

The material for a drawing board that is most convenient to obtain, and which at the same time is most satisfactory in use, is white pine. No other wood combines the features of lightness, softness, agreeable surface, and perfect retention of shape under varying conditions of climate as well as this beautiful wood. This is the wood for the carpenter to use for the purpose, even when some of the magnificent woods like mahogany or cedar are ready at hand. Whatever may be their advantages in some directions, pine has special advantages for the purpose in view in many others.

It is to be supposed that the carpenter, from various items of experience, knows that narrow stuff holds its shape far better than that which is wider. Accordingly, in constructing a drafting board he first rips his material into narrow strips and then builds up his board by gluing up these strips, always taking care to reverse them alternately, so as to secure the best results in the finished board.

Before giving the directions let us for a moment consider the reason why. To do this we must inquire at the outset concerning the shapes into which the wood shrinks when drying. It makes no difference how thoroughly seasoned the wood may be out of which we are to construct our drawing board, it is still liable to more or less shrinkage in use. Again, our board will always be more or less affected by the conditions of the atmosphere while we are working upon it, and therefore it is expedient to treat our material, so far as the method of handling is concerned, as though it were green. This said, however, it is not by any means to be inferred that under any circumstances whatever may green lumber be used for a drafting board.

The observant carpenter knows very well that a piece of wood does not shrink equally in all directions. He knows, for example, that it hardly changes its length at all. Crosswise it shrinks very perceptibly, but he knows that the shrinkage is not equal in all transverse directions.

In Fig. 1 of the accompanying illustrations is shown how wood shrinks in drying. The diagram represents the cross section of a tree. The greatest shrinkage takes place around the tree—that is, circumferentially—and the least shrinkage from the bark toward the center—that is diametrically. The result of this is that if we could concentrate all the shrinkage in one place, a dry trunk would have a V-shaped shrinkage crack in it, the same as indicated in Fig. 1. What actually takes place is that a number of check cracks make their appearance, all of them V shaped and wider toward the bark than in the center. The consequence is that if we take a plank, for example, like that shown in Fig. 2, the greatest shrinkage being in the length of the grains or annual rings, the whole plank will have a tendency to assume the form shown by the dotted lines. In other words, the result is precisely the same as though the grain extending from A to B were a cord or string, and by drawing upon this cord the wood is made to change its shape with the board pulled into the shape shown at C.

When the board is sawn as shown in Fig. 3, which,

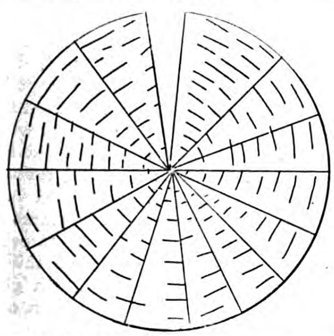


Fig. 1.—Cross Section of a Tree, Showing Season Cracks.

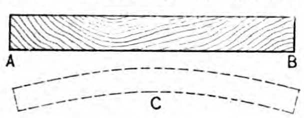


Fig. 2.—View of a Board Concaved by the Shrinkage of the Grain.

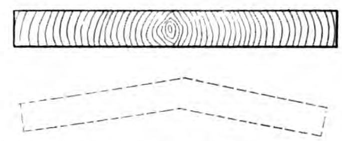


Fig. 3.—View Showing Tendency of a Board to Bend at the Middle by the Shrinkage Along the Grains of the Annual Rings.

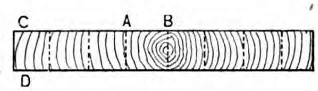


Fig. 4.—Section of Board, the Dotted Lines Indicating the Strips Into Which it May Be Cut.

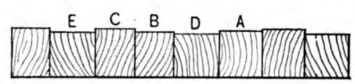


Fig. 5.—Suggestion of the Order in Which the Strips May Be Arranged for Gluing Together.

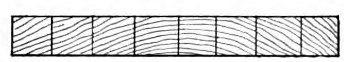


Fig. 6.—Section of Board Cut from Log Further Away from the Heart than those Previously Shown.

Making a Drawing Board.

as indicated by the lines, is nearly through the center of the log, the outer edges shrink in a vertical direction and do not very much change its shape, but the shrinkage of the grain or annual rings directly under the heart tends to draw it down into the shape shown by the dotted lines.

Cutting the Timber.

Now, by taking advantage of the facts above presented, somewhat exaggerated in the diagrams to make the case clearer, we are able to cut up our timber into such forms that when put together again it will not change shape appreciably. Suppose, for example, that we have the board shown in Fig. 4, which we want to use in the construction of a drafting table. We will assume that the thickness of this board is the same as that of the table to be made. The dotted lines show how it is to be cut up into square strips. By what has preceded we know that the strip C D will shrink most from top to bottom, but the strip A B will shrink most in a horizontal direction. The other shrinkages will be in the direction of the lines and not across them. If, therefore, we take these strips and carefully dress them on all four sides, we may put them together in such a way that all the grains will run as near as possible from top to bottom, with the result that the shrinkage will take place in the same direction.

This is shown in Fig. 5. The piece A contains the heart wood, the piece D, cut from the outer part of the board and at the greatest distance from the heart, has its grain running nearly from top to bottom. At B again, a piece is so placed that the grains run as nearly as possible from top to bottom. The same is true of E and all the other pieces. By slitting the board which we desire to use in the construction of the table, in the way here described, into square strips, it becomes possible to arrange the grains so that they will all stand in a vertical or nearly vertical position. By preference such pieces as A and C, and perhaps such a one as B, would be rejected in a table of the very best character, and yet where they are of very small size they will have so little influence on the general surface of the board as to be comparatively unobjectionable for use. In any event, in use, they should be placed as near the edge of the board as possible, and only the best pieces, with straight vertical grain. put in the center.

In Fig. 6 is shown another piece of timber cut from a log a little further away from the heart. The strips into which the board is ripped must be square on the end, no matter what the thickness may be, because if they are not square, or nearly so, they cannot be turned up edgewise and reversed so as to bring the grain upright in every case. Simply cutting the board up into narrow pieces will not answer, in spite of some carpenters' ideas on the subject. The point is to make the board so that all grains and annual rings will run from top to bottom. A natural board that happens to have its grain run this way will usually stay flat.

Board of Large Size.

If the drafting board to be made is of large dimensions, 5 feet wide by 12 feet long, the strips for it should be about 2 inches square when dressed, and, in addition to gluing, should be doweled to each other. Additional strength may be secured by iron rods running all the way through the built up boards edgewise.

No particular care need be taken to have the strips accurately of the same size. They need to be square and near enough alike in size so that after they are glued the upper rough side, as shown in Fig. 5, can be planed down to a true surface. If, through ignorance or carelessness in putting the pieces together, with most of the grain horizontal, the resulting board will be in no better condition than if made from wide stuff. If the strips are laid as shown in this cut the board will warp, since all the pieces have the grain lying in such a direction as to produce the greatest amount of shrinkage or swelling crosswise. Examples of this method of work can be frequently found even in piano shops, where great care has been taken to slit the wood, and where no care has been given to the arrangement of it after this has been done.

With a large heavy board, 5 or 6 feet in width, and from 12 to 15 feet in length, in spite of plates or dowels, it will be found that the ends will open to some extent with the wetness or dryness of the atmosphere. To prevent this the end or grain of the wood should be painted where it is exposed to the air. For this purpose something that is entirely water proof should be used. A very good white lead, or something of the same kind which has a solid body, will answer the purpose. Shellac is useless for this use. It is so porous that the dampness of the air will enter the wood in spite of repeated coatings.

In small boards, 30 or 40 inches in length, where the strips are but ½ or ¾ inch in thickness, dowels are not necessary. If the strips are carefully glued up, a board of this size can be made with end pieces tongued and grooved and glued into place. This makes a desirable finish for the ends. The resulting board is very light and has the advantage of being alike on both sides, which for many purposes is very convenient. The thinness of the wood, however, and the absence of cleats, renders such a board too thin for rough usage, and accordingly it is better adapted for light drafting than the heavy work of a shop.

Cutting Veneers.

A new system of cutting up all kinds of wood into boards, or veneers, of any width up to 5 feet, and of great lengths, is said to have lately been brought out by a German named Oncken. The timber in the round form to be converted is cut into lengths equal to the width of the boards, or veneer, required. It is then placed in a closed vessel, in which it is acted upon by steam, through which passes a current of electricity. The wood being thus softened and made easily workable, it is placed in a machine in which it is mounted like a short column in a lathe. It is then rotated against a knife in this machine, the wood and knife receiving a motion which gives them a relative longitudinal movement, so that a continuous board, or veneer, is smoothly cut from the slowly rotating log until its diameter is below that which the knife can reach. The machinery is largely in use for the manufacture of sheets of wood, from which casks and tubs are manufactured, so that they are constructed of one stave. The long strip of wood with the grain running transversely is snipped, and this enables the hoops to bring the long strip into the form of a cask or of a tub. There are already two factories in Germany—namely, at Bremen and Frankenthal—where these machines are in successful operation and turning out immense numbers of boxes and barrels ready for shipment. A third factory is established at Antwerp, where a large quantity of strip is made and converted into barrels, and arrangements are being made for turning out an enormous quantity of cement and other barrels under contract. Veneers from cedar and other materials are beautifully cut by the machine, and so thin that the cedar may be veneered to cheap woods for cigar and other small boxes.

A FEATURE of the recent convention of the National Association of Manufacturers in Cincinnati which possessed more than ordinary significance, in view of the new national conditions under which the association met, was the presentation to President Theodore Search of a gavel of unique design. The gavel, with which the convention was called to order, was the work and gift of the E. D. Albro Company, a local industrial concern. The woods of which it was made came not only from the United States, but also from its recent territorial acquisitions. Ebony from the Philippines, satin wood from Porto Rico, cedar and mahogany from Cuba, and holly, oak and walnut from the United States were united in the composition of the instrument. It was an object eminently typical and entirely suitable for an occasion on which the expansion of American trade and commerce formed the principal subject of consideration.

The Builders' Exchange

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To Unaffiliated Exchanges

The position in which the National Association of Builders now stands toward organizations of builders throughout the country not yet included in its membership is such as to encourage affiliation and support, for reasons that have not existed until now. Heretofore the exchanges composing the association have assessed themselves an annual tax sufficient to provide for extensive printing and for the maintenance of an officer whose function was, almost solely, to keep persistently before builders all over the country—in and out of the association alike—all the information in regard to organization, in its every phase, that has been gained through years of experience and careful, painstaking effort. No labor or expense has been spared in the past to make the method by which the association sought to accomplish its work as efficient and far reaching as possible. The prosecution of the work in this manner, however, has involved an expense requiring an annual assessment that has seemed to many of the smaller exchanges more than they could afford to pay, and they have, therefore, been debarred from taking active part in the work, and from doing even so much as they felt able toward its support.

While in very many cases new exchanges have been helped in their formation by the National Association, they have failed to derive a full benefit or an adequate understanding of its work, because of a lack of intimate personal connection therewith. As the policy of the association now exists, all the relations which make membership and intimate connection possible and desirable are open to any organization of builders in the country, however large or small it may be. The removal of all causes of expense has permitted the reduction of the cost of membership to an amount not to exceed 25 cents per member of the local body, thus entirely wiping out the principal, if not the only, reason that has prevented exchanges from joining in the work of the National Association.

This reduction of cost, together with the decision granting speech in conventions to any member of any constituent exchange, and the restriction of entertainment in such a manner as to entirely relieve any local organization from the burden of entertaining delegates and visitors to the conventions, places the association in a position where its benefits and all the helpfulness and advantages of national organization may be participated in by every builders' exchange in the country. The personal connection of members of exchanges in one city with members of exchanges in other cities under the fraternal protection and encouragement of the National Association will give its work a more practical value and fix it more permanently in the minds of all than has been possible up to the present time. The association—that is, the exchanges of which it is composed—is now so situated that they themselves shall do that part of the work which has heretofore been done in the secretary's office. The local exchange is now the active "missionary" for the establishment of the benefits of organization, and as fast as new exchanges join the work, so fast will new "missionaries" be created, and so fast will the practical benefits of the work be extended in the way which shall make it most valuable to all concerned.

The manner in which the National Association has worked up to the present time has been the only one by which the pioneer work could have been accomplished with the thoroughness and extent it has attained, but the conditions are no longer the same as they were when the association was formed, for through that pioneer work builders generally have been informed of the nature and value of organization and have been furnished safe and efficient lines upon which they have become organized. As a result of the work of the association and the successful examples it has created, builders' exchanges exist in nearly every city of importance in the country, where none or few existed before; but the pioneer work being finished the time has come when all builders' exchanges should come together at least once a year and consider jointly the questions and issues which affect them as a whole. Recognizing the fact that nothing must stand in the way of the closest possible bond of union between builders throughout the whole country the National Association has taken what are believed to be the most direct and simple steps toward establishing the intimacy, interest and fraternity among builders which offer the greatest amount of satisfaction and protection at present attainable, so far as business organization among builders is concerned.

Local exchanges everywhere in the United States are earnestly urged to consider the question of joining the National Association and lending it their support. The exchanges of the country need the help and support of each other quite as much as the builders in any given city need each other's help, and the National Association is the instrument through which that help may be given and received.

Efficiency of a Builders' Exchange.

In order to indicate the efficiency which may be attained by a properly organized and carefully conducted exchange, the following summary of the report made by the delegates from the Master Builders' Exchange of Philadelphia to the Milwaukee convention of the National Association is given.

The report showed that action had been taken looking to the installation of a 500-light electric plant in the building owned by the exchange.

Remonstrance against the introduction of a clause in specifications requiring the contractor to become responsible for any directions that may be given by the Building Inspector, and that the owner will not pay for any work which will be ordered by the Building Inspector after the contract is signed.

Protest against the solicitation of bids for the West End Trust Building both in the aggregate and in detail, resulting in the contract being awarded to the general contractor.

Recommendation that the practice of paying for the use of plans to be estimated upon be discontinued.

Appointment of a committee to make application for a portion of the Franklin Fund, to be used for the benefit of the trade school.

Numerous addresses at regular and other meetings from persons expert in the several phases of the building business.

Entertainment, consisting of four lunches throughout the year, average attendance of 200 persons at each lunch, the usual lunch and entertainment on the last day of the year, and personal entertainment and the hospitalities of the exchange to all visiting members of sister exchanges, at a total cost of $818.16.

The appointment of a committee to prepare a form of contract for use between the general contractor and the sub-contractor.

New Publications.

HOW TO FRAME A HOUSE. By O. B. Maginnis. Size, 7¼ x 10½ inches; 76 pages; numerous illustrations; published by the author; price, $1.

The author of the above work has just published a new edition in which is incorporated what is known as Part III, describing the method of framing the timbers for a brick house. The text is comprised in seven chapters, the first dealing with the methods of construction as laid down by the building laws of the City of New York, covering first story fire proof floors, studding and wooden floor beams; the second chapter treats of second and upper story beams, partitions, bridging and angular framing, following which fire proofing wooden floors; partitions and doors, roofs, bulkheads and fronts; wood and iron construction, heavy beams and girders and the method of framing a log cabin are considered. This portion of the volume is written in the same general style as Parts I and II, with which our readers are doubtless already familiar.

Utilizing Waste Heat from Furnace.

In discussing the topic "Simple, Inexpensive Schemes for Warming and Ventilating Small Buildings, Dwellings, &c.," at the annual meeting of the American Society of Heating and Ventilating Engineers, Prof. R. C. Carpenter described the attachments made to a hot air furnace which was burning enough coal to heat the building in which it was placed without doing it. The attachments were made with a view of increasing the heating capacity of the furnace and reducing the fuel consumption.

The first attachment was a water heater placed in the fire and combustion chamber for heating water to be circulated through radiators placed in rooms that were not satisfactorily warmed. This addition enabled the furnace to heat the building, but did not reduce the waste of heat in the chimney or reduce the coal consumption sufficiently. The temperature of the gases at the point where they ent red the chimney was very high and the draft very rapid. The velocity of a draft increases with the temperature very rapidly up to 250 degrees, but much slower as it reaches the maximum at 550 to 600 degrees.

In order to utilize the heat of the gases so that a smaller amount of fuel would do the work a section of a recently introduced cast iron wall radiator was incased in a galvanized sheet iron box and connected with the return pipe from the radiators. This box was made to fit close, so that it would bring the hot gases into contact with the radiator. The smoke pipe from the furnace was connected with one end of the box and the hot gases allowed to pass over the surfaces of the radiator section and then dive under a partition at the opposite end before escaping to the chimney pipe.

This method of utilizing the heat that had previously gone to waste was adopted in preference to creating an air heating chamber by jacketing the smoke pipe, owing to water absorbing heat much more freely than air. This attachment had a double effect; it heated the return water without interfering with the circulation and practically nullified the waste of heat in the chimney as far as was desirable by reducing the temperature of the escaping gases to 150 degrees. It also reduced the work to be done by the water heater in the fire chamber. The introduction of the water heater and radiators reduced the amount of air to be heated by the furnace, and utilized the heat of the gases in heating the water so as to enable less fuel to do the heating. A comparison of the amount of fuel previously consumed and the amount of heating done with the work now done and fuel now consumed shows a saving of about 50 per cent.

A WOMAN architect is about to be admitted an associate of the Royal Institute of British Architects, and is understood to be the first woman member of that institute. In order to become an associate of the institute stringent examinations have to be passed. Miss Ethel Mary Charles, the lady who is now a fully qualified architect, passed as a probationer in 1893, her student's examination in 1895, and last year passed the final examination, which lasts five days, and requires the student to design a building of an important public character, to show a complete knowledge of style, construction, planning, foundations, the manipulation of all kinds of building materials, specifications, estimates, &c., and proficiency in one ancient and one modern language. The architects have already dubbed the new associate Charles the First.

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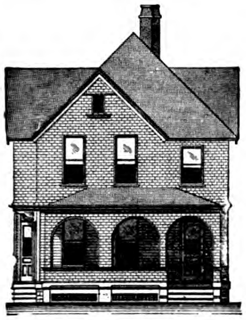

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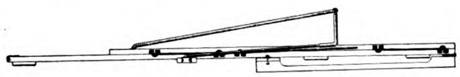
NOVELTIES.

Adjustable Sash and Door Bench.

Illustrations are herewith presented of an adjustable sash and door bench manufactured by A. L. Flegel of Racine, Wis., and designed for the use of carpenters in holding sash and doors of all sizes and thicknesses in a proper position for fitting and hingeing. The idea of such a bench was



Novelties. – Adjustable Sash and Door Bench.—Fig. 1.—View of Bench as it Appears when Folded.

evolved by practical experience. The use of a device of this kind not only means the saving of time but it enables the work to be done in a really proper manner, which cannot be said of the crude methods ordinarily employed. The bench is so constructed that it can be folded up as shown in Fig. 1 so as to occupy very little room when not in use. The sash or door is held rigidly on edge, so that the work of fitting and putting on hinges can be performed properly. The base is constructed so that it keeps the bottom edge of the door or sash from coming in contact with sand or dirt of any kind. The base is also provided with a grooved top to keep the edge in its proper place. The position of the bench adjusted for the smallest size of sash or door is shown in Fig. 2. The bench can be lowered for larger work by removing the upper ends of the brace rods and inserting them in the sockets to suit other widths. This platform, when arranged to hold a small sash or door, has sufficient strength to bear the weight of any ordinary person, which demonstrates the stability of its construction. The manufacturer states that the ability to fold this bench makes it possible to remove it from one room to another without danger of marring wood work or plaster by coming in contact with doorways or walls. The castings are all malleable and other metal parts are made of good steel. The wood is ash, well selected and seasoned, with a natural oil finish. The manufacturer claims that this is a strictly labor saving device, that better work can be performed with it than by the old methods and that with proper usage it

Fig. 2. – Position of Parts when Holding Smallest Size of Sash or Door.

will last a lifetime, and that one-third of the time can be saved by its use.

Wood Working Machinery.

We are indebted to the Hall & Brown Wood Working Machine Company, with office and factory at 1913-1929 North Broadway, St. Louis, Mo., for a copy of the illustrated catalogue which they have issued showing their latest improved machinery for planing mills. Since the previous catalogue was issued they have largely increased the number of their productions, including among others the well-known Mississippi planers and matchers. The company announce that they have succeeded in producing machinery which fully meets the requirements of modern planing mills, and the demand which they are receiving for the machines is striking evidence of their increasing popularity. The catalogue is of somewhat unusual size, the pages measuring 12 inches in width by 18 inches in length, thus affording opportunity for the display of several cuts upon one page as well as the use of illustrations of liberal proportions where only one occupies a page. The goods include self feed saw tables, band sawing and resawing machines, ripping machines, molders, surfacing machines, planers and matchers, &c. The manufacturers call special attention to their latest improved patented rear roll adjustment, which they are now using on all their heavy stationary bed double surfacers, also on their well-known Mississippi planers and matchers. It is pointed out that by moving the rear rolls away from the under cutter head with a hand wheel provided for the purpose the operator can very easily reach or gain access to the lower cutter head for inspecting, cleaning or removing it. This, the manufacturers state, is a valuable improvement, both as to saving of time as well as accessibility to the lower cutter head. Several pages in the catalogue are devoted to the names and addresses of some of those using Mississippi planers and matchers, and there is an enumeration of the supplies which the company carry in stock. The last page illustrates a number of accessories, such as molding cutters, saws, planer cylinders, emery and corundum wheels, journal boxes, coupling, hangers, machine knives, &c.

The Kokomo Ornamental Fence.

An illustration is given in Fig. 3 of an ornamental fence manufactured by the Kokomo Fence Machine Company, Kokomo, Ind. This fence is adapted to any purpose for which an ornamental design is needed, as in the inclosing of lawns, parks, cemetery lots, &c. It is a combination of wire and iron. In the construction of this fence the manufacturers state that only the highest grades of steel tubing and wire are used. The fabric is made from pickets formed by twisting two No. 11 galvanized steel wires together. These pickets after being formed are held in position by four or five cables, depending on the hight of the fabric. The cables are made from the same size and grade of galvanized steel wire, and are formed as the pickets are woven in by a series of right and left twists, thus securing ample provision for contraction and expansion. A very important feature of this ornamental fabric is the manner in which the top is formed. The pickets are woven in in such a way as to interlock all the tops, which greatly adds to the strength of the fence and prevents it from being bent out of position or mutilated. The top or line rail is 1¾ inches in diameter and is continuous, being interrupted only in case of openings for the gates. Three different styles of fabric are made, but all of them possess the lock top. Three different hights of each kind of fabric are kept in stock—namely, 24, 30 and 36 inch.

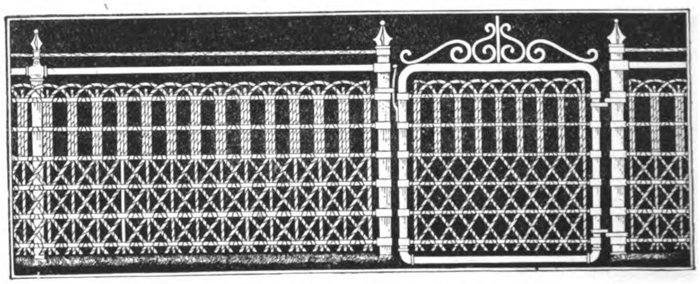


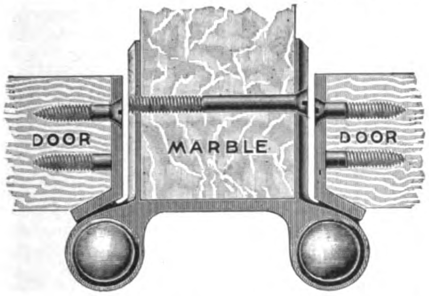
Fig. 3. – The Kokomo Ornamental Fence.

The Canton Steel Roofing Company

of Canton, Ohio, have issued their annual catalogue in a style which will be appreciated by the trade. It is a neatly bound volume of 128 pages, covered with green paper, and presenting on its front page a view of the concern's extensive works at Canton. Various sorts of roofing are considered among the early pages of the volume—the H. W. Smith patent folded lock seam roofing being the first, the Smith patent roofing coming next in order, after which we find standing seam roofing, roll and cap roofing, pressed standing seam roofing, the Dover continuous tin roofing, tin shingles, roofers' supplies, paints, brushes, &c. Corrugated sheets cover ten pages, the different corrugations being shown by illustrations, crimped iron likewise being illustrated. Crimped sheeting, siding of all kinds, pilasters, corners, window caps follow. Building fronts of various sorts are illustrated, likewise fire proof shutters. The next lines taken up are eave troughs, gutters, hangers, followed by conductor pipes, elbows, shoes, hooks, conductor heads and cut offs. Sheet metals are noticed, following which is a large line of cornices; next come finials and crestings. Skylights are illustrated in a number of styles, ornaments and weather vanes filling several pages. Ventilators and chimney caps come next, and at the end are some fine half-tone illustrations of ceilings and wall plates.

Oxford Spring Hinges.

Van Wagoner & Williams Hardware Company, Cleveland, Ohio, and 14 Warren street, New York, have put on the market the Oxford spring hinges for marble work as here shown.

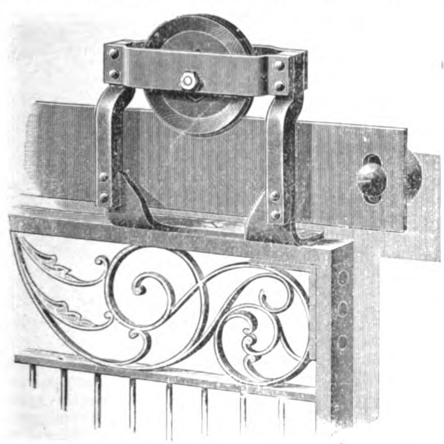


Novelties.—Fig. 4.—Section Showing Application of Oxford Hinge.

They are designed especially for use in connection with water closets, in hotels and similar places, and are furnished usually to order on receipt of the marble dimensions. Fig. 4 is a cross section illustrating its relation to the marble partition. As seen in the cut, a single acting door on each side of the slab is swung from a pair of hinges. The hinges are made of bronze and brass, and can be finished in any way as desired.

The Lane Elevator Door Hanger.

A new style of hanger designed especially for use on passenger elevator doors has been brought out by Lane Brothers of Poughkeepsie, N. Y., and is shown in the accompanying illustrations. It is often the case that hangers intended for this purpose are selected from some of the numerous styles of parlor or house door hangers which, it is claimed, are not altogether suited for this use, owing to a variety of reasons. One of the most potent causes of trouble is said to be the fact that the loose or adjustable parts of the hanger wear abnormally on account of the slamming of doors. As will be seen from an examination of Fig. 5, which shows the hanger in position, the device has a solid steel frame with no joints or loose parts, and is fitted with a ball bearing wheel. Particular attention is called to the great amount of use to which such hangers are subjected and the necessity of thorough durability. In Fig. 6 we present a sectional view of the wheel and bearing used in this hanger, which, we understand, is the same as that supplied with the company's ball bearing parlor door hanger, the claim being made that the cups, cones and balls are made in the best possible manner. The track is supported at the ends only, thus reducing to a minimum the work connected with erection. The adjustment is accomplished by means of the track.



The Lane Elevator Door Hanger. Fig. 5. View of Hanger in Position.

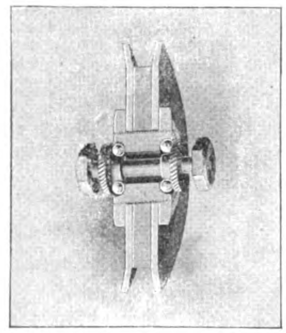


Fig. 6.—Sectional View of Wheel and Bearing.

The Acme Wind Mill Regulator.

The Novelty Mfg. Company, Rock Island, Ill., have recently brought out the Acme wind mill regulator, illustrated in Fig. 7, which is designed to keep a tank full of water without further care or attention after its attachment to the wind mill. A float, which is connected by wires with the regulator, rests on the top of the water in the tank. When the tank is filled the upward movement of the float releases the dog on a lever which, by connecting mechanism, pulls the mill out of gear and stops the pump. When the water in the tank falls 5 inches the wheel is thrown in gear again and the pump starts to work. The regulator thus prevents overflowing and the consequent annoyance of a mud hole around the tank, while on the other hand the tank is always kept full of water. Much wear is saved on both wind mill and pump.

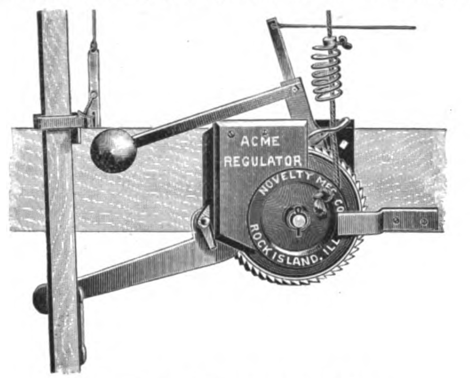


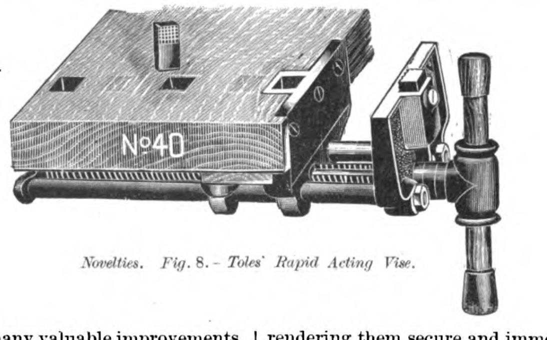
Fig. 7.—The Acme Wind Mill Regulator.

Bathroom Fittings and Fixtures.

Searls Mfg. Company, Newark, N. J., are manufacturing a large line of fine bathroom fittings and fixtures of solid cast brass and brass wire, polished and nickeled. There is a large assortment of towel racks, combined soap and sponge holders, brush and comb holders, sponge holders, towel shelves, soap cups, toilet paper holders for both sheets and rolls, tumbler and match holders, both to stand and screw on, tooth brush and whisk broom holders, cigar rests and robe hooks. A new toilet paper holder, No. 3556, for rolls, is made of heavy spring brass wire, with a broad curved top of spring sheet brass, which acts as a brake and keeps the roll from releasing more paper than is required. This device, polished and nickeled, is offered at a much lower price than some of their more elaborate holders. Another novelty just brought out is an adjustable bath seat, which consists of a quartered oak seat, 18 x 6 x $\frac{7}{8}$ inches, with rounded corners and edges and covered with five coats of varnish. The seat is held in positon by curved arms of heavy brass wire $\frac{5}{16}$ inch thick, which are partially covered with rubber to protect the tub, and so attached to the seat that they can be moved backward and forward to fit different tubs or folded so as to occupy a minimum amount of space when not in use. Frederick Klages, 127 Duane street, New York, is sole agent for this line of bathroom fixtures.

Toles' Rapid Acting Vise.

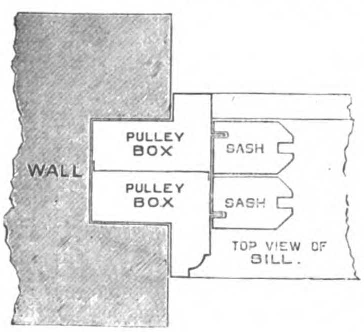
We take pleasure in laying before our readers in Fig. 8 of the engravings an illustration of a new vise, embodying many valuable improvements, which W. C. Toles & Co., Irving Park, Chicago, Ill., have recently added to their already extensive line of wood workers' vises. The company have recently erected shops on their premises where, by increased facilities, a more advantageous location, with a corresponding reduction in expenses, they are better prepared than ever before to supply the trade with these goods. We understand that the vises are having a large sale among manual training schools throughout the country, the manufacturers claiming that they are well calculated to stand without breakage or repairs the severe usage to which they are subjected in those institutions. A gratifying fact in connection with the utility of the goods is that the company's customers are continually duplicating their orders. Catalogues and circulars giving full information relative to the goods can be had on application to the address given.



Novelties. Fig. 8.– Toles' Rapid Acting Vise.

Rasner's Fire Proof Metallic Window Frame and Sash.

The number of instances which have occurred in the recent past whereby the interiors of buildings have been seriously damaged by fires



Rasner's Fire Proof Metallic Window Frame and Sash.—Fig. 9.—Partial Section through Frame and Sash.

resulting from exterior causes has served to strongly emphasize the necessity of fire proof window frames and sash, more especially in connection with structures where iron shutters are not employed as a means of protection. No little attention has been given to this phase of the fire proofing question, and as a result numerous methods for accomplishing the object sought have been brought to the notice of the public. One of the means of rendering the windows and sash fire proof is that adopted by Rasner & Dinger, Second avenue and Ferry street, Pittsburgh, Pa., and illustrated in the accompanying engravings. In this case the frames are designed to be built in the walls, thus rendering them secure and immovable in case of fire. The sash are of the sliding pattern, and the manufacturers claim that they can be operated even more easily than ordinary wood sash, owing to the fact that they are not affected by dampness, and consequently do not swell and stick. The frame and sash are made of copper or galvanized iron, all joints being thoroughly riveted, locked and soldered, thus insuring strong flush joints which, it is claimed, cannot be separated by fire, while presening a smooth surface for finishing. In Fig. 9 of the illustrations we show a horizontal section through the window frame and sash, while in Fig. 10 is represented the frame of the window with the sash shown without glass. The lower parts of the frame or sash guides are detached and the sash swung forward, the weight being pulled out, thus exposing the interior of the weight box. It will be seen from an inspection of this engraving that the simplicity of construction permits of quick access to the weight boxes, and that the sash chains and weights are easily adjusted. An important feature in connection with this construction is that the sash are glazed with wire glass ¼ inch thick, thereby dispensing with the unsightly tin covered shutters often employed to protect window openings. The sash are made with an angle rabbet, so that the glass can be puttied in as in the case of wood sash, except that in addition to the putty a metal cleat is attached to the sash which holds the glass much more firmly than by the use of putty alone. The entire construction is referred to as being durable, fire proof and weather proof, the sash fitting snugly in the grooves and being firmly locked when closed. The manufacturers state that any size or shape of window can be made without limit to architectural effect. The frame and sash have been very severely tested as to their fire proof qualities, one of the latest fire tests having occurred in Brooklyn on the afternoon of March 1, under the auspices of James White, the New York agent, the results being highly gratifying in all respects.

In this connection it may be interesting to state that the makers have patents pending on a three-sash sliding sheet metal window, the purpose of which is to fill the wants of high class office and other buildings. The construction consists of three sash balanced by counter weights in the ordinary manner, the two upper outer sash being glazed with prismatic or plain wire glass for fire protection and the lower inner sash glazed with clear glass, thus giving an unobstructed view from the inside. With this arrangement the occupants upon leaving their offices may with little trouble raise the sash glazed with clear glass and pull down the center sash glazed with the fire retarding glass, thus giving a complete fire screen. In places where the operation of these sash by hand is objectionable, an automatic attachment may be applied in the shape of a simple fusible catch of the ordinary swivel construction, which connects the two upper sash together. For purposes of ventilation, &c., these can be operated as one, and in the event of a fire, being made to part at any desired temperature, would allow the center sash to instantly drop, the

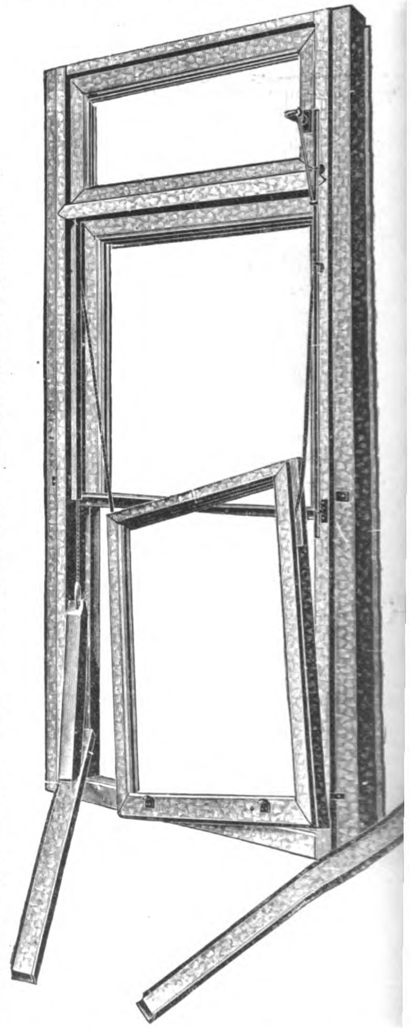


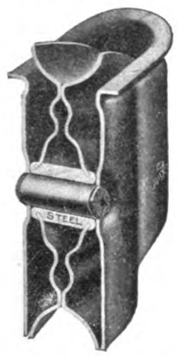
Fig. 10.—View of Frame and Unglazed Sash, Showing Sash Guides Detached and Weight Pulled Out, Exposing Interior of Weight Box.

counter weight being light so as to allow the sash just enough momentum not to injure the glass.

Rasner & Dinger announce that they have arranged with James White of New York; J. S. Thorn Company, Philadelphia, Pa.; S. D. Hicks & Son, Boston, Mass.; James A. Miller & Brother, Chicago, Ill.; W. H. Mullins, Salem, Ohio, and Shackleton Brothers, Cleveland, Ohio, to act as manufacturing agents of this sheet metal window frame and sash.

New Fox Window Pulley.

The Fox Machine Company, 387 North Front street, Grand Rapids, Mich., have just added to their already extensive line of steel sash pulleys a new pattern known as No. 5, the construction of which is indicated in the accompanying engravings. The pulley, as shown in sectional view in Fig.



Novelties.— The New Fox Window Pulley. - Fig. 11.- Sectional View of Pulley.

11, has corrugated sides, and will exactly fit a mortise made by boring four 13-16-inch holes in line with centers ⅝ inch apart, the same as for their No. 3 pulley, except that the new one may also be used in a straight mortise, presenting the same appearance in either. A good idea of the mechanical construction which is common to all the Fox pulleys may be obtained from an inspection of this engraving. The wheel is composed of two disks rigidly formed and held firmly together by the company's patent double shouldered steel bushing, which makes a very easy running wheel as well as a serviceable bearing. The bushing is shown in Fig. 12 of the engravings, while Fig. 13 represents the shouldered steel axle. The bushing, we understand, is also furnished in anti friction bronze metal when desired. Another distinctive feature of the new pulley is its interlocking fasteners, as they are termed, and we understand that the company will furnish, free of charge, one of these two-prong locking sets with every barrel of pulleys. The company have just brought out a new catalogue illustrating their pulleys in three-color work, a copy of which, we understand, tney will send, with sample pulley, to any one sufficiently interested to make application.

Fig. 12.—Doubled Shouldered Steel Bushing.

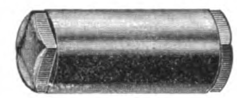


Fig. 13.—Shouldered Steel Axle.

Newly Improved Universal Wood Worker.

In Fig. 14 of the illustrations we present a general view of a newly improved universal wood worker adapted for a wide range of operations. In fact its uses are so multifarious that the manufacturers state that one "can build a house on this machine and do all the work to advantage." The column is cored out and cast in one piece, making a solid base for the machine and preventing vibration of the mandrel and heads when running at high speed. One point in connection with the machine to which the makers call special attention is the patent connected and movable bearings, which are adjustable laterally across the machine in square gibbed slides by means of the small hand wheel in front. Thus, when the operator has his fence set for doing work he can adjust the head with great rapidity to the exact line wanted, a point much appreciated by all classes of wood workers. The spindle has an outside bearing which can be instantly removed, giving free access to the head. Both tables may be adjusted vertically, horizontally and to the circle of the head independently, or may be drawn clear back from the cutter heads or saws and then may be moved back again without disarranging the tables. The convenience of the adjustments cannot fail to be appreciated by wood workers when doing gaining, rabbeting, sawing, &c. There are four inclines to each table, one at each corner, arranged so that all wear may be taken up and the tables always kept in perfect alignment. The gaining frame is referred to as something new and novel. For panel raising the manufacturers furnish two panel heads with a special fence, so that both sides of any door panel of any shape can be raised at the same time. The boring side can be used for all kinds of boring or routing, the table being raised and lowered independently by the cranks shown in the engraving. A fence for angle boring is fitted on the table, with stops for spacing the holes and routing. The builders are the Egan Company of 221-241 West Front street, Cincinnati, Ohio, who are putting out many new machines this season in order to keep fully abreast of the natural evolution that goes steadily on in the mechanical world.

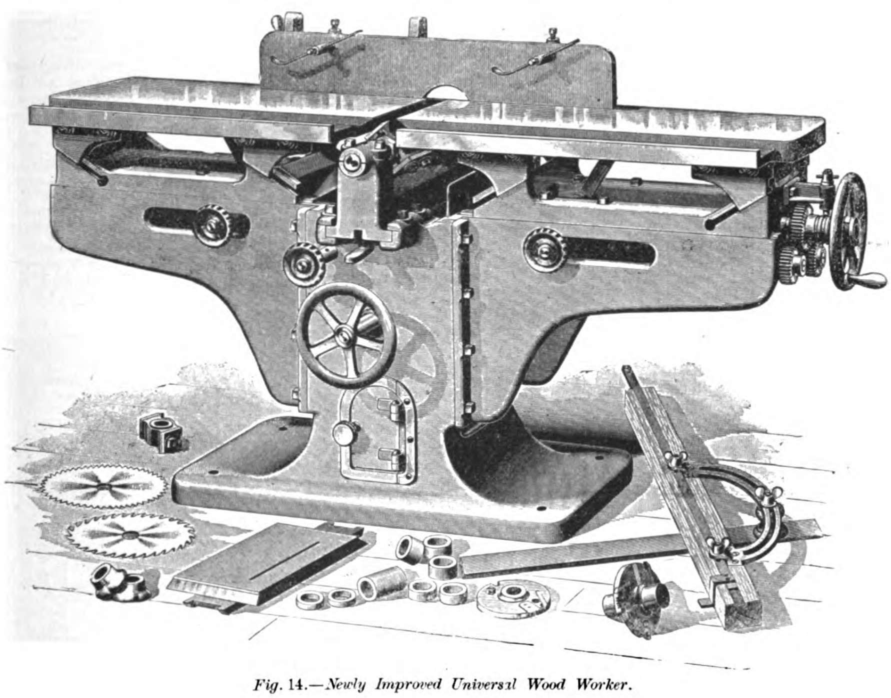
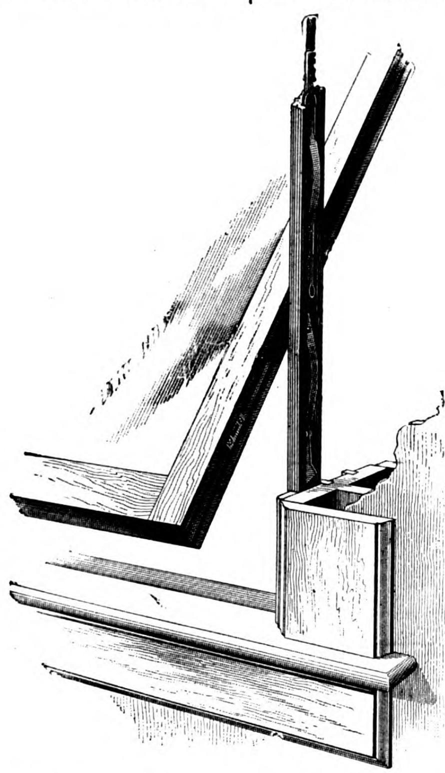


Fig. 14.—Newly Improved Universal Wood Worker.

The Century Safety Revolving Window Fixtures.

A device which will strongly appeal to architects, builders and house owners generally is the Century automatic safety revolving window fixtures, the use of which is illustrated herewith. By means of this fixture windows may be revolved in such a way that they may be cleaned on either side from the interior of the room while the cleaner remains standing on the floor. Fig. 15 of the accompanying engraings represents a broken view of the window and frame, showing the strip carrying the fixture in position, while the window is shown partially turned. The patent automatic latch, which appears just above the broken portion of the window frame, prevents the sash from being turned except when at certain points, consequently the window cannot be revolved by accident or by carelessness. The relative positions of the upper and lower sash can be changed so that the upper sash can be revolved in place of the lower sash if desired, bringing the outside of the window on the inside for the purpose of cleaning. The arrangement is also such that the sash may be raised and lowered from the top and bottom for purposes of ventilation, or they may be arranged so that the ventilation is either at the top or bottom, thus giving a free circulation, while preventing a draft, as is often the case with ordinary windows. The construction is such that the sash may slide up and down in the ordinary way, and at the same time either sash may be revolved separately and independently. If so desired they may also be revolved together, either at the top or bottom of the frame, thus leaving the entire window space open for the purpose of ventilation or as a door for egress and ingress. This is a very desirable feature in connection with the device, as it is often a matter of great convenience, especially on ground floors or in connection with porch windows. The fixtures are furnished in steel or brass attached to oak or maple bars, all ready to apply to the window. Another feature is that the device is applicable to old as well as new windows, and may be applied to windows with single sash as well as to those with double sash. It is especially desirable for hotels, schools, churches, hospitals, apartment houses, flats, factories, &c., while being almost a necessity for modern office buildings. The device is being introduced to the building trades by the New Century Mfg. Company, 22 Clinton place, New York City. When desired the windows can be fitted with a steel adjustable safety lock suited for use in connection with the revolving fixture above referred to. The lock, however, is a separate affair and can be attached to any window, rendering it impossible to open it except from the inside, and then only by knowing how the device operates. It will firmly hold either or both sash at any point desired, permitting a ventilation from the top or bottom of the window or both at the same time, while the window remains securely locked. Fig. 16 represents a sectional view of a window frame, showing the locking mechanism.



Novelties.—Century Automatic Safety Revolving Window Fixtures.—Fig. 15.—Broken View, Showing Strip Carrying Fixtures in Position and the Window Partially Turned.

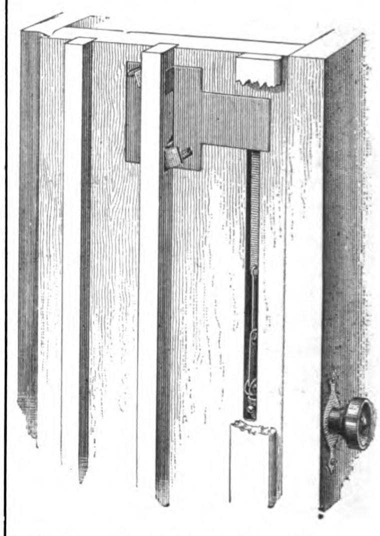


Fig. 16.—Sectional View, Showing Locking Mechanism.

The Chicago House Wrecking Company.

A remarkable catalogue has been issued by the Chicago House Wrecking Company, West Thirty-fifth and Iron streets, Chicago. This is the company who purchased and dismantled the Chicago World's Fair buildings and the Chicago Post Office Building. They have also taken down a number of other structures in that city and elsewhere, making a business of disposing of the material thus available, which covers a great variety of products suitable for rebuilding. They have established large storage warehouses and yards for this purpose, conveniently located for railroad facilities, and have added merchandise and material purchased at sheriffs', receivers', trustees', assignees' and manufacturers' sales, establishing what they now claim to be the largest mail order depot in the world for a great variety of goods. The catalogue shows how remarkable is this variety. Iron and steel roofing and siding, wrought iron pipe, fittings, steam and gas fitters' supplies, wire of all kinds, wire rope, wire fencing, wire nails, bolts, cut nails, wood screws, rivets, emery wheels, platform and family scales, chains of all kinds, tackle blocks, hatchets and axes, shovels, locks, wagons and plumbers' supplies are merely mentioned as indicatng how wide a range the catalogue covers. The company not only advertise these goods for sale, preferably in carload lots, but announce that they are in the market as buyers from those who wish to quickly convert any kind of goods into cash.

Imperial Padlock.

The Slaymaker-Barry Company, Connellaville, Pa., John H. Graham & Co., 113 Chambers street, New York, general sales agents, are making the Imperial lock No. 75, shown in Fig. 17. It has a polished and nickeled iron case, cap and shackle, the locking mechanism is bronze metal, the spring shackle is self locking, and there is a key cylinder of brass. The action is referred to as that of six-lever locks. There are two flat steel keys to each lock and the goods are put up in boxes of six, 50 dozen in a case.

Fig. 17.-Imperial Padlock No. 75.

TRADE NOTES.

A FINE half-tone plate, about 11 x 15 inches in size, of the new terminal station at Boston, from a negative by Soderholtz, is being sent out to architects by Samuel Cabot of Boston, Mass. Interesting statistics in regard to the building (which is the largest railway station in the world) are given, and attention is called to the fact that 62,000 square feet of Cabot's insulating quilt were used to insulate the heating and ventilating ducts, under specifications of Prof. S. Homer Woodbridge, the expert, who has used the quilt many times before in his work, notably in the Rutland Hospital at Rutland, Mass.; the High School at Newton, Mass.; the Insane Hospital at Medfield, Mass., &c. The quilt is made with and without the asbestos covering, and is a very efficient and cheap insulator and deadener, the makers claiming for the asbestos quilt that "it is the only article made which combines the qualities of heat insulation, sound deadening and fire proofing."

THE GRAND RAPIDS CARVED MOLDING COMPANY, 19-21 Myrtle street, Grand Rapids, Mich., are turning out some very handsome designs in the way of carved moldings, which are cut in the solid wood and are not pressed metal. The moldings are adapted for a wide range of use, and the manufacturers are meeting with a large demand for them. They have recently issued some new circulars relating to these goods and copies will be forwarded to any architect or builder who may be interested.

"FILE FILOSOPHY" is the title of an interesting little work which is being distributed among their friends in the trade by the Nicholson File Company of Providence, R. I. It sets forth in a comprehensive style the general classification of files, together with the definition of file terms, the proper methods of handling and using files so as to secure the best results, as well as a description of the most common files and the ordinary uses to which they are applied. The book is in reality an abridgment of the company's "Treatise on Files," which was published in 1878, and which has always held a high place in the literature pertaining to files. The original treatise being long since out of print, and in response to the demand for copies of it, the company have brought out the present little work on "File Filosophy." The text is illustrated in a way to prove of interest, and, altogether, it affords a valuable addition to the literature of the subject. We understand that a copy will be forwarded to any one who is sufficiently interested in files to make application to the company at the address above given.

A RATHER unique scheme for brilliantly lighting arched ceilings while concealing the source of the light is that adopted in the ball rooms of the Waldorf-Astoria Hotel at Sherry's and in the dining room of the Democratic Club of New York City. The lighting is accomplished by a clever device originated by I. P. Frink, 551 Pearl street, the method having also been introduced in private residences, it being especially valuable where ceilings are richly decorated. The electric lights are retained in a recess behind the cornice, there being a series of reflectors behind the lights placed at such an angle as to give every portion of the ceiling a uniform light.

A COMBINATION cellar cupboard and dumb waiter or cooling well elevator is the subject of an announcement in another part of this issue by G. A. Mentzer & Co. of Elgin, Ill. This device is of such construction that it may be readily hung by any one, as it requires no nails to be driven or timbers to be cut, nor does it occupy permanent space in the room. It is of a character to be readily adapted to any house, old or new, and with or without cellar. We understand that the device is shipped on trial and that agents are wanted in all parts of the country for it.

THE FLEXIBLE DOOR & SHUTTER COMPANY of 74 Fifth avenue, New York City, have acquired by purchase the entire wood working plant of Clemence & Searles of Worcester, Mass., where the various "Flexifold" specialties will be manufactured in the future. The company will retain, for the present at least, their offices in New York and Chicago. Charles R. Clemence, who has had an extensive architectural as well as mill experience, will manage the business, the products of which, we understand, are rapidly growing in public favor. With largely increased facilities for the complete installation of the "Flexifold" partition, both wood and steel, school wardrobes and builders' finish, which may be added to new or old construction, the company would seem to be in a position to satisfactorily meet the increasing demand for their important specialties.

W. C. TOLES & CO., Irving Park, Chicago, Ill., are meeting with a very flattering demand for their rapid acting vise for wood workers, reference to which is made in another part of this paper. These vises are adapted for the use of pattern and cabinet makers, carpenters and car builders, manual training schools, &c. Circulars illustrating and describing the goods will be forwarded by the manufacturers upon application.

THE ROEBLING COMPANY announce that they have succeeded the John A. Roebling Sons' Company and the New Jersey Wire Cloth Company in the fire proofing of buildings. They are now prepared to furnish plans, make estimates and enter into contracts for the erection of any of the Roebling concrete systems, or for the most approved tile construction. Their New York office is 121 Liberty street.

MANY of our readers will doubtless be interested in the announcement made in another part of this issue by the Samson Cordage Works of Boston, Mass., who direct attention to the Samson spot cord, an illustration of which is given in connection with their advertisement. The manufacturers state that for hanging windows it will outwear any other device.

A. MUGFORD, the well-known engraver and electrotyper, Hartford, Conn., with New York office at 120 Liberty street, New York, is sending out a very handsome pamphlet, entitled "Glimpses of Our Plant," which gives truthful views of the various departments. It also illustrates the character of his work, which embraces designing, wood engraving, half-tones, line work, electrotyping and catalogue publishing.

LYNTON T. BLOCK of 1109 Chemical Building, St. Louis, Mo., now represents the Ohio Foundry Company, Steubenville, Ohio; F. G. Janush, New York City, and the A. F. Voss Mantel Company of Louisville, Ky., the makers of fire grate specialties. In this connection it is interesting to note that considerable activity prevails in both the business and residence building trades of St. Louis and adjacent territory.

THE AMERICAN BRICK COMPANY is the name of a concern recently incorporated under the laws of the State of New Jersey with a capital stock of $10,000,000, the objects being to manufacture, buy, sell, deal and trade in any and every kind of bricks, stone and building material and supplies. The principal office of the company will be at 1 Exchange place, Jersey City, N. J. The incorporators include Oakleigh Thorne of Millbrook, N.Y.; Edward Thorne, Babylon, L. I.; Raymond C. Knox, Fred. W. Saunders, Charles Hensel of New York City, Edward Morse of Irvington, N. Y., and John M. Ferry of Bayonne, N. J.

FRIEDLEY & VOSHARDT, 194 and 196 Mather street, Chicago, have just issued a steel ceiling catalogue which will be highly appreciated by the trade. It consists of 60 pages, 10½ x 13½ inches, beautifully illustrated. Great care has been taken with all the details of this catalogue so as to make it worthy of the high character of the work of which it treats. Illustrations are given of a number of ceiling designs, which are on a sufficiently large scale to give an intelligent conception of the appearance of the completed ceiling with its center panels, borders and decorations. Views are given of interiors of churches and other public structures which have been supplied with steel ceilings made by this firm. Accompanying these illustrations are views of a great number of designs for panels in low and high relief and in geometrical and highly decorative patterns. The variety of treatment to which sheet metal is adapted is well illustrated in these designs. Moldings, friezes, center pieces and sheet metal ornaments come in for a fair share of attention in the catalogue. Full directions are given for applying these ceilings. The firm issued their first ceiling catalogue two years since, and in that time their business has increased tenfold. The advantages of steel ceilings have been so thoroughly demonstrated that it is not necessary to enter into argument to set forth their many good points.

THE FOREST CITY PAINT & VARNISH COMPANY, Cleveland, Ohio, issue a circular calling special attention to their Carbonite black elastic roof and iron paint. It is described as a preventive of decay; will not crack or blister; is not affected by heat or cold, being elastic under all conditions, and will stop leaks and prevent rust. It is adapted to use on roofs of all kinds and of any material, and is largely employed for coating pipes, tanks, outside iron work, gutters, copings, smoke stacks, &c. A statement in the circular is to the effect that a roof perforated with holes can be made water tight in a few moments by applying a muslin patch coated with Carbonite.

THE L. S. STARRETT COMPANY, Box 65, Athol, Mass., announce in another part of this issue that they will send free upon application a copy of a 112-page catalogue of their tools to any one who may be sufficiently interested to indicate their wishes. The catalogue illustrates a varied line of mechanics' tools, including squares, levels, steel rules, dividers, bevels, nail sets, &c.

THE DECORATORS' SUPPLY COMPANY, 215 South Clinton street, Chicago, Ill., have issued a magnificent publication illustrating their grilles. It comprises 40 pages of large size, presenting magnificent illustrations of most artistic work in this branch of interior decoration. The designs are executed in any native wood and much care has been bestowed in preparing them so as to be capable of adaptation in ordinary space, or reasonable modification without additional cost. In addition to grille work the company manufacture composition ornaments and plaster and cement relief for exterior and interior decorating appropriate to the requirements of architectural work. The specimens shown in the catalogue cover a great variety of grille work, from plain patterns to the most elaborate and intricate designs.

THE PHENIX MFG. COMPANY, 618 Hubbard street, Milwaukee, Wis., call the attention of architects, builders and house holders generally to the Phenix combined window screen and awning, which they manufacture and which is referred to in their announcement, published in another part of this issue. The device is so constructed that it admits no flies when raising or lowering the awning, is easily operated and can be hung or removed from the inside. It is referred to as affording ideal ventilation, promoting clean windows and as giving solid comfort. The manufacturers have issued a descriptive catalogue and will take pleasure in sending a copy, together with prices, to any address on application.

THE CORTRIGHT METAL ROOFING COMPANY, with main office at 50 North Twenty-third street, Philadelphia, Pa., and with western office at 134 Van Buren street, Chicago, Ill., direct the attention of the trade to the present prices of their well-known Cortright metal slate, Victoria shingles and roofing sundries, reference to which appears in another part of this issue. The company state that in the manufacture of their standard grade of goods they employ a prime, full weight terne plate, the cost of which has advanced considerably since the first of the year, thus necessitating a revision of the company's selling prices. Those who are interested in goods of the character indicated can secure quotations on application.

WE have just received from the International Correspondence Schools at Scranton, Pa., a copy of a 16-page pamphlet which they issue, entitled "Short Courses" in English Branches, Bookkeeping, Stenography, and Mechanical and Ornamental Drawing. The matter is prepared in a way to interest the prospective student and to afford him a very clear idea of the methods pursued at this institution. Some of the distinctive features of the International system are that in the courses of instruction for particular occupations only such processes, facts and principles are taught as are necessary to qualify the student therein. Printed text books and accompanying question papers and drawing plates are prepared expressly for each course; thorough examination and correction of the written work of the student are made, and full, clear and exact written explanations given of all difficulties met with in studying. Finally, the instruction is suited to the requirements of all persons who for any reason cannot attend technical schools or colleges.

THE establishment of Morstatt & Son, 227-229 West Twenty-ninth street, New York City, was visited by a disastrous fire on the night of Wednesday, March 8, but we understand that the filling of orders will not be seriously delayed thereby.

HENRY DISSTON & SONS, Philadelphia, Pa., have recently put on the market their D 100 hand saw, made in rip, hand and gentlemen's panel styles in sizes 16 to 30 inches inclusive. It has a skew back, full carved apple handle, five improved screws, except the panel, which has four, and the rip saws have graduated teeth. The blades are made of spring steel, patent ground and tempered, and both handles and blades are highly polished.

THOSE of our readers who require small power for any purpose whatsoever are likely to be interested in the announcement presented elsewhere in this issue by Aug. Mietz, 128 Mott street, New York City, relative to the Mietz & Weiss gas and gasoline engines. These are referred to as very economical in operation, simple in construction and as having no valves to get out of order. A catalogue relating to the engines can be had on application.

—BASEBALL CRAZY.—Tommy: "Pa, what's a ewer?"

Fond Father: "It's a big-mouthed pitcher, my son. But why do you ask?"

Tommy: "Oh, I just wondered who would be the ewer of the New York nine this year."—*Jewelers' Weekly.*

THE QUARREL IN THE FIELD.

A barb wire fence
Whose pride was immense
One day of its excellence pompously boasted,
Whereat the worm fence
Said, with envy intense:
"You aren't the only fence, just 'cause you're posted."

Carpentry and Building

WITH WHICH IS INCORPORATED
The Builders' Exchange

VOL. XXI. No. 5. NEW YORK, MAY 1899. Ten Cents a Copy. One Dollar a Year

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CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

DAVID WILLIAMS COMPANY, - - PUBLISHERS AND PROPRIETORS
232-238 WILLIAM STREET, NEW YORK.

MAY, 1899.

Model Tenements for New York.

If the present plans of the projectors of the enterprise are carried to a successful issue, there will be erected in this city in the near future a number of model tenements designed to be conducted after the method followed by the management of the Mills hotels for working people, to which reference has previously been made in these columns. It is not intended that the enterprise shall be in any way a charitable one, but is expected to return a fair profit on the investment, while at the same time affording a means of doing great good among the poor. The idea is to give the occupants of the tenements the conveniences of modern flats with plenty of light and air, while special attention will be paid to sanitary features. The prime movers in the undertaking are Mr. Ogden Mills, whose father erected the Mills hotels, and Mr. Ernest Flagg, the well-known architect who planned them. A large plot of ground has already been secured on Tenth avenue, extending from Forty-first to Forty-second street, and to this additions will be made until the plot is sufficiently large to accommodate the extensive buildings which are contemplated. According to Mr. Flagg the feature of the tenements which it is particularly intended to emphasize is that they will be as absolutely fire proof as it is possible to build them, stone and metals mainly to be the materials employed. The structures will be 11 in number, each six stories in hight and square in shape with a courtyard in the center. An idea of the magnitude of the undertaking may be gained from the statement that there will be accommodations for 450 families. In these new tenements there will be no room that does not have an opening broad enough to freely admit light and air, and the feature of the broad courtyard will do away with the narrow air shafts which are ordinarily made to serve for individual tenements. Each apartment will be directly accessible by the stairway, and the divisions of each building will be separated by fire proof walls extending from roof to cellar with no openings through which fire might pass. In connection with this enterprise the objects sought are safety, sanitation, comfort and economy.

Possibilities of House Cooling.

Nowhere in the world have so much thought and energy been applied to the perfecting of methods of heating dwelling houses as in the United States, and the people here are probably the best warmed people of any in a similar latitude on the face of the globe. For relief from the extremes of hot weather, however, very little has been done here, and, in fact, it is by no means certain that there is a feasible method of cooling in small houses. Of course, large places of entertainment, where there are blower systems, can be readily tempered in hot summer weather, but the private house does not offer such an easy problem from an economical standpoint. The matter has been given somewhat more attention abroad, and an interesting paper was presented at a recent meeting of the Heating and Ventilating Congress in Munich by Dr. Brückner, who explained that the most feasible means of cooling were through ammonia or carbonic acid, which took up heat as they expanded. He likened ammonia to a sponge, which, expanding in a warm atmosphere, took up the heat, which could be thus carried away and squeezed out of the ammonia by compression outside. The same thing is true of carbonic acid, though ammonia was preferred as being cheaper to work and also in case of leakage being instantly detected. In operation the ammonia gas was compressed in a machine and cooled, and thus brought into liquid form. On being allowed to expand it falls to a very low temperature, and may then be used either direct as a cooling agent or through the medium of salt water. For ordinary house cooling ribbed pipes through which the cold liquid is passed were used. Machinery is required, of course, to accomplish these several ends of compression and distribution, and this is an almost insuperable objection to the employment of such a method in a private residence, except in those palatial ones which include power plants for elevator service and lighting. Dr. Brückner described, however, one house in Germany which had a regular system of cooling operated by a 3 horse-power electric motor. The house was in Frankfort, and the system has been working for five years, salt water being cooled and carried through pipes in the ceilings of the dwelling rooms, the ceilings being perforated with narrow slits through which the air as it was cooled fell into the room. Being an electric motor it was easily handled, and, in fact, the only attention given to it was by the woman cook. It is intimated that the entire outfit cost about $5000, and the power for running it was estimated at about $75 a year. The smaller charges incidental to the machinery were not included.

Making Wood Patterns.

At intervals for a considerable period past there have been requests upon the part of our readers for a series of articles dealing with the subject of wood pattern making, in a way to meet the requirements of the average carpenter who is occasionally called upon to execute work of this character. In response to these solicitations we commence in this issue an illustrated serial from the pen of a writer well known to readers of *Carpentry and Building*, from his valuable contributions on wood carving published a few years ago. Mr. Woodsend treats the subject in a most interesting manner, rendering perfectly clear the principles on which pattern making is based, and by easy graduated stages carries the student along in such a way as to enable him to produce the most complicated pattern he is likely to require. The installment of the article which we have pleasure in presenting in the current number deals with the kinds of woods employed in pattern making, describes the manner of their preparation for use and tells of the steps necessary to produce the pattern for a plain window lintel, such as may be found in a warehouse, factory or other brick building. In succeeding installments the construction of the flask is described and the various subsequent steps necessary to be pursued are outlined, after which the author shows how to construct the pattern for a cast iron sill, suitable to go with the lintel already mentioned. The manuscript has been prepared with great care and attention to details, and the work should prove highly interesting and valuable to those of our readers who desire to take up this most fascinating branch of the wood worker's art.

The New York Public Library.

Something like a year ago we referred to the movement in progress for the erection of a large public library—the Astor, Lenox and Tilden foundations—upon the site then occupied by the old reservoir at Fifth avenue and Fortieth and Forty-second streets in this city, intimating that shortly after the inception of the movement an obstacle was encountered in the shape of a refusal on the part of the Mayor and Board of Estimate to issue city bonds to pay the expense of tearing down the old reservoir and putting the site in condition for building operations. For some months past the matter has remained in uncertain shape, but a few weeks ago the Board of Estimate and Apportionment authorized an issue of bonds to the amount of $500,000, the proceeds of which are to be used in defraying the expense of removing the old reservoir and laying the foundations for the new library building, which will probably cost in the neighborhood of $2,500,000.

New Building Commission for New York City.

A bill which was reported by the Assembly Cities Committee on April 12 authorizes the Governor of the State to immediately appoint a commission of 11 members to prepare and report to the Legislature, not later than January 15, 1900, a code of building laws for the City of New York. This commission is to serve without pay, and is to be made up as follows:

A member of the Board of Buildings, the Chief of the Fire Department, one representative of the Health Department, one member of the Tenement House Commission who shall be an architect, one representative of the Board of Fire Underwriters, one civil engineer to be chosen from a list of three names to be submitted to the Governor by the American Society of Civil Engineers, three architects to be chosen from a list of nine names to be submitted to the Governor by the New York chapter of the American Institute of Architects, one practical builder of at least five years' experience in the construction of modern fire proof buildings, one attorney and counselor at law, who has been admitted to practice in the State of New York for at least five years.

Ventilation of Theaters.

Every part of a theater should be ventilated, the stage as well as the auditorium, dressing rooms, engine room, vaults and the retiring and toilet rooms, says W. Paul Gerhard, in discussing the subject of theater sanitation. A system of extraction is of no use unless a supply of pure air, drawn from an uncontaminated source, is combined. Extraction only means a sucking up of the air of all these parts of the house. The fresh air should be warmed and filtered in winter and sprayed or cooled with ice in summer, and it should enter without causing drafts. The inlets and outlets should be of good size, and the author remarks every person in the audience should have a supply of fresh air equal to at least 30 cubic feet per minute, or 1800 cubic feet per hour. Mr. Gerhard says: "The fresh air may be introduced at the top of the house, through the ceiling, and made to move downward in a steady and uniform current, until it reaches the lungs of the spectators, and then removed at or near the floor line; or else air may be introduced at or near the bottom, and exhausted at the ceiling of the hall. Either one of the systems may be successfully planned and arranged. The plan and subdivision of the building, the details of construction and local conditions, will generally decide the question. When the theater is lighted with electric lights, the downward system will show better results than where gaslights are used." He also says a good system should effect a complete change of air three or four times an hour.

The scheme of ventilation ought to be considered in connection with the safety of the building from fire. A current of air from the stage toward auditorium would be serious in case of fire, which generally originates on the stage, as the smoke from the burning scenery, &c., would be drifted toward the upper part of auditorium, and suffocate people before they could escape. The air current should be in a contrary direction from auditorium to stage, and to effect which large ventilators over the stage to create a draft thereto are required. As to the dressing rooms, &c., these may be ventilated by windows to the outer air or by vent shafts. The currents of air should be maintained from the theater and halls into the toilet rooms, so that all odors from the closets, &c., will not reach the theater. The question of the ventilation of theaters is fraught with difficulties, and one of the foreign architectural papers states that the playhouses in London, even among the later ones, are far from giving satisfactory results. The usual entrances generally act as the main inlets for the cold fresh air, which forces back the eddying currents of vitiated air upon the people, besides causing dangerous drafts of cold air to those near the openings.

THE site of the fierce conflagration which occurred on the night of December 4, when the building at the corner of Broadway and Warren street, occupied by Rogers, Peet & Co., was totally destroyed and the modern office building adjoining was subjected to a most severe test as to its fire proof qualities, has been cleaned of *débris* and work is now in progress upon an eight-story store and office structure, which will cost about $150,000. The plans have been prepared by John B. Snook & Sons of 261 Broadway, this city.

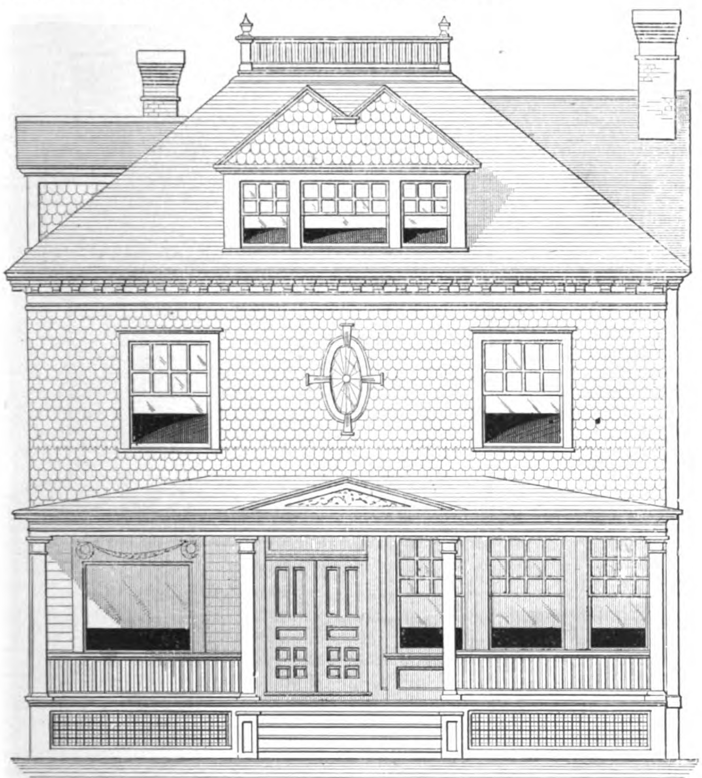
APROPOS of the discussion which has occurred in these columns relative to the amount of window surface in school rooms, it is interesting to note the position taken by the State Board of Health of Vermont in regard to this matter. The board insists that the window surface in a school room shall be equal to one-fourth of the area of the apartment. The dark room is not to be tolerated as a factor in their educational system, and it is quite probable that to its too frequent use may be attributed many instances of impaired eyesight among the pupils.

A NOVEL use has been found for the Eiffel Tower in Paris. The chief of police of that city has stationed on its summit special agents, whose sole duty it is to note all those chimneys which throw up a denser volume of smoke than is allowed by law. This idea might be used advantageously by the municipal authorities of New York City in the present crusade against smoke. The tops of one or more of the down town "sky scrapers" would provide unexcelled coigns of vantage for the detection of the offenders who are smirching the clear atmosphere of New York with volumes of smoke in defiance of the law.

THE fire loss of the United States and Canada during the month of March, as compiled by the New York *Journal of Commerce*, reached a total of $11,493,000, being $7,000,000 less than the abnormally heavy February loss, but nearly $4,000,000 ahead of the total for March, 1898. The total loss for the first quarter of the present year is $40,680,000, almost $11,000,000 above the corresponding quarter of last year.

COLONIAL COTTAGE AT MERIDEN, CONN.

THE subject of the half-tone plate which accompanies this issue as a supplement is a colonial cottage embodying many features of interest, both as regards architectural treatment of the exterior and the disposition of the rooms within. Especially noticeable is the broad veranda extending across the entire front of the house, the swelling bay of the sitting room or parlor, as the case may be; the oval window which lights the closet of one of the front chambers; the disposition of the chimney, as shown in the side elevation, and the general treatment of the second story and gables. A glance at the floor plans shows a broad hall with rooms opening from both sides of it, an arrangement which finds much favor with a large class of house owners at the present day; a reception room at the left and beyond this the



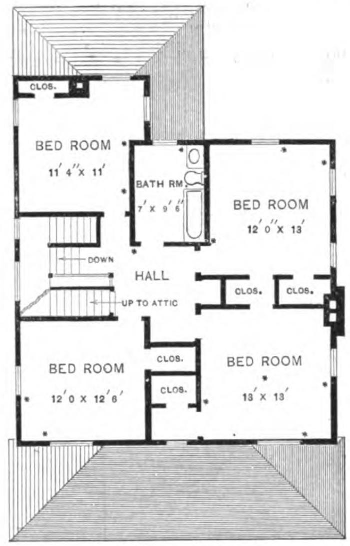
Front Elevation.—Scale, 1/8 Inch to the Foot.

Colonial Cottage at Meriden, Conn.—D. Bloomfield, Architect.

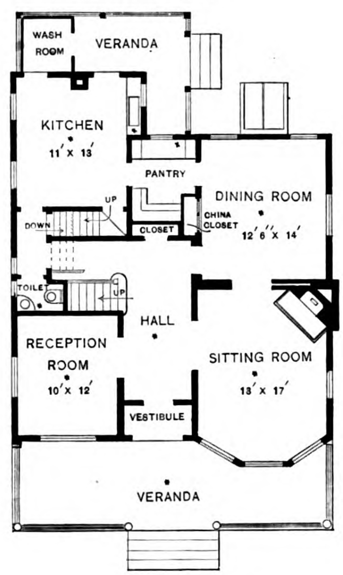
main stairs rising from very nearly the center of the building. The disposition of the rooms on the main floor is such that each may be entered from the hall without the necessity of passing through any other apartment, while communication between the kitchen and the front door is direct, and at the same time the kitchen is so shut off as to prevent odors of cooking escaping to the front of the house. Directly under the stairs is a lavatory, readily accessible from the main hall. Communication between the sitting room and dining room is established by means of a sliding door and between the kitchen and the dining room through a commodious pantry. On the second floor are to be found four sleeping rooms and bath room, together with ample closet room.

The cottage here illustrated is located on Wilcox avenue, Meriden, Conn., and was erected not long since for R. J. Rice, from plans prepared by Architect D. Bloomfield, 129 State street, Meriden, Conn.

The house is of frame construction, with cut brown stone underpinning, all the timbers employed being of sound spruce. The sills are 4 x 6 inches; the first and second floor joist 2 x 10 inches; the attic joist 2 x 8 inches; studding, 2 x 4 inches, with 3 x 4 for window studs; posts and girders are 4 x 6 inches; plates, 2 x 4 inches, doubled, and rafters, 2 x 6 inches. The outside of the frame is sheathed with No. 2 matched spruce, on which is laid waterproofed sheathing paper, which in turn is covered with clear pine narrow clapboards and shingles, all as may be clearly seen from an inspection



Second Floor.



First Floor.

Scale, 1-16 Inch to the Foot.

of the elevations. The roof is covered with best quality 18-inch sawed pine shingles.

The first floor is laid double with 7/8-inch hemlock boards placed diagonally; the kitchen and pantry with comb grain Virginia pine; the bath room and vestibule with narrow matched quarter sawn oak, while the balance of the floors are laid with 7/8 x 5 inch common matched pine. The finish of the reception room, sitting room, dining room and hall is in quartered oak. The bath room is finished in red oak, the kitchen in No. 1 selected North Carolina pine, and the pantry and second floor in No. 1 white wood. The plumbing is all exposed work, ventilated, and the fixtures are nickel plated.

The house is heated by a Winthrop hot air furnace, made by the Dighton Furnace Company of Taunton, Mass. The carpenter work was done by Z. J. St. Cyr, builder; the mason work by C. L. Tryon, contractor, and the heating by the Griswold, Richmond & Glock Company, all of Meriden, Conn.

Mexican Building Methods.

A curious feature of Mexican building is that the lime is brought to the building where it is to be used in large jute or hemp sacks, and is allowed to slack before being mixed with water and sand. In many places throughout the city there are places wherein the lime is thrown loosely in a pile in one corner awaiting purchasers. It is claimed here, says a correspondent of *Architecture and Building*, writing from the City of Mexico, that the lime is much improved by being exposed to the air, and judging from some of the construction I have seen, I do not doubt it.

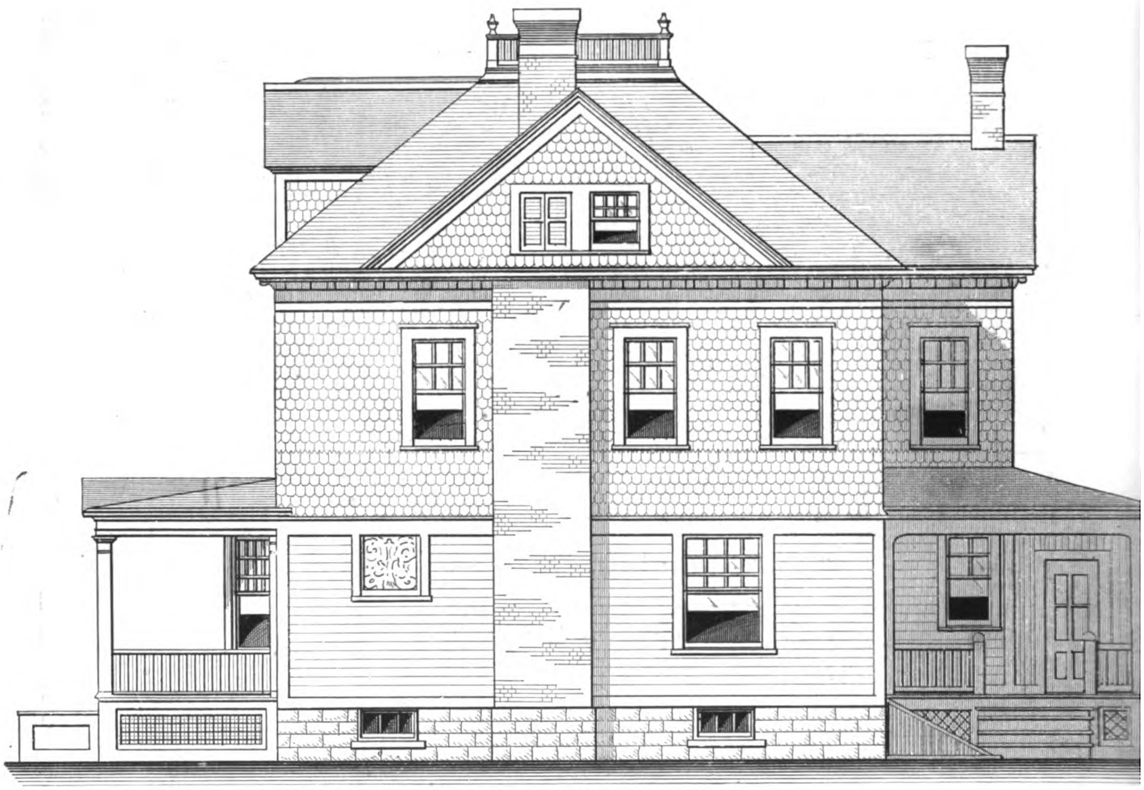
For mortar boxes the laborers construct a sort of reservoir of sand about 15 inches high and about 8 or 9 feet in diameter, in which reservoir the mortar is mixed. The mixing hoes are clumsy affairs of wood, with handles about 3 inches in diameter and 10 or 12 feet long. The part of the hoe which is usually made of metal is made of wood about 2 inches thick and 15 inches in length and 12 inches wide at its widest part, tapering to the ends. With this hoe they manage to mix quite good mortar. Very little cement is ever used in their mortar.

The most, or nearly so, interesting part of their methods is the manner in which their scaffolds are erected and the manner of ascending and descending the same. The uprights are made of timber about 4 x 8 inches and 12 feet long, and are fastened together with ropes, and the cross pieces are made of the same sized timbers and are also fastened to the uprights by ropes. These cross pieces are placed about 3 feet apart vertically and 9 feet horizontally, and from the ground to the working hight of the scaffolding the laborers carry the mortar, brick, stone and tepetate upon inclined planes having a rise of 3 feet in a run of ten, and zigzag back and forth, much the same way as mountain trails are cut up the side of a very steep incline.

In very few instances are hoisting tackles used; only, in fact, when the stone to be lifted is too large to be handled by hand. The hoisting apparatus usually consists of a double and a single block operated by several laborers, windlasses being almost an unknown quantity. The men hoisting the stone will catch hold of the rope, and, getting in the center of the street, will pull and haul until the stone finally reaches its destiny. Then the hoisting apparatus is made fast to a post or some portion of the building, and the whole force will ascend the scaffold and exert themselves to their utmost to get the stone landed on the wall where it untimately belongs.

In some cases, where the stone is unusually large, it is propped up from below to sustain it in position until the wall above is sufficiently heavy to hold it in place.

After the stone water table has been in place, it is covered with mud and small pieces of brick to prevent it from being broken by falling material as the work progresses in hight. Window sills and caps are treated the same way. It does not matter what the color of the stone may be, this mud and brick are placed on it just the same, and I often wonder how it is thoroughly cleaned off. It probably does not matter much, as the most of the stone work soon assumes a very dirty aspect.



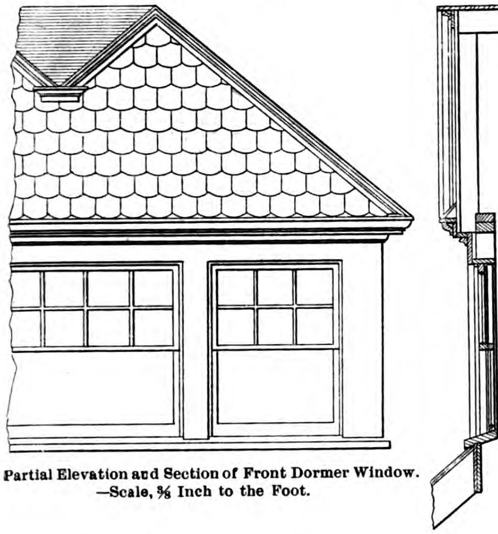
Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.

Colonial Cottage at Meriden, Conn.

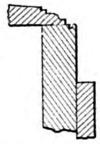
RESIDENCE OF MR. R. J. RICE, WILCOX AVENUE, MERIDEN, CONN.

D. BLOOMFIELD, ARCHITECT.

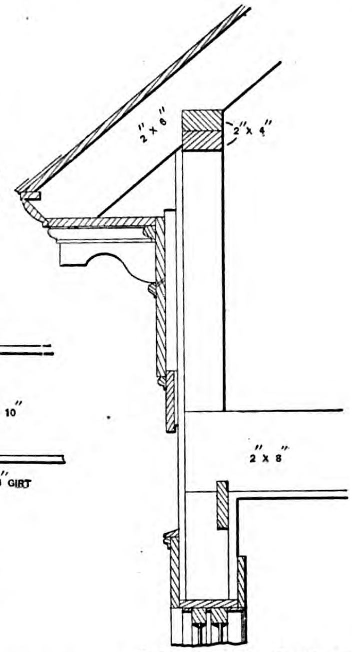
SUPPLEMENT CARPENTRY AND BUILDING.



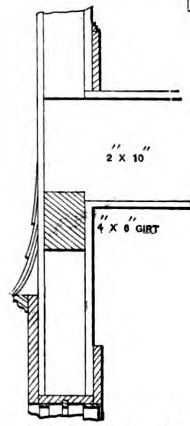
Partial Elevation and Section of Front Dormer Window.—Scale, 3/8 Inch to the Foot.



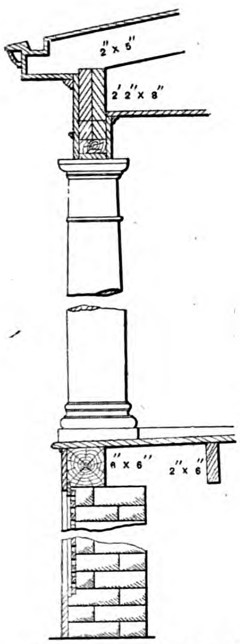
Detail of Door Jamb.—Scale, 3 Inches to the Foot.



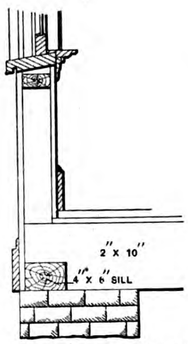
Detail of Main Cornice.—Scale, 3/4 Inch to the Foot.



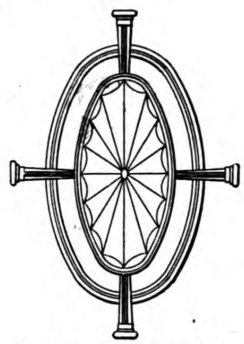
Detail of Belt Course.—Scale, 3/4 Inch to the Foot.



Details of Veranda.—Scale, 1/2 Inch to the Foot.

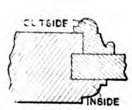


Water Table.—Scale, 1/2 Inch to the Foot.

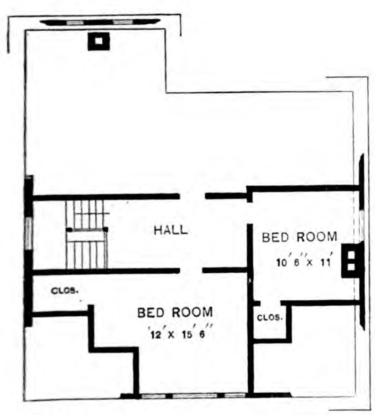


Oval Window.—Scale, 3/4 Inch to the Foot.

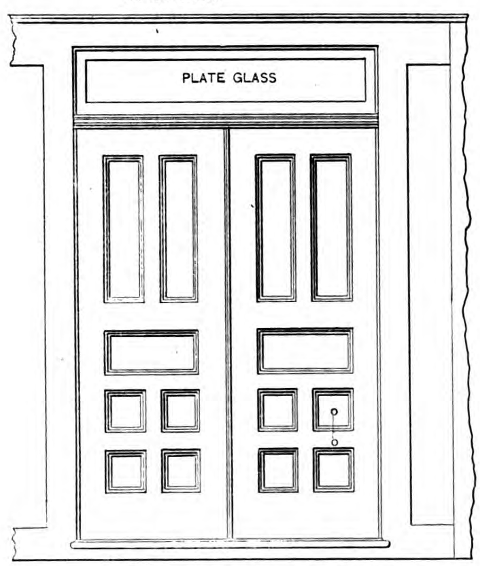
Profile of Keystone. —Scale, 1 Inch to the Foot.



Section through Front Door at O O.—Scale, 3 Inches to the Foot.



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

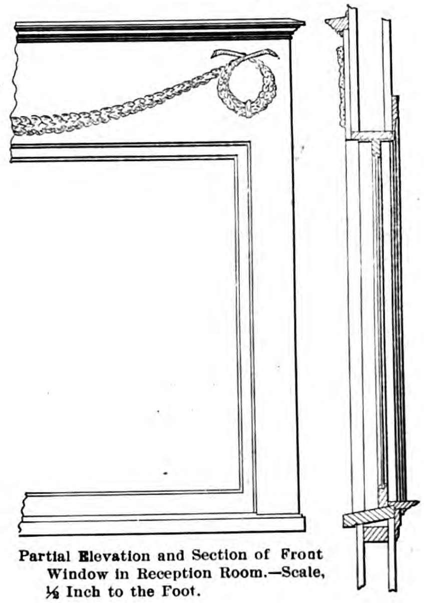


Elevation of Outside Doors.—Scale, 3/8 Inch to the Foot.

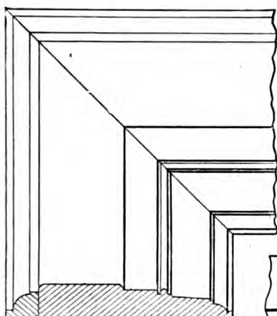
Miscellaneous Constructive Details of Colonial Cottage at Meriden, Conn.

Painting and Decorating Country Homes.

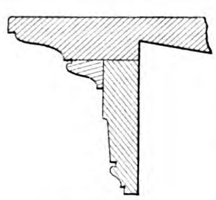
There is no field that has received so little attention from decorative painters as dwellings of the farming community. One may ride for hours through a rich agricultural country without seeing a dwelling house painted other than white, and barns and outhouses either red or unpainted. Visit the houses and the interiors will present the same monotony. The housewife may have become tired of the finish on her parlor walls and purchased wall paper at the village store, which she hung to the best of her ability. When buying the paper she gave no thought to the carpentering or furniture, but purchased that which chanced to please her; but when it was hung she saw her mistake. Had she had an opportunity to consult a skilled decorator she would not have wasted her money. This condition, says a writer in a recent issue of *Painting and Decorating*, exists everywhere throughout farming communities. The people are desirous of a change, but they are not skilled in the art of painting and decorating. The average country house painter knows little, if anything, of decoration; when appealed to, he is more likely to discourage than to encourage any deviation from the monotonous white or red, and as for wall papers and interior decorating, they are much in the position of the Dutchman who was satisfied with any color "so vat it vas red." A artistic decoration for interiors. Possessing these qualifications and a sufficient amount of energy to visit the homes of those whom he may hope to make customers,



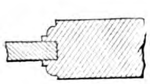
Partial Elevation and Section of Front Window in Reception Room.—Scale, ½ Inch to the Foot.



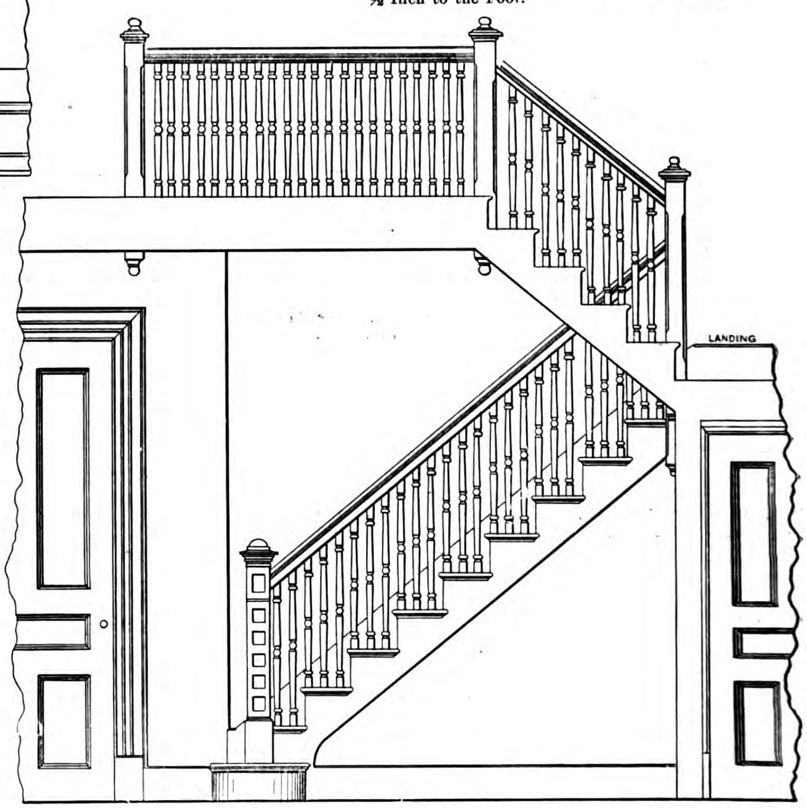
Detail of Inside Trim.—Scale, 3 Inches to the Foot.



Detail of Stool Finish.—Scale, 3 Inches to the Foot.



Section of Inside Door Stiles and Rails.—Scale, 3 Inches to the Foot.



View of Main Stairs, Looking Toward the Vestibule.—Scale, ⅜ Inch to the Foot.

Miscellaneous Constructive Details of Colonial Cottage at Meriden, Conn.

skilled painter and decorator who possesses the qualifications that fit him for artistic decorations of an order suited to the home of the well to do farmer can readily build up a lucrative business in painting and decorating farm homes. He must be able to recommend colors and combinations for exteriors, as well as to suggest neat, a score of times if necessary, he can not only build up a profitable business, but he can in addition become the medium through which the agricultural community can be taught art in decoration, and the many unattractive homes of farmers be made as inviting and elevating as those of the well to do suburban residents.

ADVANTAGES OF A BUILDERS' EXCHANGE.

In discussing the question of organization among builders and contractors, and the benefits which accrue from membership in a builders' exchange, Mr. Fred. T. Hodgson, in a recent issue of the Canadian *Architect and Builder*, shows why such an exchange is desirable in every important building community. He says:

Why? Because it offers to builders and contractors so many advantages and opportunities that must be apparent to every one who has given the subject any thought that it seems odd that every town of any importance has not got one within its corporate limits.

"What are their advantages?" it may be asked. Well, I will endeavor to point out a few, though I confess myself unable to present anything like a fair showing of the advantages and benefits that must assuredly result from a gathering of men engaged in one pursuit, and when an exchange of ideas and views on matters and things pertaining to that pursuit takes place.

Men making up the members of a builders' exchange must necessarily be men engaged in the construction, erection and decoration of buildings; bricklayers, carpenters, masons, plasterers, &c., and these again are in daily contact with other trades and occupations connected with building. The carpenter, for instance, branches off his trade and sublets portions of it to framers, roofers, stairbuilders, factory men, painters, glaziers and others.

The bricklayer and mason may, and does, often sublet portions of his work, such as excavating, cut stone work, brick work, tiling and often the plastering. Often, also, the mason supplies and places iron or steel girders, beams or bressumers, which brings him in touch with another class of tradesmen, thus extending the ramifications of the building trades. Then comes the plumber, who contracts for the water plant and sometimes for gas or electric light installation, for heating, bath service and other lesser matters. The painter, who may be a sub-contractor, besides the ordinary work belonging to his calling, may also be decorator, paperer and finisher, while the plasterer may engage master stucco workers to his aid, all of whom may be employers of labor and directors of work, and are therefore, in my opinion, eligible for membership in a builders' exchange.

A Place of Meeting.

The men at the heads of the trades I have named are to some extent dependent on one another. Contractors on any one building must, in the nature of things, meet each other often in order to give and to receive directions regarding the work in hand. The bricklayer will have his walls ready for the joists on a certain day, and the carpenter must be made acquainted with that fact, while the bricklayer must have assurance that the joists will be laid in place on that day. The carpenter arranges accordingly, and the ironmonger is informed, and his columns, stirrups and other work are made ready for that day; and everything is arranged to go ahead in harmony and without costly interruptions.

Now, how can these men be brought together, and their views and directions exchanged, by any better method than by aid of an exchange? Here, during the noon hour of every working day, builders and those engaged in building transactions will make it a point to congregate, or, maybe, meetings may be the consequence of prior arrangements. At any rate, should one member fail to see another at any given time, he simply pens a brief request for an appointment, naming the hour, and leaves it with the secretary or janitor, or drops it in a letter box provided for the purpose. Previous to accepting or even figuring on a contract, it is important that the main contractor should meet and confer with all his sub-contractors, in order that he may have his final estimate and tender on the figures obtained, and to insure a fair standard of accuracy an exchange should be well supplied with catalogues and price-lists of every article entering into the construction of a building, and these catalogues and price-lists should be so classified and listed that a member of any particular trade may be able to place his hand on the particular object he wants without delay. Further, if there is any doubt as to the reading of the plans, or a thorough understanding of the specifications, the contractor and sub-contractors may put their heads together and untangle the difficulty, and thereby make time and prevent trouble in the future.

Educational Benefits.

Besides the saving of time, there is much that is educational in the congregating of members for the purpose of discussing building matters. It is impossible for a body of intelligent men to mingle with others equally intelligent, day after day, without profiting and forming acquaintances that may be lasting and valuable. Exchange of thought, of opinions on new machines, new methods and processes for labor saving, and discussions on economical management, the value of new materials and appliances, are matters that may fairly be considered within the province of a builders' exchange, and which must result in benefit to its members. The social feature, too, is an advantage not to be despised, for it enables the members to meet each other on the same plane without that reserve that must obtain when rival contractors never have an opportunity of becoming personally acquainted with each other. It is human nature to imagine a business rival as a sort of a "terrible fellow," and one that will take all sorts of mean advantages to obtain a contract that we have an idea justly belongs to us. To meet him in a social way and under the auspices of an association where our interests are mutual, we find that after all he is not so bad a fellow as we thought him. By rubbing against each other in the exchange many of the sharp edges of business rivalry get worn off; many misunderstandings and misapprehensions are explained and rectified, jealousies are allayed and the dignity of the trades upheld.

Influence of an Exchange.

Another valuable feature is the additional character and weight an association of this kind would give to the building trades in general, and its influence on the actions of political and municipal bodies, when matters relating to buildings were involved would be immense, and in the interest of the public at large. No public body would dare to ignore an earnest request or petition emanating from a well organized and well equipped builders' association, that had for its object the betterment of the public service in the erection and maintenance of public buildings, sewering, paving of streets, laying out and grading of parks and public walks, building of docks, assessments, and a host of other matters, where the forcibly expressed wishes of a united body of builders would prove timely and effective. In the prevention of frauds and rascality in the awarding of public contracts, a builders' exchange would become a potent factor, and thus prove of much service in perpetuating good municipal government, and at the same time giving to the public full value for its expenditures. A petition or a protest emanating from an organization such as indicated, for or against any project, carries with it the united expression of an intelligent body and not the opinion of a single member, and must, therefore, demand an attention that could be denied the individual. If, after proper discussion, any law is found burdensome or unjust to the building interests and the public, or perhaps too lax in its application, or not sufficiently restrictive to compel a reasonable degree of safety in such work as the members are doing, how much more effective would be a protest or a petition from a substantial organization than one from a single person? There are many other matters in which a builders' exchange may be made a potent factor for public good.

An exchange may also be made use of as an educational and entertaining center for its members and others. There might be weekly or fortnightly lectures during the winter season on architecture, construction of buildings, sanitary science, ventilation and other matters in connection with buildings, laws regulating the construction of buildings, the methods and systems of building in foreign countries, and many kindred subjects. Such lectures would be instructive and edifying to all persons engaged in the building trades, and might be so arranged, by charging a small fee for admission, as to add a little money to the treasury.

Books of Reference.

In connection with the exchange there should be a collection of books, not necessarily a library, but a collection of good up-to-date works which show and explain the most modern and approved methods of construction, and which offer to the reader all the recent devices in time and labor saving apparatus. It would be easy to name a number of these, but perhaps not wise to do so at this time. In addition to these books, there should be on the table of the exchange copies of all the current architectural and building publications of this country, the United States and Great Britain, in connection with all Government reports that have any bearing on the building trades. Directories of manufacturers of all things required in building should be in evidence and easy of access. Models of difficult work, samples of bricks, stone, slates, glass, hardware and the thousand and one things required by builders should be present, with prices attached, so that any member may find out with the least effort all he requires to know about the material in point.

In the foregoing I have endeavored to point out a few—only a few—of the advantages that flow from a builders' exchange, but I am free to confess that those unmentioned are much greater than those I have presented, the truth of which, I think, any one will grasp, if he but think for a moment.

A Peculiar Contract.

The following description of a case that will be of interest to sub-contractors and dealers in building materials was taken from a recent issue of the New York *Tribune:*

In settling a suit which Peter Lythgoe brought against the Jewish congregation B'nai Jacob, which has just erected a new synagogue on the south side of Prospect avenue, near Third avenue, Justice Neu brought out the information that the trustees had agreed privately to pay less for the erection of the building than the contract called for. Charles West, the contractor, consented to take $7000 for his work, although, according to the agreement, the price was to be $8500. Henry Brilliant, the chairman of the Board of Trustees, went on the stand and swore that this peculiar transaction was entered into for the purpose of inducing a capitalist to lend more money on the property than he otherwise would have done.

Lythgoe was a sub-contractor and received from West a draft on the trustees for the amount of his bill, $210. The trustees said that they owed West no more money, and refused to honor the draft. The sub-contractor then sued the trustees, and the story of the peculiar contract came out. Justice Neu granted a judgment in favor of Mr. Lythgoe, and indorsed the following criticism on the back of the papers:

"'The secret agreement between this defendant and this contractor in indorsing the unpaid sum of $1500 on the defendant's copy of the contract was a fraud on the sub-contractors and material men, unless the defendant informed them of such agreement before they entered upon their work."

In preparation for the international exhibition the Eiffel Tower is to be repainted, and operations have commenced. The time required for giving one coat of paint to the structure is about three months, and the work would not be accomplished without the labor of 50 painters. For each coat over 50 tons of paint are used. The second coat will not be laid until the beginning of next year.

Steel Girders Burned by an Electric Arc.

An interesting useful application of electric arc burning, says the *Western Electrician*, recently took place in Chicago in connection with reconstruction work in the New York Life Building. The contractors for the building, the Moulton-Starrett Company of Chicago, were engaged in remodeling a portion of the building to suit a new tenant. To provide for two new stairways from the main floor of the building to the basement it was found that it would be necessary to cut through two sets of three steel I-beams. These six I-beams were each 15 inches high with a ½-inch web and 6-inch flange varying in thickness from ¼ inch on the outside to 1 inch at the center. It will be appreciated that the section of the metal to be cut through was considerable. The point at which the cut was to be made was located in such a position that it would be necessary to have special saws made, and as three I-beams of this size, side by side, would not cut very easily, it was estimated that in addition to the time required to make the special saws it would take two men at least two weeks at $3.50 a day to saw them off. This loss of time in finishing the job and the expense involved were important considerations, and when it was suggested to Ralph Starrett, superintendent of the contracting company, that inasmuch as a smooth cut was not necessary, it might be feasible to get the girders burned off with the electric arc, he placed the matter in the hands of Clyde J. Coleman of the Coleman Laboratory of Experimental Engineering. Mr. Coleman has done considerable work in the line of electric arc burning for the purpose of getting into safes and vaults with broken locks, and for cutting new doorways in vaults already in place, and also as an interesting experiment to demonstrate the possibilities of safe burglary by this method. Mr. Coleman pronounced the plan of burning off the I-beams perfectly feasible and undertook the task. The time actually required for electrically burning off the six girders was about 12 hours, and from four to five hours more were spent on mechanical work, such as removing girders to get at the remainder. The electric arc therefore did in two working days what would have required from two to three weeks by the usual method, resulting in a great gain of time for completing the remainder of the job.

The plan of operation is very simple. Current was applied at 110 volts from one of the dynamos in the plant of the building. The current used was about 350 amperes. The positive side of the circuit was grounded on the structure of the building and the negative connected to a carbon holder containing a 1½-inch round carbon. The carbon holder had a wooden handle. The operator struck an arc between the spot on the iron to be melted and the carbon. The light and heat were intense, and the effect was very disastrous to the eyes where proper precautions had not been taken. The arc is usually covered over with a muffle, consisting of an asbestos lined iron box, with a hole in the back just large enough to admit the carbon used. The box is placed against the iron to be burned and the carbon thrust through the hole and the arc drawn. In places where there is not room for the box the carbon is simply thrust through a shield consisting of a sheet of heavy asbestos board. Some resistance has to be placed in the circuit, as is the case with any arc working on a constant potential circuit. The resistance used in this case was simply a few turns of German silver wire placed in a pail of water under a faucet, from which it was constantly replenished.

MAKING WOOD PATTERNS.—I.

BY CHARLES J. WOODSEND.

THE matter which follows has been prepared in response to numerous expressions of desire upon the part of correspondents of *Carpentry and Building* for articles upon the subject of pattern making suitable for joiners, and it is the purpose to carry these articles to such an extent as to enable the serious student to make the most complicated pattern he is likely to require. It is the desire of the author to make the principles of pattern making quite plain, and this by easy, graduated steps, so that those readers who desire to take up this most fascinating branch of the wood worker's art should follow the articles closely and continuously. It is, of course, possible to construct a pattern from any one of the figures, but the principle underlying the why and wherefore can only be obtained by the closest study. The thing which it is very desirable for the student to do is to forget that he ever learned any other trade. A man may be a good joiner or cabinet maker, and yet a poor pattern maker; or a man may be a splendid pattern maker, but a miserable failure as a joiner or cabinet maker. The principles of each trade are radically different and have to be treated accordingly.

Pattern making consists in making wood models of such shapes as will enable the molder to reproduce them in sand and make castings of the required articles. The first pattern to come under our notice will be a lintel, quite plain, and such as might be used in a warehouse, factory or other brick building. The different dimensions, as given, may, of course, be changed to suit any condition. The sizes given were taken from a pattern already made, and are used simply for illustration. Fig. 1 represents the face of the lintel, as it would show when in position in the building, while Fig. 2 is a plan of the pattern, showing the ribs in place and the location of the rapping and lifting plates. Fig. 3 is an enlarged view of the pattern as seen at the end, and showing loose dowels. Fig. 4 is a section of the ribs, while Fig. 5 is an isometrical view of the pattern. Here it may be as well to state that the object in having the ribs in the lintel are two-fold: 1, Strength; 2, to counteract the tendency to warp in the cooling of the metal.

The woods used for pattern making are few in number, and comprise white pine, cherry, black walnut and mahogany. Even of these woods only the selected pieces are employed, chosen especially for their "kindness,"—that is, non-warping—and they should be straight grained, soft and free from knots or shakes. This pattern is preferably made from white pine, and after having selected the stuff it should be planed out of wind and made straight, both across and lengthwise of the grain. This should be done to a straight edge, using it in the following manner: After the piece is planed as straight as the eye can detect, take a straight edge and chalk the edge, rubbing it upon the piece which is being planed. The chalk will remain upon the high places while the hollows will be untouched. The high spots are to be planed down and the operation repeated until the work and the straight edge coincide. One side being true, square one edge and gauge to a width and thickness. It may not be out of place to mention here that it is absolutely necessary that all squares, bevels, and, in fact, all tools used in pattern making should be absolutely true and all measurements accurate. It would be well to practice taking measurements to the hundredth part of an inch, and in doing this there will be no time lost.

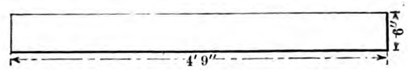


Fig. 1.—Face of Lintel.

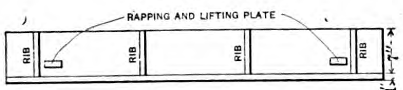


Fig. 2.—Plan of Pattern, Showing Ribs in Place as well as Rapping and Lifting Plates.

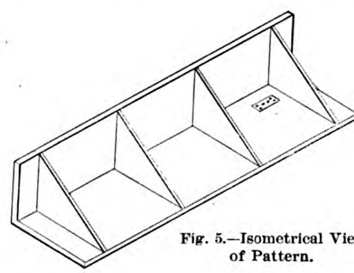


Fig. 5.—Isometrical View of Pattern.

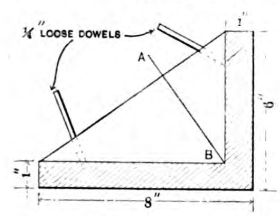


Fig. 3.—Enlarged View of Pattern at the End, Showing Loose Dowels.

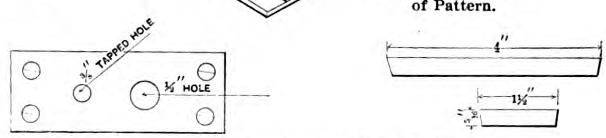


Fig. 6.—Details of Rapping and Lifting Plates.

Fig. 4.—Section of Rib on Line A B of Fig. 3.

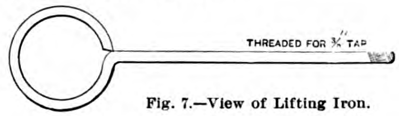


Fig. 7.—View of Lifting Iron.

Making Wood Patterns.

In practice it has been found that all metals when heated shrink to a certain extent in cooling. The lintel, which is the subject of present consideration, is to be cast in iron and the data for iron shrinkage is 1/8 inch to the foot. This must be borne in mind and allowance made for it in all measurements. Shrinkage rules can be purchased from almost any hardware dealer, and they are to be preferred to the common rules. Cut the stuff to the necessary lengths, squaring the ends with the saw and allowing a little for planing out the saw marks. After the front and bottom have been prepared thus far glue and nail them together with good strong nails; 10d common nails will be about right. Do not be afraid of making it too strong, as it will have its strength well tested when the molder gets it into the sand. Do not use screws for fastening, as under the conditions nails hold far better. The jarring of the pattern by the molder in rapping causes the thread of the screws to eat into and wear away the wood, especially if the pattern is much used. After the front and bottom boards are fastened together plane the ends smooth. They are to be square across the face of the stuff, but beveled 1-32 inch across the thickness, so that the boards will be 1-16 inch longer on the inside than they are on the outside. This bevel is for "draft," and the why and the wherefore of its use will be explained further on.

The next point to consider will be the ribs. The stuff for them will be ¾ inch, and should be sawn roughly to shape, allowing a little for fitting and cutting so that the grain of the wood runs parallel with the longest side. Fit them in their places so that they will stand vertical, both from front and bottom of pattern. Next run the gauge down the longest side so as to take off ⅛ inch on each side. Then plane down to the gauge mark so as to make them of the shape, shown in Fig. 4 of the illustrations. Bore ¼-inch holes through the ribs; also side and bottom of the pattern, as shown; then make hardwood dowels to fit loosely so as to be withdrawn without trouble. Putty up all nail holes, sandpaper the work smooth and give it two coats of shellac varnish.

The Varnish.

This varnish is made from gum shellac and alcohol, about 3 ounces of the gum to 1 pint of alcohol. Keep the varnish in a wide mouthed bottle, having a wooden plug for a stopper. Bore a hole through the stopper for the brush, which should reach two-thirds of the way to the bottom. The best brush for general use is about the size of a sash tool (painters'), but there must not be any metal about it, or else it will turn the shellac a nasty, dirty brown color. In applying the varnish the brush should be a trifle damp. It must not be put on in the same manner as paint, but press out all of the surplus varnish against the neck of the bottle and work quickly with the grain of the wood and avoid lapping. There is quite a little knack in putting on this varnish properly, but a little practice and determination will soon overcome the difficulty. Let each coat of varnish dry before the next one is applied. The dowels are not to be varnished. After the varnish is fairly hard, rub down lightly with No. 0 sandpaper until the whole pattern is as smooth as glass.

It has been the practice, and is so still in some shops, to use orange shellac for patterns for all metals other than iron, and to use black shellac for all patterns to be cast in iron. Many of the large shops, however, now use orange shellac for all patterns, using the black for distinctive marks, which the author personally prefers, and shall employ throughout these articles. The black shellac varnish is made by the addition of lamp black to the orange. It is supposed that while we are making the pattern we are also making the rapping and lifting plates, also the lifting irons, these being shown in Figs. 6 and 7 of the illustrations. There are required for this pattern two plates and two lifting irons. The lifting irons are made of ½-inch round iron threaded to fit the ⅜-inch tapped holes in the plates.

Placing Plates in Position.

Having the plates ready let them into the pattern in the positions shown in Fig. 2. They must fit in perfectly tight every way, and each plate be screwed down with four stout wood screws. Before each plate is screwed down bore two ⅜-inch holes through the pattern, and in such a way that the two holes in the center of the plate shall come directly over them. The reason for putting in these plates is to save the pattern. Without them, if there were many castings to take off, the pattern would soon be knocked and split to pieces. These plates prevent this to a great extent.

When the pattern is to be taken out of the sand the molder will insert his rapping iron into the plain hole in the plate, and after the pattern is rapped sufficiently to lift freely from the sand he will screw the lifting irons into the tapped holes in the plates and lift the pattern out without trouble. The next step is to put the ribs in their proper places and insert the dowels. Take some black varnish, and with a small brush mark each rib and the place on the pattern where it belongs. Do this neatly, and with some distinguishing mark so that it can be plainly seen. A molder does not like to hunt along in order to find the places for all loose pieces, and by the way molders, at least many of them, have a habit of making very uncomplimentary remarks about patterns which are dirty looking when they first come into the foundry, so bear this in mind and keep the work clean. It will be noticed that common nails are to be employed in fastening the pattern together. This from a joiner's standpoint would not make a very neat looking job, although, as a pattern maker would do it, the looks of the work would not be affected to its detriment, but rather the other way.

Oliver Cromwell's School.

A movement has recently been started in Huntington, England, looking to the extension of the grammar school in which Oliver Cromwell was educated. The school as it now stands is the only remaining part of the institution entitled "The Hospital of St. John the Baptist," founded by the first Earl of Huntington in the twelfth century. It has undergone many changes, but still some of the original examples of Norman work remain. There is no other building in existence, says the London *Chronicle*, which has been so intimately associated with Oliver Cromwell. It was here that he was educated until he entered Sidney Sussex College, Cambridge.

The Hospital of St. John the Baptist must have been an important institution in mediæval times. It was once a house of refuge for pilgrims, a hospital for the sick, a charity for the poor, and a school for the young. The gable of the remaining part of the building stands opposite All Saints' Church, where the register of Cromwell's birth is kept. In Cromwell's time royal pageants must have passed and repassed this school when Cromwell's kinsman at Hinchinbrook was feasting royalty so sumptuously that he entertained himself into insolvency and had to sell the property. King Charles, as a boy, is supposed to have met Cromwell at his uncle's house, and the two no doubt visited this school.

How much of the original building was in existence in Cromwell's time is not known. For some unexplained reason the building was encased in brick outside and inside. This could not have been done with the intention of strengthening the walls, which were already over 3 feet in thickness. The outside casing was removed in 1863, and the building was restored in 1878. The whole building, except, perhaps, some of the columns and arches, was removed, the stones being numbered and replaced as nearly as possible in their original positions. A new roof was erected, and new stonework was used for the upper part of the building in harmony with the original. Still, the building retains its Norman expression throughout, and the restoration served to reveal some of its solid and dignified features, which were formerly concealed. Part of the edifice certainly dates from the twelfth century. The chief façade is distinguished by a fine Norman doorway, recessed in three orders. Above it is an arcade with two window piercings, and in the gable of this end appears the symbolic device of the vesica Piscis. The whole front is terminated by the addition of a bell gable.

There is an arch bricked up in the other gable, and the side walls consist of two great bays bricked up, except for the modern windows they contain. Each of these bays and arches is in a different style. The arches opposite are not pure Norman work. A slot in the stone work of the arch which faces the school playground would suggest that the building which now remains had been partitioned off from the original.

The interior of the building is 24 feet long by 24 feet wide. It is a very plain schoolroom, where two teachers try to carry on their work simultaneously, but with great difficulty. The room contains prints of Cromwell as Lord Protector and as a child. The building is utterly inadequate for the purposes of a grammar school, and it is quite unworthy of the town. It is strange that an attempt has not been made before now to preserve this building for its historical interest and erect a new and modern school.

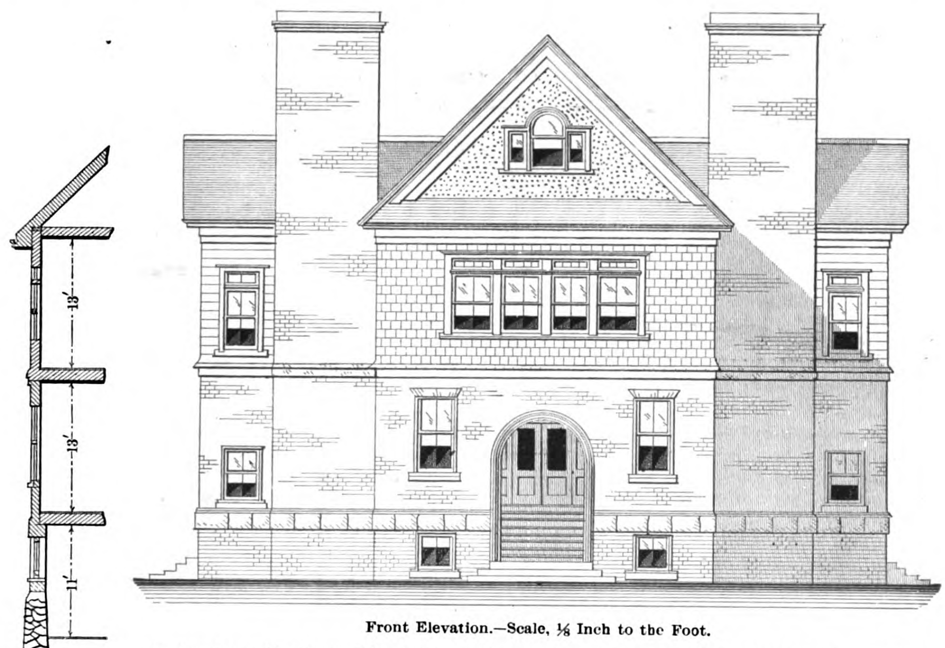
WHAT is said to be the largest sheet of glass ever blown was recently turned out at the Chambers Glass Factory, New Kensington, Pa. It measured 54 x 84 inches.

DESIGN FOR A FIVE-ROOM SCHOOL HOUSE.

IN the issue of the paper for January of the present year a correspondent made inquiry for drawings of a five-room school house, the stipulation being that there should be two rooms on the first floor and three on the second floor, all suitably arranged for plumbing and furnace or steam heating. The correspondent, however, did not specify whether the structure should be frame, brick or stone, nor was anything said with regard to the cost. This left it open to readers replying to his request to exercise their option in the matter. We have received from Architect George J. Kelleman, of East Providence, R. I., the drawings of a five room school building, which have been forwarded in response to the request of the correspondent referred to, and we take pleasure in presenting them herewith.

The author of the design submits general specifications in which it is stated that the brick work is intended to run from the grade, as shown in the section, to the under side of the second story floor joist, the joist to rest and first-class throughout. All sewer pipes in the building are to be of cast iron and all connections from lavatories and water closets to be of lead pipe in the first story. The water closets in the girls' room and in the boys' room, together with the urinals, are to connect with sewer pipe, as shown on the drawings. The outside connections are to be of salt glazed pipe.

The heating is to be by hot air from a furnace located in the cellar. The ventilation is to be accomplished by means of air ducts and shafts, provision being made for the cold air to enter the rooms nearly in the center. The foul air shaft is near one end of a room, while at the other end the hot air enters. The first, second and cellar plans of the heating and ventilating system show how it should be arranged. Reference to the section showing the foul air shaft will reveal a sheet of galvanized iron so placed that as the foul air enters the shaft it is deflected downward and is then carried to the outside of the building. The cold air duct running to the furnace



Section.

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

Design for a Five-Room School House.—George J. Kelleman, Architect, East Providence, R. I.

on the sill and brick work as indicated. All stone trimmings, steps and risers are to be of light blue stone, and no stone caps on the chimneys. The arch in the first story and entrance is to have rounded brick and all partitions of water closets and urinals are to be of slate, while all covering for ducts are either of slate or blue stone. All air ducts are to be walled with brick and to have concrete bottoms.

The second story of the building is to be covered with stained shingles and the roof is also shingled. The cornice and belt courses are painted. The interior is to be finished in white wood left natural, with a coat of filler and two coats of varnish. The stairs are to be of North Carolina hard pine with posts, rails and balusters of the same wood, filled and varnished. All floors throughout the building are to be of North Carolina grain way hard pine, not more than three inches wide. All closets are to be of the Flexifold pattern, except in the principal's room. All window frames in the building are to be of hard pine. The doors are to be 7 feet high by 3 feet wide and 1¾ inches thick, with transoms over them. All timbers are to be of spruce except the girders, which are of hard pine 8 x 12 inches.

The plumbing is to be of the most approved pattern

has a damper for the purpose of regulating the supply. It will also be seen that the cold air shaft, a section of which is presented among the details, has a galvanized iron drum. All cold and foul air shafts are of galvanized iron, the heating pipes are of tin and all registers are of suitable pattern. Mr. Kelleman requests the criticism on the part of the readers of the heating and ventilating system as he has outlined it.

Cleaning Old Brick Work.

A correspondent of one of the London architectural papers in describing his method for cleaning old brick work states that after the joints were raked out he had a mason tool the whole face of the brick work. This, he states, was not costly, but was effectual, as mere scraping would not answer the purpose. Afterward the brick work was rubbed down and pointed. Another correspondent discussing the same question stated that he had employed a liquid paint remover called "Lithicum," which he diluted with water, and after using was washed off with hot water, the work being finally gone over with a wash of vinegar and water.

Use and Construction of Greenhouses.

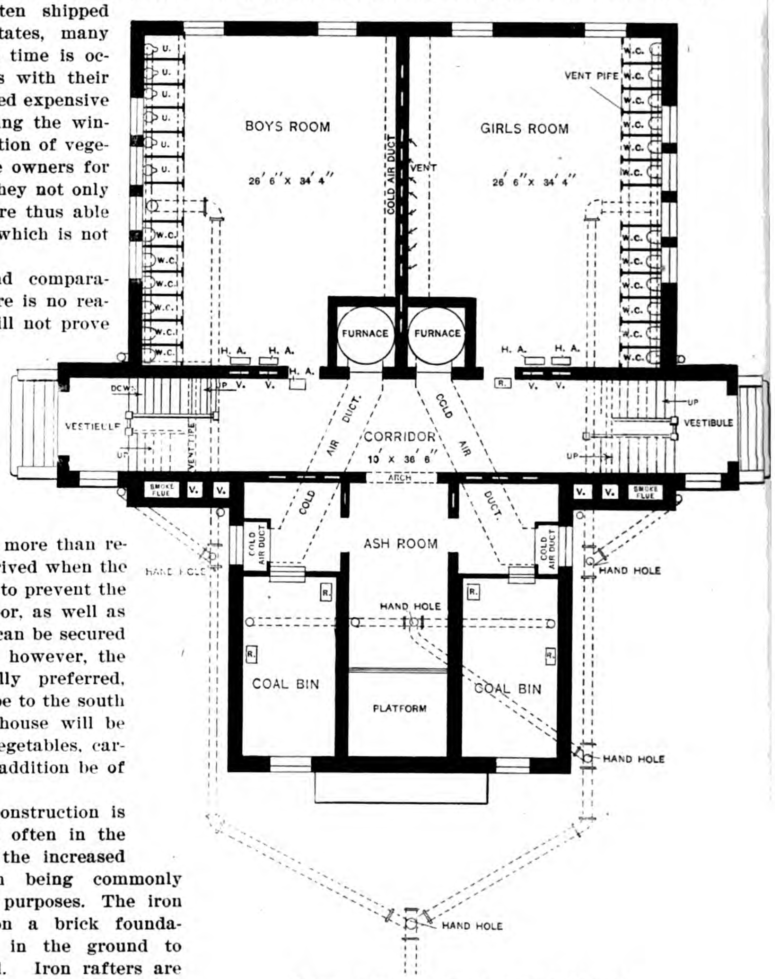
The following abstract of a paper read by L. R. Taft of the Agricultural College, Mich., at the meeting of the Missouri State Horticultural Society, in December last, may prove of interest to some of the readers of this journal:

During the past ten or fifteen years, not only has there been a marked change in the methods of building greenhouses, but there has been a great increase in their use. This increase has been very perceptible in the neighborhood of large cities, but there has been a greater amount of building in the vicinity of small towns, and even in sections remote from settled communities improved means of transportation have made it possible for growers of flowers and vegetables to locate where they can secure cheap land and fuel, from which points the products are often shipped hundreds of miles. In other States, many farmers and fruit growers, whose time is occupied during the summer months with their orchard and farm crops, have erected expensive ranges of greenhouses, which during the winter months are used for the production of vegetables and cut flowers, and, as the owners for the meantime become specialists, they not only find the work remunerative, but are thus able to occupy the portion of the year which is not required for their other work.

With cheap fuel, clear sky and comparatively short and mild winters, there is no reason why similar establishments will not prove even more satisfactory in Missouri. For such a purpose the form of house best suited is the even span; this should not be less than 20 feet in width, and of any desired length. If several houses are erected, they may be placed side by side, with division walls in common, but for most crops the extra expense required will be more than repaid by the benefits that will be derived when the houses are placed far enough apart to prevent the shading of one house by its neighbor, as well as from the light and ventilation that can be secured through the side walls. For roses, however, the three-quarter span roof is generally preferred, while in sections where a slight slope to the south can be secured, a wide, side hill house will be found adapted to the growing of vegetables, carnations, violets, &c., and it will in addition be of comparatively cheap construction.

While the modern iron frame construction is in many ways desirable, and will often in the long run prove most economical, the increased first cost will prevent it from being commonly adopted for ordinary greenhouse purposes. The iron frame house may be raised upon a brick foundation, or iron posts may be set in the ground to which side posts can be attached. Iron rafters are placed once in 7 or 8 feet and connecting them are plates, purlins and a ridge, upon which the sash bars rest. With this form of construction much lighter sash bars can be used than in wooden houses, as nearly all the strain and weight of the roof is borne by the iron posts and rafters. The house will also be much more durable, as the portions that are first to decay in a wooden house have been replaced by iron. When wooden houses are used, posts of cedar or cypress should be set at intervals of from 4 to 6 feet. The hight will depend somewhat upon the crops to be grown, and whether there is to be glass in the side walls. In the former case 4 feet will be ample, while in the latter 4½ to 5 feet will be none too much. The walls can be formed of sheathing and block siding, with a double thickness of building paper between. If ventilating sash is to be placed in the side walls, there should be a sash sill arranged for them to close upon. Various forms of plates may be used, but they should be so arranged that they will provide a firm bearing for the sash bars, and for the running off of the water upon the inside as well as on the outside of the house. In wooden frame houses rafters are now seldom used, the usual plan being to depend entirely upon sash bars which rest upon one or more lines of gas pipe or similar purlins.

The usual size of the sash bars is about 1¼ x 2½ inches, and drip gutters in the sash bars are desirable. One and sometimes two continuous lines of ventilators at the ridge should be provided, and connected with shafting so that a line 50 to 100 feet in length may be worked with one machine. In a house 20 feet wide, when a single row of ventilating sash is used, it should be from 30 to 36 inches wide, while if there are two



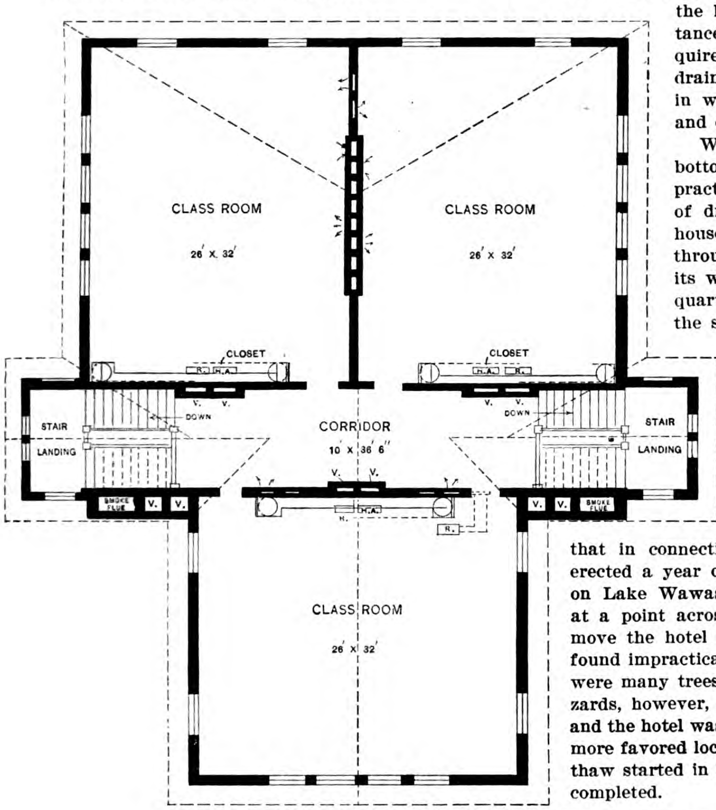
Basement Plan.—Scale, 1-16 Inch to the Foot.

Design for a Five-Room School House.

rows they should vary from 24 to 30 inches, according to the kind of crops to be grown.

For most purposes it is desirable to use glass at least 14 x 18 inches, and for roses 16 x 24 will be none too much. In setting the glass a good grade of putty or mastica is used under the panes. If it is to be lapped it is held in place by means of zinc points or brads. For many purposes, however, butted glass is preferred, the size generally being 16 x 16. The square form is desirable, as it permits of the turning of the panes so as to secure a perfect union between them. When the glass is butted it is customary to use wooden caps over the sash bars, which are screwed down upon the panes.

This makes a warm and water tight joint, and permits the ready resetting of broken panes.



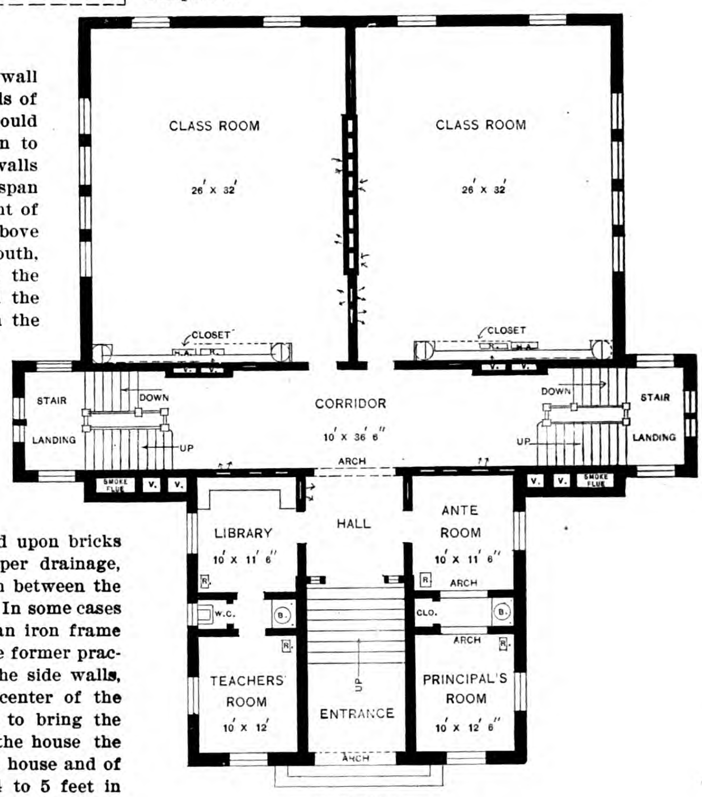
Second Floor.

In three-quarter span houses the south wall should be about the same hight as the walls of an even span house, but the north wall should be about one-half higher, if the long span to the south construction is used, but both walls may be of the same hight when the short span to the south house is used. The usual hight of the ridge in a house 20 feet wide is 7 feet above the walls, except in a long span to the south, in which the distance from the level of the south wall to the ridge is measured, and the ridge is so situated that the sash bars on the south side will be twice as long as those upon the north.

Either raised benches or solid beds may be used, the former being the most commonly employed for flowers and the latter for vegetables. In the construction of the raised benches it is desirable to use either gas pipe or angle iron for the supports, although if constructed of wood they will last a long time when supported upon bricks or cedar blocks. In order to secure proper drainage, there should be cracks of ½ inch to 1 inch between the boards used for the bottom of the benches. In some cases tile or slate bottoms are used, and with an iron frame work will form a very durable bench. The former practice was to place narrow benches along the side walls, with one or more wide benches in the center of the house, separated by walls, but in order to bring the benches into the more desirable parts of the house the plan of having walks along the side of the house and of arranging for three or four beds, from 4 to 5 feet in width, separated by walks 20 to 24 inches wide, has been adopted. With solid beds a similar arrangement has been followed, except that the beds are somewhat wider, although 7 feet is the usual maximum for violets and carnations. The hight of the solid bed is determined by the kind of crop to be grown and the distance to the glass. The same care is required as with raised benches to secure good drainage. This is generally done by filling in with broken brick and similar material, and covering with 8 inches of prepared soil.

Where sub-irrigation is to be used, the bottoms of the beds or benches are made practically water tight, and one or two lines of drain tile are placed lengthwise of the houses. The water is turned in at one end through a hose, and following the tile makes its way out through the joints. In three-quarter span houses, with a long slope to the south, the benches are placed at different levels, somewhat like a pair of stairs, so that those upon the north side will not be shaded, and they will not be too far from the glass.

THERE are various methods of moving buildings, some of which are more practical in winter than in summer. A case in point is that in connection with a 30-room hotel which was erected a year or two ago at a prominent shore point on Lake Wawasee, Ind. Cottages were later erected at a point across the lake, and the owner desired to move the hotel to a spot nearer the cottages. It was found impracticable to move it along the bank, as there were many trees in the way. One of the winter's blizzards, however, covered the lake with ice 2 feet thick, and the hotel was successfully rolled across the ice to the more favored location. The work had to be rushed, as a thaw started in before the whole undertaking had been completed.

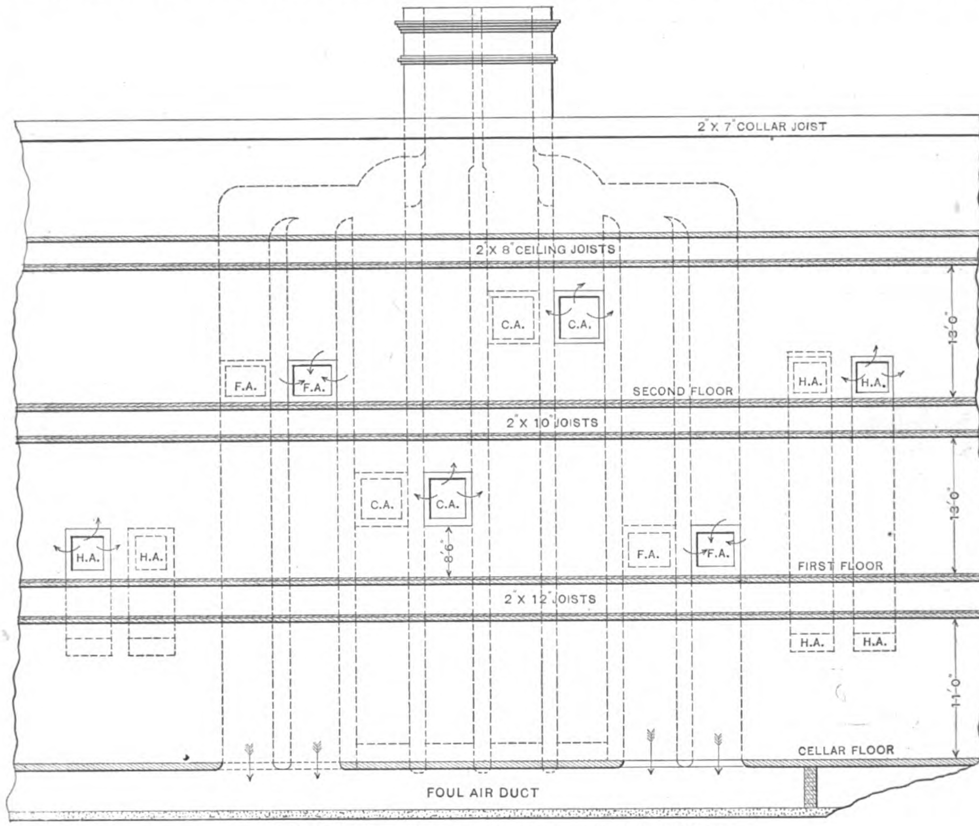


Main Floor.

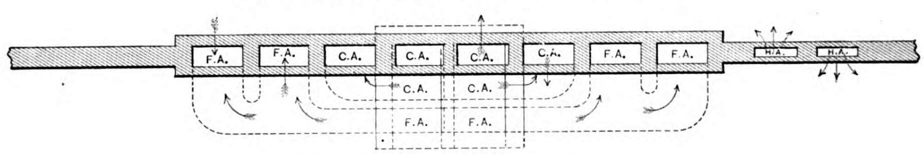
Design for a Five-Room School House.—Floor Plans.—Scale, 1-16 Inch to the Foot.

Ancient and Modern Buildings in Palestine.

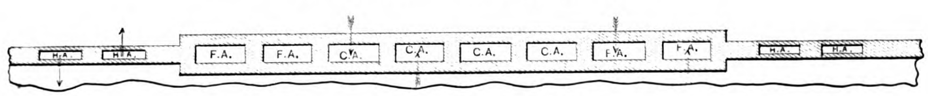
At a recent meeting of the London Architectural Association Mr. Beresford Pite delivered a lecture on the above subject, during which he stated that the building material most ready to hand was a hard limestone, difficult to work and offering little opportunity for ornamentation. The soil of the land was poor and yielded but scanty crops of coarse grain, so that when seeking to copy from nature the native imitated the heaviness of his surroundings. The country was also the seat of endless wars and disasters, so that durability and not beauty was the great aim of those engaged in architecture. The consideration of aspect was most important. It was always well to avoid an eastern aspect, and near Jerusalem itself it was advisable to turn the building away from the road because of the quantity of dust, which was terrible during the hot months when there was a drought of water. There were only two wells in Jerusalem, and the city was wholly dependent on the rainfall for its supply of water. In the absence, therefore, of a water supply the cost of water had to be seriously considered. If water ran out during building operations it meant an increase in the cost of construction. It was therefore necessary to begin building operations by constructing and excavating a cistern for the season's rainfall, thus providing against the drought which would certainly arise during the hottest months.



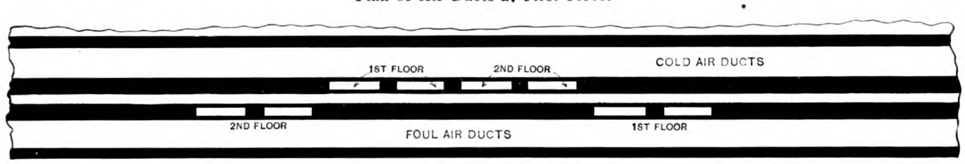
Partial Elevation, Showing Position of Air Ducts in Walls.



Plan of Air Ducts at Second Floor and Attic.



Plan of Air Ducts at First Floor.



Plan of Air Ducts at Cellar Floor.

Design for a Five-Room School House.—Plans and Elevation, Showing Air Ducts.—Scale, 3-16 Inch to the Foot.

The carriage of materials was a most important item when doing work in the East. The railway could only carry coal, so that it was impossible to send up heavy material in large quantities. Camels were the beasts of burden. In order that foreigners might erect a building of any size a royal firman from Constantinople was necessary, and even when this imperial permission had been obtained the local authorities had to be pacified and a liberal amount of backshish expended before operations could be commenced. If mosques were in the vicinity of the site the permission was more difficult to obtain, the religious traditions and superstitions of the case bearing an important part in the negotiations. There seemed to be no builder, and consequently no contractor, in Jerusalem; but still the lecturer, with the assistance of a German architect resident in Jerusalem, had overcome such difficulties. Plans made in London had been carried out with the utmost accuracy. The workmen would only recognize one master, and thus the man who gave the orders must also have the paying of the men engaged on the job. There was an entire absence of sand for building purposes, but a good supply of lime was to be obtained.

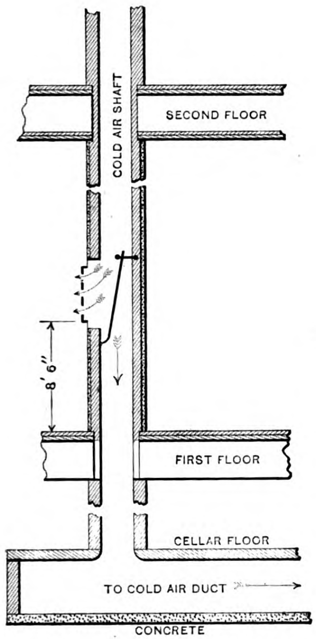
A list of the prices charged for work in Jerusalem included the following:

Roofing tiles came from Marseilles and cost 25 francs per 1000. The work was wired to battens; rewiring was necessary every ten years. The best bricks were foreign, the native ones being worth nothing. Bricks cost from 7 to 12 francs per 100 (that is, about $20 to $25 per 1000). Paving tiles cost from 6 to 8 francs per square meter.

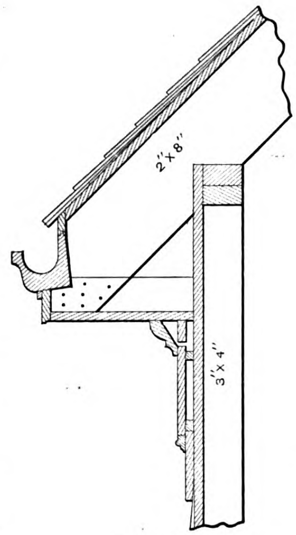
Timber cost about five times the cost paid in England. Building cost for cubing about 12 francs per cubic meter, about 10 francs for foundations, and cisterns 10 francs. Lime cost about one-twelfth of whole building; lime costs about one-fifth of cost of wall, including probably plastering; for girls' school (not plastered), one-seventh to one-eighth.

Stones for inner side of walls, 1 piastre each, for outer side, hewn, 2 piastres each. Lime, 5 to 6 piastres. Wages and hauling, 10 piastres, or in all, 12½ francs per square meter. Foundation walls, 10 to 11 francs; above ground, 14 to 16 francs; partition walls, 10 francs; dolma walls—*i. e.*, wooden framework filled with framing, 6 francs; vaulting, 8 francs—all per square meter.

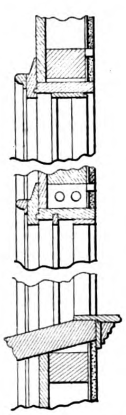
Façade stone, 100 pieces, from 10 to 14 francs. External pointing, ½ franc per square meter. Corner stones or quoins, 2 francs each. Lintels and cornices, 3 francs per lineal meter, or 40 francs per door and window opening. Plastering, 1½ to 2 francs per square meter. Cementing new cisterns, 3½ to 4 francs. Plastering ceiling, 2½ francs. Tile roofs, including wood, labor, nails, &c., 12 francs; with heavier wood work, 15 francs. Carpentry for window, glazed, painted and fixed, 50 francs. Per internal door complete, 50 francs; per pair of shutters complete, 40 francs. Iron bars fixed, ½ franc per kilo. Girls' school, Jerusalem, including boundary wall, gate house and cistern, and clearing site, about 12 francs per cubic meter. Not plastered.

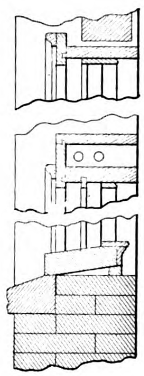


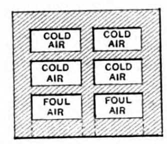
Partial Section through Cold Air Shaft.—Scale, ¼ Inch to the Foot.



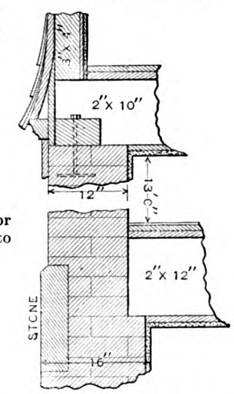
Detail of Main Cornice. — Scale, ¾ Inch to the Foot.


Detail of Second Story Windows. — Scale, ¾ Inch to the Foot.

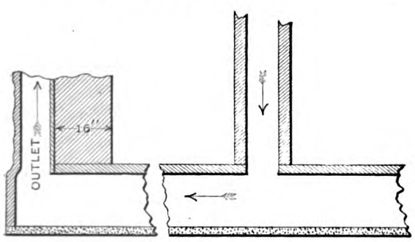

Detail of First Story Windows. — Scale, ¾ Inch to the Foot.



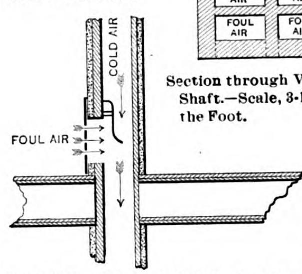
Section through Ventilator Shaft.—Scale, 3-16 Inch to the Foot.



Section through First and Second Floors. — Scale, ½ Inch to the Foot.



Detail of Foul Air Shaft and Duct.—Scale, ¼ Inch to the Foot.



Section Showing Foul Air Shaft at First Floor.—Scale, ¼ Inch to the Foot.

Miscellaneous Details Relating to Design For a Five-Room School House.

THE IDEAL HOME.

THE Mechanics' Institute, at Rochester, N. Y., has been conducting a series of weekly lectures on "The Ideal Home," the address on March 30 having been delivered by Architect Claude F. Bragdon, who spoke of the planning and construction of the home from a practical standpoint, illustrating his remarks by means of blackboard sketches and enlarged plans of houses. He said at the outset that there are so many things to be taken into consideration in the building and planning of every house—such as location, surroundings, the age and taste of the prospective occupants, &c.—that the ingenuity, experience and knowledge of the architect are always in demand. But while there is a diversity of plans, they are all formulated in accordance with fixed rules. The two-room house is a type of the most complicated structure, he said, because it recognizes the fact that one part of the house is for use and the other for pleasure. The tendency in the development of the house is to separate these two divisions as far as possible.

In considering room by room a house of moderate size and costing from $3500 to $6000 or $8000, according to size or finish, the speaker said: This house is representative of about four-fifths of all the houses in a city like Rochester. If possible, there should be a vestibule, the climate of this section making this arrangement desirable. A substitute for the vestibule is a curtained arch. Where there is room there should be a separate adjoining hall for the staircase. This gives more privacy in the use of the staircase. In any event, the foot of the stairway should not be too near the front door. To have it close to the front door, as in so many houses built 25 or 30 years ago, is the worst possible place to have it. The hall should give access to every important room. A rear hall can usually be planned to give access to the dining room, but if this cannot be done, by reason of limited room, the dining room door should be as far as possible from the front door and in an inconspicuous position.

In a very small house it is well to make the reception room an adjunct of the hall, dividing it from the hall only by an arch. In regard to the "living room," Mr. Bragdon said that if there isn't another large room in the house this should be large, comparatively speaking. It should have a fireplace and a bay window. Wherever a study is possible it should be so arranged that it can be shut off completely from every other part of the house.

The dining room should have an eastern or a southern exposure. The best place for it is at the southeastern corner of the house. It should not be too narrow, so as to make it difficult for the maid to move about while the family is at the table. There should be a place for the sideboard, but if the room is to be small perhaps the fireplace should be omitted. The dining room should be connected with the kitchen through a rear hall or a butler's pantry. As a rule the better the house the further the kitchen and the dining room are separated. In the old Southern and the English houses the kitchen was a long distance from the dining room.

The butler's pantry should be of ample size, with outside light, and liberally fitted with shelving and drawers. The kitchen should not be too large, for the reason that the larger it is the more difficult it is to keep clean, but it should be very conveniently arranged. There should always be a place for the range, a cupboard, a shelf for the clock, a sink, &c. Then there should be a kitchen pantry, fitted very much like the butler's pantry, though not so large. The kitchen pantry often contains the refrigerator, and it is very convenient to have the refrigerator so located that the ice can be placed in it from the back porch.

In describing the second story the speaker said that the windows of each sleeping room should face in two directions. The closets, of which there should be one for each room, should be as large and as light as it is possible to make them. The ordinary closet is a little coop with a shelf at one end, but this arrangement can be improved upon. Shelves with drop fronts, hooks from the ceiling as well as from the walls, and a rod across the closet were suggested. The bathroom, supposing there is one, should be as central as possible. Perhaps the most expensive item connected with the building of a small house is the bathroom, with modern sanitary plumbing.

Attention was next given to the construction of the house. The well built house, he said, costs at least one-third more than the shoddily built house, but it doesn't pay to economize too closely in the construction. One of the worst practices in building is to allow the outside of the cellar wall to be rough. If only one side of the wall can be smooth it is best that this should be the outer surface, so as to avoid dampness.

In speaking of the exterior of the house, Mr. Bragdon said that unless there was beauty of proportions there could be no beauty. It is well to confine the exterior decoration, he said, to important points like the main entrance and the cornices.

It is best to have the piazzas at the side of the house, overlooking the lawn or garden. Only we don't have gardens in America, as a rule. We have back yards. It is better to have only the entrance porch at the front of the house.

LAW IN THE BUILDING TRADES.

NO LIEN WHEN BUILDING IS DESTROYED.

When the building, for which the labor and materials were furnished, and against which a statement for a mechanic's lien had been filed, is afterward totally destroyed by fire, no lien attaches against the land.—Wood *vs.* Wilmington Conf. Academy, Del., 41 Atl. Rep., 89.

AN INJURY WITHOUT LEGAL ACTION.

Construction of a building, so that part of it overhangs the street in such a manner that the property of a neighbor is rendered more liable to fire than before, thus increasing the cost of insurance, and depreciating the market value of the property, ordinarily gives no right of action to the party aggrieved.—Siskiyou L. & M. Co. *vs.* Rostel, Cal., 53 Pac. Rep., 1118.

USE OF SPECIAL FLOOR SYSTEMS.

Where the Building Commissioners allowed the "Rapp System" of floor support to be used in the first four stories of a building, and then compelled the use of the old style arch for the succeeding stories, which order was complied with in the fifth and sixth stories and then disregarded in the four remaining stories, and the building was practically completed, a preliminary injunction should not be allowed, especially since the commissioners had allowed the Rapp System to be used in other buildings of similar character.—Dept. of Bldgs. N. Y. *vs.* Jones, 53 N. Y. Supp. Rep., 836.

CUSTOM CANNOT SUPERSEDE CONTRACT.

Evidence of a custom entitling architects, on completion of the plans and specifications, to 2 per cent. of the total cost estimated for the work is not admissible where the contract expressly provides for a compensation of 3 per cent. on the total cost of the work, with payments to be made on monthly estimates.—Davis *vs.* N. Y. Steam Co., 54 N. Y. Supp. Rep., 79.

RENEWAL OF BUILDING NOTES.

The fact that promissory notes are given in payment for the building of a house, and renewed from time to time, does not relieve the land on which the house stands from this liability.—Nickerson *vs.* Crawford, Minn., 77 N. W. Rep., 292.

WHEN OWNER IS NOT LIABLE FOR INJURIES DURING BUILDING OPERATIONS.

One contracting to erect a building under an architect's direction, the owner reserving the right to make any deviations from the contract, is an independent contractor, for whose negligence the owner is not responsible.—Frassi *vs.* McDonald, Cal., 55 Pac. Rep., 139.

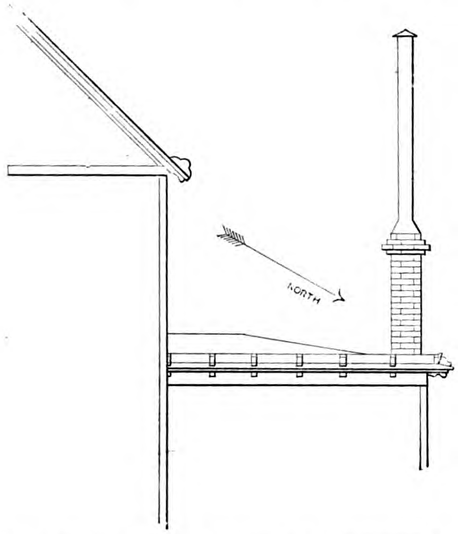
CORRESPONDENCE.

Design for Five-Room School Houses.

In presenting in the last issue of the paper the letter of W. G. Mumma relative to designs for five-room school houses, a most annoying error occurred in connection with his State address. There are several towns in the country known as Warrensburg, but the particular one in which Mr. Mumma resides is located in the State of Missouri.

Trouble With a Smoky Chimney.

From W. B. B., *Ansonia, Conn.*—I would like to ask for information through the columns of *Carpentry and Building* in regard to smoky and defective flues. I have on my house, as shown in the accompanying sketch, a one-story addition with 12 x 16 inch chimney, topped out 16 x 20. In windy weather the smoke blows down the chimney and into the room. It is impossible to start a fire if the wind is blowing hard, and to put on wood means to leave the house or suffocate. At first I put on ventilators with a globe top and two lengths of pipe, which, by the way, rusted off, and did not improve the draft while on. I now have on an 8-inch pipe with plain cap. It smokes at times and does not clear the ridge of the house by about 2 feet. What I would like to know is is not there a ventilator made which will stop the smoking without going to the hight of the ridge of the main house? I would like something to put on top of the chimney without so much pipe. Let me hear from the readers and thus oblige a subscriber of the paper.



Trouble with a Smoky Chimney.—Sketch Accompanying Letter of " W. B. B."

Note.—We submit this inquiry to those of our readers who have experienced trouble with defective flues, in the hope that they will describe the methods which they employed in overcoming the difficulty.

Hanging Inside Blinds.

From F. P. R., *Citronelle, Ala.*—Can any one give me through the Correspondence department some information about hanging inside blinds? I am a young carpenter and would like to see some suggestions and directions bearing on this subject, as I feel sure that the matter will interest others as well as myself.

Plans for a Lime House.

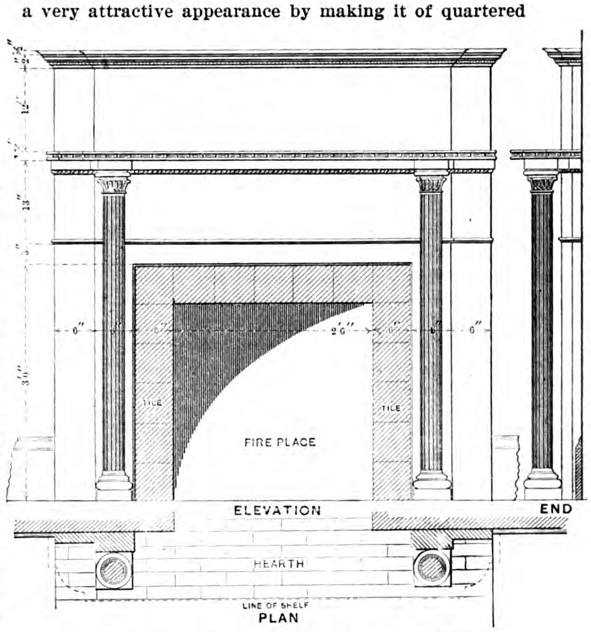
From J. M. S., *Appleton, Wis.*—I notice in the March number of *Carpentry and Building* that " J. S. H.," of Wilmington, Del., wants to obtain plans for a cheap lime house. Now I cannot furnish him with a plan myself, but I can tell him where he can get one. If he will apply to T. T. Moulton, Oshkosh, Wis., he can obtain a plan and specification for a good lime house, this being the person who also furnishes the iron doors which are used in connection with the bin. I expect that the correspondent will have to pay something for the use of the plans, as Mr. Moulton has a patent on them.

Paint for Zinc.

From J. A. N., *New Hampshire.*—One year ago I moved into a new house of old Colonial architecture, and the cornice, gutters, roof, deck molding and in fact all the trimmings were of galvanized iron or zinc. Before putting it on the house I had all the sheet metal thoroughly primed with half and half red and white lead, and wherever we made a joint or did any soldering we primed it over, then painted it three coats of white. After six months it began to peel and continues doing so. It appears to peel most where the sun strikes it most, as the north side of the house is all right. I would like to know from some of the readers of the paper how I could paint the metal so as to prevent peeling.

Design For Mantel.

From H. E. B., *Quincy, Mass.*—In answer to "'W. D." of Batesville, Texas, who made inquiry in the March issue of the paper for designs for neat mantels—inexpensive yet easily made—I inclose a sketch which may serve his purpose. The drawing so clearly indicates the general construction that very little descriptive matter seems to be necessary. As shown, there is a front elevation, an end view and a plan with some of the more important dimensions given thereon. The mantel can be given a very attractive appearance by making it of quartered oak and treated natural wood. If white wood or pine is used I would suggest that it be treated with ivory white.



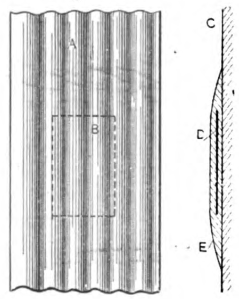
Design for Mantel.—Contributed by " H. E. B."

Faulty Roof Truss for Armory.

From F. E. KIDDER, *Consulting Architect, Denver, Col.*—In looking through the correspondence columns of the April issue, I noticed a serious defect in the roof truss submitted by R. M. B., which I think should be pointed out to your readers. This defect is that the main or end strut comes apparently about two feet in from the support, so that the tie beam has to support, as a beam, practically all of the load on the truss including its own weight. As a general rule such construction would not be safe. The outer strut should come as nearly over the support as it is possible to have it.

I also notice that the center rod is larger than the end rods. This is wrong. In such a truss the end rods have the greatest stress, and the center rod the least. In the truss shown the only load carried by the center rod is the weight of the tie beam and of the ceiling supported by it, if there is one. The general proportions of the truss are correct, but where a long hall is roofed in this way the truss should be braced from the wall to prevent the building racking sideways, and possibly a total collapse during a severe gale.

From E. R. R., *Denver, Col.*—A correspondent in one of the recent issues of the paper asks for a truss for an armory roof, and in the March number an answer was published showing a strong and well designed truss. In the April issue appeared another answer which, while representing one of the most common types, is designed in such a manner as to show that the author had no conception of the duties of the various members of which the truss was composed. The entire thrust of the principals is exerted upon the tie beam at a point some 3 or 4 feet from the wall, while a 1½-inch rod has been thoughtfully provided in the center to keep the tie beam from sagging.



Repairing Corrugated Roofs.—Fig. 1.—Mending Black Iron Roof.

Repairing Corrugated Roofs.

From C. W. S., *Waverly, Ohio.*—Please inform me how to make a preparation for mending holes in a corrugated steel roof. Also let me know the best way of repairing the same where the roof is in a fair condition except for a few holes rusted through it.

Answer.—It will hardly pay our correspondent to make his own preparation of roofing cement which is required to mend the holes in corrugated roofing. Numerous manufacturers of roofing cement sell in quantities as low as 5-pound cans at prices which would be cheaper than self made cement. If the roofing is of galvanized iron the leaks can be soldered or new sheets put in place; if the roofing is of black iron or steel it can be mended as shown in Fig. 1, where A represents a part of the roof and B the point at which a patch is to be placed. Clean off the roof by removing all peeled paint, dirt, &c. Over the defective spot give a coat of metallic paint. With a trowel spread on one side of a piece of unbleached muslin of the required size a layer of paint skin or roofing cement, and place it over the defective spot, pressing it down firmly into the corrugations, as at B. Spread another layer of cement on top and smooth it down to the lines of the roof, as shown in the section at E, a side view of the roof being represented by C and the patch of muslin by D. In the same manner treat any other leaks that may exist.

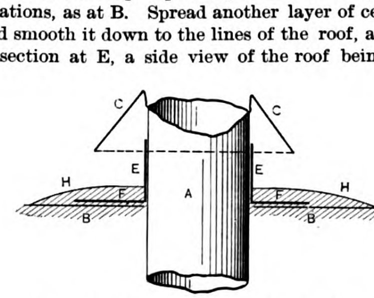


Fig. 2.—Mending Leak Around a Smoke Stack

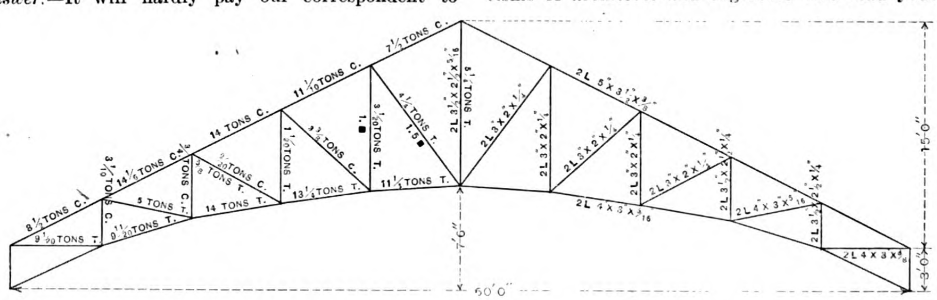
If there should be a leak around a smoke stack, which was heated, and muslin or cement would be apt to crack from the heat, sheet lead could be used, as shown in Fig. 2, where A is the stack, B B the iron roof and C C the hood around the stack to prevent the rain from following the lines of the stack inside the building. Place a layer of paint skin around the stack at the roof line, and with sheet lead 1-16 inch thick flange it around the stack, as shown at E E, and out on the roof, as shown by F F, bedding it well into the paint skin. The lead being soft is easily worked into the corrugated forms, after which put a layer of paint skin over this sheet lead, running it smooth to the lines of the roof, as shown at H H. Where the leak is caused by rivet head put small lumps of paint skin over same cone shape and paint lightly over all with one coat metallic paint in linseed oil.

Roof Plan Wanted.

From A READER, *Pulaski, N. Y.*—Will some of the readers of *Carpentry and Building* furnish for publication the roof plan for a house 26 x 36 feet, so there can be rooms finished off in the attic?

Criticism Desired of Iron Roof Truss.

From S. W. J., *Huntington, Ind.*—I inclose herewith a sketch of an iron roof truss of 60-foot span, to be spaced 8 feet on centers with the usual purlin connections at each joint, to be covered with tile, under which is 1⅜ inch matched pine roofing boards. I would like the criticisms of architects and engineers who read your valuable journal as to the construction employed. It will be seen from an examination of the right side of the diagram that I have shown the sections of angle irons, &c., of which the truss is to be formed.



Criticism Desired of Iron Roof Truss.—Diagram Accompanying Letter of "S. W. J."

Strength of an Oak Post.

From M. D. S., *Pittsburgh, Pa.*—In regard to the inquiry of "J. L. T.," Bremen, Ind., in the March number of *Carpentry and Building*, I would say that it is a difficult matter to give a strictly accurate answer to his problem, because the result sought depends so much upon conditions. A well seasoned oak post will sustain one-half more, or perhaps twice the safe load, as a green post of the same dimensions. Then the data and formulæ given as the result of experiments by various engineers and experts vary. But in a problem of this nature I would always follow the most conservative methods—that is, keeping on the safe side.

For convenience we will restate the inquiry: "How much weight [safe load, I presume, he means] will an oak post 4 x 10 inches support, the post being 7 feet high and braced 3 feet from the bottom, the 4-inch way?" I would eliminate the statement as to bracing. I do not think that in this case the braces increase the sustaining power of the post. In an iron column it would be different. Placing the crushing strength of 1 square inch of seasoned oak at 7000 pounds, and calling the least side of the rectangle the breadth, we proceed to find the breaking load in pounds per square inch of area of an oak post 7 feet long:

$$\frac{7000}{1 + \frac{\text{square of length in inches}}{\text{square of breadth in inches}} \times 0.004};$$

or, in analysis, the length, 7 feet or 84 inches, squared = 7056. The square of the breadth is $4^2 = 16$; and $\frac{7056}{16} =$ 441; and $441 \times 0.004 = 1.764$; and $1.764 + 1 = 2.764$.

Now $\frac{7000}{2.764} = 2532$ pounds, the breaking or crushing load per square inch. The area of the post, however, is $4 \times 10 = 40$ inches, so that the entire breaking load is $2532 \times 40 = 101{,}280$ pounds, or 45 (long) tons. But in practice we should only trust timber with about one-sixth of its calculated crushing load; and in this case we have, then, $\frac{0.45}{6} = 7.5$ tons as the safe load for the post in question.

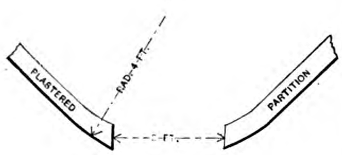


Fig. 1.—Plan.

Laying Out Circular Headed Doors in Round Cornered Partitions.

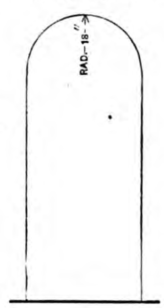


Fig. 2.—Elevation of Opening.

Laying Out Circular Headed Doors in Round Cornered Partitions.

From W. W. D., *Kansas City, Mo.*—I inclose plan, Fig. 1, and elevation, Fig. 2, of a round cornered partition showing a doorway or opening with a circular head. I would like to have some of the readers show how they get out this form of door head or head jamb.

Comments on "N. H. D.'s" House.

From F. K. T., *Raleigh, N. C.*—I submit the following in answer to the inquiries of "N. H. D." on page 98 of the April issue, hoping that my omissions will be covered by other correspondents.

The roof shown, covering floor plan submitted, contains 1288 square feet, this being the surface necessary to be covered with sheathing and shingles. Allowing that 750 shingles, 4 x 16 inches, laid 5 inches to the weather, will cover one square of 100 feet, the roof will require 9660 shingles.

A rapid and sufficiently accurate method for finding the surface in plain gable roofs, like the one under discussion, is to take the sum of the lengths of roof surfaces measured from a point half way up the gables to valley (holding the rule parallel to ridge) which in this case amounts to 92 feet; multiply this sum by 14 feet, the average length of gable rafters, which gives 1288 square feet to be covered, as stated above. This rule is applicable only to plain gable roofs, where ridges are on nearly the same level. For more complicated roofs, each surface should be computed separately and the sum taken.

Lead is considered best both for lining tanks and for pipes. Galvanized iron will be found satisfactory for supply pipes in ordinary work, but waste pipes should always be of lead.

I would recommend the use of a siphon jet water closet with hard wood seat cover, and in this particular case the connection between soil pipes and house drain should be made outside the foundation wall. The soil pipe should be 4 inches of heavy cast iron, tarred inside and out, and joints thoroughly caulked with oakum and molten lead. The house drain to cesspool should be a 5 or 6 inch salt glazed tile, carefully laid with joints cemented and kept swabbed smooth on the inside.

The soil pipe should have suitable trap where it enters the house drain.

Any good force pump can be used at the kitchen sink, and to fill tank by coupling to supply pipe running to tank in attic.

A 4-inch leader will carry all waste and water from tank.

For a neat job of plumbing the supply and flush pipes for water closet and other exposed pipes should be nickel plated.

As the plan shows 14,212 cubic feet to be warmed, a hot air furnace, listed with a heating capacity of from 12,000 to 20,000 cubic feet, will be required. The successful operation of any furnace is a matter requiring the best judgment after an accurate knowledge of the local conditions, such as exposure, direction of prevailing kinds, points of compass, &c., have been obtained; without these it is impossible to give an accurate estimate for size of piping and registers. However, under ordinary conditions, rooms of the size shown on first floor plan would require an 8-inch pipe, with an 8 x 12 inch register. The pipes for bedrooms on second floor can be run between the studding and joists, and should be covered with asbestos bagging, as a precaution against fire and loss of heat.

From READER.—On page 98 of the April issue, "N. H. D." asks for suggestions regarding the house of which the floor plans are there presented. In reply I would suggest first that he move the pantry, washtubs and sink to the other side of the kitchen, the partitions forming a support to the bathroom and the partitions of the bathroom a support for the tank overhead. Of course proper supports should be placed under the pantry in the cellar. Second, if the plan will admit of it, I would change the direction of the upper half of the flight of stairs, placing a landing midway, and if necessary providing some other means of access to the attic. Make the rear of the house the same width as the front, the pitch for the whole 12 inches to the foot, and place the porch on the west side where the afternoon sun in summer is most objectionable.

Strength of Floor Joist.

From S. W. J., *Huntington, Ind.*—In answer to the inquiry of "G. S." of Hersher, Ill., regarding the constants or values of A for different kinds of wood, I would say that the formulæ used some years ago have changed to a certain extent. For instance, to compute the strength of a beam we first used the formula:

$$\text{Safe load, uniformly distributed} = \frac{2 \times \text{breadth} \times \text{depth squared} \times A}{\text{Span in feet} \times S}$$

when the constant A for hard pine was 375 and a factor of safety represented by S was shown in the formulæ, but now the formula is as follows:

$$\text{Safe load} = \frac{2 \times \text{breadth} \times \text{the square of the depth} \times A}{\text{Span in feet.}}$$

The constant in the last formula for hard pine is 100;

hence the computation is almost the same, allowing a factor of safety of 4, or in other words the formula, by performing it as shown, would allow that factor of safety. The value for A in the new formulæ for loads uniformly distributed for the different woods is:

Hemlock	55	White oak	75
Georgia pine	100	Oregon pine	90
Norway pine	70	White pine	65

F. E. Kidder, who is an authority on these matters, says for permanent loads such as brick walls, &c., use only four-fifths of these values.

The constant A for wrought iron is 666 and for steel is 888, but the tensile strength of wrought iron is 10,000 pounds per square inch, while that of steel is 12,500 pounds.

Are Chimneys the Mason's or Plasterer's Work ?

From YOUNG CHIP, *Wilno, Minn.*—Will some of my brother contractors and masons tell me, through the Correspondence department of the paper, whether chimneys belong to the mason's work or to the plasterer's?

Dampness of Plastered Walls.

From J. B. P., *Hawkeye, Iowa.*—In regard to damp walls, about which "H. A. F." makes inquiry in the April issue, I would say that I was in a house this week which was affected the same way. The only cause I could see was that the building was sheathed outside and inside and double papered; also lathed and plastered, which made it air-tight, as you might say. "H. A. F." says that the walls of his house are filled in with mineral wool. Now, it seems to me, that, it being so tight, it acts like a solid wall, there being no chance for the air to come through and create a circulation. The wall cooling off at night condenses what moisture there is in the air in the room and causes the trouble about which he speaks.

From GHEQUIER & MAY, *Baltimore, Md.*—We have carefully read the letter from "H. A. F.," Port Antonio, Jamaica, in the April number, relative to dampness on the inside of a wall, and without an examination of the premises it is impossible to give more than a theoretical opinion. It seems to us that the trouble does not proceed at all from the outside, but is caused by interior "sweating." The climate of Jamaica is a damp one, and "H. A. F." has taken every effort to bottle up his moisture. It might in some degree have got away if he had used ordinary plaster. It is curious to what extent the walls of a room holding moist air "sweat" when the temperature within is ever so slightly raised. We remember once coming into an old frame mansion in Virginia on a damp, muggy day. To honor our arrival a fire was kindled in the "best" parlor. In a few minutes the moisture commenced to condense on the walls and before long it was literally streaming over the floor in rivulets. Much of the dampness in houses attributed to outside causes is really the product of the inside. In summer time the walls of our office sometimes sweat in places, causing stains on the paper. The hardness and non-porosity of the adamant have undoubtedly, in the case of the correspondent named, aided the untoward result, and we should suppose also the carbolic acid was a bad medicine.

The means whereby a cure can be effected will probably be more difficult of discovery than the cause, but reasoning from the statements made and our theory, it would seem advisable, first and foremost, to entirely strip and wash the wall and allow it to dry as thoroughly as possible by the aid of artificial heat. After this the paper should be put on with a paste that will quickly dry. Still, even then we should not like to assure the result. Cannot "H. A. F." look around and see what other people in Jamaica have done; whether other walls are damp and how the papering has been put on where there have been no bad results?

From A READER.—In reply to the inquiry of "H. A. F.," Port Antonio, Jamaica, I would suggest that the trouble may be caused by moisture finding its way into the filling of mineral wool. If upon examination this is found to be the case, I would advise some other means of insulating, as for instance removing the shingles and sheathing and after the lath and plaster had dried out, nailing 2 inch square furring strips on the framing stuff next to the lathing, forming a shoulder for nailing matched sheathing. On this some sort of water proof building paper might be used. The paper which is employed to decorate or finish the rooms I would remove, replacing it with some sort of kalsomine or gypsum finish, such as "Alabastine," which may be procured in the United States.

Plumbing in N. H. D.'s House.

From LEAD PIPE, *Long Island.*—In reply to the somewhat extended inquiry of the correspondent, "N. H. D.," in regard to the best method of plumbing a house, the floor plans of which were published in the April number of *Carpentry and Building*, I would say that "N. H. D." will find very little difference in the cost between copper and lead as a lining for the tank. While copper is better than lead, lead is better than zinc, and zinc in turn is better than galvanized iron for the purpose named. Lead pipe is by far the best to use, the only objection being the cost, but it is without question the cheapest in the end.

It is largely a matter of opinion what is the best water closet to employ. Any good siphon closet will give satisfaction if properly put in. No doubt it would be just as well to connect the soil and waste pipes inside the house.

In regard to the kind of pump to employ for supplying the tank in the attic, it is only fair to say that there are many on the market that will do the work, and perhaps a double cylinder brass force pump would be as satisfactory as any hand pump. The suction pipe should be 1¼ inches, the supply to the tank 1 inch, while a ¾-inch feed pipe will be found sufficient. The supply for the closet tank should be ½-inch. The waste or flush pipe should be 1¼ inches if of lead and 1½ inches if nickeled. The soil pipe for the closet should be 4 inches, while the branches from the sink and tubes should be 2 inches. The vent from the soil pipe should be 3 inches. If tile pipe is used it should be at least 5 inches, but if of iron 4 inches will be sufficient, and will probably make a better job than if tile is used. If the overflow pipe from the tank to the leader is larger than the inlet pipe from the gutter to the tank, and this most certainly should be the case, there is no necessity for having a stop in the inlet from the gutter to the tank, for the reason that when the stop is in use water will stand between it and the gutter, and in cold weather it will freeze and so cause trouble.

It seems to me that it would be much better to have an extra leader attached to the one that leads to the cistern with a rain water cut-off placed at the intersection. Then if the tank overflowed it would run into the cistern, and if the cistern became filled the cut-off could be turned so as to cause the water to be discharged into the ground or into a drain pipe.

Some Questions in Furnace Heating.

From A. B. K., *Burlington, Vt.*—Alluding to the letter from "W. B.," Bridgeport, Conn., whose furnace pipe leading to second story fails to deliver any warm air, the correspondent states that the vertical pipe is on the outside of the building and that many experts had failed to suggest a remedy.

The failure of this pipe to perform its function is an easier problem to solve than that involved in the question as to what sort of experts they could have been who failed to discover the difficulty and suggest a remedy. They certainly were not experts in the art of warm air heating. If this hot air pipe is, as he says, outside of the building, which I think must be an error in printing, a misstatement or some sort of a mistake, or even if it is inclosed in an outside wall, let it be got in at once and carried up in some inside partition or through some closet, or anywhere inside the house. This change will probably remedy the whole difficulty if the heater is supplied with a circulation of air through a proper duct, either from one of the doors or from the house. In the latter case the doors in the hall and adjoining rooms should be generally left open, so that the air can circulate freely. If the heater is arranged to take air from both outside and inside, there should be a separate duct for each, and that from outside should be entirely shut off when taking air from inside. The rectangular pipe, 4 x 10 inches by 3 feet, would better be replaced by a larger pipe either round or square, perhaps not necessarily for the working of the job but on general principles. The cut shows the 7-inch horizontal pipe to pitch down away from the heater, or at best to be about level. This is a defect and should be remedied by giving it an incline upward toward the vertical pipe. If these suggestions are carried out I am sure the unruly member will be brought to terms; but if not cover all the exposed pipes

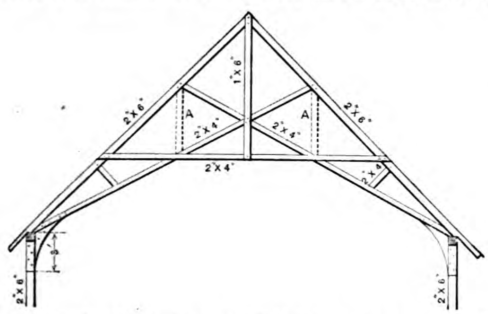


Fig. 1.—Sketch Submitted by "G. M. E." to which the Dotted Lines Have Been Added.

with some non-conducting substance, such as old woolen blankets or carpets wound on neatly and tied, or some of the many non-conducting coverings known to the trade.

From W. W., *New York*.—In answer to "W. B.," I would say that if he connected his horizontal pipe directly to the pipe going to the second story and put in a cold air pipe large enough to drive the hot air up he would obtain better results. When a furnace has an insufficient air supply it is apt to draw air down some one of the pipes. A pipe exposed to the outer air may be commendable for cold storage, but certainly not for heating purposes, for instead of serving as a heating pipe it is probably acting as a cold conductor for carrying cold air to the furnace.

Truss for Roof of 34 Feet Span.

From G. M. E., *Russell, Mass.*—I am interested in the building of a truss roof to span 34 feet, and in order to post myself have been looking over back numbers of *Carpentry and Building* for the past five years, but cannot find what I want. There are plans enough and differences of opinion enough—some simply hair splitting, as note the drawings of roof truss which appeared in the issue of the paper for December, 1893. Nearly every balloon frame truss roof plan submitted is practically the same, the only difference being in the size of the timber and some minor bracing. I would like to have the matter of truss roofs discussed more in detail by practical builders, giving their experience, stating how to raise them, how much to allow for spreading of plates, size of timbers, distance apart of trusses, and whether nails are sufficient or if bolts are necessary. "A. H." of Sac City in reply to "C. W. B.," says in the issue for December, 1893, that he built a roof similar to the first sketch there shown, which was not satisfactory; that he drew in the plates 2 inches and that they spread enough to throw them out of line. Is it customary to draw in the plates before putting up the truss or stay them straight and contract the foot of the truss?

Would a roof built according to Fig. 1 of the accompanying sketches, with trusses placed 2 feet on centers, be sufficient for a span of 34 feet? Is the timber large enough? What change would be necessary if any? I want the hight as shown in the sketch.

Answer.—The following comments on the above have been prepared by F. E. Kidder: The truss shown in Fig. 1 of the accompanying engravings is a good and economical type for church roofs, ranging from 30 to 36 feet in plan, provided a tie is inserted at A A, as indicated by the dotted lines. Without this tie a heavy cross strain is brought both on the tie and rafter. The truss as shown in the original form cannot be considered safe for a span of 34 feet with a spacing of 2 feet, although it might stand for some time. By placing a 1 x 6 tie at A A and increasing the rafter to 2½ x 6, it will be safe for a shingle roof and plastered ceiling, provided, however, spikes are used in the joints. What the writer would recommend, however, is that a truss of the dimensions shown in Fig. 2 be employed and the truss

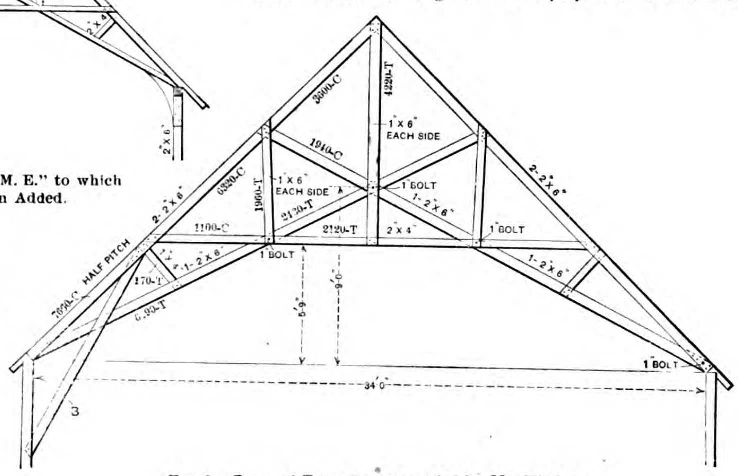


Fig. 2.—Form of Truss Recommended by Mr. Kidder.

Truss for Roof of 34 Feet Span.

spaced 32 inches on centers, the ceiling beams being strapped with 1 x 2½ inch stock, 12 or 16 inches on centers for lathing. The advantages of the truss, Fig. 2, over the truss shown in Fig. 1, is that in the former the rafters are double and the ends of the tie beams and collar beam are spiked between them. This secures a symmetrical strain without a tendency to twist. It is also better to use two boards for the vertical ties, one on each side of the truss. Where the ties intersect there should be a least one bolt reinforced by spikes. When spikes alone are used they are sometimes partly drawn by the twisting or warping of the planks.

There is also another point which should be considered in placing such a roof over a large room, and that is the danger of the building collapsing from a heavy wind pressure against the side of the structure. If the room is more than 30 feet long without any break or buttresses to stiffen the sides, or cross partitions, the trusses should be braced from the walls, as indicated by the brace B in Fig. 2. The writer has in mind a brick veneered frame church, 80 feet long by 42 feet wide, roofed with trusses somewhat similar to Fig. 2, which was blown down before it was entirely completed, owing to a lack of bracing of the walls.

The relative stresses in the different pieces of this truss, Fig. 2, are indicated in pounds in connection with each piece, calculated for a spacing of 32 inches and allowing 30 pounds pressure per square foot for wind and snow, the ceiling being plastered. The letter "T" denotes that the piece is in tension, while "C" denotes compression. These figures show which parts of the truss are called upon to bear the most strain. The tie beams and rafters have to be computed for a transverse strain and also for a direct stress.

In conclusion the writer wishes to emphasize the fact that any true truss is capable of being calculated with reasonable exactness, and the stresses and sizes of timbers should be calculated in every instance. No person can make an accurate guess at the size of timber required, and to guess at such construction is hardly less than criminal.

Plans for a Roof of One-Third Pitch.

From A. D., *Glenwood, Iowa.*—I send herewith a plan of a roof for the house described by "A. S.," in the February issue of the paper. I prefer this plan, Fig. 1, to any of those given in the March number.

From J. W. G. and J. S. T. B., *Ithaca, N. Y.*—We send under separate cover an isometrical drawing, Fig. 2, giving our idea of the roof called for in the February issue by "A. S." of Lancaster, Ill. The drawing is of such a character that we think it will require no explanation.

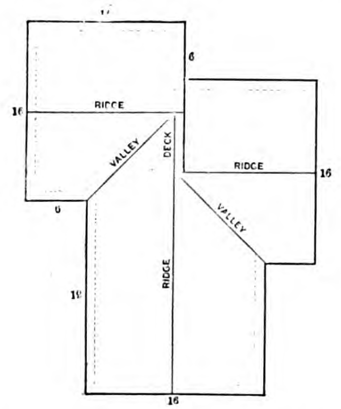


Fig. 1.—Roof Plan Submitted by "A. D."

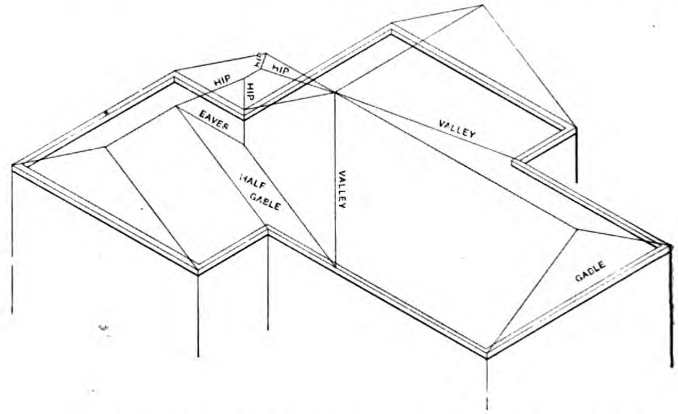


Fig. 2.—Isometrical View of Roof Contributed by an Ithaca Correspondent.

Plans for Roof of One-Third Pitch.

From J. P. K., *Worcester, Mass.*—I have been somewhat interested in the many different answers and examples sent in for the roof plan asked for by "A. S." of Lancaster, Ill. The answer from "G. H. D.," Charlestown, S. C., Fig. 6, and "C. F.," Junction, N. J., Fig. 4, in the March issue, are proper enough, but they should not have the flat valley, and it is not necessary. If they continue the two valleys to the next hip they will get a ridge instead of the valley. The same objection and remedy will apply to Fig. 6, by "J. F. B.," Greenfield, Mass., in April issue. The roof shown by "C. E. E.," Fig. 1, is properly marked out and shows the way the ridge should be placed in problems mentioned above. The answer from "C. B. L.," Fig. 7, is an odd idea, and would answer the purpose all right. As the author says, it is as cheap as any; but for the easy part of it I do not agree with him. A great many who could frame a regular roof could not do this, but it would be a good problem to practice on.

Criticism of First Prize Designs

From T. W. N., *Ingersoll, Ontario.*—I notice in the April issue of the paper a reprint of some comments on the $750 first prize house design, published in the March number. I suppose all readers of the paper have a right to express their opinions, and in so doing I do not wish to throw any reflection on the publishers of *Carpentry and Building*, for I think they deserve credit for going to the expense and trouble of furnishing every reader with those "extras" which are so valuable in the paper. But I must say with regard to the Committee of Judges that their taste and mine are at great variance, or else the other competitors must have had some very "ratty" designs. I must say, Mr. Editor, I have no use for those potato-pit houses. In the first place, the roof looks as though it had the rheumatism and could not straighten up. In the second place, the bedrooms upstairs are such that any one taller than Tom Thumb cannot move around without keeping in the very center of the room. I think it would not cost a cent more to carry the walls higher and have less roof. I think the floor plans are all right for a house of that price, and had the walls been carried up higher I think you would have had a model house for the money.

I also see in the April number the first prize man has given us a dose of the same medicine. He says:

"I have adopted the gambrel roof colonial style, as giving greater individuality." That is a big word, but it's a big roof and has to have some support. Now, Mr. Editor, I may be all out of date, living over here in Canada, but they are not wearing those rheumatic roofs here, and I would be glad to have you publish in a future issue for the benefit of us out-of-date fellows on both sides of the line a house that a man 5 foot 9 tall can go to bed in without crawling into the room on his hands and feet. I would like to offer a suggestion, which may be asking too much of you, Mr. Editor, but it is as follows: Have the committee select, say, three designs in each class and have them published, and then leave the matter in the hands of the readers to say which they think is entitled to the first, second and third prizes. It seems to me this would be fair with the competitors and also create a more general interest. I know nothing about how much extra work this might cause you to place on your paper, which is already a big thing for the money, but merely throw out the hint and leave the judgment with your good reason.

Note.—The columns of the paper are open to all for the discussion of any topics of trade interest, and we shall be glad to hear from other readers touching the prize designs, or giving expression to opinions on other subjects in which they feel an interest.

Description of a Tool Chest.

From WAY OUT WEST, *Portland, Ore.*—If the correspondent from "Down South," Poplarville, Miss., will please give a description of the tool chest referred to in the May issue of *Carpentry and Building* for last year he will bestow a great favor on a number of "chips" way out West. I have been a reader of the paper for the last year and a half, and the more I read and study it the better I like it. It is an excellent paper that every carpenter ought to support.

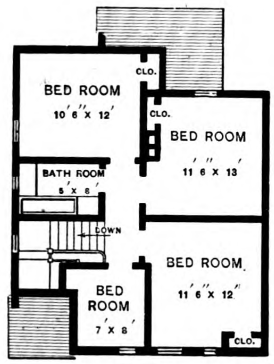
COMPETITION IN $1000 FRAME HOUSES.

SECOND PRIZE DESIGN.

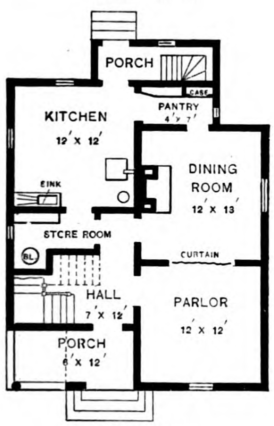
According to the report of the committee having in charge the award of prizes in the Twenty-sixth Competition, being that for $1000 frame houses, the second prize was secured by C. B. Chappell of Charlottetown, Prince Edward's Island, and we take pleasure in presenting the design herewith, together with extracts from the specifications accompanying it.

The cellar walls, of local stone, are to be 5 feet high and 15 inches thick, laid up in lime and sand mortar, the portion above ground to be neatly pointed, brick-nogging at sill all around to make the cellar frost proof. A double chimney is to be provided, as shown, and the hearth is to be set with brick. The chimney top is to be clear of the roof and laid in cement mortar.

The frame is to be in half balloon style, the outside



Second Floor.



First Floor.

Scale, 1-16 Inch to the Foot.

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

Competition in $1000 Frame Houses.—Second Prize Design —C. B. Chappell, Architect, Charlottetown, Prince Edward's Island.

to be covered with rough boards. The roof is to be covered with clear sawn cedar shingles laid 4½ inches to the weather and placed on one thickness of tarred paper. The walls are to be covered with second clear sawn cedar shingles laid 4½ inches to the weather, placed on one thickness of sheathing paper. All valleys and other places requiring it are to be flashed with 10-ounce zinc. All eave and other finish is to be of good quality pine and executed in accordance with the details. The overhanging portion of second floor is to be filled in and made warm with coarse mortar. The window frames and sash are to be made according to the details, one sash in each frame to be hung with cord and weight. The cellar windows are to be made in the usual manner. All sash throughout the building is to be glazed with 21 ounce glass, puttied, back puttied and sprigged. The porch is to have turned posts and matched flooring of spruce, the sill to rest on iron tubes supported on a stone placed in the ground. The bottom is to be finished with lattice. The beam in the cellar is to be supported on 8-inch cedar posts, resting on stones 2 feet square.

All partitions throughout the first and second floors are to have 2 x 4 inch studding, placed 16 inches on centers.

The first and second floors are to be laid single with ⅞ x 4 inch seasoned matched spruce flooring. The door frames are to be of 5-inch spruce, and the inside doors 1½ inches thick with flush molding and four panels. The front door is to have glass in the upper part. All the doors are to be hinged and fitted with a good quality of mortise locks and suitable handles. All doors and windows on the first and second floors are to have 4 x ⅞ inch block finish, in accordance with the details. All rooms are to be skirted with molded base, as shown, the material being clear spruce. The kitchen and bathroom are to be wainscoted 3 feet high with narrow boards put on vertically and neatly finished without base. The main stairs are to have turned birch newels and balusters, birch rail and coping, while the treads and risers are to be of pine.

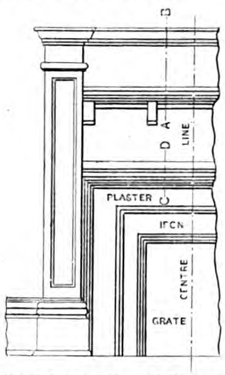
The entire first and second stories are to be lathed and plastered with best three coat work. Shelving in the pantry is to be provided, also one pantry case with glass doors complete. Mantel shelves are to be put up in parlor and bedrooms, the mantel for the dining room being of pine, as indicated in the details.

The plumbing is to consist of one 14-ounce copper bathtub, one 14-inch basin and one 24-inch cast iron sink, with all pipes, cocks, fittings, &c., complete. The owner is to furnish water closet and provide the drain and also the heating.

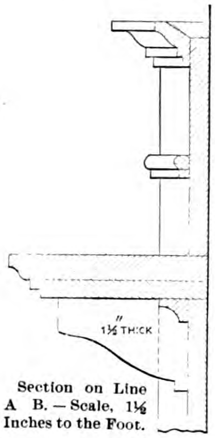
All wood work inside and out, with the exception of the floors and roofs, is to be painted two coats of best lead and oil, in colors to suit. The hardwood is to be varnished two coats.

The detailed estimate of cost furnished by the author of the design is as follows:

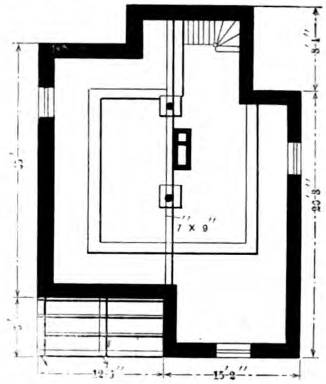
108 yards excavating at 15 cents	$16.20
25 perch stone work at $3.50	87.50
2000 brick for flue at $9	18.00
Building 38 feet double flue at 30 cents	11.40
2 casks lime at $1.60	3.20
2 loads sand at 50 cents	1.00
1 sash door, 75 cents; 3 thimbles at 20 cents, 60 cents	1.35
2 cedar posts at 15 cents	.30
1 turned pillar for veranda	.50
14 feet veranda rail at 12 cents	1.68
85 feet sheathing for veranda at 2 cents	1.70
85 feet flooring at $1.50	1.28
Lattice for porch	2.00
1 front door and frame	6.00
1 outside kitchen door and frame	5.00
2 sets outside steps	5.00
6 windows, 4 lights, at $2	12.00
7 windows, 2 lights, at $1.50	10.50
3 cellar windows at $1.50	4.50
43 feet saddle board at 2½ cents	1.07
75 feet galvanized iron conductors at 10 cents	7.50
1675 feet matched flooring at $15	25.13



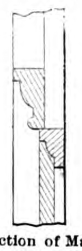
Partial Elevation of Dining Room Mantel.—Scale, ⅜ Inch to the Foot.



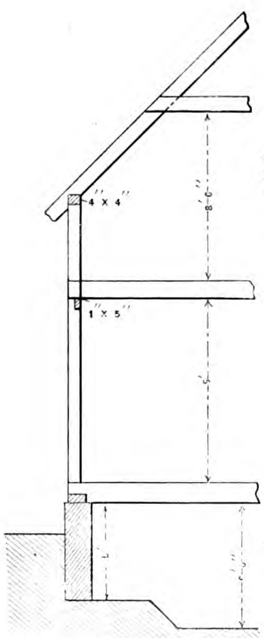
Section on Line A B.—Scale, 1½ Inches to the Foot.



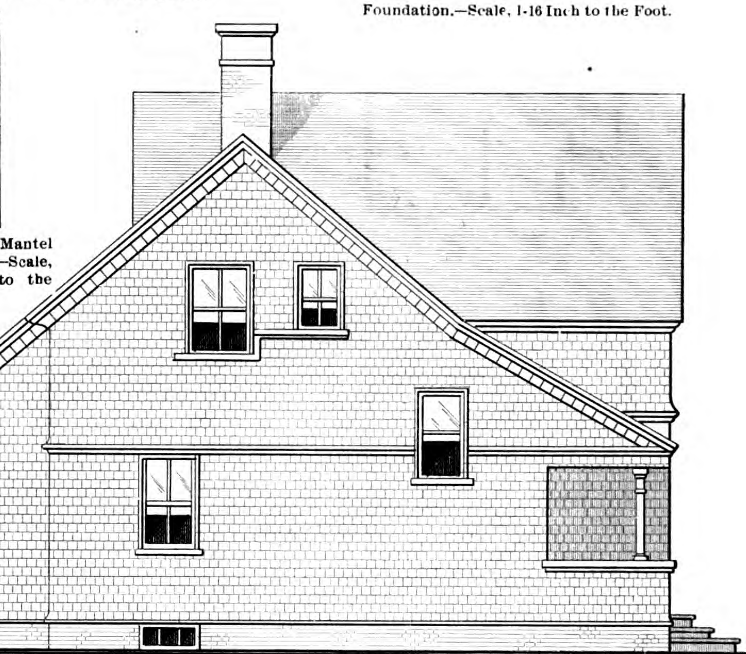
Foundation.—Scale, 1-16 Inch to the Foot.



Section of Mantel on Line C D.—Scale, 1½ Inches to the Foot.



Section.

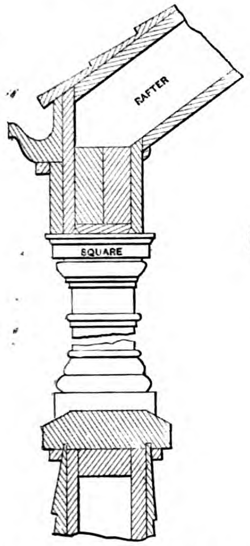


Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.

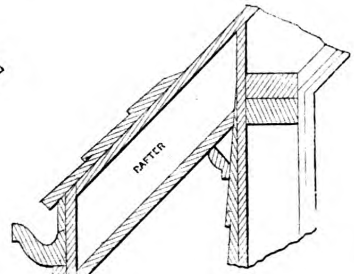
Competition in $1000 Frame Houses.—Second Prize Design.

130 feet sill	4 x 5	217	
1 beam 28 feet long	7 x 9	147	
82 joists 13 feet long	2 x 9	1788	
14 joists 9 feet long	2 x 9		
40 studs 15 feet long	2 x 4	2616	
27 studs 12 feet long	2 x 4		
3000 running feet	2 x 4		
20 rafters 16 feet long	2 x 6	544	
8 rafters 15 feet long	2 x 6		
8 rafters 13 feet long	2 x 6		
15 cellar beams 12 feet long	1 x 7	105	
150 running feet	2 x 6	150	
		5567 superficial feet at $10	55.67

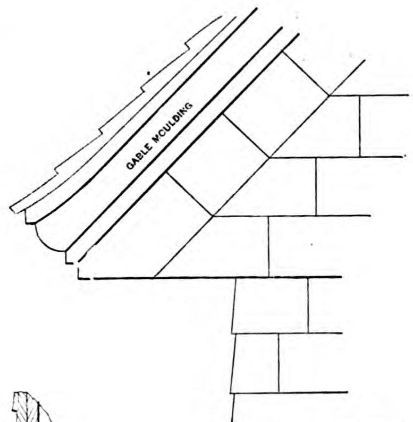
3500 feet hemlock boards at $8	28.00
12,000 clear cedar shingles at $2.10	25.20
16,500 clear cedar shingles for walls at $2.10	34.65
92 feet belt molding at 2½ cents	2.30
123 feet water tabling at 2 cents	2.46
66 feet gutters at 6½ cents	4.29
104 feet rake molding at 3½ cents	3.64
170 feet bed molding at 1½ cents	2.55
350 feet pine for eaves at $2.25	7.88
14 inside doors and frames at $3	42.00
650 feet inside casing at 1½ cents	9.75
60 base blocks at 1½ cents	.90
86 corner blocks at 4 cents	3.44
52 feet window stool and apron at 3 cents	1.56
1500 feet strapping and bridging at 20 cents	3.00
470 feet base molding at 2 cents	9.40
650 yards lathing and plastering at 16 cents	104.00
1 turned newel post, $1.75; 2 landing posts at $1, $2	3.75
16 feet hand rail at 6 cents	.96
30 baluster rails at 8 cents	2.40
16 steps and risers for stairs at 15 cents	2.40
150 feet pine for stairs at $2.50	3.75
100 feet spruce for back stairs	1.50
100 feet spruce for stair carriages	1.00
1 mantel	6.00
2 shelves at $1.50	3.00
235 feet wainscoting at $2	4.70
70 feet cap for wainscoting at 2 cents	1.40
Shelving for pantry	2.00
Glass and putty, $12.50; paper, $14; lead and zinc, $6; nails, $20	52.50
Locks and hinges, $10; carpenters' labor, $200	210.00
Painting	100.00
Sink, bath and basin	40.00
	$998.86



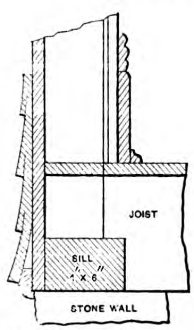
Details of Porch Column and Cornice.—Scale, 1 Inch to the Foot.



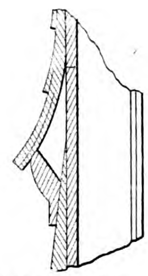
Detail of Main Cornice.—Scale, 1 Inch to the Foot.



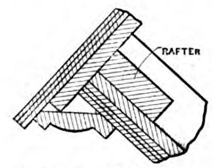
Elevation of Gable Finish.—Scale, 1 Inch to the Foot.



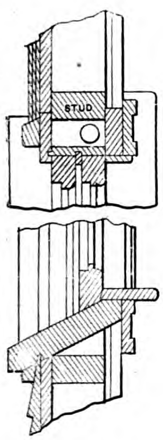
Detail of Water Table.—Scale, 1 Inch to the Foot.



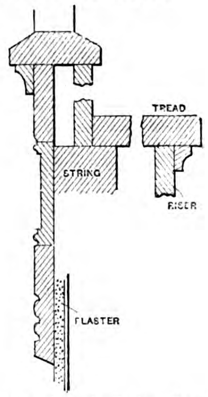
Detail of Belt Course.—Scale, 1 Inch to the Foot.



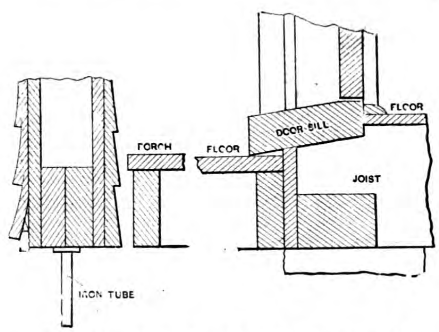
Detail of Gable Cornice.—Scale, 1 Inch to the Foot.



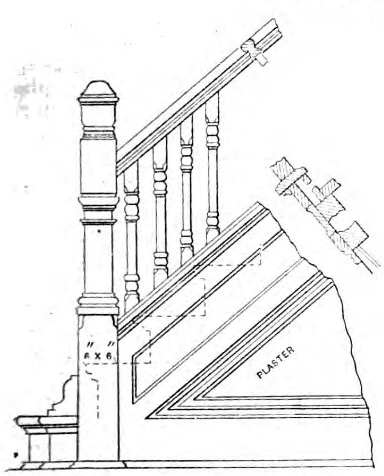
Detail of Window Construction.—Scale, 1 Inch to the Foot.



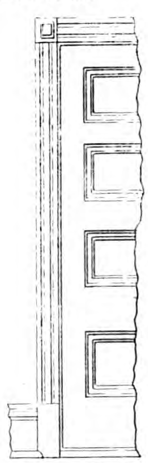
Detail of Stair String Panel.—Scale, 1½ Inches to the Foot.



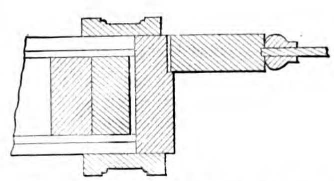
Section through Porch and Door Frame.—Scale, 1 Inch to the Foot.



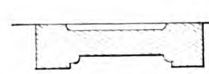
Detail of Stair Finish.—Scale, ½ Inch to the Foot.



Detail of Inside Doors and Trim.—Scale, ⅜ Inch to the Foot.



Horizontal Section through Door Frame.—Scale, 1½ Inches to the Foot.



Detail of Casing.—Scale, 3 Inches to the Foot.

Detail of Base.—Scale, 3 Inches to the Foot.

Miscellaneous Details of Second Prize Design in Competition for $1000 Frame Houses.

SOME REMARKS ABOUT HARDWOOD FLOORS.

THE selection of flooring requires intimate knowledge of the fibers, grains and colors of the various woods; even the different characteristics assumed at the various times and conditions of growth; the colors, as new lumber, sun and kiln dried, and in wearing old age; the usage to which it is to be put must be a prime factor; its price and the ease of obtaining it must not be ignored. About a dozen families of trees give nearly all the flooring, says Edgar J. Sprayling, in the *American Architect and Building News*. The two hard pines (*Pinus rigida* and *Pinus resinosa*), known in lumber yards as Georgia, Carolina or Southern, are more trod upon in America than any other wood. From them come the oil of turpentine and rosin of commerce, by "boxing" the trees, blazing with a cup-shaped hollow at the bottom of the blaze, in which the crude rosin accumulates. From this the oil is distilled, and the residue refined into clear amber rosin. Contrary to general belief, boxing adds to rather than detracts from the value of the wood. By extracting the sap year after year the growth is retarded, and the grain made more compact, finer and harder. Consumptives seek the piney wood to gain the delicious aroma arising partly from the increased ozone, as well as delight in the dry pine straw upon which to ramble and to loiter—the laziest, most delightful of occupations.

Selecting the Flooring.

Boards of flooring should be selected entirely from the hearts of old trees. This will cost when laid about 5 cents to the square foot. It is of light straw color and takes on an excellent polish, is hard but elastic, and makés a good floor for dancing. Its unfortunate feature is its proneness to sliver, but this can largely be obviated by the way in which it is laid.

White wood or bass and ash cost about the same as the above, but neither is worth considering. The wood is soft, is not pretty, slivers readily and does not keep its shape under atmospheric changes.

Oak markets at about the same figure, and either one of the three mentioned varieties makes an excellent floor. The red oaks, unfortunately, are the ones generally selected. The wood from them makes the homeliest and roughest of the oak floors; the grain is the coarsest, and they stand moisture least well. However, remember that we are comparing oak with oak, and no oak floor is to be lightly condemned. The so-called Spanish oak is the best of the red oaks. It grows in all the lower Allegheny regions. The live oaks and post oaks make light colored, hard, easily polished timber. But the white oak stands head and shoulders above all the others. It is the lightest in color, hardest, grained closest, and is susceptible of the highest polish. From this comes the finest of the old English black oak furniture; it withstands alike all climates.

Birch and Hard Maple.

Birch makes an entirely satisfactory floor for dancing, as well as for kindred uses. It is easily brought to a smooth surface and a fine polish, and is of a rich amber color of an even shade. In addition, it has that rare elasticity and resiliency that make it alike delightful for walking and dancing. It costs about 10 cents laid, and is in no way a disappointment to those using it.

What is said of birch applies equally well to hard maple, both the white and the red varieties, the white being that chosen for floors, and is the lightest colored of the wood so used. It is very hard, takes readily a fine polish; the boards are not liable to warp, but, unfortunately, require the very closest care in the drying to prevent shrinkage when laid. It is lasting, and is but little affected by water. Only beech, hickory and white oak approach it in lightness of color. Hickory has sterling qualities, too generally appreciated to need detailed discussion of its intrinsic worth, yet it is sadly neglected when the question of flooring is under consideration. Perhaps this is due to the difficulty with which it is laid. It is an open-grain wood, but takes polish with ease.

Beech makes almost an ideal floor, light colored and hard, and has the rare quality of wearing smoother with age; at times it is found beautifully bird's-eyed. In the Southern States it grows in the greatest profusion in the swamps and lower woods, but is unappreciated, only enough being preserved for use in making plane stocks and other tools requiring a hard, durable wood that does not shrink, warp or split. It could be laid for 10 cents. And along with it goes apple, which polishes to a rich, delicate amber color; the cost being about the same as beech, but the apple wood has the tremendous disadvantage of not being obtainable in large boards.

The cherry woods, especially the *Prunus Pennsylvanica* (red) and the *P. serotina* (black) are esteemed highly in cabinet making, and are equally beautiful and desirable for flooring. The garden cherry is often used as a cheaper substitute, but can be readily detected by the odor and taste, as well as by the general appearance. This is not an ideal wood for dancing floors, but for dining rooms it cannot be excelled. Both the red and black varieties are beautifully grained, and often can be found curled, and even bird's-eyed; neither of these could be laid for less than 15 to 18 cents a foot. To properly select the boards, and lay the body of the straight grained and the border of the curled, nothing could make a prettier floor.

The walnuts are about the same price and wearing value. The black walnuts are the ones best known to cabinet makers, they being also the hardest and most durable of them, as well as of the richest and darkest colors, that being too well known to require comment. The lighter walnuts, among them the butternuts, have many admirable qualities, and by some persons are chosen for that reason. But of course the general appearance and desirability of the real black walnut can not be imitated, certainly not excelled, by any wood except mahogany, which, being about $1 a foot, is excluded from the consideration of most persons, and so comment would be needless—except to say that it lacks that elasticity and resiliency so desirable in a floor for dancing. The uses, the furnishing and the window space of a room should therefore determine the kind of wood to be used.

Skill in Laying Flooring.

The laying requires not only a good carpenter, but an expert judge of woods, and of the individual boards, because only by carefully selecting and placing like planks can we get a permanently even surface. Suppose a plank of heart and one of sap should be placed side by side; no matter what the wood, when a rainy season may come the sap will swell more and rise above the heart. Even when they come from like relative positions in two like trees their texture may differ so widely as to make them undesirable companions. In spite of the nicest workmanship and the best judgment in selecting, some inequalities of surface will be present till removed by the most thorough sandpapering. This should be done with enough care to avoid scratching; then comes the polishing.

It must be remembered that not a drop of water has touched the wood since it left the saw mill, and none must touch it until demanded by soiling incidental to daily use; or, more strictly speaking, none should ever get nearer the wood than the polishing covering it. After the floor is perfectly smooth and free from all stains or dust spots the following mixture should be applied hot: Four ounces of English rosin, 12 ounces paraffin, 1 gallon turpentine. This mixture will make a solution only under heat, and should be applied to the floor as hot as possible with a cloth or brush, or, better still, a felt applicator. After standing a few hours, it should be briskly rubbed with a felt or woolen rubber, and is then ready for use. This protects the wood from water, or whatever else may fall upon it, and also fills in the pores, thus preventing shrinking, which is a very important factor in keeping a smooth floor.

WHAT BUILDERS ARE DOING.

THE building prospects in Atlanta, Ga., are rapidly growing brighter, and it is stated that the month of March broke all previous records in building circles, as during that period there were more dwellings erected than during the same month in any year since the incorporation of the city. The record for the first quarter of the year shows a good advance over that of last year, and it is estimated that the number of new buildings for April will go even beyond that of March. The nearest approach to the record for March of this year was the corresponding month in 1896.

Baltimore, Md.

The month of March was characterized by the inception of several large building projects in the city, some of which have already taken definite shape. A large addition is to be made to the Equitable Building, extending to St. Paul street and filling an entire block. Directly opposite, on Calvert street, an eight-story bank and office building is to be erected, and at the corner of Baltimore street, a square below, an imposing trust building is contemplated. Posner Brothers are putting up a $500,000 store on Howard and Lexington streets. There is considerable building in progress in the suburbs of the city, and the general feeling is one of confidence as regards the future.

The Board of Directors of the Builders' Exchange have decided to establish a technical library to be located in the association's building at Charles and Lexington streets. The need of a technical library containing reference books useful in building matters and allied industries has long been felt, and the idea of the library is meeting with general approval. The exchange now has a small collection of books which will form a nucleus for the library. Accommodations are available for at least 10,000 volumes, and it is hoped to include in the library reports of building operations from various cities; reports of technical institutions and universities; reports of the Johns Hopkins University in particular; Government reports; papers of the Maryland State Geological Survey and publications issued by large manufacturing institutions. The directors of the exchange have decided to appoint a committee of three to take charge of the new department, and it is expected that the library will, in time, become one of the most interesting archives of the city.

Boston, Mass.

The members of the Master Builders' Association of Boston gave a complimentary banquet on the evening of April 10 to John E. Parry of Cambridge, who has recently returned from an extended tour through the South and the Pacific Coast. Mr. Parry is one of the popular members of the organization, and the affair at the Copley Square Hotel was enjoyable in every way. During the after dinner speeches Mr. William R. Maxwell referred to Mr. Parry as a leading candidate for the Republican nomination for Councillor in the Third District, stating that Mr. Parry has been one of the most progressive citizens of Cambridge, having served his city faithfully for several years in both branches of the City Council and later represented his district for two years in the Legislature. In every public capacity he has proven a conscientious representative of the best interests of the business community, and his many friends in the Master Builders' Association wish for his continued success.

Buffalo, N. Y.

A celebration which was quite out of the ordinary occurred on the first of April on the floor of the Builders' Exchange. It was what might be called a "special April fool's day convocation," and a large attendance was secured by posting on the notice board a call for a meeting of the exchange in the usual form. The proceedings were under the auspices of what was called "the Innermost Inner Circle of the Honorable Guild of the Circle of Bunco Men," the principal ceremony of the day being the "presentation of the laurel wreath." The Worthy Grand Sire, Mr. Henry Rumrill, called for Charles P. Damon, but his call was interrupted by the presentation to him of a "silver tea set," the different articles of which were composed of pewter. There were numerous speeches and felicitous testimonials were read, and then Mr. Damon had placed upon his brow the laurel wreath for conspicuous merit, being crowned by the Grand Worthy Sire as "Charles the Smooth, the Courteous." Mr. Damon responded in a humorous speech in which he referred to the "rich flow of creamy eloquence and intoxicating flattery" of Otto W. Weyer, who was the Worthy Grand Treasurer. There were various other features of a humorous character, and the affair was enjoyable in many ways.

Butte, Mont.

A Builders' Exchange has recently been organized with a membership of 52 contractors engaged in various lines of the building industry. It is known as the Silver Bow, and the object is to establish the building business of Butte and vicinity on a more satisfactory basis and to afford protection to the builder as well as to the public. Joseph A. Redell is the president and J. R. McGlaufin is the secretary.

Chicago, Ill.

The enforcement of the building ordinance in the matter of fire escapes is receiving added attention, due, no doubt, in some measure to the large number of fires which have recently occurred in various cities. The Building Department has just been sending out something over a thousand notices to owners of buildings which the inspectors have found improperly protected in this respect. The amount of building in progress as indicated by the permits issued during the month of March show something of a falling off as compared with the same period a year ago.

The wages of some of the carpenters were advanced 5 cents an hour on the first of April, the increase having been from 37½ to 42½ cents an hour. The increase has been granted by a number of the large contractors and others are expected to follow suit. Under the new agreement eight hours will constitute a day's work, except on Saturday, when work shall cease at 12 o'clock, this half-holiday arrangement to hold good the year round. Heretofore the half-holiday has been in force only during the summer months. The agreement is made for one year.

Cleveland, Ohio.

The Master Painters held their regular monthly meeting on April 5 in the rooms of the Builders' Exchange in the Arcade, when trade conditions were considered. While the general outlook for spring business was acknowledged to be good, the majority of the members present reported few contracts signed, although a great deal of figuring on work has been in progress.

The carpenters of the city, to the extent of several thousands, went out on strike shortly after the first of April, but a compromise was reached and after about a week of negotiation the men returned to work. The original demand was for an eight hour day and 30 cents an hour, but by the terms of settlement the men receive 27½ cents an hour with an eight-hour day. Heretofore the carpenters have worked nine hours a day. It is thought that something over 3000 men are benefited by the adoption of the new scale.

Denver, Col.

Builders in Denver are looking forward to a season of considerable activity, although the extremely backward spring has retarded operations thus far.

The records of the Building Inspector's office show that there were issued during the month of March 110 permits for buildings, aggregating $265,700, and classified as follows: 54 dwellings, costing $156,700; 9 business blocks, costing $90,000; 11 stables, costing $8,600; 1 church, $1500; 35 miscellaneous, costing $10,400. This shows an increase of $139,200 over the previous month, and of $100,500 over the corresponding month of 1898.

At the recent election bonds were voted to the amount of $400,000 for the erection of an Auditorium, which will probably be built as soon as a suitable site can be procured. The consensus of opinion seems to favor a location as near the center of the business district as possible.

Hartford, Conn.

The outlook for building in all parts of Hartford is very bright, the activity running largely to structures intended for dwelling purposes. As the city increases in size the demand for dwellings shows a steady growth, and as a result the class of houses which are being built in most sections are of the latest design and furnish all the modern conveniences. Real estate men also predict a prosperous year and the outlook for the city as a whole is regarded as healthy and encouraging.

Jersey City, N. J.

The members of the New Jersey Society of Architects are exerting their influence in an effort to secure the passage of an ordinance providing for a compensation of 5 per cent. for architects performing work on public buildings. According to a law passed by the Legislature some time ago, the governing bodies in each municipality of the State may allow compensation not exceeding 5 per cent., and in Newark the Board of Aldermen adopted the maximum as the rate. In Jersey City, however, architects are allowed only 3 per cent.; hence the efforts to have the rate increased.

Judging from the increased demand for building material of all kinds there is likely to be a great deal of activity in the building trades this spring and summer. Orders for material are said to be more plentiful than for many years past, and in many instances difficulty is being experienced in making deliveries sufficiently prompt to suit the builders.

Joliet, Ill.

There is considerable work in progress in and about the city, and by some it is regarded that there is likely to be more building this season than has been done in the last six years put together. The situation, however, is not altogether peaceful, as on April 5 several hundred carpenters went out on strike, owing to the refusal of the contractors to grant an increase in wages. The men demanded 30 cents an hour and nine hours to constitute a day's work, which demand the contractors refused to grant. The present scale is 25 cents an hour and 10 hours a day. The contractors took the ground that as a large part of their contracts were taken before the advance in wages was asked, a granting of the de mands at this time would cut off all their profits. The men, on the other hand, justify their position on the ground of the flattering outlook for the building business.

Memphis, Tenn.

A builders' exchange to be organized on a large and comprehensive scale is the object of a movement which has been started among the contractors, material men and representatives of the building trades in Memphis. There is already a builders' exchange in the city, but it is composed entirely of carpenter contractors, and the movement referred to contemplates the taking in of representatives of all building trades, besides material men of all classes. It was decided that the next meeting be held on the call of the temporary chairman and a special committee, which is composed of W. I. Cole, A. W. Higgins, F. L. Dykmann, A. W. Burdick, W. H. Fleahearty and Lou. Grant.

Milwaukee, Wis.

The members of the Builders and Traders' Exchange are preparing for a busy season. The weather has been keeping work back to some extent, but from present indications it is felt that the backbone of winter has been broken and work can go ahead without interruption. Local architects are quite busy with plans for buildings, and there are a number of outside jobs with the prospects for work and fair prices very encouraging. Matters in the exchange are going along as well as could be expected, some new applications for membership being made, while the attendance is better than it has been for a long time past.

The members of the exchange have been enjoying a series of receptions arranged by the Standing Committee of Entertainment, which proved very satisfactory both in point of attendance and choice of programme rendered. The last entertainment was a "Progressive Cinch Party" which was well attended and a most enjoyable affair. It has been found that these receptions have proven very beneficial, as they tend to increase the interest in the exchange and promote a more social feeling among the members.

The amendment to the Lien law, which was introduced to the Assembly this past winter, has been defeated in spite of the efforts made to secure its adoption, and it leaves the old law as it was. The amendment was a desirable addition to the law, but was defeated owing to the fact that many of the dealers found it more to their interest to resort to the right of lien than to select responsible men to whom to sell their goods.

New York City.

Preparations are being made for a very active season in the building line in and about the Greater New York. According to the reports of the Building Department, 881 buildings were projected during the month of March in the Boroughs of Manhattan and the Bronx, which are estimated to cost $16,868,078, and 762 structures in Brooklyn, for the erection of which $2,403,025 will be expended. The increase in the outlay for buildings in Manhattan and the Bronx as compared with March of last year was 75 per cent. and in Brooklyn 29 per cent.

The Association of Roofers and Sheet Metal Workers of Greater New York and adjacent cities held their annual meeting April 6, when the following officers for the year were elected: John G. Grace, president; M. F. Westergren, first vice-president; Barth G. Rice, second vice-president; Frank P. Cumicor, treasurer, and James R. McAfee, secretary. The Executive Committee consists of C. T. Galloway, chairman, and Messrs. Schenk, Ringle, Harrison and Schwoerer.

The Building Trades Club will celebrate on April 24 the tenth anniversary of its organization. The House Committee, of which Stephen M. Wright is chairman, has arranged a programme suitable for the occasion, and a very enjoyable affair is anticipated.

Philadelphia, Pa.

The principal event in the building trades during the month ending April 10 was the strike of the journeymen bricklayers, owing to the failure on the part of the Master Builders' Association to accept the proposed wage schedule for the ensuing year. The agreement of 1898 under which the journeymen were paid 37½ cents per hour expired March 31, and the demand of the journeymen for 45 cents per hour for the ensuing year was met by an offer of the Master Builders to pay 42½ cents an hour. This offer was refused, and the Journeymen Bricklayers' Association called out the men pending a settlement. The strike continued until April 7, when the demands were agreed to and the men returned to work. The work day will be eight hours for five days of the week and four hours on Saturday. These conditions and others relating to overtime and minor details were embodied in an agreement entered into on the evening of April 6 between the builders and their employees, to hold good for a year. This termination of what threatened to be a serious struggle at a critical time in the building trade was consummated at a conference held in the Builders' Exchange on the evening named.

Racine, Wis.

The Builders and Traders' Exchange has been incorporated by Josiah Hocking, O. C. Davis and L. S. Jones, the committee in charge. The exchange has petitioned the Board of Public Works, requesting that in advertising and contracting for school buildings the work be subdivided under the heads of carpenter, including mill work; mason work, including plastering; brick work, rubblestrom, excavating; constructional, iron and terra cotta, setting cut stone; painting, plumbing, including gas and sewers; electric wiring; blackboards; heating; cement walks; cut stones, hardware, &c.

Rochester, N. Y.

The strike of painters which was inaugurated on the first of April was brought to a close on the 6th, an understanding having been reached with the contractors. The Painters' Union demanded a wage scale of $2.25 a day and nine hours to the day. The contractors refused to accede to the demands and a strike was ordered. A settlement was reached by 25 of the contractors signing the agreement on the terms above indicated.

St. Louis, Mo.

The outlook from the building standpoint is very encouraging, and it is thought that the present year will prove the best which the city has enjoyed for some time. It is thought that the rate of wages will not vary to any great extent, although the plasterers may receive a slight advance. The building permits which have been issued are a fair indication of what can be expected in building during the year. They show that a large number of fine residences are contemplated, especially in the West End, and there will also be considerable done in the way of buildings for business purposes. Among the latter are four structures which will be put up on Washington street, while on Grand avenue will be erected a new music hall to cost $110,000 and to be completed by the first of October. The Sullivan Building, for wholesale purposes, to be put up at Tenth street and Washington avenue, will cost $150,000. It is also thought that the World's Fair will give an impetus to building, although the builders seem to be of the opinion that leaving this out of the question the prospects were never brighter for a good year in their line. The improvements already under way or decided upon will probably aggregate several millions of dollars.

Springfield, Mass.

The members of the Builders' Exchange have accepted the changes in the by-laws which were reported by the special committee appointed for the purpose, and the matter is now in the hands of the printers. In general the by-laws remain unchanged, the few alterations being matters of detail. In the exchange is now included "all builders, all tradesmen and all dealers in supplies connected with the construction and alteration of buildings," instead of master mechanics and architects as heretofore. The membership fee has been reduced from $10 to $5 and a second vice-president has been added to the former board of officers.

The Springfield Architectural Club recently had its second exhibition, which included sketches prepared by members of the club during the past year, as well as drawings by out of town architects. The drawings were some hundred in number and consisted of water color sketches and studies, as well as models of Corinthian and Ionic capitals, &c.

Notes.

The annual banquet of the Builders' Exchange of Worcester, Mass., was held Tuesday, April 11, at Brigham's restaurant.

Building operations in Waco, Texas, are at a standstill, as the carpenters and painters are out on strike for higher wages and less hours of work. The carpenters made a demand for an advance of 25 cents a day, and the contractors declined to grant it on the ground that they could not afford to pay higher wages on the work now in progress.

The Brick Contractors' Association has granted an advance of 5 cents per hour to the bricklayers of Pittsburgh and Allegheny, the new rate being 40 cents an hour for a nine-hour day. It will go into effect May 1.

The outlook for building operations in Portland, Me., is very bright, and local building contractors are looking forward to a long and busy season. At all the summer resorts there is more or less building to be done, and in some of the wards of Portland a condition closely akin to a building boom in the near future is regarded as certain.

New structures are to be erected in all parts of the city of Bridgeport, Conn., and contractors express the opinion that business has not been so good in years.

The Mayor of Northampton, Mass., has completed a form of ordinance which he hopes to have passed, creating the office of building inspector and defining the duties connected therewith. The ordinance is intended not only to secure safety, but to protect builders of limited means from sham work by contractors.

The carpenters of Keyport, Keansburg and Matawan, N. J., have organized for the purpose of enforcing the nine-hour day rule. Heretofore they have been working ten hours for $2.25 per day, and now they want $2.50 per day for nine hours.

The master contractors and builders of San Francisco, Cal., are said to be greatly opposed to the contemplated ordinance prohibiting builders from mixing mortar or depositing bricks or lumber on sidewalks in front of buildings in course of construction. They claim that the effect of the ordinance will be to increase the cost of houses, and intend to fight it if necessary in the courts.

The bricklayers, masons and plasterers of Ashtabula, Ohio, have organized and have decided that nine hours shall constitute a day's work. They have adopted a wage scale and have agreed to discourage strikes.

The Brick Contractors' Association of Allegheny have mailed a circular to architects notifying them that the contractors will refuse to bid on work where the non-lien contract is a part of the specifications or articles of agreement.

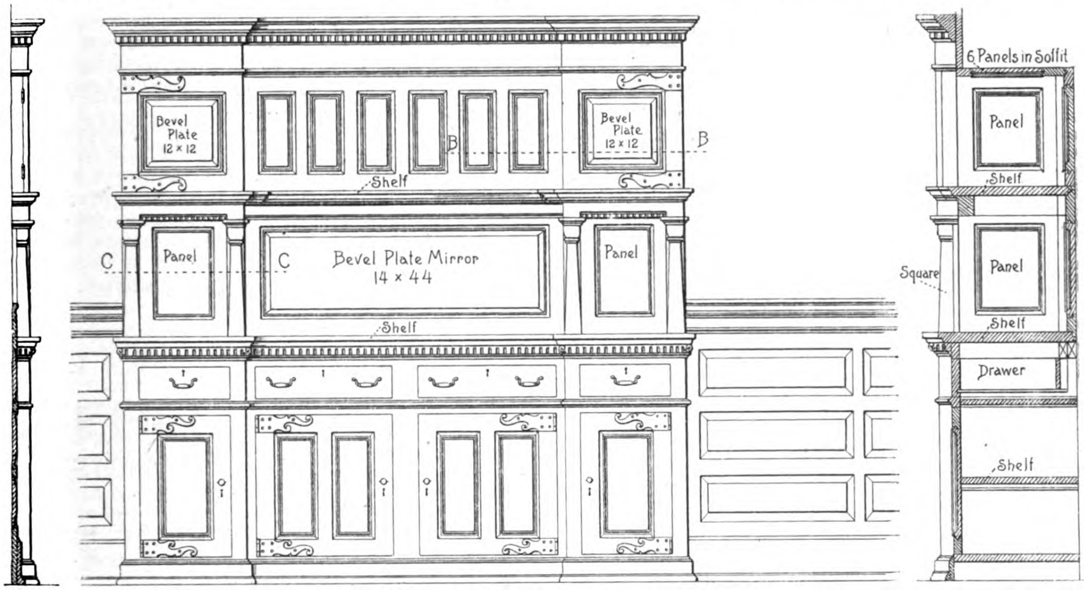
Dayton, Ohio, is feeling the improved conditions in the building trades, and the permits which are issued from week to week are showing a steady increase.

The year is opening auspiciously for both contractors and workmen in Anderson, Ind., and the scale of wages and hours will be practically the same as last year.

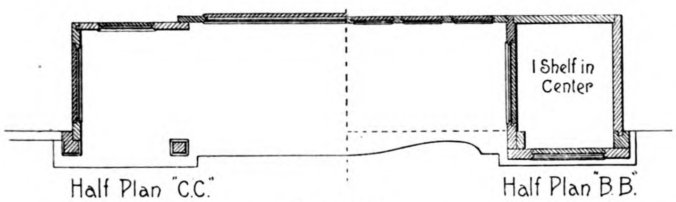
A great deal of building in the way of substantial dwellings is contemplated in Seattle, Wash., and according to local authorities there will be more homes built in that place this year than any year before in the city's history, save, possibly, the year immediately following the fire.

Design for Dining Room Sideboard.

An important feature of the equipment of the dining room is a sideboard or buffet of such design and treatment as will harmonize with the style of finish of the apartment in which it is placed. This may call for something simple and unpretentious in its composition, or it may be elaborate and costly, depending somewhat upon the taste of the owner, and the requirements of the surroundings. In many instances the sideboard, instead of being portable is built into the dining room, thus forming in some measure a part of the finish of the interior. A sideboard of this latter class is represented in the design which we illustrate herewith, in combination with a portion of the paneled wainscoting, which extends around the room. The sideboard was designed



End View. Front Elevation of Sideboard. Vertical Section through Sideboard.



Plan View.

Design for Dining Room Sideboard.—Scale, ¾ Inch to the Foot.

by Grodavent Bros. of Denver, Col., and is intended to be executed in black ash. Especially noticeable features are the treatment of the several doors having the old fashioned hinges, the panel effects and the style of the cornice employed. The character of the work is such as to meet the requirements of a handsome interior, while the design itself may afford suggestions to those desirous of executing something of a similar nature though perhaps somewhat less elaborate in its composition.

The Bridgeport Architectural Exhibition.

An exhibition of architecture and the allied mechanical and decorative arts is to be held during the month of May in the newly refitted galleries of the Bridgeport Public Library and Reading Room, Bridgeport, Conn. The exhibition will consist of a display of plans, working drawings and elevations connected with the construction of modern buildings, and there will also be shown designs for the decorating and furnishing of such structures. Studies in mural painting, draperies and furniture, wall paper patterns, memorials and other windows in stained glass, decorative panels, and all similar artistic productions will be included, together with designs for magazine covers, book plates and bindings and other subjects.

The Future of Acetylene as an Illuminating Agent.

Regarding the place which acetylene may be expected to fill in the future as an illuminant in competition with gas and electricity, the *Electrical World* puts forth the following views:

As a competitor in the illuminating field acetylene will probably be a greater rival of illuminating gas than of electric current, and it is possible that its success will be of more benefit than harm to the latter. It is the old story over again of one rival stimulating another in competition, and by means of improved service and reduced cost increasing the demand by an amount greater than its own supply. Illuminating gas, electric lighting and acetylene all have their own individual advantages, which, to a certain extent, outline certain fields of application of each in which the others cannot compete. For vehicle lighting, including train lighting, and for gas distribution where but a small percentage is used for fuel, acetylene will probably show advantages over other forms of gas; while for combined heating and lighting service from one system illuminating gas cannot be met by either acetylene or electric current, but for isolated plant service, theatre lighting and all cases where ease of control from a distance or convenience of ignition or adaptability to special decorative effects are of any importance, the electric current has the advantage. It cannot be met by its competitors in the qualities of safety, neatness, cleanliness, convenience and elegance.

THE third annual electrical exposition will be held in Madison Square Garden, New York City, from May 8 to June 4. In connection with the show there will be a special exhibition of patents and inventions, where inventors will be enabled to bring their models before a large public.

Commencement Exercises of the New York Trade School.

The eighteenth annual commencement exercises of the New York Trade School, Sixty-seventh street and First avenue, New York City, were held on the evening of Wednesday, April 5, a large audience being present, including many prominently identified with the various trades. The exercises were opened by President Cutting in a brief address introducing J. A. Rossman, who spoke at some length to the young plumbers. In the course of his remarks he offered some good advice to the young men who were about to start out and make a place for themselves in the world. He recommended the graduates to use their information to work for the good of all and pointed out the advantages which they possessed over young men who had not had the benefits of a course of study at the New York Trade School.

A pleasing feature of the exercises was the presentation of medals to the students making the greatest progress during the term, one of these, offered by William O. Allison, being awarded to Fred. W. Isabon of the painting class. The New York Association of Master Steam Fitters this year presented two medals instead of one, James Alexander McNeill of the day class securing one of them, and Thomas Glen of the evening class the other.

After the certificates to the cornice class had been distributed the members presented their instructor, William Neubecker, with a gold watch, and his assistant, Joseph Danz, with a diamond pin.

President Cutting made the closing address, stating that the young men were leaving the institution for good and expressed the feeling that their stay had proven profitable by eager, willing work and close attention, and that they were well prepared to meet the obstacles in the struggle of life. One of these obstacles would be the effort of the trade unions, which it was pointed out had come to stay, to prevent so many young artisans entering the field. On the other hand, they were engaged in a good work of guarding skilled labor from oppression and under pay. A new condition they would meet would be the association of large enterprises under one management, which was a good thing, as it helped to cheapen the cost of everything. Many men start in business and 85 of every 100 failed, but in the trust each would find and fill a position rising up to his capacity and be spared the disaster and discouragement of failure. Character was presented as an important factor in life, and all were advised to know their trade and do their work so as to build up character and reputation for honest, careful and correct work, and thereby reflect credit to themselves and the New York Trade School.

The graduates in the class in carpentry numbered 12; in the class of bricklaying, 20; in house painting, 8; in plastering, 3; in sign painting, 10; in fresco painting, 17; in cornice work, 20; in plumbing, 155; in electrical work, 24; in steam fitting, 29, and in printing, 5.

Woman Architect for Dormitory Building.

The trustees of Wilson College for Women at Chambersburgh, Pa., recently invited plans for a new dormitory building in which architects from many sections of the State participated. After the plans had been examined and a decision reached, it was found that the successful competitor was Elsie M. Mercur of Pittsburgh, Pa., who in private life is Mrs. K. R. Wagner. She has been engaged in the practice of architecture for a number of years, and during the past four has had offices on Fourth avenue in the city named. The new dormitory building, as planned by Miss Mercur, will be a three-story brick structure of the Colonial style of architecture. It will be 175 feet long, with two wings each 80 feet in length and 40 feet in width. It is to be sufficiently large to accommodate 125 students, and there will be nearly 100 rooms with all modern improvements, ventilating and heating systems, &c. Between the wings of the dormitory a building containing the dining room will be erected, this being of brick two stories and attic in hight and will cover an area 40 x 50 feet. It will be accessible from all wings of the dormitory.

Illustrations.

George W. Kittredge, who for many years has had charge of the department of illustrations for *Carpentry and Building*, as well as for *The Metal Worker* and *The Iron Age*, has left this office and taken a studio at 150 Nassau street, New York, where he purposes continuing in the work of preparing illustrations of mechanical subjects for use in the columns of trade papers or for catalogues, circulars, &c. His ability in this class of drawing is recognized by all who are familiar with his work, while his long experience in matters pertaining to the various processes of engraving renders him especially valuable as an illustrator in this field. We commend him to any of our readers or advertisers who may need engravings of their wares or manufactures.

CHARLES EVERETT CLARK, a builder of wide reputation, died at Somerville, Mass., on Monday, March 20, at the age of 55 years. He moved to Boston from Worcester something like 25 years ago, and also had an office in Chicago. Mr. Clark was one of the Massachusetts State House Commission, and was the builder of the Newport residences of William K. and Cornelius Vanderbilt, and of that of the late Ogden Goelet.

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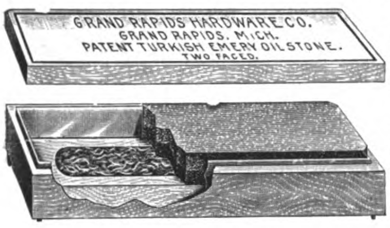
NOVELTIES.

Double Faced Turkish Emery Oil Stone.

Grand Rapids Hardware Company, Grand Rapids, Mich., have just put on the market the two-faced Turkish emery oil stone as shown in Fig. 1. The leading characteristic of this novelty, aside from the cutting quality of the stone, is the recess in the bottom of the box, in which waste saturated



Novelties. - Fig. 1. Double Faced Turkish Emery Oil Stone.

with water or kerosene, preferably water, is placed. The capillary attraction keeps the liquid drawn into the stone, and so always ready for use. The stone can also be removed and used on a heavy knife as a hone. The box is fitted with four brads on the bottom to keep it firmly in place on a bench when in use.

White's Universal Door Key.

The White Mfg. Company, Ithaca, N. Y., are making White's universal door key, shown herewith. Fig. 2 represents it about half size, there being two tinned iron keys pivoted together so that a complete turn can be made. Upon each lever are four teeth. To lock a door the keys are turned at right angles with each other, as indicated by the dotted lines in Fig. 2, when the shank of one lever is inserted between door and jamb, the remaining key being used as a lever to give the inserted key a quarter turn, which sets two of the teeth into the door and two into the jamb, locking the door, as seen in Fig 3. The manufacturers refer to the fact that the imprint of the thin teeth is scarcely noticeable, except when the door is particularly close fitting, when the

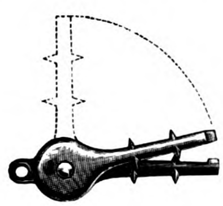


Fig. 2.—White's Universal Door Key.

key can be used either at the bottom or top. This device is also designed for locking transom and other windows, either open or shut in the latter case. It is recommended particularly for tourists, cyclers and other travelers.

GEORGE MERTZ'S SONS of Port Chester, N. Y., are offering the trade an extensive variety of patent turned art moldings and spindles adapted to a multitude of purposes. Many new designs have been brought out and the productions are of high class workmanship. A copy of a catalogue relating to the goods can be secured on application to the address above given.

New Ideal Spring Hinge.

The Stover Mfg. Company, Freeport, Ill., refer to their New Ideal spring hinge No. 99 as greatly improved in appearance over their New Ideal No. 1, yet retaining every mechanical feature of the former. The No. 99 has the slot for the pintle bearing on the under side of the ear or lug instead of on the top, as in No. 1, and the hook is made of steel. A feature of these hinges, the manufacturers state, is that the application of power to the door is greatest at the closing point, and that the resistance gradually decreases in opening the door and increases in closing. It is also explained that there is less than usual working strain on the coil spring, so that it does not weaken and then fail to firmly hold the door shut; that the coil is covered to protect it from the weather and that it reverses at about 30 degrees and holds the door open.

Fastening in Place the Fox No. 5 Sash Pulleys.

In connection with the No. 5 all steel sash pulley, which has just been brought out by the Fox Machine Company of Grand Rapids, Mich., a rather interesting method is employed for fastening it securely in place in the mortise. In each end of the casing or shell of the pulley are two semicircular cuts or interlocking fasteners of such a nature that a slight tap on a two-prong locking set, which is furnished for the purpose, will securely fasten the pulley in place, the work being done in such a way that any splitting of the wood is prevented. Just how the operation is performed may be readily understood from an inspection of Fig. 4 of the accompanying illustrations. There is also shown the locking set and a plan view of the

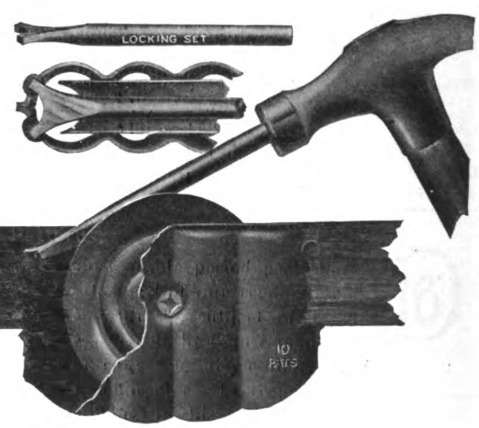


Fig. 4.—Method of Securing the Fox Sash Pulley in the Mortise.

set and pulley when in position for fastening the latter in place. Although the No. 5 pulley has corrugated sides it may be used with equal facility in a straight side mortise, thus meeting the demand of the larger mills for a Fox all steel pulley that may be inserted by their pulley mortising machines. The flange provided on the top of the shell gives the No. 5 pulley the same appearance whether it be used in a straight or corrugated side mortise.

Stable Fixtures.

We have received from W. A. Snow & Co. 19 Portland street, Boston, Mass., a copy of a 78-page catalogue, which is of special interest to those owning or about fitting up a stable. The matter relates to the varied lines of specialties which the company manufacture in the way of improved stable fixtures, weather vanes, copper finials, cow fittings, iron stairs and Snow's sanitary stall floors. In issuing this catalogue of stable goods the company state that they have taken great pains to illustrate the best methods of drainage and ventilation, as well as to meet the wants of every

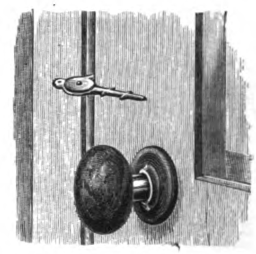
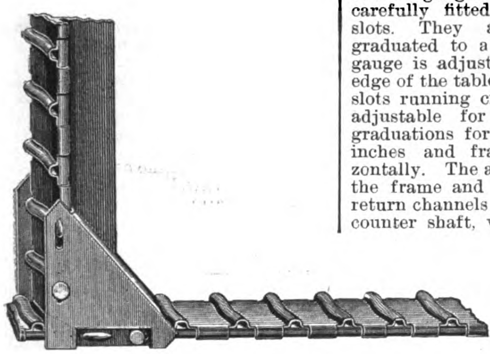


Fig. 3.—The Key in Position.

class and design of stable, from the cheapest to the most elaborate. At their salesroom in Portland street they have stalls fitted up complete with the latest fixtures, so that visitors and prospective customers can see just exactly how the stalls appear ready for use. The company announce that they have constantly added new machinery to their factory in order to meet the growing demands of their business and are prepared to execute orders for iron stair work, copper work, as well as all kinds of wrought iron work. An interesting feature of the volume is found in the framing plans which are given, showing how to do the work when the timbers run lengthwise with the basins, also when at right angles to the basins. A chapter on water tight floors is another interesting feature of the catalogue. Scattered through the volume are half-tone reproductions of photographs showing the interiors of some of the prominent stables which have been furnished with sanitary stall floors and other fittings made by the company. In connection with the numerous illustrations of stable fittings are to be found descriptive particulars, with numbers, sizes, prices, &c. The line of goods shown covers about everything required in connection with a well equipped stable, and the volume considered as a whole is full of interest and value to those for whom it has been issued.

Nailable Iron Studding and Furring.

A form of iron studding and furring possessing many features of interest to architects, builders and contractors is being placed upon the market by Thomas Curran of 74 Cortlandt street, New York City, and is illustrated in general view in Fig. 5 of the engravings. It is of such a nature as to well adapt it for use in connection with metallic lath and sheet metal coverings generally, one of its important features being that no



Novelties.—Fig. 5. Nailable Iron Studding and Furring.—View Showing Construction at an Angle.

bolts or rivets are required, as all parts are nailed together. The studding consists of lengths of flat T or angle iron, as the case may be, to which are clamped by special machinery strips of sheet metal measuring about 1¼ inches wide by $\frac{1}{32}$ inch in thickness. In these strips, at intervals, are sinuous projections or corrugations, as shown in the engraving, these offering openings for the entrance of the wire nails which are employed in fastening the lath to the studding or furring. The corrugations being sinuous instead of straight, cause the nails when driven to take an irregular course, thus increasing the friction of the parts and preventing them from readily drawing out. In cases where great holding power is required the nails may be clinched on the opposite side. The illustration which we present represents two pieces of the prepared material fastened together at an angle by means of a sleeve nailed both to the upright and horizontal strips, the nails extending through the sinuous corrugations and to the opposite side, where they are clinched. The upright piece is of angle or T iron, such as is employed about door and window openings, where great rigidity is required. The flat horizontal strips are secured to the iron floor joists by means of clamps and the same method is pursued for the ceiling. The furring for walls is nailed to the brick work in such a way as to leave an air space—a very desirable requisite in fire proof construction. In bringing this nailable studding and furring to the attention of the trade the manufacturer states that it is adapted to a wide range of purposes, such as pier sheds, portable houses, partitions, as well as in all places where it is desirable to employ sheet metal as a covering. It is pointed out that this form of construction effects a great saving as compared with other styles of studding and furring, while at the same time it affords a basis for strength and fire proof qualities which cannot fail to commend it to all those interested in building construction.

The No. 0 Saw Bench.

Recognizing the need for a small, well designed and accurate circular saw bench, adapted for inside trim, pattern, chair, furniture and light work, which needs to be quickly handled, the American Wood Working Machine Company are introducing the device illustrated in Fig. 7 of the engravings. The design is compact, well proportioned and convenient in its details; the frame is cast in one piece, while the table rises and falls on gibbed ways and has a detachable throat plate surrounding the saw. The cut off gauges are light, strong and carefully fitted to the longitudinal slots. They are also accurately graduated to a miter. The ripping gauge is adjusted upon a way at the edge of the table, so that there are no slots running crosswise, and it is also adjustable for bevel sawing, with graduations for degrees and also for inches and fractions thereof horizontally. The arbor boxes are cast on the frame and are self oiling, with return channels for circulation. The counter shaft, when attached to the frame, runs in self adjusting and self oiling boxes, the latter being adjustable horizontally to take up the slack of the belt. When so ordered an independent counter shaft is furnished in place of the one shown, and the machine may be belted through the floor. The saw bench here illustrated is made in large lots by the Frank H. Clement Company Branch of Rochester, N. Y., and no pains are spared to produce an accurate and satisfactory machine in all its details. Those who are desirous of securing

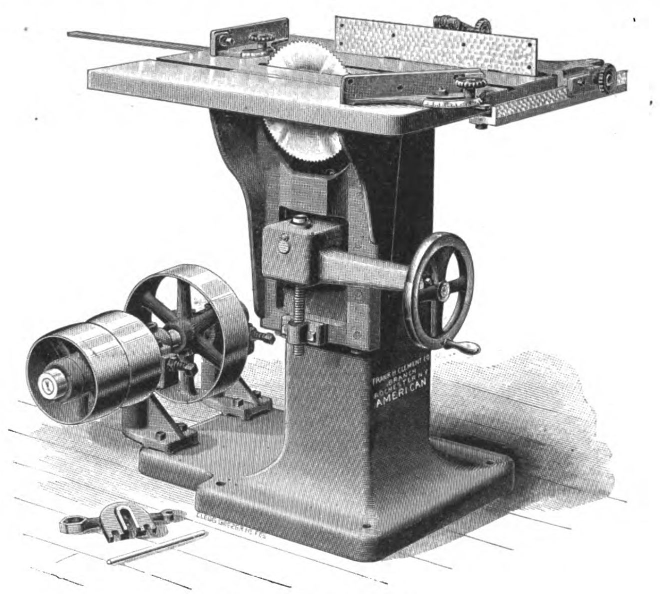


Fig. 7.—No. 0 Saw Bench.

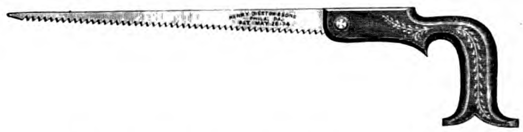
descriptive circulars of this machine or of others designed for wood working can secure them from the nearest salesroom of the American Wood Working Machine Company, these being located at 109 Liberty street, New York City; 3101 Chestnut street, Philadelphia, Pa.; 94 Pearl street, Boston, Mass.; 330 Lyell avenue, Rochester, N. Y.; 45 South Canal street, Chicago; Church and Basin streets, Williamsport, Pa.

The Walda Improved Sectional Window Weight.

The views shown in Fig. 6 relate to an improved sectional window weight offered by Barney & Reed Mfg. Company, 85 Water street, Boston, Mass. The weight hangs from the center to

Fig. 6.—The Walda Improved Sectional Window Weight.

permit free running in the box, the eye being smooth, it is explained, so that there is no wear at points where the cord comes in contact with the shoulder in the head of the weight. It is shown that there is no possible chance of the pieces becoming detached after they have been placed in the box, as they couple and uncouple only when held nearly at right angles, but it is stated they can be easily removed at any time if necessary. The weight is made round and square to meet the requirements where small, medium or extremely heavy windows are used, with ample or cramped pocket room as the case may be. It is so designed that a workman, by the use of the weight, can balance a sash exactly right before leaving it without breaking a weight or sending to the store for another. Half-pound sizes are made by coupling on a ½-pound piece. The weights are packed in small crates containing 100 pounds of a size, both crates and weights being plainly marked. A crate or two of each size may be placed on the floor where the work is being done, so that the sash may be balanced as the workmen proceed. The manufacturers state that the merchant is able to furnish every size required if he has the number of pounds in stock, while not so much capital is invested in the same proportion of stock. Reference is also made to the saving of space and labor, and non-accumulation of old stock. The manufacturers furnish fixtures



Novelties.—Fig. 8. Adjustable Compass Saw No. 9.

constructed to fit the head of the weight where chain is used. They also carry the thimbles and rings for attachment to the sash.

Adjustable Compass Saw No. 9.

Henry Disston & Sons, Philadelphia, Pa., have put on the market the adjustable compass saw shown in general view in Fig. 8 of the accompanying illustrations. The handle is apple wood, carved and polished, and so constructed that new blades may be quickly inserted. The handle has a take up device, or tightening screw, Fig. 9, to compensate for different thicknesses of blades, which adds to its convenience when one has use for compass, keyhole and pruning blades. The No. 9 is put up only with compass blades.

Interior Sheet Metal Work.

A handsome and elaborate catalogue for the years 1899-1900 is the twenty-fifth series issued by the Penn Metal Ceiling & Roofing Company, Limited, of Philadelphia, Pa. The pamphlet, or more properly speaking portfolio, is 14 x 10 inches in size, the front cover being a handsomely colored plate of rich design, paneling illustrations of the metal ceilings and side walls taken from the company's inexhaustible stock of patterns. In guaranteeing their metal ceiling they say return all faulty plates, whether whole or cut, as it is the cheapest way of checking their skilled pressmen, shearers and inspectors, their plates being supposed to be perfect. A phrase in this introductory statement is to the effect that "it takes more money to buy Sagendorph sectional ceiling plates but less time to erect and decorate them."

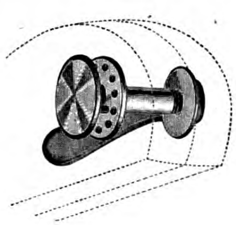


Fig. 9.—Take-Up Device for Compass Saw.

The application of the sheet metal interior decorated plates covers the widest variety of purposes. Public and private buildings, churches, halls, stores, steamboats, in fact, every inclosure with ceiling and side wall, is a possible place to apply these stamped plates. Some designs are rich and extremely elaborate, while others are made more simple for plainer effects, the style of sheet metal being of course adapted to the purpose to which it is put, and the extraordinarily large assortment made by the company offers the widest possibility of choice. The application of sheet metal for interior work is growing rapidly, but it has by no means reached its limit, and it is a line of work that might be taken up by many sheet metal workers who complain that modern progress and factory goods are interfering with their old business.

Combination Wood Working Machine with Band Saw and Boring Attachments.

We present in Fig. 10 of the engravings a view of a new combination tool which has just been placed upon the market by L. F. Parks, Colerain avenue and Dorman street, Cincinnati,

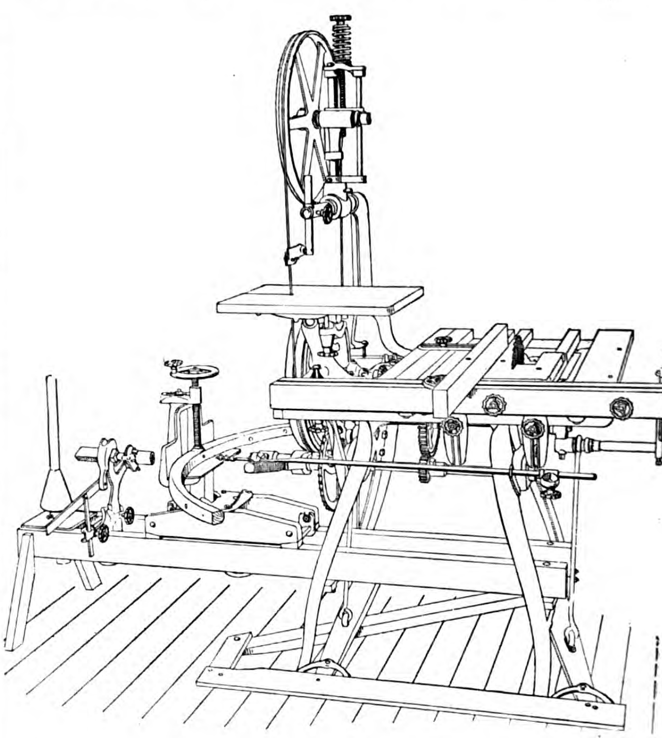


Fig. 10.—Combination Wood Working Machine with Band Saw and Boring Attachments.

Ohio. It is referred to as the No. 5 combination wood working machine with band saw and boring attachments. The frame for the top wheel is made in such a way that all necessary attachment is provided for lining up the saw, and there are also guides for the saw both above and below the table. The one above can be raised to take in material 7 inches thick and swing 17½ inches. The table is so constructed that it can be conveniently tilted for sawing to a bevel and the whole attachment can be set out of the way by means of two hand wheels, one of which is at the back and the other at the front of the machine. The boring attachment has a chuck with long socket to slide on the end of the lower shaft. A lever is provided for the purpose of throwing the bit to and from the work, while a connecting rod with a handle on the end is arranged as a stop for the purpose of adjusting the depths to which to bore when making a blind mortise. The manufacturers state that ordinary bits can be employed for this purpose. The boring attachment shown in line with the lower shaft is especially adapted for wagon makers, a hollow auger for tenoning spikes being used in place of auger bits. There is also furnished a wheel support, which is shown at the extreme left of the engraving. When it is desired to do dowel boring in the edge of wide stuff, such as in connection with cabinet work, the ways can be cleared and the clamping support turned around. The manufacturer refers to this machine as a good combination rip saw, band saw and boring attachment all in gear ready for use.

Cutting Machine For Wooden Statuary.

John Brielmaier, superintendent of the Dubuque Altar Company, Dubuque, Iowa, has just constructed and applied for a patent on a machine that will be an innovation in the altar trade It is known as a cutting machine and is used in the manufacture of wooden statuary and images. Heretofore all such work has been done by hand and it required five or six weeks for skilled workmen to finish a figure of any size. It is claimed that with Superintendent Brielmaier's machine the same labor can be accomplished in less than two days. The principal part of the machine is the steel rod to which are attached the cutters. This is so constructed that it is as flexible as a rubber hose. This rod makes 6000 revolutions a minute and is the finest kind of mechanism. The machine is operated somewhat on the plan of some drawing machines. The model of plaster of paris stands beside the block of wood which is to be carved. A " dead " pin is attached to the cutter rod. When this pin is traced over the model the cutter reproduces exactly the surface of the model on the block.

Paints in Architecture.

We are indebted to the New Jersey Zinc Company, 52 Wall street, New York City, for a copy of a very interesting pamphlet which they have issued, entitled "Paints in Architecture," this being in effect "a treatise on the characteristics and properties of pigments and paints for the use of architects," the matter having been prepared by Stanton Dudley. It is the purpose of the pamphlet to set forth certain facts regarding the base pigments and the various manufactured paints which will facilitate selection from among them. One of the many things required of the architect, and frequently of the builder, is a familiarity with paints and their qualities, for upon this acquaintance depends in a large measure the beauty and permanence of his "color scheme," and in a general way the beauty of his entire work. His object, therefore, in selecting paints should be to secure those that will give him clear, brilliant and permanent tints and shades together with a durable coating. In discussing the question of paints the little pamphlet states that the measure of the protection afforded by painting depends upon the impermeability of the coating and upon its durability, while the measure of beauty obtained depends first upon the knowledge and taste of the architect, and, secondly, upon the permanence of the color used. Some of the headings under which "Paints in Architecture" are considered include Pigments and Vehicles, White Lead and Zinc, Inert Pigments, Permanence, Combination Paints and Ready Mixed Paints. The concluding division of the pamphlet is devoted to Specifications, under which head it is stated that "architects intrusted with important work are usually expected to specify the materials to be used. From a very natural lack of special interest in this department of their calling, it has become almost a matter of course with them to specify a priming coat either of lead or of ocher and oil, succeeded by one or two coats of pure white lead and oil. A few architects, however, whose attention has been more especially directed to the question of paint materials, are accustomed to order the addition of a certain proportion of zinc white to the finishing coat, 'to hold the lead in place.' There is no doubt that the last mentioned practice will retard deterioration to an appreciable extent; but as in these cases the zinc will probably be added by hand in the paint shop, with the certainty of imperfect incorporation, it is preferable to select a brand of prepared paint conforming to the required formula. Still more satisfactory results can be obtained by using the combination formula throughout.

"If what has been said will justify the conclusion that combination paints are preferable to 'straight' paints, no difficulty should be found in framing specifications accordingly. The specifications may either indicate the desired proportions of the several materials, or mention a local brand of known composition 'or a combination practically identical with it.' It would also be very advantageous to specify that the materials shall be mixed and ground by machinery. This method will greatly mitigate the defects of lead and will avoid all the so called faults of zinc. In connection with this it might also be well to forbid specifically the use of driers and japans made chiefly with lead salts, and the best way to insure this omission is to specify the incorporation of the necessary manganese driers, made with a very small proportion of litharge, in the process of grinding. . . .

"For interior work it is generally admitted that straight zinc or paints based on zinc should be specified to the exclusion of lead. The result will be more satisfactory in beauty, durability, economy and healthfulness. It is very well known that no paint containing an appreciable proportion of lead will endure or hold its color in an atmosphere where gas or coal is burned, or where there is any trace of effluvium from closets, &c. Finally, if the architect wishes good, honest work from competent painters, he will place his contracts for painting directly with the painter, and not with the carpenter or any other third party."

TRADE NOTES.

WE HAVE received from the Atlas Cement Company, 143 Liberty street, New York City, a copy of a handsome publication which they have issued from the press, bearing upon the record of Atlas cement in the laboratory of the chemist and cement tester, as well as in actual work. The volume is made up of 64 pages of handsomely printed letterpress bound in slate colored covers, with an embossed side title in old gold. In referring to their product the company state that they manufacture but one grade of cement, devoting their entire attention to maintaining the highest quality. The interests of the engineer and architect have been carefully studied, and the company point out that their approval has been demonstrated by the use of Atlas cement in many large and important works. During the entire course of manufacture great care is used, and both chemical and physical tests are made at the company's own laboratory, thus insuring uniformity, all cement passing a rigid test before shipment. Reference is made to the works of the company, which are situated at Northampton and Copley, Pa., and it is stated that the annual production is 1,500,000 barrels of Portland cement, which is shipped in barrels, duck and paper bags. The publication under review is handsomely illustrated with half-tone engravings, showing many buildings, both public and private, together with sidewalk construction, bridge work, aqueducts, fortifications, water works, harbor docks, &c., in connection with all of which the Atlas cement has been used. There are also given a number of letters from builders, architects, engineers, &c., who have made use of the cement, as well as tables of strength, official reports of Government engineers and other data likely to prove of interest in this connection. A copy can be had on application to the company.

MERCHANT & CO., INCORPORATED, of Philadelphia, Pa., have recently taken an order from the War Department for a large number of galvanized Star ventilators for use on the officers' quarters and barracks to be erected at Havana and Matanzas, Cuba. We understand that the order includes 587 Star ventilators 24 inches in diameter and 199 which are 14 inches in diameter. One of the conditions of the order is that the goods shall be very promptly delivered, and this the company are enabled to do through the exceptional facilities which they have for turning out work.

"YOUR CHANCE HAS COME" is the title of a 32-page pamphlet of a size convenient to carry in the pocket which is being freely distributed by the International Correspondence Schools of Scranton, Pa. The matter is made up of testimonial letters from some of those who have taken a course of instruction in these schools, each letter being illustrated with a likeness of the writer. The pamphlet is neatly printed and shows in a most interesting manner the varied lines of trade in which instruction is successfully carried on. A circular of information issued by the schools will be sent to any one sufficiently interested to make application for a copy.

AN ANNOUNCEMENT likely to prove of more than usual interest to architects, builders and house owners generally is that of the Dille & McGuire Mfg. Company of Richmond, Ind., which appears in another part of the paper. It refers to the McGuire trackless sliding parlor door hanger, which, it is stated, requires no special framing, as ordinary pockets serve the purpose. The head is solid and in one piece, no wheels are used and there is no opening above the doors. The manufacturers state that any carpenter can apply a pair of hangers in doors in less than two hours, the hanger butts being applied to the jamb casings the same as ordinary swinging butts. Another interesting feature in connection with the hangers is that they may be applied and the doors hung after all plastering is completed. A descriptive catalogue will be forwarded by the company to any one who may make application.

WE are indebted to the Samson Cordage Works, 115 Congress street, Boston, Mass., for copies of two circulars which they have recently published. One of these relates to the Samson spot cord, which is made from the best cotton yarns, braided and finished by the company's patented and secret processes, and inspected with great care to insure freedom from flaws. The statement is made that the Samson spot cord is the result of 30 years' experience in the manufacture of solid braided cords. The second circular is in the shape of a four-page folder and calls special attention to the solid braided cord, which is claimed to be from "5 to 40 times more durable than the various qualities of twisted or hollow braided line, or of metal chains or tapes." The manufacturers refer to the fact that with the strands doubling on each other, as they do, leaving freedom of play without slipping, the strain in running over pulleys is quite equally distributed over all the strands, while "in twisted or hollow braided line the strain is largely on the outside strands at the points where it surrounds the pulley, or else the strands slip and wear on each other."

A FOUR-STORY addition is being built to the works of the Joseph Dixon Crucible Company, Jersey City, N. J. The building will be used for the manufacture of pencils. The company expect to build a very large addition to their crucible plant during the summer.

AULD & CONGER of Cleveland, Ohio, announce elsewhere in this issue that they are the only manufacturers in the United States of genuine No. 1 Bangor Union and Ribbon slate, Mammoth Vein, Poultney, Sea Green, Purple and Variegated. Reference is made to the Lightning slate dresser, which they are prepared to furnish, as well as to nails, felt and tools of interest in this connection.

J. B. COLT & CO. of 3-7 West Twenty-ninth street, New York City, report a good business in connection with their Criterion acetylene gas generators. They recently booked an order for 60 of these machines to be shipped abroad, and state that there is an increasing demand generally throughout this country. The Criterion meets the approval of prominent fire insurance boards of underwriters in the United States, and embodies in its design and construction features that insure the most desirable results in the use of acetylene gas for household and commercial purposes.

THE GOODELL-PRATT COMPANY, Greenfield, Mass., is now the name of the firm formerly known as the Goodell Brothers Company, well known as manufacturers of mechanics' tools. They advise us that the officers, directors, management and location remain the same as formerly.

THE GRAND RAPIDS HARDWARE COMPANY of 3 Pearl street, Grand Rapids, Mich., set forth in another part of this issue the merits claimed for the Grand Rapids all steel sash pulley which they are manufacturing. These pulleys are such, it is claimed, that they cannot split the window frame, no screws or nails being required to fasten them in place. The pulleys have turned steel axles, firmly riveted on both ends; the wheel is interlaced and the claim is made that it cannot split. The axle is always lubricated and the manufacturers point out that the operation is noiseless. The company will forward a sample free on application.

"EVIDENCE of a Magnificent Record" is the title of a 24-page pamphlet which reaches us from the Eastern Machinery Company of New Haven, Conn. The matter is made up in large part of testimonial letters from some of those who have used the company's machines, following which is an illustrated description of the New Haven horizontal brick machine, the first one having been erected ten years ago, and the manufacturers state that it has been in continuous use seven months in each year ever since. The company call attention to the fact that in addition they manufacture horizontal brick machines, vertical brick machines, clay granulators, pug mills, coal crushers, clay elevators, winding drums, clay cars, revolving dump tables, brick trucks, kiln castings, stamp mills, &c. In fact, the company state that they can supply complete brick manufacturing outfits of any size.

MERCHANT'S GOTHIC SHINGLES are the subject of an announcement presented in another part of this issue by Merchant & Co., Incorporated, of 517 Arch street, Philadelphia, Pa. Reference is also made to copper, terne plates, galvanized steel, &c., and the statement is presented that a catalogue and price-list will be mailed to any address on application.

— PRIMA FACIE EVIDENCE. — Billy: "Your dad hez quit smokin', hain't 'e?" Johnny: "Yep. How'd you know?" Billy: "I seen 'im kickin' the dorg." —*Detroit News.*

— HIS INFERENCE.—"How did you enjoy your trip?" inquired Mr. Sogback, a prominent citizen of Arkansaw, addressing Woodtick Johnson, another Arkansaw citizen, also prominent, who had recently returned from a journey which had taken him some distance up into Missouri; "what did you think of things, anyhow?"

"By heck, Bill!" replied the ingenuous Woodtick; "if the world is as big all over as it is whur I've went, she's a whopper!"—*Puck.*

Carpentry and Building

WITH WHICH IS INCORPORATED

The Builders' Exchange

Vol. XXI. No. 6 . New York, June 1899. Ten Cents a Copy. One Dollar a Year

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DAVID WILLIAMS COMPANY, - - PUBLISHERS AND PROPRIETORS

232-238 WILLIAM STREET, NEW YORK.

JUNE, 1899.

The Sympathetic Strike.

An interesting legal fight has been started in Chicago which promises to severely test the power of workmen to order a sympathetic strike. The Winslow Bros. Company, manufacturers of ornamental iron work, had contracted to remodel a building for L. Z. Leiter, but after the work was begun their men struck for an advance in wages and for the establishment of some arbitrary regulations to which the company would not submit, but proceeded to hire other workmen. Thereupon the Building Trades Council, composed of federated unions, ordered the men of all other trades to quit work on the building. This completely stopped progress on the remodeling, much to the dissatisfaction of the owner, who is alleged to have threatened to rescind the contract with the Winslow Bros. Company. They then applied to a local State court for an injunction against the Architectural Iron Workers' Union, the Building Trades Council and L. Z. Leiter to restrain all of them from interfering with the complainant company in carrying out their contract to perform the work. The action is unique in its including the owner of the building with the labor organizations as defendants. He is thus to be prevented from being coerced by the unions into assisting to force the complaining company to their terms. This has been a shrewd practice of these organizations, and employers have usually been brought to time by the indirect pressure thus exerted. If the Winslow Bros. Company are successful in winning the power of the courts, a great deal will be accomplished in breaking the force of sympathetic strikes in the Chicago building trade.

Commercial Education.

The rapidly expanding foreign trade of this country is bringing home to business men the need of providing facilities for commercial education of a wider and more thorough character than are yet available in the United States. A movement to establish a school for the training of young Americans for consular and foreign commercial service has just been set on foot by the National Business League Association. As planned, the proposed school is to be modeled after the Higher Commercial Institute of Antwerp, where young men receive a thorough commercial training. The course of that institution occupies two years, at the end of which time a diploma is issued to graduates. The institution is practical as well as theoretical. It includes a thorough instruction in methods of bookkeeping and the transactions of commercial houses, the theory of exchange, correspondence in foreign languages, &c. The principles of political economy, of international commercial law and of customs legislation are also taught, and the geographical and economic conditions of foreign countries are closely studied. The cost of obtaining these advantages is very small, the expense of the institute being shared by the Belgian Government and the city of Antwerp. The entire outlay of a pupil for the two years' course is only about $100. The obvious advantages of a school of similar character here will recommend the scheme of the Business League to the public at large. Meanwhile the Board of Education of New York City are formulating plans for the establishment of a commercial high school as an addition to the system of public education of the city, and the State Legislature is to be asked to authorize an appropriation of $1,500,000 as a fund for this school. The scope of the proposed school is designed to embrace thorough instruction in bookkeeping, banking, commercial law, the tariff of all countries, textile fabrics, chemistry and the products of the countries of the world, with the export and import trade of such countries, as well as a study of the French, German, Spanish or Italian languages. It is expected that this school will be opened by March of next year.

Arbitration in Illinois.

The Legislature of Illinois has taken an advanced position in endeavoring to settle labor troubles through the medium of a State Board of Arbitration. In 1895 an act was passed creating a board for this purpose, and providing that when a decision has been given in a case in which both parties to the dispute have asked for arbitration the decision shall be binding upon the applicants for six months. It was assumed at the time that the decision would need no enforcement, but that it would be accepted and carried out in good faith by those who had invoked the kindly services of the State authorities. Circumstances having arisen which show that the decision of the board is not always observed for the prescribed six months, the act has just been amended at their request. The additional powers given are expected to greatly strengthen their position and give their decisions greater weight. Under its provisions they will be enabled to compel the production of such books and papers as may be deemed necessary to a full and fair investigation of the matter in controversy. In case of disobedience to a subpœna the board can apply to a judge of a State court, who shall issue an attachment for the witness desired and compel him to appear and testify or produce such books and papers as may be lawfully required. If the decision of the board is disregarded complaint can also be made to a State court, and upon investigation by the judge if it is found that the complaint is sustained he can punish the offending party or parties for contempt by imposing a fine, but it is provided that such punishment shall in no case extend to imprisonment.

Amendments to the Law.

The amendments which have thus been made to the Illinois law are to be commended for their moderation. A penalty seems to be necessary for the enforcement of any decision made by legal authority relative to the rights or the privileges of persons. Otherwise the decision can be accepted if it suits, or disregarded if that seems more desirable from the standpoint of one of the interested parties. But a severe penalty would probably defeat the whole purpose of the law by deterring those involved in a labor dispute from applying to the State Board of Arbitration, as they would not like to render themselves amenable to such a law or be compelled to abide by a decision which they would consider unjust or unfair. In this cautious way it is probable that a course of procedure may be evolved that will prove to be of value in settling labor disputes and to some extent fulfill the expectations of the humanitarians by whom such legislation is prompted. If even a few serious strikes or lockouts can be averted every year by the existence of a State Board of Arbitration, it is an experiment in sociology well worth trying by every commonwealth.

Additional Hotel Accommodations for New York.

The demands for hotel accommodations in this city are increasing to such an extent that the owner of the Hotel Manhattan has decided to double its capacity in the near future, probably during the coming summer. The plans for the new structure have been drawn by Henry J. Hardenberg, who was the architect of the Waldorf-Astoria, and by means of the extension contemplated something like 400 rooms will be added to the Manhattan. The purchase of property adjoining the present structure, for which negotiations have been pending for some time, has been completed, and the hotel will thus occupy the entire front of the block on Madison avenue extending from Forty-second to Forty-third streets. It is expected that active operations will be commenced within the course of the next month or six weeks. On the same avenue, at the northwest corner of Fifty-sixth street, there will soon be erected a 12-story fire proof hotel of steel skeleton frame construction, which, according to the estimates filed with the Department of Buildings, will cost in the neighborhood of $250,000. The plans have been prepared by Howard Cauldwell & Morgan, according to which the style will follow the Renaissance, the design being worked out in limestone and brick. The hotel will cover a site about 50 x 100 feet, and there will be two entrances, one in Madison avenue and the other in Fifty-sixth street.

New Home of the University Club

The new building of the University Club, at Fifth avenue and Fifty-fourth street, New York City, which was recently opened, is one of the largest in the city, as well as one of the most attractive. The structure occupies an area 140 x 100 feet and is of a style of architecture which suggests the Florentine, although somewhat more classic in its details. The material of which it is constructed is pink Milford granite. The plans were drawn by McKim, Mead & White of this city. The hall, which is the main room of the ground floor, is in the Roman style and the distinguishing feature of which is a group of 12 columns of green Connemara marble. Other rooms on the ground floor are a café, the office, strangers' reception room, reading room and coat room. On the second floor is the billiard room and on the third floor are 17 bedrooms. The fourth floor is devoted to the library, a feature of the ceiling being its groined vaults. The fifth floor, which is the second mezzanine floor, contains a card room, a room for pipe smokers, designed and decorated in the old Dutch style, and other lounging rooms. The sixth floor is occupied by bedrooms, and the seventh floor by the main dining room, the walls of which are of wood work and the floor of marble. There is also on this floor a council room and some small rooms. The eighth floor is taken up by the kitchens, the ninth floor by private dining rooms for small or large parties and the tenth floor is the roof garden, which is partially covered.

BOSTON, MASS., is to have a $400,000 hotel exclusively for women, the building to be an eight-story structure and to be put up by the trustees of the Homestead Building Trust. The building is to be arranged in suites of one, two and three rooms and bath, while the general accommodations include parlors, gymnasium, bowling alley, roof garden and restaurant, with all the other adjuncts of a first-class house.

THE architectural clubs of some of the leading cities contemplate holding a national convention in Cleveland, Ohio, on Friday and Saturday, June 2 and 3, one of the principal objects of which is to make arrangements for an exhibition circuit for next year. The plan which has been proposed is to select some city as a place for opening a grand exhibition of drawings and work from the different architectural clubs, and at the conclusion of the exhibition in the first city, to send the exhibits to another city and so on around a circuit. In speaking of the approaching convention, Herbert Briggs, president of the Cleveland Architectural Club, is reported by a local paper to have stated that one of the objects will be to work for the passage of laws in municipalities governing the erection of buildings.

ONE of the papers published at Springfield, Mass., states that a local authority on architecture is responsible for a very hopeful view of the improved taste in building displayed in that city. The steps of progress, he thinks, have been very well defined. In the earlier built districts there was too much of a sameness, but this was followed by a period of more pretentious buildings, "which are to be seen both in parts of the 'Hill' and in Forest Park. The so-called colonial house of recent years has been of this kind. It has had attractiveness, but it has lacked the chief charm of the real colonial house—its reserve. This period has been gratifying as showing a desire for improvement and for individuality. An era of more subdued and better taste is now beginning, when people appear to recognize that a residence in a city of this kind should have individuality, but at the same time should not be too ambitious, but should be built on simple and harmonious lines, which can be thoroughly and consistently carried out."

AN attractive ten-story hotel which, when completed, will have cost more than $300,000, is about to be erected on Seventh avenue and Thirty-eighth street, New York City. The work of tearing down the old buildings occupying the site is now in progress and will be rapidly pushed to completion. The new structure will be of brick and will be erected in accordance with plans prepared by architects Barney & Chapman after the ideas of R. H. Stearns, a popular hotel man who has already leased the building. He is proprietor of "The Gladstone," at Narragansett Pier, and it is his intention to make the new hotel one of the most attractive in this city. It will be of fire proof construction and every room will have a private bath. While at the present time the neighborhood is of a rather uncertain character, it is the purpose of the owner of the property, Mrs. Eliza White, to improve the locality by tearing down the present buildings and erecting in their place handsome apartment houses with all the latest conveniences.

A NEW office building, covering an area 39 feet 9 inches by 100 feet 5 inches, is about being erected by the American Exchange National Bank at the corner of Broadway and Cedar street, this city. The plans, which have been drawn by Architects Clinton & Russell, call for a structure 16 stories in hight and to cost $400,000. The façades will be of granite and limestone, with copings of bluestone.

A 12-STORY fire proof brick building, intended for store purposes, is to be erected for Robert Hoe at 683-685 Broadway, New York City, in accordance with plans drawn by Wheeler Smith, architect, the estimated cost being placed at $200,000.

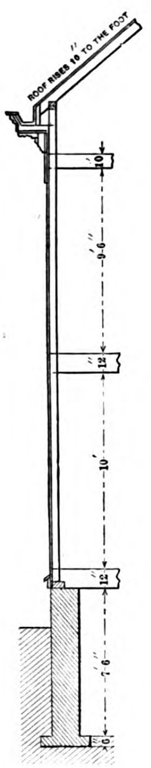
HOUSE IN A CINCINNATI SUBURB.

WE have pleasure in laying before our readers this month illustrations of a modern residence located in one of the many charming suburbs of which the city of Cincinnati can boast. The style of architecture partakes somewhat of a colonial character, modernized in its treatment and presenting some rich architectural effects. Among the more notable features which may be mentioned are the large circular porch for the main entrance, with its rich columnar effects, handsome frieze and tasteful treatment of the balcony above it, the oriel windows, with extension and leaded glass of unique design, the broad parlor window and the pilasters at the front corners of the building with their beautifully carved caps. The arrangement of the interior is thoroughly in keeping with a design of this character, and meets all the requirements of a modern and convenient dwelling.

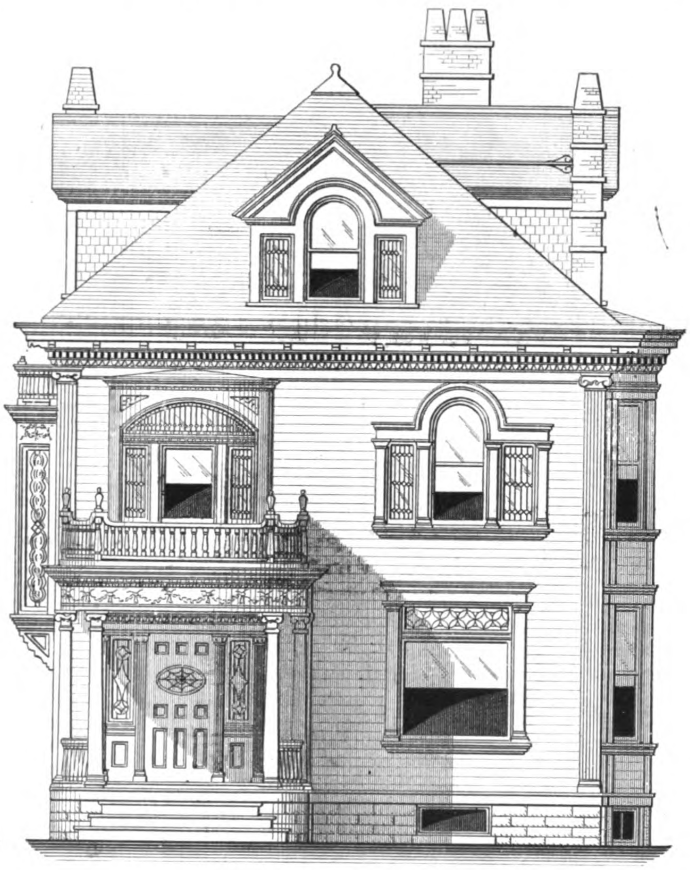
According to the specifications of the architect the foundation walls are composed of blue limestone, the exposed faces above grade being "rock range" work neatly pointed with colored cement mortar. A 13-inch wall of hard burned brick laid in cement mortar extends through the cellar from the front to the rear, thus making a firm support for the division bearing wall. The house is of frame construction, the timber employed being of the best quality Norway pine. The studs are 2 x 4 inches, the first floor joist 2 x 12 inches and the second and third floor joist 2 x 10 inches, all placed 16 inches on centers. The second and third floor joist are notched ½ inch over a 1 x 5 inch girt strip let into the stud 1 inch and spiked. The joist and studs are firmly nailed to each other, the joist being cross bridged with 1 x 3 inch bridging every 5 feet apart, and all interior studs stiffened with diagonal blocking courses. The hip rafters are 2 x 8 inches, the ridge rafters 2 x 10 inches and all others 2 x 6 inches, placed 16 inches on centers. The rafter plate is 2 x 4 inches doubled and all corner posts are 4 x 6 inches. The collar beams are 2 x 6 inches, placed 16 inches on centers, and the sills on top of the stone walls are 4 x 6 inches, halved together.

The outside walls and roofs are covered with yellow pine sheathing, planed and matched and secret nailed to each stud and rafter. All plain surfaces on the exterior are covered with Sackett's No. 2 water proof sheathing paper, over which are placed first quality yellow poplar weather boards 3½ inches wide and laid 2¼ inches to the weather. All exterior finish, including porches, moldings, window and door casings, water table, base, brackets, imposts, &c., is of clear white pine. The turned columns on the porches are solid poplar, while the porch ceilings are lined with narrow beaded yellow pine partition, secret nailed. The main roof is covered with 10 x 20 inch black Virginia slate, laid 7½ inches to the weather.

The floors of the attic are composed of yellow pine, with riff sawed for the kitchen and serving room, and second common white pine for the second floor and re-



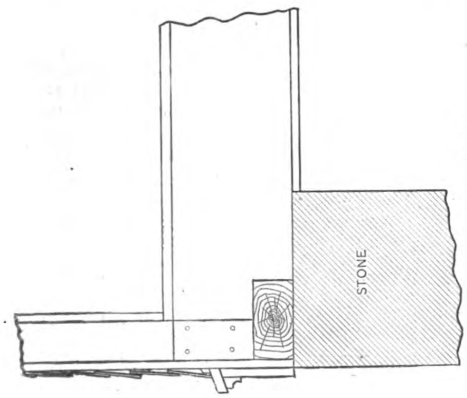
Section.



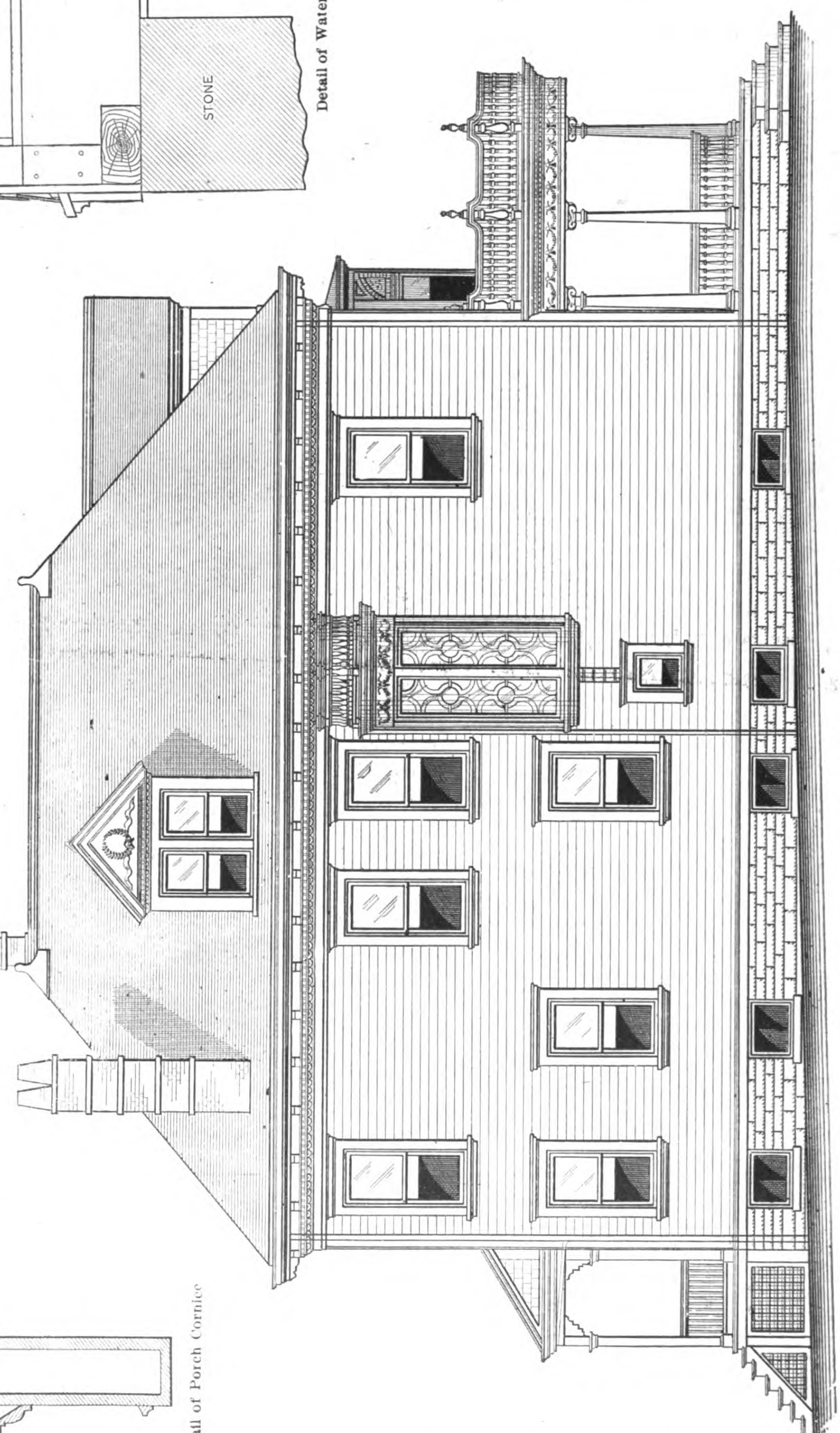
Front Elevation.—Scale, ⅛ Inch to the Foot.

House in a Cincinnati Suburb.—John P. Striker, Architect, Cincinnati, Ohio.

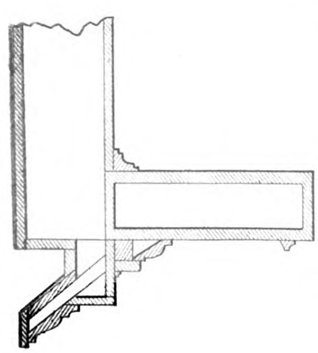
maining portions of the first floor. The reception hall, parlor and dining room have in addition a parquet floor of oak 3/8 inch thick and secret nailed. The floors of the porches are 7/8 x 2 1/4 inch white pine, tongued and grooved, and secret nailed to 2 x 8 inch joists, supported on an 18-inch stone wall. The balcony over the front porch is composed of 2 x 10 inch joist, cambered down



Detail of Water Table.



Side (Left) Elevation.

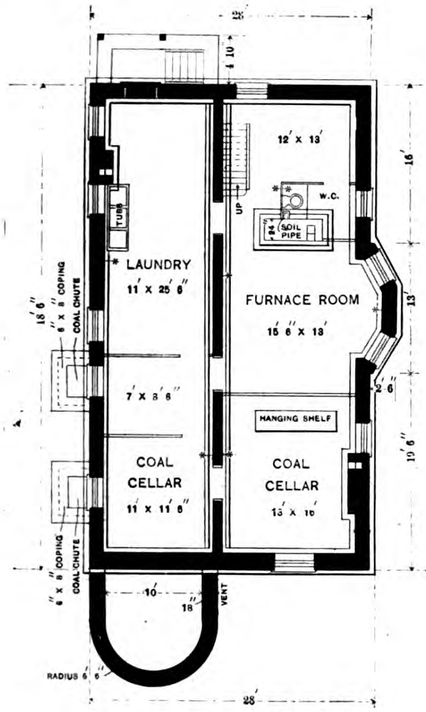


Detail of Porch Cornice.

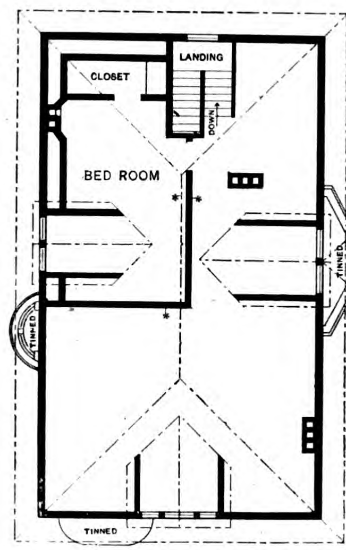
House in a Cincinnati Suburb.—Elevation.—Scale, 1/8 Inch to the Foot.—Details.—Scale, 3/4 Inch to the Foot.

to give a fall to the gutter at all points, on which is laid sheathing of yellow pine covered with McDonald's Old Style tin. The chimneys are topped out from the roof up with buff pressed brick laid in white mortar with sunken joints. All flues are 8 x 8 inches and well pargeted throughout.

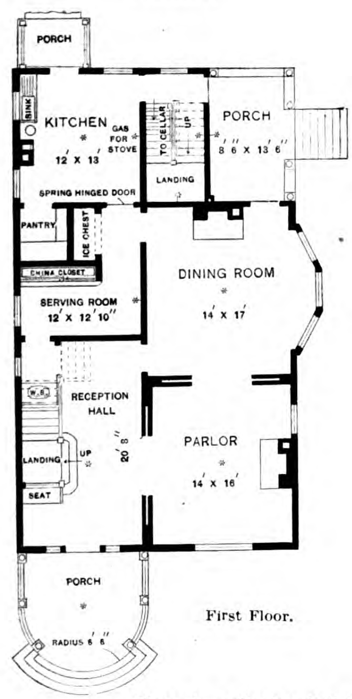
The inside finish of the house is of the simplest kind, showing an Eastlake design so prevalent in medium priced homes. The finish is composed of turned check



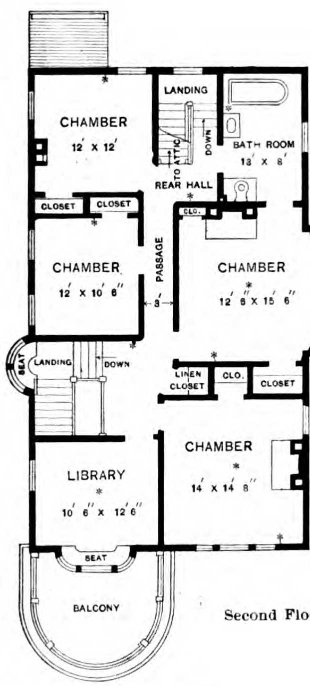
Foundation.



Attic with Roof Lines.



First Floor.

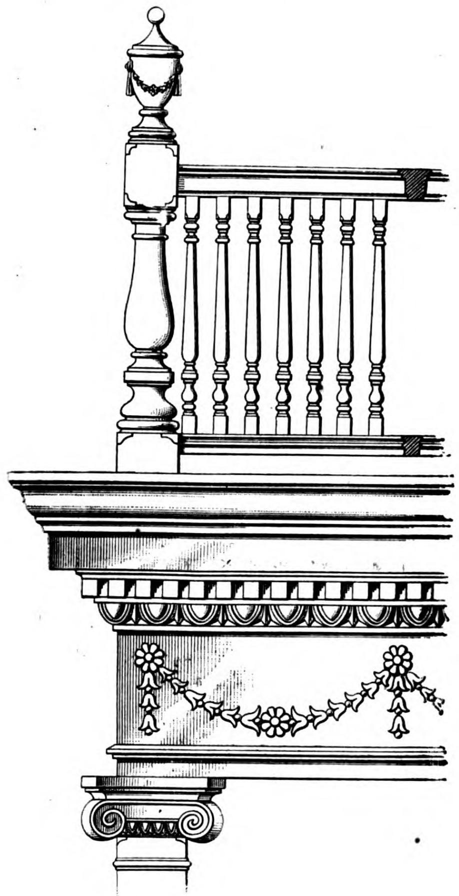


Second Floor.

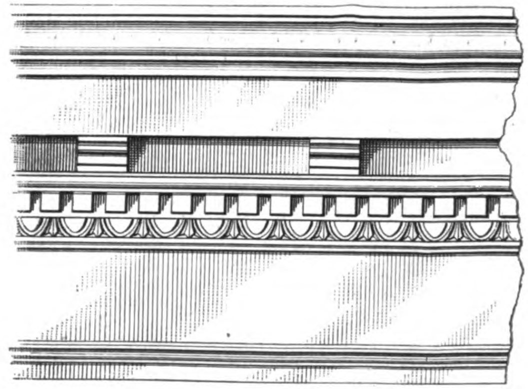
House in a Cincinnati Suburb.—Floor Plans.—Scale, 1 16 Inch to the Foot.

blocks and plain plinths each $1\frac{1}{8}$ inches thick, 5-inch molded casing, 8-inch molded base, with stool and molded apron for windows, all $\frac{7}{8}$ inch thick and of selected yellow pine. The main stairs are finished throughout in quartered oak, while the front door is veneered in oak, also the side lights. All inside doors are five-paneled, with stiles and rails of white pine and the panels of yellow pine. All principal doors are $1\frac{3}{4}$ inches thick, likewise the sliding doors, which are carried on Wilcox hangers. All other doors are $1\frac{3}{8}$ inches thick. The interior wood work is treated with three coats of the best coach varnish, well rubbed and sandpapered between each coat, the last being a flowing coat.

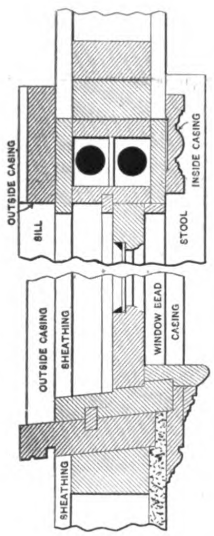
The bathroom is wainscoted with beaded yellow pine and secret nailed. The plumbing is of the open variety, all exposed pipes being nickel plated brass. The equipment consists of white enameled iron tub with secret waste and nickel plated trimmings, siphon jet closets



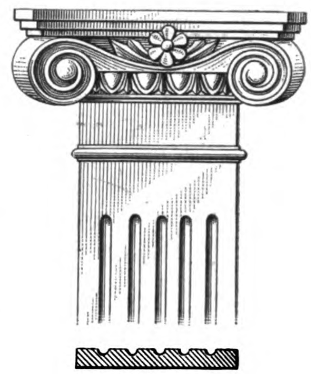
Detail of Front Porch Cornice and Balcony Railing.



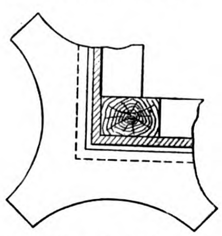
Partial Elevation of Main Cornice.—Scale, ¾ Inch to the Foot.



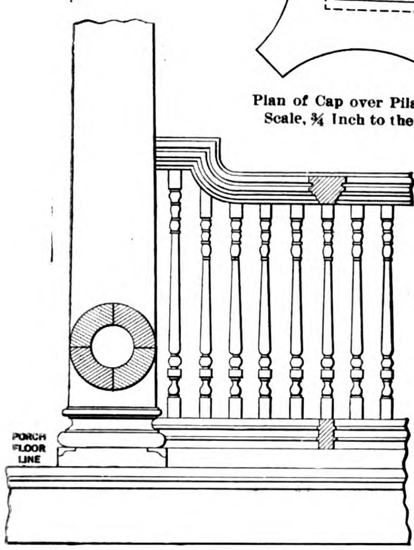
Details of Window Frame. —Scale, 1½ Inches to the Foot.



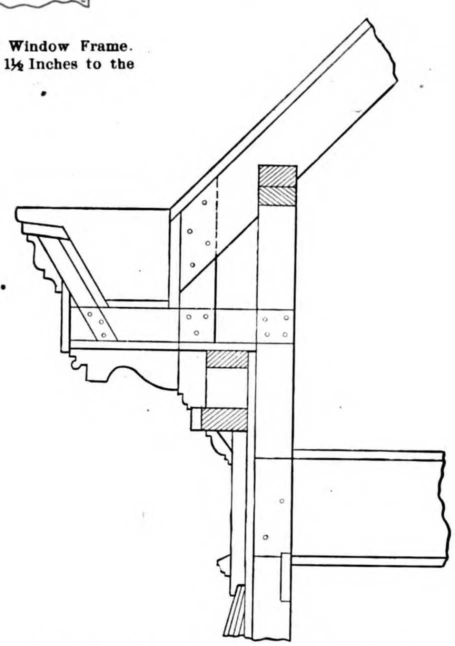
Detail of Front Corner Pilaster with Cap.—Scale, 1 Inch to the Foot.



Plan of Cap over Pilaster.— Scale, ¾ Inch to the Foot



Detail of Porch Balustrade.—Scale, ¾ Inch to the Foot.



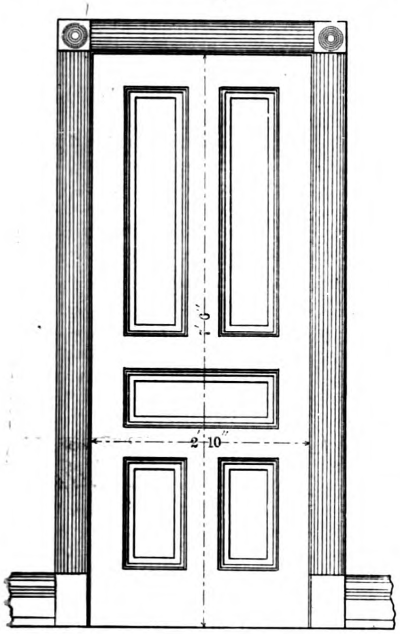
Detail of Main Cornice.—Scale, ¾ Inch to the Foot.

Miscellaneous Constructive Details of House in a Cincinnati Suburb.

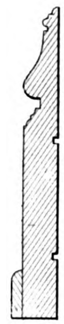
and marble washstand with 14 x 17 inch Duroware oval bowls with nickel plated fixtures, all marble used being of Godfrey's gray Knoxville, Tenn., variety. The house is wired for electric and gas lighting throughout, and is fitted with speaking tubes, electric bells, annunciators,

Building, Cincinnati, Ohio. The contract price was $4000, but about $1000 additional was expended for hardwood mantels, hardware of colonial design, elaborate gas fixtures, heating plant, &c.

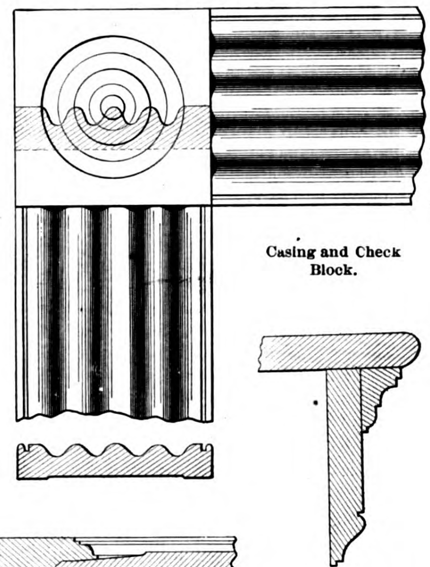
The half-tone engraving which forms the basis of our



Elevation of First Story Doors.—Scale, About ½ Inch to the Foot.

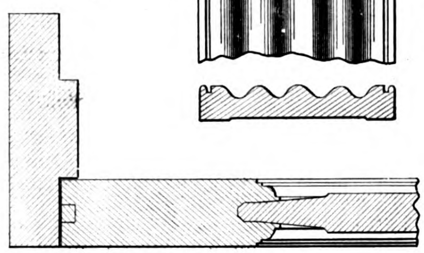


Base.

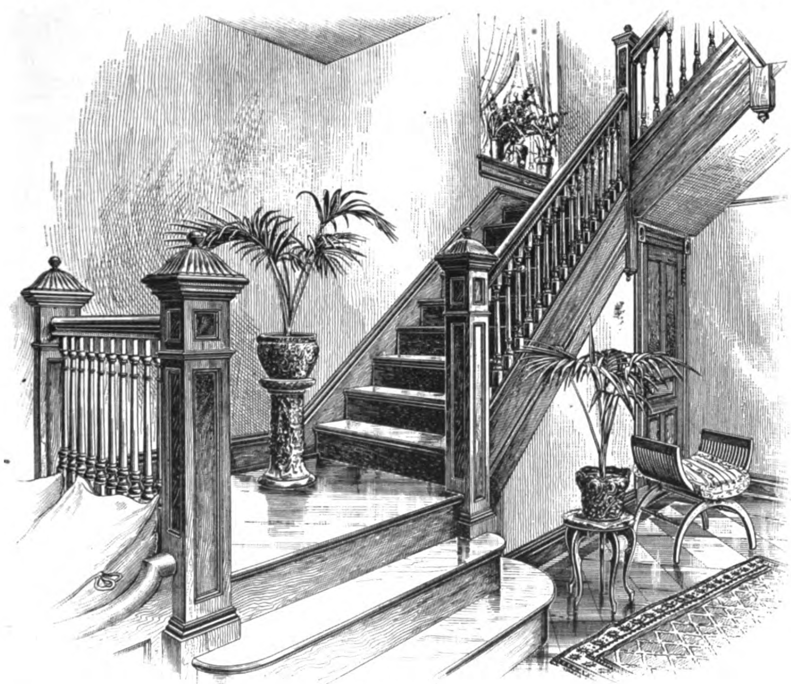


Casing and Check Block.

Stool and Apron.



Partial Section through Door and Frame. Scale, 3 Inches to the Foot.



View in Reception Hall, Showing Main Stairs.

Miscellaneous Constructive Details of House in a Cincinnati Suburb.

&c., making it up to date in all respects. The heating is by means of hot air with open grates in the rooms as indicated on the floor plans.

The house was completed late last fall for Mrs. Anna J. Wilder in accordance with drawings and specifications prepared by John P. Striker, architect, of 96 Perin

supplement plate is a direct reproduction of a photograph taken especially for the purpose and gives a very good idea of the appearance of the completed structure. The floor plans, elevations and details presented herewith show the arrangement of the interior and the method of construction employed.

RELATION BETWEEN ARCHITECT AND HEATING ENGINEER.

AT the annual meeting of the American Society of Heating and Ventilating Engineers, held a short time ago, T. N. Thomson read a paper bearing the above title, and dealing with the subject from the standpoint of the heating engineer. We reproduce herewith some extracts as being of interest to many of our readers.

It is unfortunate for the advancement of heating and ventilating interests that so little consideration is given to the scheme of installation while the building is in the embryonic condition. There is so much "hurly-burly" in the current methods of business that the bulk of our wisdom is included in the "backsight" instead of in the "foresight" lens of discernment, and until clear and well defined lines of procedure are adopted in the offices of both architects and engineers little progress can be hoped for.

Example.—Broker Martineau calls on Architect "Sector" with the information that he has purchased a lot and wants him to get out the drawings for a four-story residence right away; in fact, a friend of his is ready to start excavating as soon as the cellar plan is out, which must be within ten days.

The Results of Haste.

The architect naturally maintains that it is poor policy to talk of building cellar walls before he has thoroughly studied the requirements of the building and had sufficient time to complete the structural plans in detail, but his client feels that immediate progress must be made, and will listen to no explanations. As a persuader, he hints that Architect Todhunter is very anxious to do the work, and unless Mr. Sector can see his way to go right ahead he will have to see the other fellow. The client's patronage is valuable, and he must be humored, so the result is that Mr. Sector immediately commences preliminary studies and submits them to his chief draftsman with instructions to push them along, as Mr. Martineau will call in three days to examine them. Before the broker and his wife, however, have made up their minds to the many details of arrangement which they wish incorporated in their residence, it is found that 30 days have elapsed and the architect is still goaded by his impatient client to make a start. The office force is set to work preparing the working drawings, and the chief draftsman, having decided on the structural requirements of the design, now turns his attention to the location and size of the smoke and heating flues, &c., provision for which must be made in the walls. He therefore consults with his superior on the proposed system of heating, but finds that the owner has not yet decided upon a system. The work must be pushed, however, and the very important matters of heating and ventilation are entirely neglected until the building is under cover. Up to this time the only provision that has been made for the heating system is a chimney flue located somewhere—generally anywhere—and it will be a miracle if this flue is not too small.

The reason why this state of affairs exists, possibly, is that the owner does not know what kind of a heating system he wants, and consequently his architect has been working in the dark; it is more probable, however, that the energies of the architectural force have been concentrated on the construction of the building, and the heating system has, therefore, been overlooked. The owner is now notified by the architect that a decision must be made on the system of heating and the contract must be let and the work started immediately, otherwise the plastering will be delayed. After many consultations between architect and owner, the latter decides that, as the design of his residence has attracted so much attention and has been so favorably commented upon, he is justified in having the very latest and most approved system of heating and ventilation installed in the building, and Mr. Sector is instructed to submit schemes for accomplishing the same, with estimates of cost.

The architect immediately calls in a few expert heating and ventilating engineers and explains to them the characteristics of the structure and certain conditions which he is desirous of having complied with. He also gives each engineer a set of blue prints and general instructions.

Of course each engineer decides upon an indirect steam or an indirect hot water system, but when he takes a general survey of the now half-finished building the difficulties to be surmounted are so pronounced, and the expense of such an installation is so great, that he reluctantly feels like recommending the old direct radiation method all over. It is just the old story—no provision made for anything but the chimney.

Heating Plans Submitted.

After an enormous amount of worry and scheming each engineer submits two sets of plans and specifications—one set is for direct radiation and the other for indirect radiation with the necessary outlet or vent flues and probably an aspirating stack.

The indirect plans are submitted first, and the architect is simply stunned. His practiced eye sees at a glance that this vent stack and that flue boxing, along with many other projecting monstrosities, will ruin the internal effect of the structure. The basement will be like a factory, and, in fact, the entire building will become a "hotch potch" of pipes, flues and boxings. Something must be done so that a reasonable degree of character and style will remain in the internal treatment. Engineer and architect now consult and decide upon a "give and take" plan. The architect is willing to cut out here and build up a little there in order to conceal certain flues. He changes the plans somewhat to get in a central vent stack, and puts in a few more open fireplaces for the sake of ventilation. He also agrees to build an underground duct and brick in the indirects, &c., all for appearance and general utility's sake. The engineer, on the other hand, cuts out some indirects and replaces them with direct radiation, because it would weaken walls or beams too much if the proposed flues were all run through, and so the thing goes until a fairly good arrangement is mapped out on the "trestle board." But see what it will cost to make the changes in the building; compare it with the very simple, economical and unobtrusive system that could have been devised if architect and engineer had but worked together on the first lay-out of the plans, before the construction was commenced.

None Master of All Crafts.

The science of building construction extends over such an enormous field of operation and covers such a large number of industries that no one man can possibly be master of all the crafts. It therefore is foolish to expect an architect, or, in fact, any other human being, to design a modern building without the assistance of experts well versed in the several branches of the building trades and equipment.

Architects are not blind to this fact, and nobody knows that better than we do; they all prefer consultation with the engineers before the working drawings are made, because they know how much can be saved and how superior the results will be when all installations are carefully considered in detail and accurately mapped out before the cellar walls are built. But this treatment of a building is seldom resorted to except by a few of the leading architects.

WHAT will be one of the largest steel chimneys in the world is to be erected at Laurel Hill, L. I., for a chemical works located on Newtown Creek. According to the plans filed with the Building Department at Jamaica the chimney is to be 315 feet high and 36 feet in diameter. Its construction will take about 231,700 pounds of steel and will cost $10,000.

RESIDENCE OF MRS. ANNA J. WILDER, CINCINNATI, OHIO.

JOHN P. STRIKER, ARCHITECT.

MAKING WOOD PATTERNS.—II.

BY CHARLES J. WOODSEND.

THE pattern is now ready to go to the foundry and we will make a flask to suit it. A flask is a box-like structure to hold the molding sand. For standard work—that is, work for which there is a steady and regular demand—they are usually made of iron, but in this case we will make one of wood. The flask we are about to describe is known to the trade as a two-part flask, consisting of the drag and the cope, these being the lower and upper parts respectively. An idea of the appearance of the flask and the parts of which it is composed may be obtained from a study of Figs. 8 to 13 inclusive. The sides and ends of the flask are to be made of 2-inch plank, while the bars may be of 1-inch boards. All may be rough, and, as a matter of fact, they are better rough than dressed.

In making the flask strength should be aimed at more than neatness. The sides are to be gained and mortised to receive the ends. The tenons upon the ends should be left long so as to permit of their being draw bored and pinned, the pins to be upon the outer surface of the sides. The sides should be shaped as shown. so that cope did not rest in the same position relatively to the drag when the flask was closed as it did when the pattern was rammed. From this the reader will see the absolute necessity for the pins and plates fitting accurately.

The necessity is equally as great that the cope should lift freely. If the molder has to use force to part the cope from the drag he is very liable to break the molding and thus destroy the work of perhaps hours or possibly days.

After the cope lifts satisfactorily we will proceed to bar it up. These bars run across the cope from one side to the other and should be gotten out in the shape shown in Figs. 10 and 11. In order to obtain the correct shape lay the pattern down with the line A B of the ribs, Fig. 3, in a horizontal position. This line will be parallel with the parting of the sand. The ribs should follow the shape of the pattern as well as the parting of the sand, keeping away about ¾ inch from both, and keeping the width of the bars so they will not reach to the top edge of the cope by anything from ¼ inch to 1 inch.

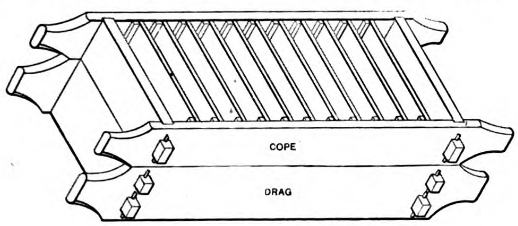


Fig. 8.—Isometrical View of Flask.

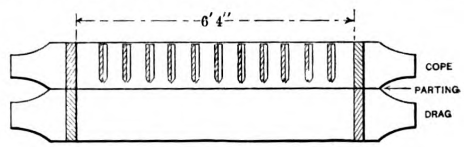


Fig. 9.—Longitudinal Section of Flask.

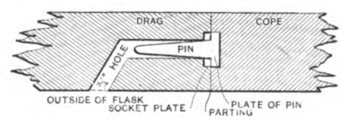


Fig. 13.—Broken Section of Sides of Flask, Showing Method of Putting in Pins and Plates.

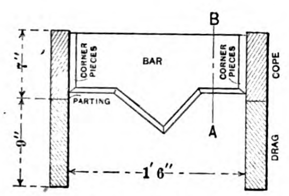


Fig. 10.—Cross Section of Flask.

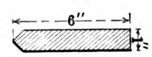


Fig. 11.—Enlarged Section of Bar on Line A B of Fig. 10.

Fig. 12.—Enlarged View of Corner Piece to Carry Bars.

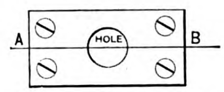


Fig. 14.—View of Plate for Flask.

Making Wood Patterns.

they may be readily lifted. This can be accomplished with a draw knife. When the sides and ends are ready put them together and pin up tightly. They may also be spiked upon each side of the tenons to keep the edges from springing out. The two edges which it is intended shall form the parting (see Figs. 9, 10 and 13) must be taken out of wind and planed so as to fit snugly upon each other.

The pins and plates are next in order, these being shown in Figs. 14 to 17 inclusive. Let the plates—those with the holes to receive the pins—into the edges of the drag and about 12 inches from the ends; let them in flush. Mark where the holes for the pins come and bore holes of the shape shown in Fig. 13. The reason these holes are bored in this way is to allow the sand which will accumulate in them to be forced out easily. Fasten the plates securely with stout 1¾-inch screws. Now drop the pins into them, place the cope in the position it is to occupy and mark where the plates of the pins come. Let them in neatly. Screw fast; then try and see how they will work. They must fit freely, but when the cope is in position upon the drag there must not be the least play. To illustrate what might occur if there was any play between the cope and the drag, possibly the readers have noticed sash weights whose section would show similar to Fig. 18. The reason for it is that the

The edges of the bars that come next to the drag should be beveled, as shown in Fig. 11. The exact bevel does not matter and it is preferably done with either a draw knife or hatchet. The bars are to be built anywhere from 5 to 7 inches apart and must not come nearer to any rib than 1 inch. There are no bars in the drag.

The next thing to consider is the corner pieces to carry the bars. In Fig. 12 is shown an isometrical view of one of these corner pieces. Two of these pieces are required for every bar. In putting in the bars nail one of the corner pieces on each side of the cope; then toe nail the bars in place and so on until all are in position. Great care must be taken in putting in the bars so as not to spring the sides of the cope, or else the pins will jam and the cope will not lift freely.

Each flask that is made requires a bottom board, which may be of 1-inch material with four 2 x 6 inch battens. All may be rough, but should not have any loose knots or shakes. The boards should run lengthwise of the flask. The joints should be close and the finished bottom should be the same size as the outside of the flask. Do not nail it to the flask, but leave it separate.

Now if there are several castings to be taken off the pattern at one time it will be a great saving in time to the molder if there is one board made similar to that shown in Fig. 19. This board is constructed in the same general way as the bottom boards previously mentioned, but in the present case the lumber should be planed. Nail a piece of 1 x 3 inch stuff upon one edge, projecting above the board 1 or 1½ inches. Now lay the board upon the floor, put the drag upon it even at the two ends and close up to the ledge at the side. The drag, let it be understood, is to be laid with the parting edge to the board. Remove the ribs from the pattern and lay it inside of the drag upon the board. Lay it an equal distance from the ends and in the center between the sides of the drag. Mark upon the board exactly where it comes. Remove from the board both the pattern and the drag. Next cut pieces exactly the same shape as the ribs of the pattern, such, for example, as those shown at D D D of Figs. 19 and 20. These pieces should not be more than 12 inches and may be ⅞ inch or thicker. Nail two of them, C C, upon the board so that their outside comes even with the ends of the pattern. Next take a straight edge and nail the others by it so that all are in direct line. We must now make two blocks the same as C C, Figs. 19 and 20, these blocks being so shaped as to run the parting of the sand from the two sides of the triangle formed by the pattern down to the straight parting between the cope and the drag. It is not necessary to make these blocks very elaborate, as the molder will smooth the parting when the drag is

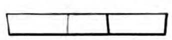


Fig. 15.—Section of Plate on Line A B of Fig. 14.

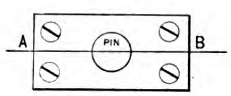


Fig. 16.—View of Pin for Flask.

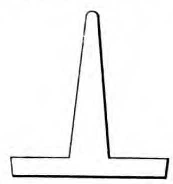


Fig. 17.—Section on Line A B of Fig. 16.

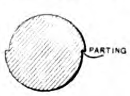


Fig. 18.—Cross Section of Sash Weight, Showing Movement of the Cope Upon the Drag.

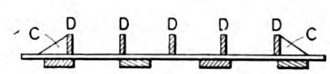


Fig. 20.—Section of Molding Board on Line A B

Making Wood Patterns.

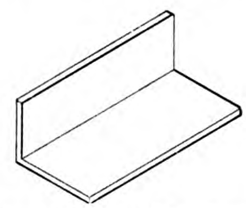


Fig. 21.—Isometrical View of "Stopping Off" Piece.

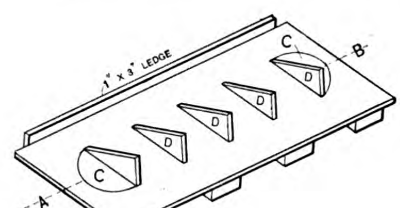


Fig. 19.—Isometrical View of Molding Board.

turned over. Nail everything solid so that there will be no danger of their breaking away when the flask is rammed. With this board all the molder has to do is to lay it straight upon the floor of the foundry, place the drag upon it, the pattern inside, and ram up. When there are several castings to make this effects a great saving of time.

It may so happen that there are several different lengths of lintels required, all to show the same face and bottom, but varying in length. Now it is not necessary to make a pattern for every different length, but make it to suit the longest one. The shorter ones can be stopped off, and for this there will be required a "stopping off" piece, Fig. 21. In this case it will be a piece 10 inches or 12 inches long and made exactly the same as the pattern without the ribs. It should be shellacked and finished essentially the same as the pattern. There will be no rapping plates needed for it. All that the pattern maker would have to do would be to cut some light rods the required length, allowing for shrinkage, and send them and the "stopping off" piece with the pattern to the foundry, when the molder will do the rest. Any molder could explain to the reader how the stopping off is done, and from him could be learned more in five minutes than the author could explain in half a day. Then, again, this part comes under the head of molding rather than that of pattern making.

THE installation of the electric light in the huge palace of the Vatican at Rome has just been completed. It is on a very extensive scale, as befits the vastness of the building. Six thousand incandescent lamps of 16 candle power are used in the thousands of rooms which make up the great pile in place of the old mixed method of illumination by oil, gas or candles. One great advantage of the new system is that the electric lights in the halls and galleries reveal beauties in the way of wall and ceiling paintings that had been entirely lost sight of, while the paintings of the famous Vatican gallery can be viewed to advantage by night as well as by day. It was only recently that Leo XIII introduced furnace heating on the American plan into the Vatican in place of the huge copper and bronze *brazieros* burning charcoal which formerly served to mitigate the chill of his palace. Telephones have also been installed in the Pope's study and private apartments. This amounts to a revolution in what up to lately was the greatest stronghold of conservatism in Europe.

Damages Against a Builder.

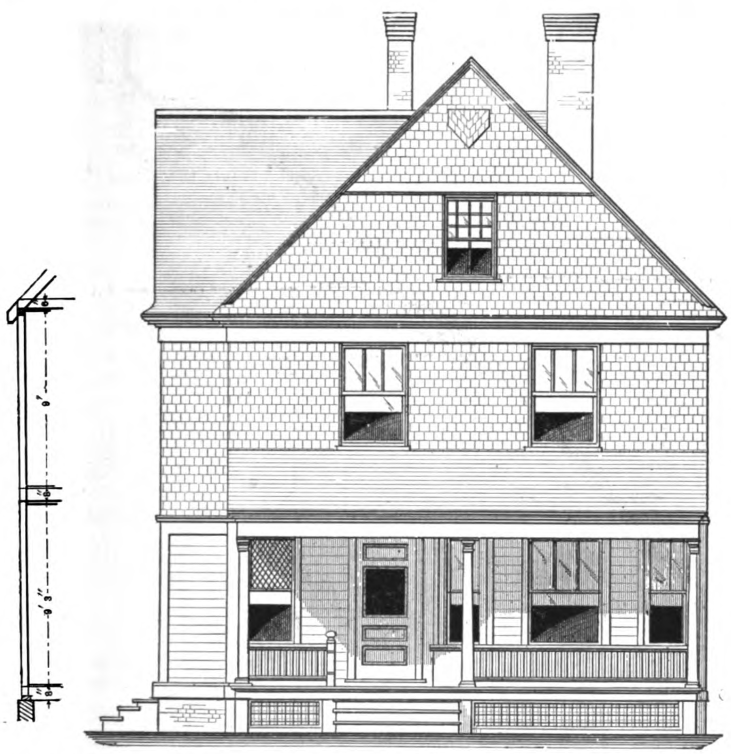
In a recent case in England a rather interesting point to builders was raised as to the right of their clients to recover for expenses incurred by them by reason of defective materials used in building and not in accordance with the requirements of the London Building act, 1894. It appeared that the plaintiff employed the defendant, a builder and contractor, to build a dormitory to one of his lodging houses, and contracted with the defendant to supply the mortar. The mortar was supplied and the building erected. After the building had been erected the plaintiff was served with a notice from the London County Council to pull down and rebuild, on the ground that the mortar was not composed of one part of lime to three parts of grit or sand, in accordance with the act of 1894. The plaintiff, in accordance with the notice, pulled down and rebuilt, and brought his action to recover from the defendant the whole cost of pulling down and rebuilding, and also the loss of ground rent. It was proved that the mortar was defective, and his Lordship found that it was so supplied by the defendant. The plaintiff also proved that in a wet state the inferior quality of the mortar could not be detected.

In giving judgment the Justice said that the question was whether the plaintiff, by reasonable diligence, could have discovered the defects in the mortar before using it. He came to the conclusion on the evidence that he could not when the mortar was in a wet state before being used, and that the cost of pulling down and rebuilding could properly be recovered from the defendant, and he was also entitled to damages for loss of ground rent. Judgment was accordingly entered for the plaintiff.

COMPETITION IN $1500 FRAME HOUSES.

FIRST PRIZE DESIGN.

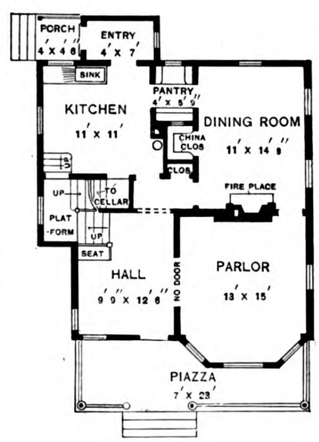
IN December of last year we called the attention of our readers to three competitions in low cost frame houses, intimating that the publication of the designs winning the several prizes would constitute one of the many interesting features of the paper for the present year. The results of two of these competitions have already been announced, and in this issue we consider the third and last competition, being that for houses costing $1500, and known as the XXVIIth in the series conducted by this journal. This competition brought out a large number of responses, and studies were received from contestants scattered over a wide area of country. In



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

Competition in $1500 Frame Houses.—First Prize Design.—Charles E. Sargent, Architect, Ware, Mass.

Second Floor.



First Floor.

Scale, 1 16 Inch to the Foot.

due course the designs were referred to a committee of experienced architects and builders, who have made their report after a most careful examination of the drawings in the light of the conditions and requirements as set forth in the issue of the paper for December last.

The requirements called for a front and side elevation, plans of each floor, including foundation or cellar, together with a selection of miscellaneous details of construction showing both interior and exterior finish. Another condition was that each set of drawings should be accompanied by brief specifications, an estimate of cost in detail under the headings of "Excavation," "Mason Work," "Carpenter Work," "Plastering," "Painting" and "Tinner's Work;" also that each estimate should be accompanied by a certificate from some responsible builder, stating that he would be willing to erect the house indicated by the drawings and specifications for the amount named in the estimate. Finally, it was required that the device or *nom de plume* used by each contestant should be placed upon a sealed envelope in which was contained the real name and address of the competitor.

It is greatly to be regretted that so many of the contestants either failed to fully comprehend the import of the conditions of the competition, or else read them with such indifferent attention. The results of this were to be seen in the many designs which it was necessary for the committee to throw out as not entitled to consideration, owing to the fact that they did not in all respects conform to the advertised requirements of the competition. Some designs were not accompanied by estimates of cost in detail. while others had no envelope containing the name and address of the author, these being plainly written on each sheet of the drawings, thus showing the committee at a glance by whom they had been prepared.

A striking feature of many of the designs was their elaborate character, and the evident desire upon the part of the authors to include about everything which one would expect to find in a well planned dwelling fitted with all modern conveniences. In dealing with these the committee were forced to throw out a considerable percentage on the ground of excessive cost. While in each case a builder's certificate accompanied the estimate, it was practically of no value in assisting the committee to a decision, for the reason that it appeared to be largely in the nature of a favor to the architect by the builder, who doubtless felt certain he would never be called upon to make good his figures. Conceding the claim that for the same class of building the cost of construction will vary to an appreciable extent in different sections of the country, and making due allowance for the locality in which the plans were drawn, the committee were not for a moment misled by the certificates of the builders, more especially where it was obvious from the most casual examination that the structure could not properly be erected for the sum of money to which the competition was limited. Finally the committee report that in reaching a decision they were in every instance governed by the advertised conditions of the competition and based their conclusions on the individual merits of the case.

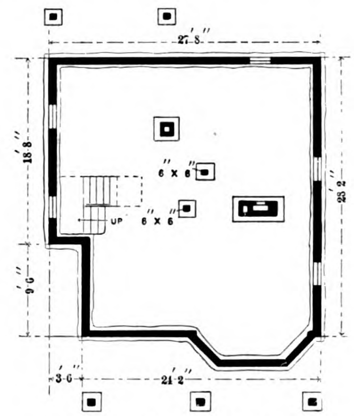
In the light of the above facts the committee award the first prize of $100 to the drawings bearing the *nom de plume* of "Walpole" and submitted by Charles E. Sargent of Ware, Mass., the second prize of $60 to the design marked "Novice Architect," submitted by Charles N. Christen of Decatur, Ind., and the third prize of $40 to the design entitled "Highland Cottage," submitted by Karl G. Johanson of 197 Middle street, New Bedford, Mass.

Specifications.

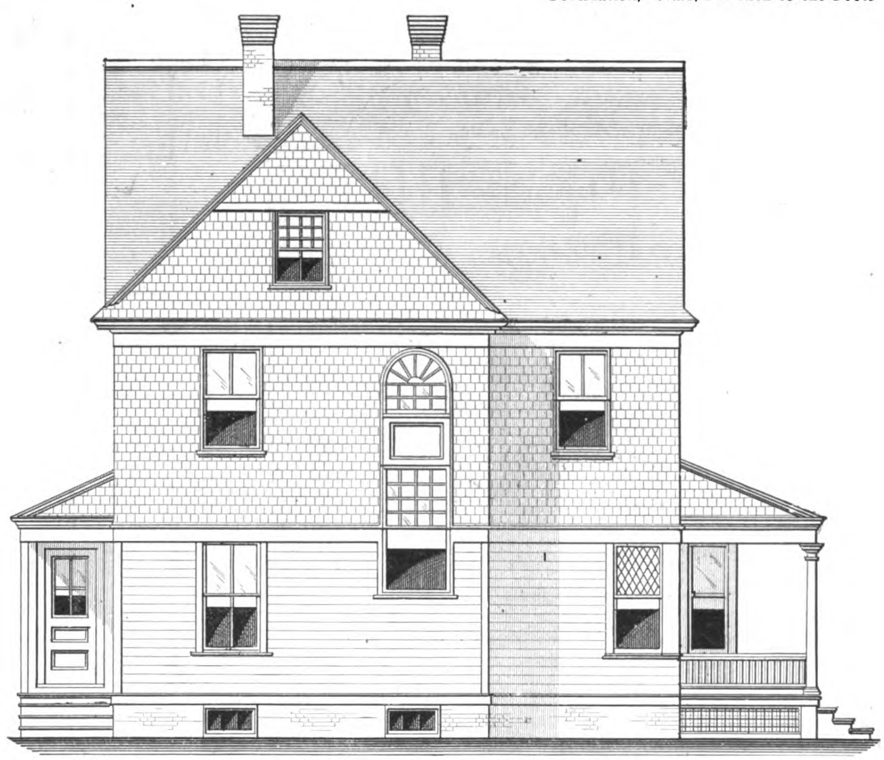
We have pleasure at this time in laying before our readers the design to which was awarded the first prize, in part cement mortar. Provide thimbles for all rooms adjoining flues, and ash door in cellar.

PLASTERING.

Lath with good spruce laths, and cover same with one



Foundation,—Scale, 1-16 Inch to the Foot.



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

Competition in $1500 Frame Houses.—First Prize Design.

and give in connection herewith the specifications for labor and material.

EXCAVATION.

Excavate under the entire main building as indicated by "Foundation plan," and use material to grade around building.

FOUNDATIONS.

To be built according to plan, of pasture stone, laid dry, well bonded together, and pointed on inside.

BRICK WORK.

The underpinning, chimneys and piers to be built of good merchantable brick laid in lime and sand mortar. Flues to have struck joints on inside. The fire place to be built of selected brick. The facing and hearth laid

coat of good sand, hair and lime mortar of proper proportions and well applied. Finish with a good skin coat. All plastering to run to floor. This applies to all walls and ceilings of two stories.

CARPENTER WORK.

The frame and studding to be of No. 2 spruce, sills 4 x 6, first and second floor joists 2 x 8, attic 2 x 6, rafters 2 x 6.

Put girders under partition in first story except when running same way as joist, then double the joists. All partitions to have caps, and all floors to be bridged. Provide all needed grounds and beads.

BOARDING.

The entire outside of building, including all roofs, to be covered with square edged hemlock boards, also same for under floors of first story, and all well nailed to bearings. Lay a spruce floor in attic.

UPPER FLOORS.

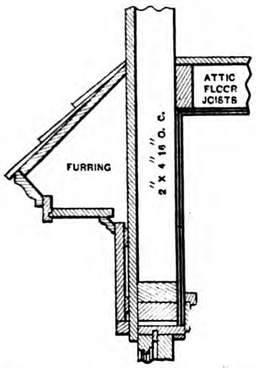
To be of good quality of spruce, well laid and nailed. This for first and second stories. No under floor in second story. Lay N. C. pine floor in kitchen.

OUTSIDE FINISH.

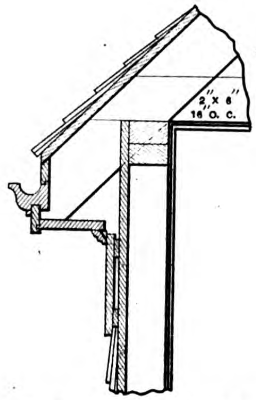
To be wrought according to details given from native pine, well seasoned, good quality. All moldings to be of stock pattern. Construct porches as shown.

WINDOW FRAMES.

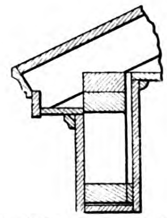
To be constructed of sizes shown in the usual manner, all stock pattern. Plank frames in cellar and box frames



Detail of Gable Cornice.—Scale, ¾ Inch to the Foot.



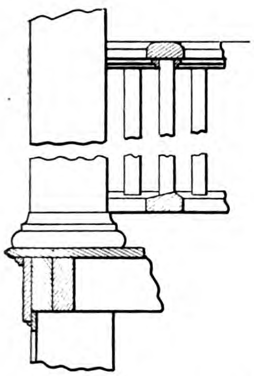
Main Cornice.—Scale, ¾ Inch to the Foot.



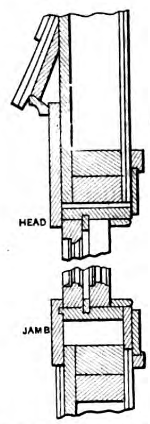
Porch Cornice.—Scale, ¾ Inch to the Foot.

Detail of Rake Molding.—Scale, 1½ Inches to the Foot.

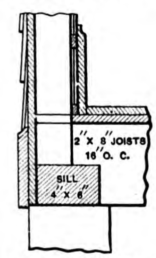
Partial Elevation of Gable Cornice.—Scale, ¾ Inch to the Foot.



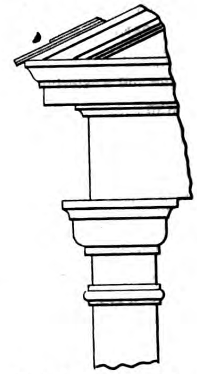
Detail of Porch Column and Balustrade.—Scale, ¾ Inch to the Foot.



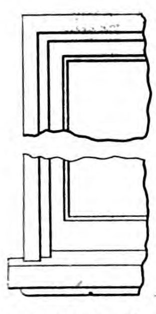
Details of Belt Course and First Story Windows.—Scale, 1 Inch to the Foot.



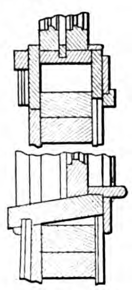
Detail of Water Table.—Scale, ¾ Inch to the Foot.



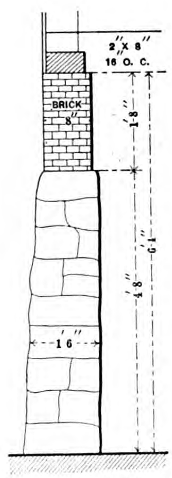
Partial Elevation of Porch Column and Cornice.—Scale, ¾ Inch to the Foot.



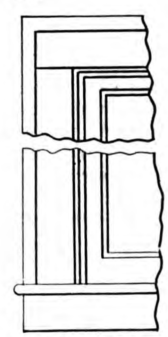
Partial Elevation of Outside Window Finish.—Scale, 1 Inch to the Foot.



Details of Second Story Windows.—Scale, 1 Inch to the Foot.



Section of Foundation Wall.—Scale, ⅜ Inch to the Foot.



Detail of Inside Door and Window Finish.—Scale, 1 Inch to the Foot.

Miscellaneous Constructive Details of First Prize Design in Competition in $1500 Frame Houses.

CLAPBOARDING.

Laid with good quality of spruce clapboards, laid 4 inches to weather.

SHINGLES.

To be of good quality of cedar, laid 5½ inches to weather on sides and 4½ inches on roof. Do all necessary flashing for roofs with tin.

in first and second stories. Sash 1½ inches, glazed with first quality single thick glass, except the large lights on the first story, which will be double thick.

INTERIOR FINISH.

To be made from good quality of N. C. pine and put on after plastering is done. The finish will be quite plain and moldings of stock patterns, or as shown by detail.

Doors $1\frac{1}{2}$ inches thick, of sizes and designs kept in stock. Cove base in first and second stories.

Fit up pantry and china closet with shelves as shown in usual manner. Fit up sink with drip board, &c. All closets to have cleats with hooks. Do all carpenter work required for plumbing. Front stairs to have posts, rail and balusters of neat pattern kept in stock. Attic will be a box flight and cellar to have spruce rail and posts. Provide and put on suitable hardware. Allow $8 for mantel.

PAINTING.

Paint outside woodwork (except shingles) two coats of lead and oil. The shingles on sides to have one coat of shingle stain. The interior to have two coats of varnish, or hard oil finish.

PLUMBING.

To consist of the following fixtures: One bathtub; one bowl; one W. C.; hot water boiler, and 20 x 30 sink, all to be "open." Plumbing properly ventilated and connected with sewer.

Hot and cold water supply to be brought to every fixture, and all lead joints wiped. All joints of iron pipes calked with lead and oakum.

It is understood that all the work is to be done to conform to town ordinance, and to be tested by the inspector.

Estimate.

The estimate of cost accompanying the design submitted by "Walpole" is as follows:

MASON WORK:		
Excavation	$25.00	
Foundation	84.00	
Brick work	70.40	
Lathing and plastering	116.00	
		$295.40
PLUMBING		160.00
CARPENTER WORK:		
Frame	$77.00	
Partitions	27.00	
Rough boarding	54.40	
Upper floors	27.90	
Outside finish	65 80	
Clapboards	15.00	
Shingles	48.00	
Windows and frames	84.00	
Outside doors	14.00	
First story finish	79.00	
Second story finish	58.00	
Stairs	45.00	
Conductors and flashing	12 50	
Hardware	35.00	
Nails	12.00	
Carpenters' labor	290.00	
		944.60
PAINTING		100.00
Total		$1,500.00

The builder's certificate is signed by A. W. Allen, 166 Devonshire street, Boston, Mass.

The Construction of Shop Floors.

Some very valuable suggestions relative to the construction of shop floors are to be found in a report recently made to the Association of Railway Superintendents of Bridges and Buildings, as may be noted from the extracts which we present herewith.

The following method of laying brick floors conforms to the generally accepted practice:

Assuming the soil to be firm and well drained, excavate the ground to an even surface 8 inches below grade of desired floor. Tamp well with heavy rammers to secure a firm foundation, then fill in with good clean sand or gravel to within $3\frac{1}{2}$ inches of grade, making a crown of about 2 inches between pits for drainage; wet this down well, tamp with rammers, and trim off with straight edge, taking care to get good even surface brick on edge, close to each other and breaking joints so the tops come one-half above grade. After laying, roll bricks with 2000 or 3000 pound roller, cover the surface with 1 inch fine sand and broom it well into cracks, or fill cracks with cement grout. A concrete foundation is recommended by some, but except in cases where the natural ground is not firm, or where the floor is to be subject to extremely heavy loads, it is not considered necessary.

For blacksmith shops or foundries the natural earth frequently forms a very suitable as well as substantial floor. In localities where the soil is too soft in its natural state, the addition of cinders or clay will solve the problem cheaply and satisfactorily.

In machine shops the conditions are different, and here we find the recommendations almost as varied as are those for round house floors. A brick floor in a machine shop answers many of the requirements, but there is good evidence in support of the objection that men cannot stand all day on such a floor or upon a surface of concrete or asphalt without feeling the bad effects of cold upon the feet. This difficulty is overcome to a large extent by the use of slatted floor racks or platforms at the machines where operatives stand. When machines are set upon a brick floor there should be special provisions made for foundation. But this can hardly be urged as an objection, as it is necessarily the case with heavy machines under almost any circumstances.

A bedded plank floor has recently been laid in an extensive shop plant of the Boston & Maine road. The earth is well compacted and brought to the proper surface and a bed of coal tar concrete put down in three courses. This bed is 4 inches thick when finished. The specifications are that the stones of the lower course shall be not less than 1 inch in diameter, and those of the second course not more than 1 inch in diameter. Stones of each course to be well covered with tar before laying and thoroughly rolled afterward. The finishing course to be composed of good clean sharp sand, well dried, then heated hot and mixed with pitch and tar and brought to a true level to fit a straight edge. Roller to weigh not less than 700 pounds on a length not exceeding 22 inches. On this finished surface of the foundation there is spread a coating $\frac{1}{4}$ inch thick of the best roofing pitch, put on hot, into which the lower course of plank is laid before it cools. Care must be taken to have the plank thoroughly bedded in the pitch, and, after laying, the joints must be filled with pitch. If vacant places occur under plank they should be bored and filled. The finishing flooring is laid across the lower and thoroughly nailed.

For the lower course $2\frac{1}{2}$-inch spruce plank s. l. s. is used, and for the upper $1\frac{1}{2}$-inch s. l. s. spruce plank. It is also noted that the lumber for lower course should be fairly seasoned, and that of the upper course well seasoned before using. The cost of such a floor is given at 18 cents per square foot, using spruce lumber.

For paint shops and car shops a brick floor has been found very satisfactory. The committee believes that a brick floor, generally speaking, is the most economical, durable and satisfactory floor for shops as well as for round houses.

A Substitute for Plaster.

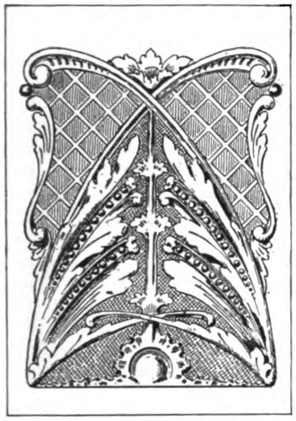
The latest thing in the way of fire proof building material is said to come from Holland, and is in the nature of a substitute for plaster. One of the London papers referring to the matter says: "It is in the form of plates and may be fixed on to the walls in place of plaster. A practical test of its qualities was made at Wormwood Scrubbs a few days ago. For the purposes of the test a small wooden building had been erected containing three rooms, one of which was lined inside with the fire plates. Then a pile of tarred wood was set on fire in the protected room, filling it with fierce flames. Meanwhile a number of experts, including representatives of the Admiralty and War Department, entered the two other rooms. To all appearances the test was perfectly successful. Not only did the plates resist the flames, but they also confined the heat of the fire within the room. Thermometers applied to the other sides of the partition walls indicated practically no increase in temperature after the fire was started. We find no hint as to the nature of the substance of which the plates are composed, although one newspaper goes so far as to describe it as 'very much resembling frozen nougat.'"

EMBOSSING ON WOOD.

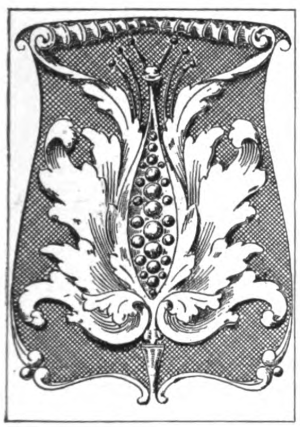
By Paul D. Otter.

EMBOSSING on wood has proven of such great value to the furniture manufacturer that it is very largely taking the place of other means of ornamentation on medium grade goods, and, indeed, the perfection developed in imitating higher grade relief ornament permits the manufacturer to offer greater value for a low price than ever before.

The use of the embossing die by the millman and the interior finisher has not been appreciated or made use of as much as it might. While it is true embossed molding and small trimmings have been used somewhat extensively in car work and on mantels, yet there has been little done on larger surfaces, and certainly the initial cost to the millman should not be as great as to the furniture manufacturer, for it is he who has to be in line with at least two seasons' changes annually in his styles, and "style" is somewhat fickle and arbitrary, compelling him to prepare new designs before the last are well on the market. Not so with the interior finisher, who, with a small, well selected stock of patterns, could run them to good effect for a long time on surfaces that have long since been found to be correct and not to be distorted by mere caprice.



Design for Base Block.

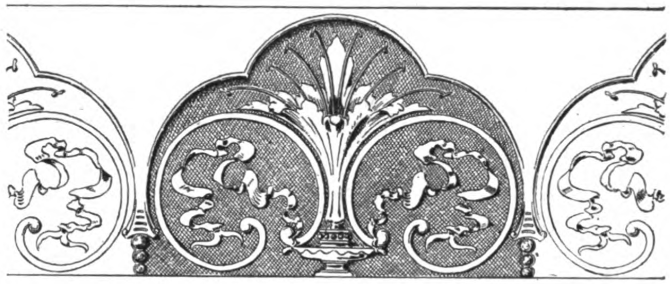


Suggestion for Corner Block for Door Trim.

The modern dwelling finished in natural wood within creates an especially good field for very low cost relief work, or depressed ornament by means of embossing. The surfaces treated should, of course, be considered with care and the designs used be somewhat in spirit with our prescribed style of architectural treatment. The upright and horizontal panels to doors offer ground for beautiful ornamentation, door and base blocks would give forth marked character to an entrance, while base boards could be rolled through the machine and beautified indefinitely, and yet when in place, capped by a good molding, not present the effect of "struck off by the yard."

The skill shown by the die sinkers of late has been marked and progressive, so that the designer is not compelled to follow so literally a stereotyped figure of ornament and to consider as most particular the direction which main members of his ornament would occupy as related to the grain of the wood. While this last is no doubt an important point to keep in mind, the experience of the die cutter has taught him clever treatment of the metal to produce a clear imprint and offset the possibility of starting a split in the wood when the hot die rolls over it. Certain set ways of producing clear cut lines or sprightly effect must be adhered to. The outlining of the figure should be quick, knife-like incisions; the use of small balls or pellets, interlacing strap work, with shading, imitated by a series of raised hair-like lines—these all throw out life and character when otherwise it would look really "ironed out." Basket work or cross hatched lines are very effective for the background, but however much used on such work, stippling will always be found to be most satisfactory in placing the main figure in strong relief.

The embossed "drop out" fret is largely supplanting the sawed out, machine or hand carved ornament in furniture work. This style introduced in interior work would greatly enhance the general trim on work requiring close estimating, as it so creditably replaces the more expensive hand carving. "Drop out" frets are ornaments embossed from a die cut with greater depth and sharpness as to outer edge, so that when selected stock, not thoroughly seasoned, is passed under the heated roll an acute deep imprint is made that will permit of the ornaments dropping out as the stock is run past a gauge set about 1/8 or 1-16 inch from the band saw. It will be seen that heavy stock dressed and embossed on both sides and slit by the band saw produces ornaments, each perfect and alike, at a rapid rate and a low cost. An advantage to the manufacturer is that the drop out fret is very tough and pliable compared to jig sawed frets, allowing considerable bending and twisting in their application to varying surfaces. This class of relief ornament is coming largely into use on case work, refrigerators and pianos. With a well selected combination of corner pieces and running ornaments a great variety of treatment may be given to panels and other flat surfaces. Where softer woods are being used extensively, such as white and yellow pine, birch, cherry and gum, and particularly the last named wood, which is admirably adapted for embossing, as the smallest bit of detail is most accurately impressed on the close grain—these named varieties will take the embossing satisfactorily from the deepest dies with a keen detail. In using oak, ash and other wood of a coarse grain preference should be given to the brash, close quartered grain variety, as bastard cut generally has too much of the hard, bony character to emboss well.



Design for Base Board—Repeat Pattern.

Embossing on Wood

By the recent introduction of the hydraulic vertical embossing machine the work is turned out 75 per cent. quicker than from the horizontal rolling machine in common use. This is a great item where set figures, flat, curved and irregular surfaces are to be treated, but when borders and indefinite lengths or repeat patterns are wanted the roll machine must be used, and for general purposes this form will be found more adapted to the needs of a small factory.

DESIGN FOR A GRAIN ELEVATOR.

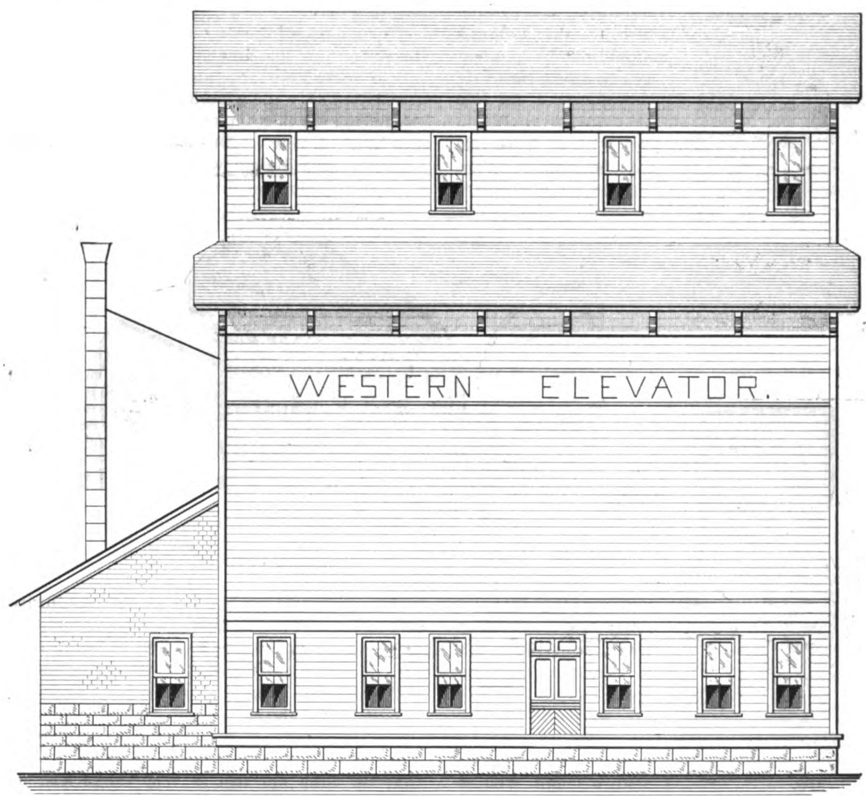
IN one of the early issues for the present year a correspondent presented an inquiry for plans of a grain elevator having a capacity of about 30,000 bushels and the design to be of such a character as to render it suitable for execution in a country town. In reply to this request we have received from W. G. Mumma, Warrensburg, Mo., the drawings of a grain elevator of first-class construction and calculated to meet the requirements in the case. The drawings are reproduced herewith, and in connection with them we give the outline specifications as furnished by the architect.

The walls of the foundations are to be started on a solid rock or hard clay bed free from all moisture. The first story is to be 13 feet 6 inches in hight, the bins 26 feet in hight and the cupola above the bins 24 feet 6 inches. The walls of the first story are to be built of 2 x 8 inch and the walls of the bins 2 x 6 inch plank, laid sidewise and well spiked. Each bin is to be 5 feet square and 26 feet deep, with a capacity of about 500 bushels of grain. The walls of the cupola are to be built with 2 x 6 studding placed 16 inches to centers.

The walls of the first story are to be started on a solid stone wall 18 inches thick at the top and the outside walls of the bins are to be started on the walls of the first story, while the other walls of the bins are to be started on bearers 8 x 12 inches, the bearers to be supported by girders 12 x 14 inches. The girders are to be supported by posts 12 x 14 inches placed on rock bearers built in the cross walls. The girders are to be in one solid length the full width of the building if practicable; if not they are to be "built up" and well bolted.

The floor of the first story is to be laid double with rough boards 1½ inches thick, on which are to be placed hard pine boards 1 inch thick and 3 inches wide. The floors are to be laid on joist 3 x 12 inches placed 16 inches on centers. All the other floors are to be of the same kind.

All of the outside walls are to be covered with coved siding 9 inches wide. All windows are to have four lights each 15 x 42 inches, double strength, sash 1¾ inches thick and hung with weights and cords. All doors, of such size and pattern as may be desired, are to be 2 inches thick and provided with transom. All roofs are to be covered with best quality of cedar or pine shingles laid 5 inches to the weather. The sheathing is to be 1 x 6 inch fencing well laid on 2 x 6 inch rafters placed 2 feet on centers. The cupola is partly floored to accommodate the placing of machinery as may be required. The engine and boiler room is to be built of brick and stone as indicated on the drawings. The kind of machinery and the placing thereof will be in accordance with the requirements of the case, so that no description will be attempted. The walls, roofs, &c., are to be treated with a good quality of mineral paint, three coats, of such color as may be desired.



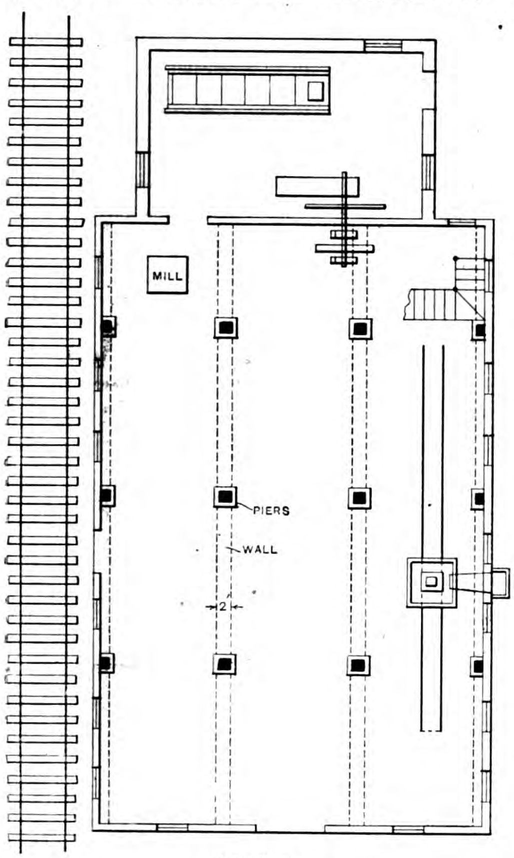
Side Elevation.—Scale, 1-16 Inch to the Foot.

Design for a Grain Elevator.—W. G. Mumma, Architect, Warrensburg, Mo.

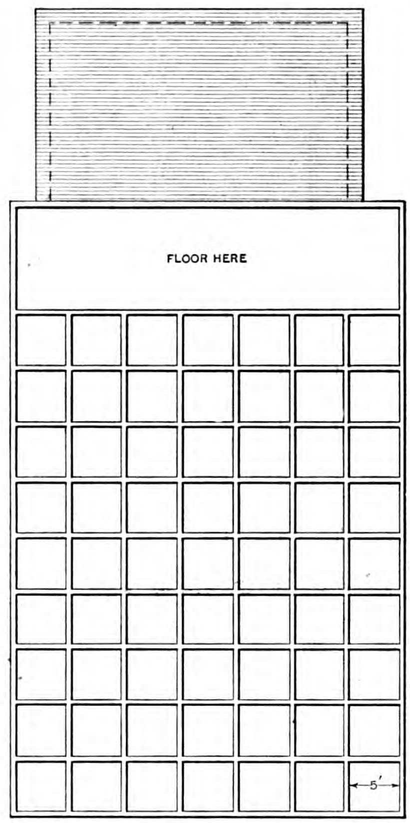
Retaining Walls.

At a recent meeting of the Civil and Mechanical Engineers' Society of Great Britain a paper bearing the above title was read by A. T. Walmisley, which touches upon matters of interest to architects and builders, and we therefore present the following extracts: The center of pressure should in the case of all banks and retaining walls not be nearer the outside edge than one-third the width of the foundation, or, in other words, should fall within the middle third of the base. The mean thickness of brick, masonry or concrete retaining walls in ground of an average character should be equal to one-third of the hight from the top of the footings, and as experience shows that under no ordinary conditions of surcharge or heavy backing it is necessary to make such a retaining wall on a solid foundation more than half the hight of the wall in thickness, we have a mean thickness of five-twelfths—*i. e.*, the mean between one-half and one-third—to provide. A margin of one-twelfth usually is assigned to a batter of 1 inch to the foot. Too great a batter is not desirable, as the wet gets into the joints and tends to weaken them. Earth pressure is different for every kind of soil, and is also greatly influenced by the dry, wet, compressed or loose condition in which the soil is found, absorption of water tending to increase such pressure, but it is found by experience that the average actual lateral thrust of good filling may be approximately

As a rule, the earth backing should not be tipped in. If the backing be of clay, great care must be taken that it is not too dry, or it will swell on becoming moist, and produce pressure on the wall that may not have been foreseen. For this reason mixtures of sand and clay are bad, the sand admitting water and the clay retaining it. That the generally accepted natural slopes of material are more or less empirical is evident from an inspection of certain large clay pits, where the clay is seen to stand more vertically than is usually estimated in the calculation of earth work pressures. Weep holes for drainage should be provided in a retaining wall, and the weep holes should not be under 7 square inches in section, or they will soon choke and become ineffective until cleared. They may be inserted at different levels, and in order to convey the surface water, which necessarily



Main Floor.



Plan of Bins.

Design for a Grain Elevator.—Plans.—Scale, 1 16 Inch to the Foot.

taken as equivalent to a fluid weighing 10 pounds per cubic foot, and if, as a factor of safety, we double this unit pressure so as to allow for contingency of vibration and variation of soil, it follows that a wall should be able to resist about 20 pounds fluid pressure, for which it needs to have only a theoretical thickness of one-quarter of the hight.

Line of Fracture.

There is, however, a line of fracture, along which the earth that is retained by a wall surcharged with earth has a tendency to slide, and this line has been found by numerous trials to practically bisect the angle formed by the natural slope of the material of which the soil is composed, and the line of the back of the wall. This element forms an important consideration in the calculation of retaining walls, as it enables us to arrive at the weight of a mass acting vertically, which is prevented from sliding on this line of rupture by the wall. Though this gives the back pressure to be dealt with, accidents may occur from the want of due care in the back filling.

drains into the earth work, to these points of escape, it is advisable to back up the wall with dry stone or rough angular material.

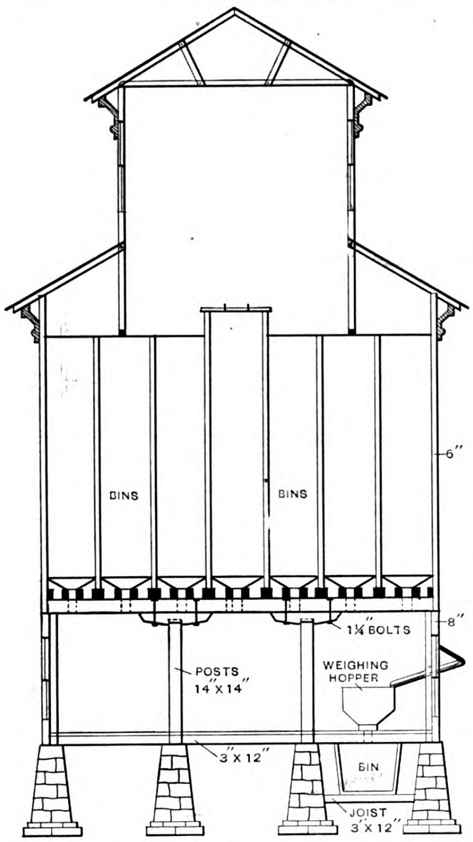
Great care is needed in joining concrete to concrete. The surface needs to be well washed, scraped with a wire brush, and dusted with neat cement before another is built over it. It is not always by overturning that walls may fail. They may give way from bad workmanship, or they may slide bodily forward on their base, or their foundation may subside. It is a common rule to allow from 1 to 1½ tons per square foot on a foundation of ordinary firm earth. Slipping may be obviated by benching out, so as to provide a base at right angles to the direction of the line upon which there is a tendency to slip. In this way dwarf walls have been built with inclined tops and bases at the toe of the slope to a railway embankment. Such retaining walls, though only about 3 or 4 feet in hight, hold up the slope, and may be arranged so as to provide sufficient clearance for an additional line of rails to be laid.

Curved Batter.

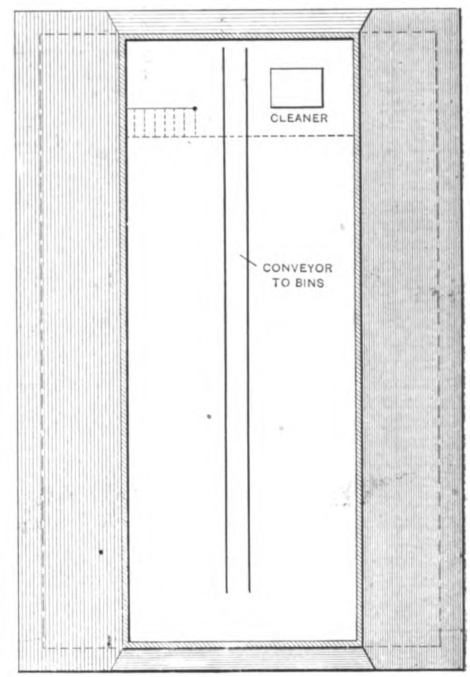
A form of retaining wall frequently met with in practice, especially in brick structures, is that with a curved batter stepped in offsets at the back. The curve usually adopted is the arc of a circle, the radius of which is from two and a half to three times the wall's hight, and the center of the curve is, as a rule, in the same horizontal plane as the top of the wall. In such structures the courses are built to radiate from the center, and the result is that the joints of the brick work at the back are thicker than is expedient. When the radius of curvature is large the increase of thickness may be inconsiderable; but it becomes large when the radius of the curve is a short one, since the thickness of the wall cannot be reduced in the same ratio as the hight or as the radius. Retaining walls are frequently employed upon railways in which buttresses connected by horizontal arches are introduced. The chief advantage of a curved form of construction is that the curvature brings the center of gravity further in toward the bank, and, although it conveys the idea of greater strength than a straight batter, it is more expensive, and care must be taken that in the end bay the horizontal arch is not left with a single abutment. Curved batters cannot be universally recommended. Even when curved vertically, as in a sea wall, the foundation is more difficult to get in, and the bed joints have usually to be set out at right angles to the face of the wall. Counterforts constructed at the back of a retaining wall are usually preferred to buttresses, on account of the encroachment made by buttresses upon the roadway, whereas counterforts help to oppose more friction to the earth at the back of a wall. There are two main points of importance relative to counterforts always to be remembered. They should not only be built simultaneously with the wall, but the wall should be well bonded with each counterfort, otherwise they tend to detract from the wall's strength, and the material employed in their construction might be more profitably added as a uniform increase of thickness in the wall. When the surface supported is level with the top of the wall the thickness at the top may be one-tenth of the hight, up to 30 feet, the minimum thickness being 18 inches, and the maximum 3 feet.

The back of a retaining wall should be rough, in order to resist any tendency of the earth to slide upon it. This object is promoted by building the back in steps. A catch water drain behind a retaining wall is frequently expedient. It may either discharge its waters through pipes into an outside drain in front of the base of the wall, or it can be provided with an independent outlet.

The coping of a retaining wall should consist of large flat stones, preferably laid as headers. In cases where it is necessary to anchor the face of a wall by introducing tie rods, the level of tie rods depends upon their object. If the retaining wall is to depend mainly upon the tie rods for its security against sliding forward, the tie rods should be fastened to plates upon the face of the wall in the line of the resultant pressure of the earth behind the wall—that is, at one-third of the hight of the wall above its base; but if the resistance to sliding forward is to be distributed between the foundation and the tie rods, they are to be placed at a higher level. Thus, supposing the tie rods to be fixed to the face of a wall at two-thirds of its hight above the footings, the horizontal thrust will become equally divided between the tie rods and the foundation. In the case of a continuous concrete wall with an exposed face, it is well to assume that cracks will appear, and to form a straight joint, say, every 30 feet, whereby the tendency to crack is obviated, and there is no defacement. In the case of a concrete wall against which there is a shifting foreshore, it is well to face the concrete with masonry. Precaution should also be observed to extend the concrete base of the wall both forward and backward so as to cause the line of resultant pressure to be central over the space of ground upon which the footing is laid, and the concrete toe must be made sufficiently thick to obviate risk of breaking across.



Vertical Cross Section.



Plan of Cupola.

Design for a Grain Elevator.—Scale, 1-16 Inch to the Foot

CORRESPONDENCE.

Roof Truss for an Armory.

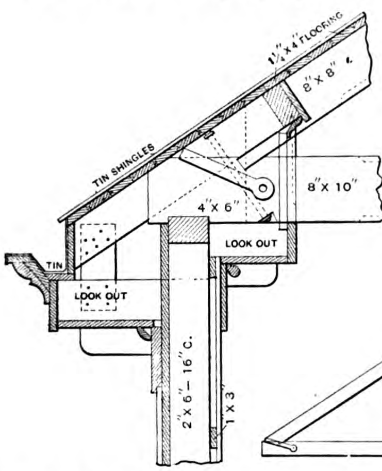
From G. H., *Teller Institute, Grand Junction, Col.*—Replying to the inquiry of "A Man from Northern Ohio" for a design of a roof truss suitable for a building 44 x 100 feet, I inclose a drawing of a truss roof we erected here during the past summer. The roof timbers are of Washington fir, dressed, with chamfered corners. The roof is covered with 1¼-inch fir flooring laid diagonally. All exterior is finished with hard pine, siding of fir and interior of yellow pine. Most of the work was done by full blooded Indian pupils, the drawing in question being prepared by a Yuma boy.

Finding the Specific Gravity of Bricks.

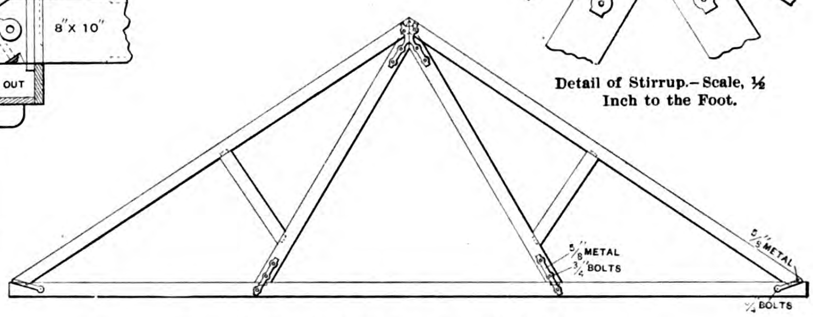
From E. L. H., *Rahway, N. J.*—In the article "Finding the Specific Gravity of Bricks," on page 54 of the March issue of the paper, there is an error in the description of the process. The weight of water absorbed by the brick instead of being added to its weight in air, as stated, should be subtracted from the same. Perhaps the following explanation of the method of finding the specific gravity of a brick will be helpful to some of the readers. Let us take a brick weighing 5 pounds in air. We will first assume it glazed so that it will not absorb any water. Now suppose, if possible, a brick of the same size composed of water. This weighs in air say 2 pounds. According to definition, the specific gravity of a body is the ratio of its weight to the weight of the same bulk of water, consequently the specific gravity of the brick we have taken will be the quotient of 5 divided by 2—that is, 2½. Lower the imaginary water brick into a vessel of water at the same temperature. Plainly it will not weigh anything, being just supported by the water about it.

If we take a real brick and substitute it for the water brick, the surrounding water will continue to press on it with the same force that it did on the water brick. That is, since it just supported the brick of water weighing 2 pounds it will exert a force upward of 2 pounds on the real brick. The side pressures balance themselves, and as the water will support 2 pounds of the weight of the brick the scales must show only the remainder of the weight, or 3 pounds.

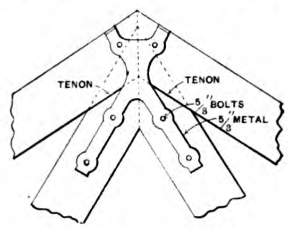
We see by this that a body immersed in water always loses from its weight in air an amount equal to the weight of the same bulk of water. So to find the weight of water of the same bulk as any body, we have only to weigh the body in air and then in water, noting the difference or loss, this being the weight required. Now assume the same brick to be porous. Suppose it absorbs ½ pound of water, making its weight, saturated, 5½ pounds. Weigh it thus saturated in water and clearly it will there weigh 5½ pounds less 2 pounds, or 3½ pounds. The ½ pound of its weight in water when glazed is due to the absorbed water that occupies space which in the glazed brick was filled with air, a substance not affecting the weight in the present problem. Following the rule given in the March issue of *Carpentry and Building*, with the exception noted at the beginning of this letter, the specific gravity of the brick would equal 5 pounds, its weight in air, dry, divided by the remainder of 5 pounds minus the quantity (3½ pounds less ½ pound), or 2½ as before, when the brick was assumed to be glazed for the purpose of simplifying the problem.



Detail of Main Cornice and Heel of Truss—Scale, ½ Inch to the Foot.



Elevation of Truss.—Scale, ⅛ Inch to the Foot.



Detail of Stirrup.—Scale, ½ Inch to the Foot.

Roof Truss for an Armory.

Paint for Zinc.

From W. F. COZZENS, *St. Louis, Mo.*—In the issue of the paper for May "J. A. N.," New Hampshire, makes inquiry with regard to the most suitable paint for zinc or galvanized iron. This has been a study with me for the past 20 years. In adapting paint to its most profitable use we should first consider the affinity of the two materials. I find it very difficult to impress the painters with my idea, which is to first see that the surface of the zinc or galvanized iron is cleaned of all scale arising from the decomposition of the paint which has been used heretofore. Should it be a new job first clean off all acid, then give it two coats of zinc white. Here comes the universal cry from the skilled painters, that zinc white is only used for inside finish. What need we care what it has been used for by the painting fraternity if it is what we want? What has practice to do in the case? I have for the past 30 years done most of the galvanized iron work for a large concern, and I at last prevailed on them to try the zinc as a foundation coat with the most satisfactory results. Let "J. A. N." try it according to the above suggestion, and I shall not fear the outcome, the painters to the contrary notwithstanding.

Plan Wanted for a Church.

From C. K. S., *Wayland, Iowa.*—I would be very much pleased if some of the readers of *Carpentry and Building* would furnish for publication a plan for a church with steeple and having a capacity of from 400 to 500 people. I want the design rather plain, as regards its style of architecture, and the cost to range somewhere from $1500 to $1800.

Design for an Octagon Barn.

From J. M. W., *Alderly, Wis.*—Will some of the readers of *Carpentry and Building* give plans for an eight cornered barn 60 feet in diameter with 20-foot posts outside ? How would they frame such a barn as this ?

Use of Red Cedar Shingles.

From C. K. S., *Wayland, Iowa.*—Can any one tell me how long the Washington red cedar shingle has been used in the Middle and Eastern States ? Are these shingles any more durable than pine, and if so, in what way ? What causes the nails to rust so much quicker in them than when used in connection with other kinds of shingles ?

Circular Headed Window in a Round Tower.

From H. F. T., *Ontario.*—This problem, like obtaining the wreath for a hand rail for a circular stairway, has always been a lion in the path of young workmen, and, it must be confessed, it is a difficult problem to solve. Some of the readers have recently inquired about the subject, and I offer herewith a solution which I know to

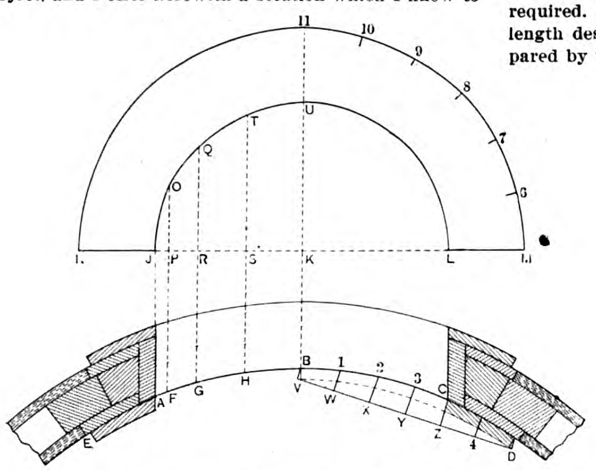


Fig. 1.—Elevation and Plan of Opening, Frame and Casings.

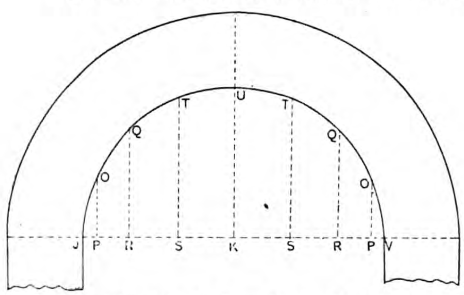


Fig. 2.—Elevation of Frame Head with Casing.

be simple and as reliable as any in vogue. It was published about 30 years ago by the veteran James Monckton, and it ought to be more familiar among workmen than it is. Referring to the sketches, Fig. 1 represents the elevation and plan of an opening, with frame and casings on which the stuff is to be bent for making the same. Let E B C represent the line of wall and E A and C D the casings. Let L U J be the concave edge of the casing and J N its width, as at E A. Divide U J into any number of equal parts, and through each of the divisions, as T Q O, draw lines parallel to U B, as T H, Q G and O F. Take the divisions B, H, G, F and A and set them in Fig. 2, as shown from K to V and from K to J. Erect perpendiculars, as shown by K U, S T, R Q and P O of Fig 2, these being made equal to the corresponding lines of Fig. 1. Through the points thus found trace the concave edge of the veneer and from this gauge the width. If the casings are to be formed of veneers that are thin they had better be bent over a form made for the purpose and corresponding with the convex or concave surface of the wall. The same holds true of the head of the frame itself.

In order to get the casings out solid proceed as follows: Referring to Fig. 1, draw V D, as shown, and divide it into any number of equal parts. Through the points of division and at right angles to V D draw the lines W 1, X 2, Y 3, &c. Now divide M 11 of the elevation into the same number of parts as in the case of V D. Transfer these divisions to Fig. 3, as shown by M 11, making 11 A, 10 B, 9 C, 8 D, &c., of this figure equal to V B, W 1, X 2, &c., of Fig. 1. Through the points thus determined trace the curve, as shown from W S in Fig. 4. Saw out the quarter as represented by L U 11 M of the elevation, Fig. 1, using stuff as thick as indicated at Y 3, and on the convex edge M 11 apply Fig. 3, marking the curve G D A. On the concave edge L U apply Fig. 4, marking the curve W Y S. By this means the curvature of the convex side of the casing is found, from which it may be gauged to the thickness required. Straight wood may be added to L M of any length desired. Moldings may be worked on stuff prepared by this method.

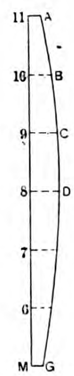


Fig. 3.—Vertical Curvature.

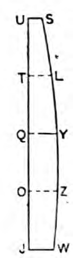


Fig. 4.—Horizontal Curvature.

Circular Headed Window in Round Tower

A thorough comprehension of the foregoing will enable "J. W. C." to lay out his frames, also his sash, if there are no radial bars in the sash. If there are radial bars in the head of the sash it will require a series of lines especially adapted to properly lay out and describe the bars, and if he has to meet this difficulty and makes known his wants in the columns of the paper I will be pleased to help him to the best of my ability.

Requisites of an Oil Stone.

From M. K., *Mena, Ark.*—An answer to "Oil Stone," whose inquiry appeared in the March number, would be quite extensive if carried out to completion. I had occasion to look up the matter about a year ago, owing to a discussion which arose among some carpenters with whom I was working. I soon discovered how little they knew about one of the indispensable articles of which their kit consists, and which they seemed incapable of selecting in a store. It was more of an accident than anything else, as to whether they got a good or a poor one. In the past 20 years or more I have used many oil stones from as many parts of the world found in the chests of carpenters from other countries, and I have noted the various qualifications of the different kinds. Upon questioning the owners I found they knew as little as myself about where they were found or made, and by what name they were known. My inquiries were all in vain until I finally wrote to the Pike Mfg. Company of Pike Station, N. H., where I found my first reliable information. I then consulted encyclopedias for more information, the result of which was I learned that the best oil stones were found within a few miles of the place where I now write, and from which I can see the hills and valleys where rise the head waters of the river from which the oil stone for carpenters' use takes its name—that is, the Washita. It is on the banks of this river that the stone is found.

I was not living in Arkansas at the time I became interested in this subject, but, having used one oil stone for 19 years, and having lost it, I was looking for another—the best the market could afford—and found it in one of the Lily White Washita, soft, medium coarse, free cutting grit. This is the fastest cutting stone with which I have ever met, and, while it does not put on as fine an edge as some stones, it answers very well for carpenters' tools, and saves time and labor. Finer grades of the same name can be had if wanted. The grade known as Arkansas is too hard, too fine and too slow for carpenters, and is used only by engravers, whose tools are small and tempered for cutting metal. Other oil stones are found and made in New Hampshire, Indiana and Ohio, but are inferior to those found in the neighborhood of Hot Springs in Arkansas. There is a stone in Asia Minor called Turkey Red; Water of Ayr —a Scotch stone—in Scotland, and the Welsh stone in Wales. The cutting qualities are due to the quartz or silica, of which about 90 per cent. is found in the Washita and Arkansas, while in the Turkey stone is to be found from 70 to 75 per cent.

Now I want to say something as to the kind of oil used on oil stones, and am liable to find a great many who will disagree with me. When I commenced working at the trade in the seventies I was informed by old carpenters that kerosene spoiled oil stones, by making them hard. I believed this until forced by circumstances to disbelieve it. Having for months at a time to use kerosene, when other oil could not be had, I found my oil stone cut faster, put on a keener edge, was always clean and never gummed, as with other oils, and after 19 years the stone was as good as new, if not better. Occasionally, I had to reface the stone with sand and water on a piece of board, or with sand paper or emery cloth, laid on a board, to give it a true surface. This is something too many carpenters neglect, and it results in a very poor and uneven cutting edge in their plane bits, especially for joiner work. I have often seen carpenters with oil stones scarcely fit to sharpen a shovel or grub hoe.

In regard to oil stones becoming hard, I only want to refer to the common grindstone, which every intelligent farmer or mechanic knows will become as hard as a field stone if left exposed to the sun, year in and year out. So it is with oil stones which are baked for years on the work bench.

If "Oil Stone" will write to the Pike Mfg. Company, stating the kinds of tools he has to sharpen and the nature of his work, allowing them to select the stone, he will not regret it, as they have a thousand to choose from, where a storekeeper has a dozen or less, and a carpenter must take such as he can get. Even then he cannot tell, without trial, one grade from another when he sees them, for lack of experience and comparison. He can get them by mail from the company named, and the cost will range according to size and weight. I have seen razor hones and oil stones on the market with Japanese, Chinese and Hindoo hieroglyphics, and names to lead people to suppose they were imported. These stones, weighing 2 or 3 pounds, sell, sometimes, as low as 10 cents—a price which would not pay to handle them, even if brought to this country as ballast. They are worthless.

I have been a reader of *Carpentry and Building* since 1881, and do not remember of this subject being brought up before. I hope it will interest others enough to warrant them in expressing an opinion and giving their experience with the different kinds of oil they have used. I have always used that known as the Signal oil, when I could get it: otherwise, kerosene.

Finding the Lengths and Bevels of Rafters with the Steel Square.

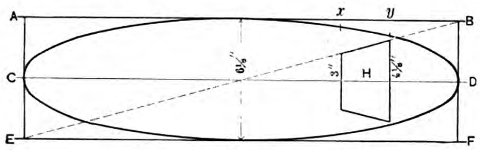
From J. B. W., *Shelton, Wash.*—I would like to ask through the columns of the paper how to find with the steel square the top and down bevels, also the lengths, of valley and jack rafters where two roofs of different pitch intersect. It is easy enough to find the lengths and bevels by making a draft, but life is too short for that, if there is an easier and quicker way of doing the work. Where the roofs are of the same pitch I can frame a roof while a man is making his draft, by simply using the base, rise and the hypotenuse. It seems to me that the same rule could be changed a little and obtain the same results where the roofs are of different pitches. If some of the good readers can give a few pointers on this score I am quite sure they would be of interest to many, and would be highly appreciated by myself.

Test and Strength of Cement.

From GEORGE W. B., *Long Island City, N. Y.*—In answer to the inquiry of "W. W. S.," Brockton, Mass., in the April number, I would say that there are various methods of testing the strength of cement—in fact, quite a book could be written upon them. I will, however, give a few rules which have been followed in connection with works upon which I have been employed. The strength of cement can be very closely told by its color or weight. Any cement of a light color and not closely ground should not be used on work of great importance. Cement should be ground fine so that at least 80 per cent. will pass through a sieve of about 3000 meshes to the square inch. It should with safety stand from 40 to 70 pounds tensile strength after one week in water. This is for hydraulic Rosendale cement. Portland will sustain more and has on works upon which I have been engaged sustained as high as 250 pounds. Cement should be a few weeks old before using, as freshly burned cement is not as strong. A slow setting cement should always be used where possible, as it has more strength, but, unfortunately, cannot always be used, as, for example, under water. Cement when once set should not be tempered up again for use. "By good authority" cement when once wet and tempered up can again be reburned and its strength restored. The strength of cement is also much affected by the air and water. On this account cement in barrels should be stored in a dry place and sufficiently raised above the ground.

Comments on Prize Designs.

From E. G. W., *Mitchellville, Iowa.*—I see in the April number of your valuable paper that the first prize design in the competition for $1000 houses has been awarded to an architect, E. R. Rice of Denver, Col. I desire to say a few words in regard to the labor in connection with some portions of the carpenter's work, as itemized in his estimate. It may be I take a wrong view of the estimate, but if Mr. Rice had put his material in one place and labor in another, a casual observer might have overlooked it, but it is very hard to decide in what place to apply the word labor, and also what it is intended to include. For instance, he does not state under the heads of "Kitchen Wainscot" and "Kitchen Cupboard" whether it is labor or material, but I suppose he includes both in the amount. I am not conversant with the current prices of material or labor at Denver, but always supposed that the labor of skilled mechanics was in demand at 25 to 30 cents per hour, which, if so, would keep the best of men just hustling to furnish material and build a kitchen closet for $6, especially of the kind and dimensions given. Further, he gives 1600 feet Texas Star flooring, ⅞ x 4 inches, laid throughout the house, except the porch, which is ⅞ x 3 inches, laid in oil, all of which, according to the estimate, is to be done for $6. Now, 1600 feet less one-fourth would be 1200 feet, or 12 squares, which, at 50 cents per square, would give his figure, $6. I infer from the details that he intended the floor bridging to be included in the $6 for labor. Now, for the life of me, I do not know how it could be possible for him to get flooring ⅞ x 4 inches laid, and put in a row of floor bridging in every room, for 50 cents per square. At that rate one man would have to lay five squares per day in order to make anything like wages—an amount of work which I never saw done, and in a workmanlike manner, as called for in this case. Here in Iowa the prices range from 70 cents to $1 per square for flooring 1 x 4 inches, depending on the shape of the room and the finish of the floor. I do not want to be taken as finding fault, but simply as asking for more light on the subject. I have failed to see any



Grinding Machine Cutters.

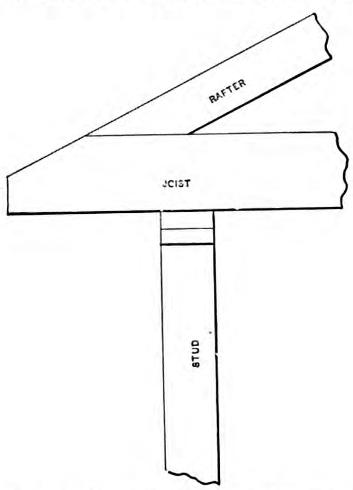
one estimate on labor as low as that and come out with even wages, nor do I believe that the labor on that house can be done for the amount at which it is estimated.

Grinding Machine Cutters.

From O. L. W., *Dallas, Texas.*—The diagram which I inclose will, I think, enable "J. M. S." of Madera, Cal., to draw the correct curve for his cutter. It is an arc of an ellipse and may be found as follows: Draw the head H on the center line C D; draw A B and E F as far from the center as the knife is to cut. Extend the tapering side of the head until it intersects at E and B. Draw B F and A E. In this parallelogram accurately describe an ellipse, when that part of the curve at x y will be the cutting edge of the knife.

Raising a House.

From H. M., *Doon, Iowa.*—Will some of the readers of the paper tell me how to raise a hip house 3 or 4 feet, as I want to make it one and one-half stories in hight? The building is 24 x 24 feet, with about 9-foot ceiling,



Raising a House.—Sketch Submitted by "H. M." of Doon, Iowa.

and the floor joist are 2 x 6 inches, placed 16 inches from center to center. The joist are nailed on top of the plate and the rafters nailed to the top of the joist, as shown in the sketch which I send.

Dampness of Plastered Walls.

From G. A., *Memphis, Tenn.*—In answer to "H. A. F.," Jamaica, with reference to dampness of plastered walls, I would say that the mineral wool filling between the studding applied as a non-conductor of heat acts as a conductor of moisture, which obtains a constant supply through the interstices of the shingles and sheathing, which should have been separated by a good building paper entirely impervious to water. The peculiar climatic influence due to extreme moisture is largely responsible for the difficulties of which the correspondent complains. The best medium for remedying the defect is ventilation. Take out the mineral wool and create a circulation of air between the inner and outer covering of the wall and the dampness will disappear, although the temperature of the interior of the house may perceptibly increase. The house, however, will be more tenable from a hygienic standpoint. In the making up of plaster it is the opinion of the writer that mineral wool is a poor substitute for cow hair. In such moist situations a more porous plaster is preferable to Adamant.

An excessive amount of carbolic acid in the paste is the cause of the discoloration of the paper. Five drops to a gallon is sufficient to prevent fermentation. It is better to use a solution of alum and sugar of lead. The old paper should be removed.

Laying Out "Nail Ties" for an Ogee Roof.

From W. H. M., *Clebourne, Texas.*—As a subscriber to *Carpentry and Building*, I take the liberty of asking for an explanation of the method of laying out the nail ties in the sketches which I inclose. The ties are C D E G H I. as shown in the elevation, Fig. 1, and are set

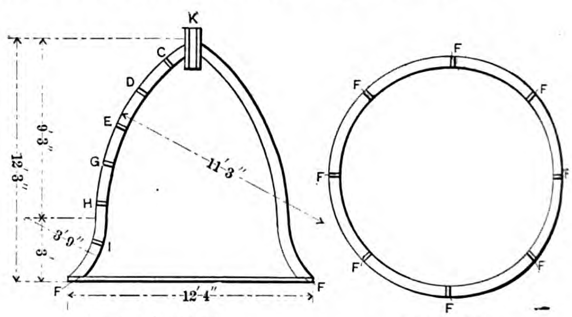


Fig. 1.—Elevation. Fig. 2.—Plan.

Laying Out "Nail Ties" for an Ogee Roof.

square with the face of the rafters indicated on the plan view, Fig. 2, by F F F, &c.

Cause of Dampness in Brick Walls.

From J. A. H., *Morotock, Va.*—Referring to the April issue of the paper, page 101, I would say to the correspondent "A. P. H.," New Bloomfield, Mo., that if he will secure a copy of the "Techno-Chemical Receipt Book," by William T. Brannt and William H. Wahl, he will find some remarks on page 53 relative to "Plaster for Damp Walls;" on page 54, "How to Dry Damp Walls," and page 164, "How to Protect Walls from Moisture."

Note.—As being of possible interest to other readers as well as to the correspondent making the original inquiry, we present extracts from the work in question, as follows:

Plaster for Damp Walls.—Two coats of ordinary lime mortar are applied to the wall; the last coat is smoothed with a steel float. Upon this is applied a third coat of very fat lime, and this is glazed with pure lime compounded with some alumina and 1-20th part of alum.

How to Dry Damp Walls.—The old plaster is first removed from the walls and the joints. Slabs consisting of rosin 3 parts, tar 2 parts, asphaltum 5 parts and quartz sand 6 parts are then prepared. The smooth surfaces of these slabs are coated with a lacquer consisting of oil of turpentine 2 parts, shellac 1 part, spirit of wine 4 parts, and then strewed with sharp sand, while the rough surface of the plates is fastened to the wall with a mortar consisting of 4 parts sand, 2 parts hydraulic lime and 1 part Portland cement. The joints are filled in with a putty consisting of 6 parts rosin, 1 part asphaltum and 2 parts powdered lime. They receive then a coat of the above mentioned varnish and are also strewn with sharp sand. The wall is then plastered.

The asphaltum is composed of 15 parts of bitumen, 35 parts coal cinders, 10 parts powdered coke, 130 parts lime and 160 parts fine gravel, all by weight. The bitumen and coal cinders are mixed in a boiler, heated and skimmed until the formation of froth has ceased. The powdered coke and lime are then intimately mixed and heated to 575 degrees F. in order to dry them, when they are mixed with the ingredients in the boiler, and finally the gravel is added.

To Protect Stone and Brick Walls from Moisture.—Brush the wall over with a hot solution of ¾ pound of castile soap in 1 gallon of water. Let it dry for 24 hours and then apply a solution of ½ pound of alum in 4 gallons of water.

Rosin as a Protection Against Moisture in Walls.—Heat 5 parts of turpentine and stir in 10 parts of pulverized common glue and 1 part of finely sifted sawdust. Cleanse the wall and heat it by means of a soldering lamp or other flame and apply the rosin composition, which can be run into every crack and joint by keeping the wall warm. Smooth by use of a hot iron. An addition of bone black to the composition will give a dark color, or if the wall is to be painted, a light color can be had by using light colored rosin and woody fiber. This composition is also good for wood buried in the ground or exposed to moisture.

Should our correspondent desire a copy of the work in question he can obtain it through this office, the price being $2. postpaid.

Some Questions in Furnace Heating.

From J. F. H., *Watervliet, N. Y.*—If "W. B.," whose inquiry appears in the January issue, will put inside the furnace casing a hood I believe he will overcome the trouble and get all the hot air necessary to fill the pipe for the room. The 9-inch pipe draws the heat from the defective or 7-inch pipe, which also runs too nearly level. It should have a pitch that will raise the bottom of the elbow at least 2 inches above the top of the collar at the furnace. But hot air can be forced by putting a hood inside of the furnace, shutting the pipe it protects from all of the other pipes. The hood must be large enough to fill the pipe with hot air from the radiator in the furnace.

From L. E. W., *Nevada, Iowa.*—I presume "W. B." will receive all the advice necessary in regard to the furnace inquiry in the January number of the paper. However, if he will extend the vertical 7-inch pipe down to the bottom of the joist and put on a square box large enough to receive a 9-inch pipe from the furnace and give this pipe from the furnace all the rise possible, and will further facilitate the movement of the air by placing a sheet of tin in the back of the box in a curved position and cover all the pipes with asbestos, he will make a decided improvement. If he can't box up the pipe he should cover it with asbestos and with water proof building paper. Then he will have no further trouble. The difference of 2 inches in the size of the pipe from the furnace is easily compensated for by the better draft attained in the vertical pipe.

From J. J. A., *Madison, Neb.*—In the January number I notice an article bearing the above head from "W. B." of Bridgeport, Conn. I should say at the outset that this was something of a problem, but "W. B." fails to give us any idea of what I regard as important points. He does not tell how his furnace is located, how long are the other three pipes, what their elevation may be as compared with the one in question, nor does he describe the system of return circulation or ventilation. Assuming, however, that the ventilation is sufficient, and the other pipes are not over 10 to 12 feet in length, I would suggest to the correspondent that he dispense with the rectangular pipe and increase the horizontal one to a 10-inch instead of a 7-inch pipe. I am inclined to think that his ventilation or circulation in the upstairs room is insufficient. If this is the case, then it must be remedied before he can secure the desired results. Then if he has all necessary ventilation in this room I would say his cold air duct has not the required capacity, or else it is not properly located. I am not quite certain whether the pipe running up outside the building would materially affect the draft of hot air, but think it would not. As the matter of heating and ventilation is an important one, I would like very much to hear from other readers of the paper.

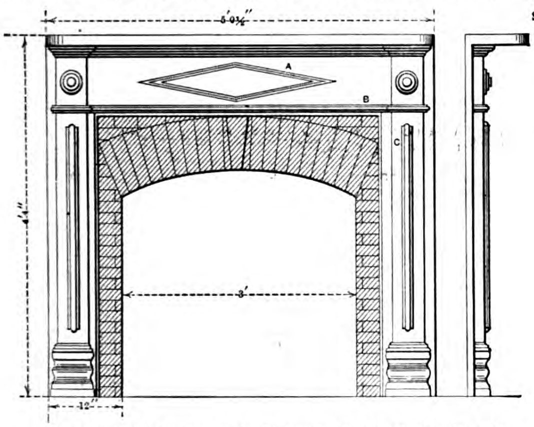


Fig. 1.—Mantel Design to be Executed in North Carolina Pine.

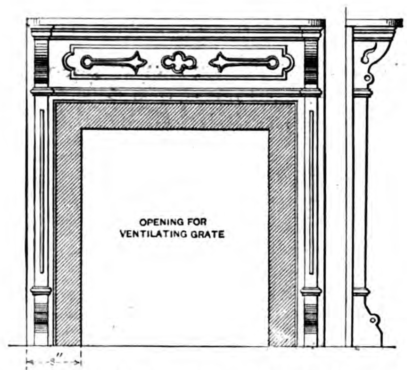


Fig. 2.—Mantel of Design for a Hall.

Designs for Mantels.—Contributed by "G. W. B.," Locust, N. J.

Designs for Mantels.

From G. W. B., *Locust, N. J.*—In reply to "W. D.," Batesville, Texas, I inclose pencil sketches of mantels which he may use to advantage. I have just finished two mantels similar to that shown in Fig. 1 and found them quite easy to make. They do not require much material, and, in my estimation, present a very neat appearance, especially when made from North Carolina pine or some wood with a prominent grain to take oil and varnish. Such mantels can be ornamented to suit the taste or according to the materials at hand. In the present instance I employed ogee batten molds at A, B and C, with 3-inch bed mold under the shelf and pieces of molded base boards at the bottom. It would be well to use the same pattern of base as that of the room in which the mantel is to be placed. In the absence of turned rosettes they can be made from miters of the mold at A, finished square. I also send a sketch, Fig. 2, of a small mantel as a suggestion for a small hall where a grate is to be used.

WHAT BUILDERS ARE DOING.

THE building situation in and about Appleton, Wis., is rather quiet and the outlook is hardly as good as it was two months ago, when there were quite a number of buildings contemplated. The rapid advance, however, in the prices of building materials has caused a decided falling off in the amount of work in prospect, this being especially the case in the line of dwelling houses. With regard to some of the larger building operations in prospect, it may be stated that the Sacred Heart Congregation has awarded the contract for a $10,000 school house, to be completed by September 1; the plans are out for a new public library building, and the contract was awarded on May 15. The Appleton Post Publishing Company intend fitting up a new building in the near future, which may be used as a post office just as soon as the lease on the old building expires. There are a number of paper mills in and about Appleton which are making additions and alterations, so that in the aggregate there is a fair amount of work in prospect. There is also considerable building going on throughout the agricultural districts, as farmers have bought and hauled their material during the winter months when sledding was good and materials were cheap.

Baltimore, Md.

There is a noticeable degree of building activity in the city at the present time, with a number of large office structures planned for erection at an early date. There is also considerable doing in the way of apartment houses and the feeling is that architects and builders will have a good season.

The technical library in connection with the Builders' Exchange is growing apace and contributions of volumes are steadily being received. The library promises to be one of the leading features of the exchange.

Boston, Mass.

Local building operations are somewhat more active than they have been, although in the aggregate there is not much increase as compared with the corresponding period of a year ago. Taking the figures for April, 1898, there was an increase in April of this year of 17 in the number of permits for new brick buildings, and a decrease of 16 in those for frame. The first four months of the year, however, show an increase of 63 in the number of brick structures, but a falling off of 114 in new frame buildings compared with last year. There has been considerable discussion over the bill introduced in the Legislature, affecting a radical change in the building laws of Boston, more especially as regards the construction of frame buildings, and the hight of structures generally.

The Mason Builders' Association and the bricklayers have come to an understanding as to wages, hours of labor, &c.

The members of the Twentieth Century Club recently listened to descriptions given by several local architects of their schemes for economical houses for the use of the poorer classes. The speakers included R. C. Sturgis, who presented a scheme providing central open spaces with plenty of provision for light and air, obtained by introducing as many corners as possible; A. W. Longfellow, Randolph Coolidge and Osborne Howes.

Brooklyn, N. Y.

The amount of building in April was considerably larger than for the corresponding month a year ago, and there was also an improvement in the quality of the buildings erected. According to statistics available, the month of April shows an increase over the same month in 1898 of 160 new buildings and of $900,000 in the estimated cost. From the first of the present year up to the close of the second week in May the total number of new buildings projected was 1536, estimated to cost $8,713,867, while for the same period in 1898 the number of buildings projected was 1219, costing $5,315,456.

One of the most noteworthy building operations under way at the present time is the erection by W. A. A. Brown of 70 modern stone houses in the heart of the most picturesque section of the borough. The buildings consist of 20 three-story and 50 two-story residences, the fronts of which are in Indiana limestone of various colors and designs and selected brick. From an architectural point of view the buildings are regarded as among the finest in that district of beautiful houses, and judging from the number of sales already recorded Mr. Brown's operations in that section are likely to meet with his most sanguine expectations.

Chicago, Ill.

The figures which have been issued covering building operations for the month of April indicate a gratifying increase as compared with the same month a year ago, both as regards the number and the money value. During April, 1899, permits were issued for 499 buildings, involving an expenditure of $2,999,650, as compared with 371 buildings, costing $1,329,500, in April of last year. The increased cost of all classes of building materials is proving an important factor to investors who contemplate building, the advance in price being particularly noticeable in lumber. In erecting dwellings and apartment houses quotations on plumbers' and steam fitters' materials have to be closely scanned, owing to the rapidity of their fluctuations. A real estate man expresses the opinion that while building materials have advanced rents have not appreciably changed, so that the inducements for building are not quite so great as formerly.

There have been several disturbances in the building trades, but these were adjusted about May 1, with little interruption to business. The stone cutters secured an agreement with the cut stone contractors that all stone planers be taken out of the shops by June 1. The sheet metal contractors agreed to a scale fixing the minimum of wages at 38½ cents until June 1, 40 cents an hour from June, 1899, until February 1, 1900; and 42½ cents an hour from that date until January 1, 1901.

The plan for an organization of the employing contractors of the city is progressing slowly, although those in charge of the work appear to feel confident the scheme will be successfully carried through. The associations said to be in the plan are the carpenters and builders, masons, plumbers, steam fitters, sewer builders, cornice manufacturers, painters and decorators, cut stone contractors, employing plasterers and the Architectural Iron League.

On May 1 the Chicago Masons' and Builders' Association took possession of new quarters in the Merchants' Building, Washington and Lasalle streets, where exceptional facilities are offered for the transaction of their business.

Cincinnati, Ohio.

According to the report of the Building Inspector the showing of building operations for the first four months of the present year is not altogether flattering, when considered in the light of the figures for the same period a year ago. The estimated cost of the buildings put up in January, February, March and April, 1898, amounted to $723,125, while the cost of buildings for the first four months of this year involved an expenditure of $629,440. March of this year showed quite an advance over March a year ago, but April showed a falling off.

Cleveland, Ohio.

The Builders' Exchange is removing from its present quarters in the Arcade Building to the new and handsome Chamber of Commerce Building on the public square. This building has just been completed at a cost of nearly $500,000, and is considered as one of the finest structures occupied by a commercial body in the United States. The entire third floor will be occupied by the exchange, and will be fitted up with all the improved facilities for the conduct of their business. One of the prominent features is to be a permanent exhibition department, the spaces occupied by exhibitors being separated by a wire network partition and iron railing only a few feet high, thus leaving the entire series of exhibits open to view. Many of the members are arranging to have desk room, and to spend a considerable portion of their time at the exchange, filling appointments made with out of town clients and those from other parts of the city. Private rooms for consultation are provided, and opportunity for the examination of materials is given through the exhibits. In the library will be found on file books of reference, magazines, &c. The rules governing the new exchange rooms provide that they shall be open to members, visitors and the general public from 8 a.m. to 5 p.m., with the exception of the 'Change Hour, which is from 11.30 to 12.30. We understand that the secretary, Edward A. Roberts, will soon visit, in the interest of the exchange, the leading cities of the country.

There is considerable activity in the building line, and while there have been a few temporary labor troubles, matters are now running smoothly.

Denver, Col.

The building season in the city and vicinity is fairly under way, with indications that the present year will witness a greater amount of activity in the building line than any corresponding 12 months since 1893, and this in spite of the fact that wages and all kinds of materials are much higher than a year ago. During the month of April there were issued 135 permits for buildings aggregating a cost of $270,025, this being an increase over March of $4325, and as compared with April of last year an increase of $66,800.

Real estate dealers all predict a prosperous year, and the outlook in every branch of the building business is very gratifying. Reports from such of the mountain towns as have emerged from their mantles of snow indicate that times will be equally good throughout the State.

Detroit, Mich.

Every one in the building business in the city is busy, and it has been difficult of late to obtain workmen, especially in the case of common laborers. Some of the contractors are inclined to think that the present activity is the result of the usual rush of spring repairs, but the indications from the architects' offices point to a busy season. Members of the various trades are demanding increased wages and a strict adherence to the eight-hour day. In most instances they have been successful. There are some buildings of importance contemplated, but the details have not as yet developed. The city will erect six or seven new schools, and the Fire Commission has been allowed appropriations for two new engine houses.

The members of the Builders and Traders' Exchange are looking forward with a great deal of pleasure to their annual outing, which will be held in June or July, and as these occasions have always been very enjoyable a large attendance is assured.

Los Angeles, Cal.

A peculiar phase of the building industry in this city is the encroachments of the oil wells on one of the finest residence sections of the city, there being several hundred residences of a cost of from $2000 to $3000 from which almost all value has been taken by the proximity of the wells, while a section in which there are some of the most expensive residences in the city appears to be in the immediate track of the oil district. Efforts are being made to protect these residences by legislation. The city continues to be under the necessity of providing for from 10,000 to 15,000 new residents each year, and the buildings at the present time are approximately a year ahead of actual demand and are increasing in number rapidly, the building boom of the last ten years having suffered no reverse. While there are some notable exceptions, it is a general rule that the buildings are not of the best construction, being of cheap balloon frame to meet the demand for low priced residences for men of moderate means, and are generally sold on installments. This is not so great an evil as it would be in a more severe climate, but even here it is evident that a better class of work would be desirable. The general public, however, demand this class of work, and the contractors and builders simply let the people have what they want. There is probably no city in the country in which so large a proportion of the people live in cottages. Flats are almost unknown, while cottages of from five to eight rooms, costing from $1200 to $3500, including land, constitute almost exclusively the residence buildings of the city. During the past few years there has been found an increasing tendency to more pretentious residences, and this seems to be gaining in momentum. In this respect there appears to be a great improvement in store for the next few years. Through the many prosperous fruit growing towns of Southern California there is a great boom on in building, and the rapid growth of the country is in no way better illustrated than in this. The desire of many Eastern people to reside in a country where severe weather is unknown has overloaded all occupations, and wages in California at present are, from the best information obtainable, believed to be lower than in the East, with little indications of improvement. The architects are faring even worse than the carpenters, their branch of business being in the hands of a very few men with the great majority in idleness, while the duplication of buildings from one set of plans reduces the need of architects to the minimum.

Lowell, Mass.

The Master Builders' Exchange held their annual election for the ensuing year on April 20, and at the same time received the reports of the secretary and treasurer and of the Board of Directors. These reports all reflect a flourishing condition of the exchange. The officers chosen were: President, William H. Kimball; vice-president, William H. Fuller, and secretary, Philip E. Connors. The directors elected were E. W. Coburn, J. B. Varnum, James Dow, J. L. Cushing, James McElholm and Thomas E. O'Day.

In the evening the members held their annual dinner, which was enjoyable in every way. The president acted as toast master and introduced the speakers, the first of whom was Mayor Crowley of the city of Lowell. He was followed by several others, all of whom spoke in a happy vein.

The master builders of the city are looking forward to a very active season, greater perhaps than has been experienced for a long time past. One of the causes of complaint on the part of the builders is that those who have already decided to put up homes the present season are slow in making a start. This will doubtless cause a great rush toward the end of the season, with the result that many buildings will be finished in cold weather, and possibly in a more or less unsatisfactory way.

New York City.

A considerable amount of new building is in progress in the boroughs of Manhattan and the Bronx, and it is probable that the capital which will be invested in this line during the present year will reach an enormous total. This is the season when it is natural to expect the most activity as regards the number of plans filed with the Department of Buildings, and the statistics of the first quarter of the year show that they are much more numerous than usual. The total number of buildings projected the first three months show an increase over the same period of last year of 522 and an increase in estimated cost of $9,454,807. The amount expended in alterations was about the same in both years. The first quarter of 1898 was an unusually dull one, owing to the war cloud which then hung over the country, and the present activity is considered to be due in some measure to the fact that capital withheld during the progress of hostilities is now being freely invested. Bringing the statistics down to the time of going to press it may be stated that the total number of new buildings projected from the first of the year to the close of the second week in May was 1941, estimated to cost $48,479,952, as against 1182 buildings projected in the same period of last year, estimated to cost $27,171,215.

The National Tile, Grate and Mantel Association has been formed, with Charles J. Bogert as secretary and Alonzo E. Conover as president, the object being to bring about closer interests, demonstrate to manufacturers the advantages of dealing with reputable firms and to establish more uniform methods of conducting the business. The Tile, Grate & Mantel Association of New York gave a banquet early in May at the Hotel Savoy in honor of the formation of the National Association.

Toward the middle of May it looked very much as if building operations in the city would be suspended on account of a threatened strike of the bricklayers and other workmen, but the matter was adjusted after a conference between the Mason Builders' Association and the Bricklayers' Unions. The men are to receive 55 cents an hour and work eight hours a day, except on Saturday, when they will work only four hours.

Pittsburgh, Pa.

The outlook for the building business is very gratifying, and this feeling of hopefulness is substantiated in the reports issued from month to month by the Bureau of Building Inspection. Superintendent J. A. A. Brown states that for April permits were issued for buildings estimated to cost more than $600,000, which was an increase of $200,000 over the previous month. The permits were almost wholly for dwellings, and it is thought that May will go ahead of April. Architects are busy and the indications are that they will have all the work they can do for some time to come. Nearly every borough in the vicinity of Pittsburgh has awakened to new life in the past few months, and each one seems to be developing a "boom" of its own. The establishment of numerous new manufacturing plants and increase in capacity of old ones have created what amounts to almost a scarcity of dwellings. Among the prominent buildings contemplated is the new observatory to be erected in Riverview Park, Allegheny, to cost $160,000, the drawings having been prepared by Prof. F. L. O. Wadsworth, former instructor in Physics at the University of Chicago.

A strike of the union carpenters for higher wages threatened at one time to seriously interfere with building operations, but so many non-union men were available that the strike is far from being general. The tile layers are on strike, not, we are informed, for higher pay, but for the recognition of their union by the master tile layers.

Rochester, N. Y.

The new scale of wages which went into effect May 1 between the building contractors and their workmen, provides that eight hours shall constitute a day's work, and the minimum rate of wages shall not be less than $2.25 per day for regular working hours. Work done on holidays and Sundays shall count as double time, and all overtime shall be paid for at the rate of time and a half. Either party wishing to change the articles of agreement at their expiration shall give three months' notice. The articles of agreement, which are to be enforced for one year, also provide that no contractor shall employ more than one apprentice for each five journeymen in his employ, but shall be allowed the privilege of employing as many laborers as he may deem necessary. Any one working at the trade less than three years and under the age of 21 years is classified as an apprentice.

San Francisco, Cal.

Committees from the Builders' Association and the Builders' Exchange recently conferred with the Merchants' Association for the purpose of discussing the proposed new building ordinance for the city, the contractors and builders being opposed to it in its present form, as it prohibits the mixing of mortar, or the placing of other material, on the street, the claim being that it will greatly increase the expense of building, while putting a check upon improvements. They would prefer the ordinance now in force which permits them to use the street for their material upon making a deposit of $20 with the Street Superintendent, to guarantee that the street shall be put in order after the building is completed. The Merchants' Association has favored the new ordinance as a means of insuring clean streets, but as a result of the conference with the builders we understand they decided to recommend to the Board of Supervisors that the ordinance be modified in its provisions.

St. Paul, Minn.

A large percentage of the buildings now in process of erection or contemplated in and about the city are intended for dwelling purposes, although from this it must not be inferred that no business blocks are being put up. There is a good demand for building mechanics in all lines, and a local paper is authority for the statement that the wages of carpenters, stone masons, joiners and others have not been so high in nine years as they are at present. In the latter part of April there was some scarcity of skilled labor, as a consequence of which all construction work advanced perceptibly in cost, and it is said that contracts are taken at from 10 to 20 per cent. in advance of what the same work would have cost three or four years ago. One reason given for the scarcity of carpenters is that during the hard times they left the city or went into other lines of work.

Washington, D. C.

When Congress adjourned, after passing a large number of bills, it was found that a goodly portion of the money appropriated would be expended for purposes connected with the city of Washington and vicinity. For the new addition to the Government Printing Office $2,000,000 was appropriated, $1,000,000 for a building for the Department of Justice, $25,000 for an addition to the Weather Bureau's quarters, and $70,000 for Fire Department buildings. Nearly $250,000 is to be spent in constructing new school buildings, and two structures for the Washington Insane Asylum will cost $65,000. So it is certain that the contractor, builder, carpenter and mason will ere long have much to do in the capital city, and Uncle Sam will be paying out money and supplying work that for some time past has been needed by Washington workingmen.

When a piece of work is to be undertaken by the Architect's Office of the Treasury Department, a design of the building to be constructed is produced and submitted to a board of officers, who pass upon its fitness for the purpose intended. Duplicates of the drawings are now made and specifications written, and after these are given to contractors, who use them in making estimates, the Department waits for offers, giving the work to the lowest responsible bidder. The latter begins work under Government superintendence, but has the helpful advantage of receiving each month, as the building goes on, an amount equal to 90 per cent. of the value of work accomplished.

It would seem that to furnish drawings of the various parts of buildings to all contractors who bid would require a large force of draftsmen; and this would be the case if a special oil paper tracing was made for each bidder. But to obviate the necessity for this duplicates are produced from first copies. This work is accomplished by means of a photographic process, in which a camera is not employed. A special kind of sensitized paper is used, being put into a large flat glass fronted frame and covered with the drawings (on oiled paper), after which the frame is put in the sun and left until all the lines, &c., of the draftsman's work are transferred to the copy-paper. The latter is then immersed in a liquid chemical preparation and allowed to dry.

In regard to buildings it is a noteworthy fact that the apartment house is becoming a prominent feature. Heretofore the boarding house has had the man without family (and often the familied man), so to speak, "by the throat," as for many years the capital city has been very much of a boarding house locality. But now the flat is being utilized extensively, on account of its superior convenience, in freedom from various forms of petty annoyance, and in personal comfort.

Although style in architecture does not change as rapidly and as decidedly as fashion in dress, still every once in a while certain cities are found following new ideas, or reviving old ones, in structure making. In Washington the colonial architectural period seems to a considerable extent to have precedence. Of late quite a number of houses have been erected after this plan, conforming not only outside but also inside to the pre-revolutionary type, and in some cases the furniture used is such as to harmonize with the "ancient" features of its encasement. The adoption of this style of architecture has increased the demand for colored brick, of which there is a great variety in use. Cream colored brick are very much favored, but orange, yellow, red, pink, gray and white are not infrequently seen. In some buildings pretty combinations in color are formed, and in one instance of a row not long ago finished, the front of each house is composed of rough faced light gray brick. It is safe to say that 1899 will be a good business year for the District of Columbia, and that there will be a great deal done in the way of building in Washington and its surrounding suburbs. The last fiscal year the number of permits issued from the Building Inspector's office, including those for all kinds of structures erected in the District, was 2258, which represented a property value of $4,153,459.

Notes.

The carpenters, bricklayers and masons of Birmingham, Ala., are very busy, and it is said that contractors have all they can do.

Building is going on with great rapidity at Republic, Wash., and there is an active demand for all kinds of building materials.

A number of new buildings are being put up in New Haven, Conn., and the prospects for the present year will be far ahead of 1898.

An era of prosperity seems to have struck Youngstown, Ohio, and the prospect is that a great deal of building will be done during the year.

The architects of Ithaca, N. Y., have been busy this spring and new houses are rapidly going up all over the city. The outlook is very encouraging.

Some of the leading mason and bricklaying contractors of Watertown, N. Y., have recently signed an agreement to employ none but union men this season.

The prospects for builders in Nashua, N. H., are regarded as very good, one builder declaring that business never opened up better than the present spring.

Some of the older masons and builders of Mount Vernon, N. Y., have recently organized under the title of the Masons' and Builders' Association of Mount Vernon.

The master bricklayers of Camden, N. J., have agreed to pay bricklayers 40 cents per hour during the month of May, and to increase the rate to 45 cents per hour on June 1.

Portsmouth, N. H., is experiencing a "building boom," and carpenters and painters are in demand, the statement being made that there are not enough local men to meet the requirements of the situation.

The strike of the carpenters in Passaic, N. J., was settled on May 10 on the basis of a wage scale of 28 cents an hour until June 1, after which the builders will pay 31 cents an hour to the best men.

A strike of the carpenters, at Homestead, Pa., which began May 1, was declared off May 9, the contractors granting the demand for an advance of 20 per cent. in wages, and the men waiving minor working rules.

The building contractors in Mount Carmel, Pa., report that while the outlook is good for a large amount of building the work is being delayed on account of the difficulty in obtaining a sufficient number of carpenters.

The builders of Lincoln, Neb., expect that the present year will be the best they have seen since the panic. A number of houses are in process of erection, while a large sum of money has been appropriated by the Legislature for new State buildings and improvements.

The formation of two sardine syndicates, at Lubeck, Maine, has been the cause of stimulating activity in the building line, as a large number of small houses are being put up for the hands employed in the factories. Additions are also made and the outlook is regarded as very encouraging.

Toronto, Ontario, has been having a strike among its building laborers, and coming just at a time when there is more building in prospect than for a number of years past, the strike is much to be regretted. It is stated that the bricklayers demand 40 cents an hour and the stone cutters 43 cents an hour.

In the latter part of April some of the bricklayers and masons at Morristown and Madison, N. J., went out on strike because of the refusal of the contractors to sign a new agreement to take effect July 1 of the present year. The men wanted an eight hour day and 38 cents an hour, instead of nine hours and 34 cents an hour.

Norristown, Pa., is enjoying a very gratifying degree of activity in the building line, and it is stated that no less than 100 dwellings will be erected within the borough limits. This means, of course, employment for bricklayers, masons, carpenters, plasterers, laborers &c., and there seems to be no reason why they should not materially benefit their financial position.

According to local advices the present promises to be a record breaking year for Concord, N. H., so far as building operations are concerned. Up to the first week in May ground had been broken for more buildings than for many seasons past, while the big work projected would carry the total expenditure for the year to high figures.

Carpenters and builders on Long Island, N. Y., are actively engaged, especially in the prominent places along the north and south shores frequented by summer residents. A large number of new houses are under way in the vicinity of Hyde Park and Mineola, and it is said that new houses are being started at the rate of 100 a week in Queens County, one builder alone having filed applications for permits for 14 new houses in one day. Bay Shore is also the center of considerable activity, and all the carpenters in the neighborhood are fully employed.

LAW IN THE BUILDING TRADES.

CONTRACT INDUCED BY FRAUDULENT REPRESENTATIONS.

A contract which a party is induced to sign without reading by fraudulent representations, and without a knowledge of its contents, is void, although he might have discovered the fraud by reading it.—Alexander *vs.* Brogley, N. J., 41 Atl. Rep., 691.

EFFECT OF ASSIGNMENT UNDER BUILDING CONTRACT.

A contractor assigned what interest he had in a balance due for the erection of a building, after the payment of a previous assignment, to a party for material furnished in the erection of the building. The contract provided that such balance should not be paid until all claims for labor and material were paid. The court held that by taking the assignment the assignee did not waive his right to assert his claim under the contract.—Independent School Dist. *vs.* Mardis, Supreme Court of Iowa, 76 N. W. Rep., 794.

RIGHT OF SUBCONTRACTORS AGAINST OWNER.

Where mechanics and material men made improvements on leased premises under contract with the tenant, upon the faith of the landlord's agreement that the improvements might be paid for by the tenant out of the rent then due, and to become due, they are entitled to the benefit of the landlord's lien to secure their claims, and the landlord cannot defeat them by subjecting the tenant's property to the payment of rent which accrued after the improvements were made; but they are not entitled to a personal judgment against the landlord.—Rubell *vs.* Avritt, Ky., 47 S. W. Rep., 460.

CONSTRUCTION OF ARCHITECT'S CONTRACT WITH OWNER.

An architect made a written offer to prepare plans and specifications for certain buildings, to supervise the work and to make final duty test for 3 per cent. on total cost of work, with "payments to be made on monthly estimates." The owner accepted the offer in writing, adding thereto, "Conditioned on this agreement terminating in 24 months." It was held that the contract fixed the time of payment, since the words "payments to be made on monthly estimates," meant payments each month of 3 per cent. on the estimated cost of each month's work, especially when considered in connection with the terms of owner's acceptance.—Davis *vs.* N. Y. Steam Co., 54 N. Y. Supp. Rep., 78.

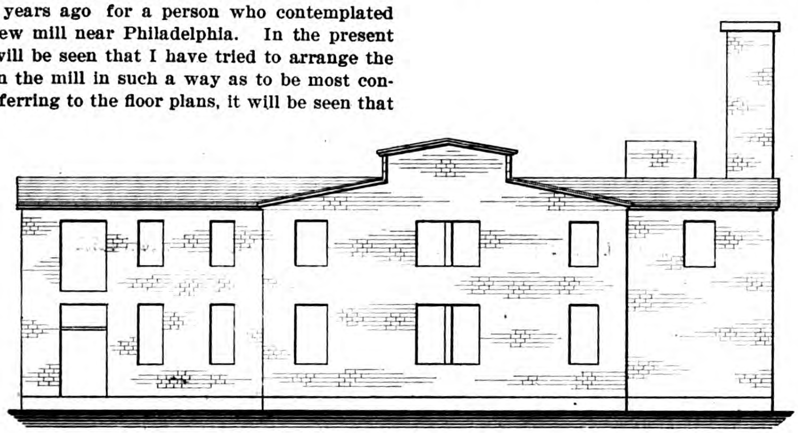
MEASUREMENT OF BRICKS.

In an action on a written contract to lay brick at so much "a thousand," evidence of a well-known custom prevalent in the business and in the locality is admissible to show that a thousand is estimated according to the cubic feet of masonry of laid brick and of one-half of the openings in the buildings, rather than by the actual count.—Brunold *vs.* Glasser, 53 N. Y. Supp. Rep., 1021.

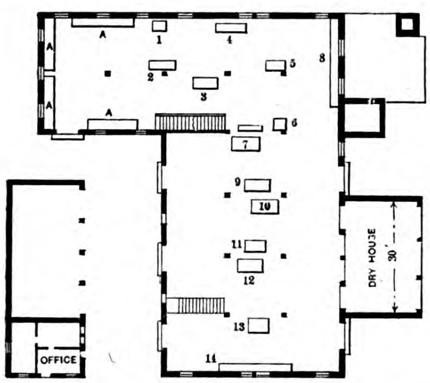
DESIGN FOR A PLANING MILL.

A VALUED correspondent, who states that he has been a reader of *Carpentry and Building* for some years and has gained much knowledge from its columns, sends us drawings of a planing mill in reply to the inquiry presented by "G. McG.," Canonsburg, Pa., in the February issue of the paper. From the drawings we have prepared the engravings shown herewith, and in connection with them give the descriptive particulars as furnished by the author of the design, "C. L. J.," North Wales, Pa.

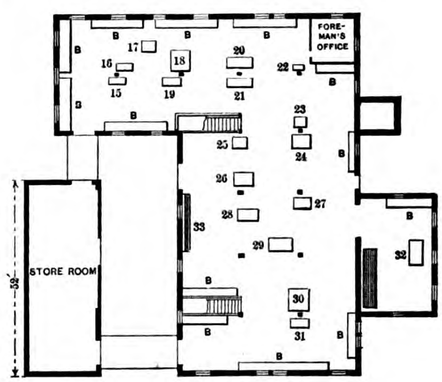
As being of interest to the correspondent in question, and possibly to other readers of the paper, I send floor plans and elevations of a mill that I drew about three years ago for a person who contemplated erecting a new mill near Philadelphia. In the present instance it will be seen that I have tried to arrange the machinery in the mill in such a way as to be most convenient. Referring to the floor plans, it will be seen that the machines are numbered, as they can be more readily indicated in this manner, and with less confusion than by writing the name of each one on the drawing.



Front Elevation —Scale, 3-64 Inch to the Foot.



First Floor.



Second Floor.

Scale, 3-128 Inch to the Foot.

Design for a Planing Mill, Contributed by "C. L. J.," North Wales, Pa.

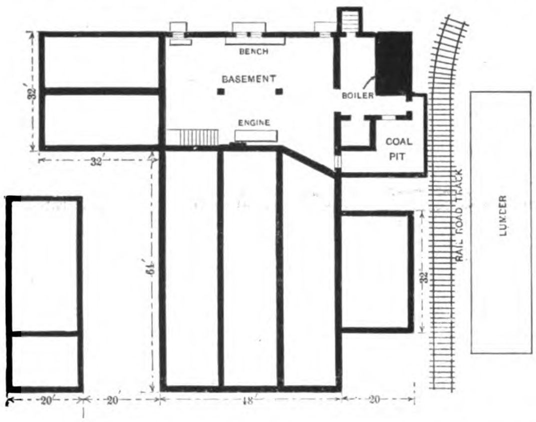
In connection with the first floor plan A A, &c., are work benches. No. 1 is a pulley stile mortiser, No. 2 a jointer with 14-inch cutter, No. 3 a Universal saw bench, No. 4 a molding machine with 6-inch cutter, No. 5 a rip saw, No. 6 a heavy band saw, No. 7 a molding machine with 10-inch cutter, No. 8 a swing cut off saw, No. 9 a large rip saw, No. 10 a double surface planer, No. 11 a rip saw, No. 12 a molding machine with 7-inch cutter, No. 13 a rip saw, and No. 14 a swing cut off saw.

On the second floor B B, &c., are work benches. No. 15 is a light mortise machine, No. 16 a rip saw, No. 17 a sash and shutter clamp, No. 18 a tenoning machine, No. 19 a horizontal boring machine, No. 20 a sand papering machine, No. 21 a molding machine, No. 22 a blind slat tenoning machine, No. 23 a jig saw, No. 24 a light band saw, No. 25 a cylinder sand papering machine, No. 26 a single surface planer, No. 27 a boring machine, No. 28 a jointer with 16-inch cutter, No. 29 a Universal saw bench, No. 30 a tenoning machine, No. 31 a mortising machine, No. 32 a door clamp, and No. 33 a turning lathe.

The engine, it will be noticed, is placed in the basement in order to get it as near as possible to the center of its main work. There is also a machine shop in the basement, as it is supposed that the engineer will have time to repair the machines, make bits and sharpen the knives. He has all his work in the basement, and is able to watch his engine at the same time. The floor of the boiler room is level with the floor of the basement, so as to make it convenient to the engine. It will be noticed that there is a dry kiln on one side of the main building opening into the main floor at one end, while the other end opens to the railroad track at the side. The room is laid with pipe on the floor and heated by the exhaust steam from the engine. The room over the dry kiln, opening on the second floor, is used for gluing purposes, and is fitted with glue pans and pots. There is a coil pipe for heating veneers, also a veneer press and a large door clamp.

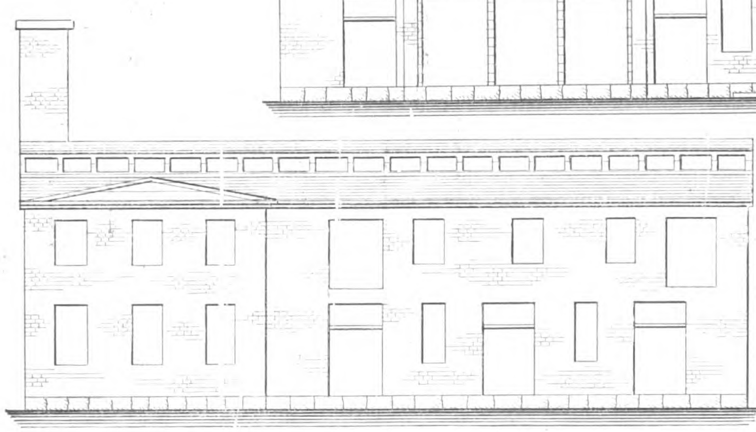
The building is arranged for the frame makers to work on the first floor in the "L" of the building, and for the heavy machine work, such as cutting out, planing and working moldings, to be done in the main part of the building. On the second floor of the "L" are made the sash, outside blinds and shutters, and here also are the inside blind makers, the work of the different divisions extending into the main building. The balance of the space on the second floor is intended to be occupied by door makers, stair workers, bulks, &c. An inspection of the second-floor plan shows that there is an office for the foreman and his draftsmen, which is to be inclosed by sash, so that observation can be made of what is going on in the mill. At the left of the main building are the offices and warerooms, which are built two stories high to correspond with the other structures.

To run a mill of this size to its full capacity would require a bookkeeper, a man to estimate, one to make out orders and make measurements, a main foreman and his assistant; an engineer, a teamster and 35 mechanics, both bench and machine hands. I trust that what I have



Ground Plan.—Scale, 3-128 Inch to the Foot.

Side (Right) Elevation.—Scale, 3-64 Inch to the Foot.



Side (Left) Elevation.—Scale, 3-64 Inch to the Foot.

Design For a Planing Mill.

given may be of some benefit to the readers of the paper, and I would be glad to hear from any of them on this topic through the columns of the paper.

THE ingenious man is always ready to turn an apparent disadvantage into a benefit, says a writer in one of our local exchanges. When a New York builder found that in his absence bricks of a slightly different shade had been used to those he ordered and saw the artistic effect was improved, he inaugurated a different method of building, a method which was pleasing because it gave something distinctive. The dead monotony of one color was broken and a harmonious blending of various shades was the result. When the blundering engineer set up two dynamos in the wrong way the great invention of the motor was evolved. Every builder must have under his eyes similar chances to improve by methods as simple which have long remained unseen. Washed bricks were considered of inferior quality till a wide awake man thought such bricks would give the picturesque weathered effect of ancient buildings, and, as a consequence of this application, washed bricks are now employed in a considerable quantity, and a special method of manufacturing them has been developed.

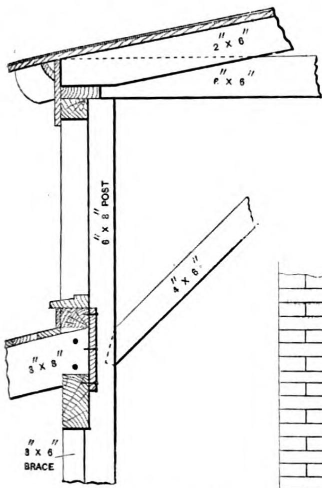
The Philadelphia Exposition of 1899.

Of the many expositions projected for the next three or four years in different parts of the United States, the one to be held in Philadelphia next fall promises to be, in many respects, the most important in its bearing upon the commercial and trade interests of the country. The Philadelphia Exposition of 1899 is an exposition for the development of American manufactures and the expansion of our export trade, and it will be the first national exposition of that character ever held in this country. It is the purpose to exhibit at next fall's exposition every line of manufactured products of the United States especially suitable for export. Such exhibits will form the principal department of the exposition and will comprise everything which is, can or might be exported, from locomotives and heavy machinery to the smallest novelties.

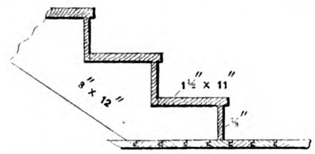
The exposition will be under the joint auspices of the Philadelphia Commercial Museums and the Franklin Institute, two public institutions of Philadelphia, whose standing is such as to assure the success of the exposition. The Board of Directors of the Philadelphia Exposition Association, the corporation organized to conduct the exposition, includes a number of the most prominent and energetic business men of Philadelphia. Sanction and support has been given to the exposition by the national Government, Congress appropriating $350,000 to aid it. The city of Philadelphia has given $200,000 and the State of Pennsylvania $50,000, and $100,000 is being raised in Philadelphia by individual subscriptions. A bill now pending in the Legislature of Pennsylvania appropriates $200,000 more, making a total exposition fund of about $900,000.

The main buildings, which are now under construction, cover 8 acres of ground, and the available exhibition space will be at least 200,000 square feet.

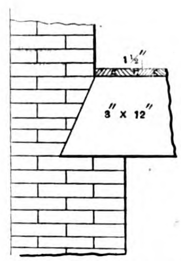
The exposition will open on September 14 next and close on November 30. All communications and applications for information should be addressed to W. P. Wilson, director-general, 233 South Fourth street, Philadelphia.



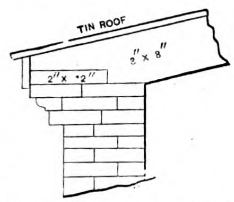
Detail of "Monitor" Roof.—Scale, ½ Inch to the Foot.



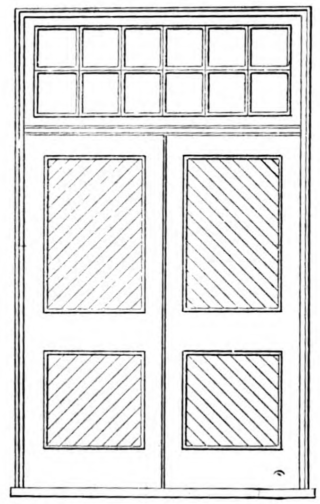
Detail of Stairs Leading to Second Floor.—Scale, ½ Inch to the Foot.



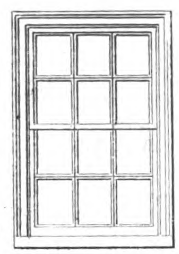
Detail of Brick Wall at Second Floor.—Scale, ½ Inch to the Foot.



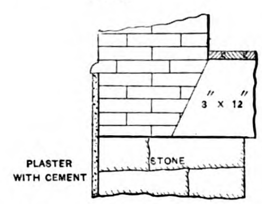
Main Cornice.—Scale, ½ Inch to the Foot.



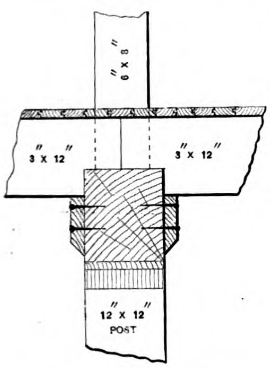
Double Doors.—Scale, ¼ Inch to the Foot.



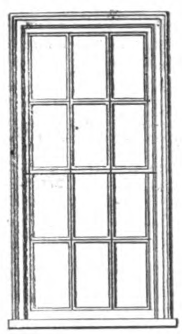
Second Story Windows.—Scale, ¼ Inch to the Foot.



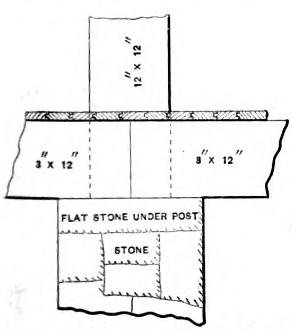
Detail of Water Table.—Scale, ½ Inch to the Foot.



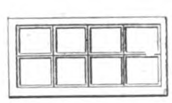
Detail of Column Construction at Second Story.—Scale, ½ Inch to the Foot.



First Story Windows.—Scale, ¼ Inch to the Foot.



Detail of Pier at First Floor.—Scale, ½ Inch to the Foot.



Ventilating Sash.—Scale, ¼ Inch to the Foot.

Design for a Planing Mill.—Details of Construction.

IT is said that the Old Manor House, at Hythe, England, which has recently changed hands, possesses many features of great interest. The terminal newel of the principal staircase is surmounted by a lion rampant supporting a shield, designed by Sir Edwin Landseer, and carved in oak, while the flight is illuminated by a magnificent lamp of ormolu with glass panels, which formerly hung in the Palace of the Tuileries. In the library is a large open fire place, with an Elizabethan chimney piece curiously carved with the words "Drede God and honour the King." Among the contents of the house, which are to be disposed of under the hammer in the spring, is a grand piano made for George IV when Prince Regent.

Coating for Damp Walls.

In view of the discussion which has recently been in progress in these columns relative to the dampness of walls, the following from the *Plumber and Decorator* may prove of interest: "The wall must be thoroughly cleaned and the plaster renewed if found to be impregnated with so-called 'wall nitre' or efflorescence. The surface is then brushed over twice with a 50 per cent. solution of water-glass (silicate of soda), followed after a thorough drying with three coats of the following mixture: 100 parts of mastic dissolved in an equal weight of absolute alcohol; 200 parts of gelatine dissolved in 1000 parts of water by cold steeping for six hours and subsequent boiling; 100 parts of 50 per cent. spirit, and a hot solution of 50 parts of ammoniacum in 250 parts of 50 per cent. spirit, the whole being well stirred and kept warm over the fire for five minutes. It should be freshly prepared for use. When this coating is dry it is overlaid with a coat of oil, or oil-lacquer paint. The sweating or efflorescence of fresh brick work may be prevented in a similar manner, but substituting distemper or limewash for the oil paint. Newly built walls intended to be prepared can be prevented from sweating by two or three coats of the gelatine solution, which will preserve the paper from discoloration; and dirty patches arising from smoke, soot, &c., in kitchens and corridors can also be covered over with the same liquid, and so kept from showing through the fresh coat of paint.

Tenth Anniversary of the Building Trades Club.

The Building Trades Club celebrated at its quarters in the Townsend Building, 1125 Broadway, this city, the tenth anniversary of its foundation on the evening of Monday, April 24, as briefly announced in these columns last month. The affair was largely a social one and confined to the members of the organization. All the rooms of the club were thrown as much as possible into one, and, instead of a set programme carried out on the stage in the usual manner, the various numbers were presented wherever the members were most heavily massed for the time being, and in an easy, untheatrical way that made the affair all the more enjoyable. The entertainment consisted of both instrumental and vocal music, legerdemain, &c., this feature being in charge of Roland Taylor. Refreshments were also served during the evening.

At an early hour the members were called together by the president, John L. Hamilton, who referred to the flourishing condition of the club and to his personal satisfaction in seeing so large and representative a gathering. The secretary, William K. Fertig, read letters and dispatches from those who were unable to be present on that occasion, among the number being John S. Stevens of Philadelphia, president of the National Association of Builders, and Henry W. Redfield, the first secretary of the club.

A most interesting feature of the evening was a history of the club, which was outlined in an address by Stephen M. Wright, for many years secretary of the organization. In closing the address Mr. Wright paid a tribute to the efficiency and well directed efforts of William H. Sayward, who is aptly styled the "Father of the idea of co-operation in the trades." The address was well received, and it was decided by the club to have it printed and a copy sent to each member; at the same time it was unanimously voted that the president express the thanks of the club to Mr. Wright for his able address, and for his many and continued services to the club, to which Mr. Wright feelingly and appropriately responded.

At the request of the president of the club, William H. Sayward, who had stopped over night in the city, being on his return journey to Boston from a visit to Virginia Springs on account of poor health, made a few remarks in which he alluded to the very happy accident that obtained for him the privilege of participating in the club celebration. He pointed out that the opportunity presented for continued building up was very great, and it was only by honest work, fairly done and honestly paid for, that they could ever hope to build the profession up to the point it should attain. "So I say," he remarked in conclusion, "even if it should be my last word to you, that the purpose of the builders of this country should be to make honesty and integrity in our work stand for the high aim and the glorious opportunity that is given to us. Never let it decrease, never let it decline, and we will stand where everybody will respect us and the building profession stand for one of the important features in this community, in this country and in the world."

A WRITER in one of the daily papers discussing the question of house planning recommends that "the windows be judiciously placed so that the rooms can be well aired. In bedrooms see to it that they are so set that the room can be thoroughly aired without a draft passing over the bed. Do not have too many doors in one room and never have a room capable of only being entered through another. Let the bedrooms be comfortably large; have no 9 x 9 cubby holes for sleeping apartments. Crowd the parlor if you must, but let us in bedrooms have space for breathing. Do not have bedrooms on the ground floor. It always is unhealthy to sleep on a first floor. Many cases of seemingly chronic ill health have been cured by sending the patient into the third story."

A SHORTAGE of box timber threatens to cause serious inconvenience in all branches of trade. Soft woods are scarcer than they have been in many years, and prices have doubled in all lines. The question of how to secure packing cases is becoming one of considerable difficulty for manufacturers, wholesale dealers and jobbing houses. It is estimated that at least 60,000,000 feet of timber is used annually for packing purposes in New York City alone. Thus the packing box industry is one of no mean proportions. At present it is seriously hampered for lack of material. The time seems ripe for the introduction of some new form of package that will take the place of wood cases. The woven case, which has been recently introduced in New England, is found satisfactory for some purposes, and it is cheaper than the all-wood case; but it will not stand very rough treatment. Moreover, it cannot be handled with hooks, thus entailing more work in loading the cases onto trucks. The problem of packing boxes is an important one at the present time, and its solution is exercising many minds. It may be that metal cases will come into greater use.

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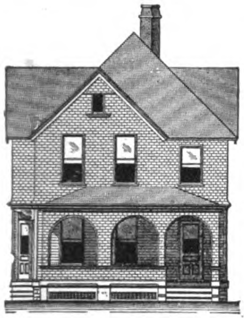

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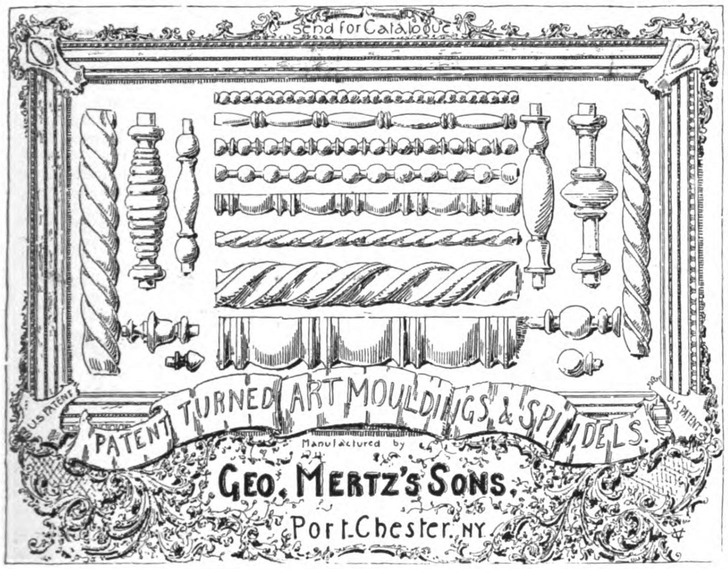

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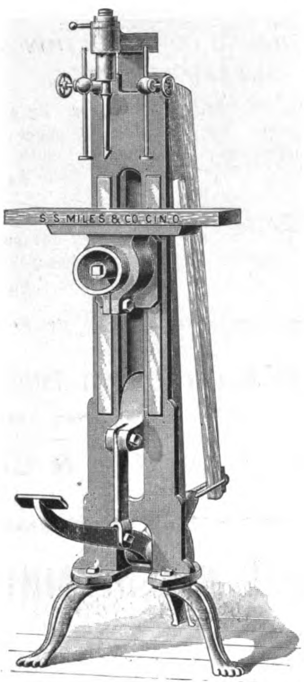
NOVELTIES.

The Miles Foot Power Mortiser.

A new design of mortiser, embodying a number of interesting points of construction, is being manufactured by S. S. Miles & Co. of Cincinnati, Ohio, and is illustrated in Fig. 1 of the accompanying engravings. The table has an up and down adjustment of 15 inches, can be tilted to cut mortises at any angle desired and can be adjusted to or from the face plate. The chisel holder is readily moved front or back to correspond with the



Novelties.—Fig 1.—The Miles Foot Power Mortiser.

table, which is a convenience that will be readily appreciated by wood workers in mortising square lumber, cutting tenons, &c. Among the other special features to which the manufacturers direct attention is the width of the frame and the deep angle plates, giving the necessary strength to mortise hard wood as well as soft. The spring is of ash and the tension is readily changed by means of a thumb screw to suit the work to be done. All bearings and working parts are finished true, thus making the machine accurate in operation and easy to run.

Poster Art Glass.

The discovery of Tyrol opalescent glass, which furnishes an infinite variety of shades, enables beautiful designs to be made for decoration of houses. This glass not only mellows the glare of light from without, but lends the attraction of beauty and form to the interior. The Flanagan & Biedenweg Company, 57 to 63 Illinois street, Chicago, Ill., have recently turned out some exceedingly beautiful work of this character for the residence of Samuel Strouse of Ligonier, Ind., designed by H. L. Ottenheimer, a Chicago architect. The treatment of this work is of the "poster" order, and it is in this that the wonderful play of color of the Tyrol opalescent glass is especially discernible. The landscape, the draperies, and, in fact, the entire window are produced without the aid of brush or paint, and thus are preserved the even texture and diaphanous glow of coloring. In constructing a window of this description the method is practically employed of making wall mosaics, except that for a window the artist must study the effect of transmitted and not reflected light. The effect of light and shade is obtained by the inequalities of the surface of the glass by its varying thickness and also by the placing of two or more pieces over each other to get the depth of color desired, thus avoiding the necessity for the use of paints or enamels, and giving to the deepest shadows in the window a luminous glow. Few lead lines are used, and these are generally so arranged as to help the drawing and not mar the design, but accentuate the salient features of the work. A great variety of treatment can be employed, suitable to any special place as, for instance, mantel and sideboard recesses or library and reception hall windows. This character of work opens up a wide field for decorative artists, there being no limit to the imaginative possibilities of poster art in glass.

Moulton's Patent Lime Bin.

For the permanent preservation of lime it is generally recognized that two conditions are essential, the first being a low temperature, and the second the exclusion of the air. It is with the object of meeting these requirements that T. T. Moulton of Oshkosh, Wis., is bringing to the notice of those making a business of handling lime a bin in which the material may be safely stored. The building consists of an inner bin of octagon form inclosed by a square, leaving a space between the two. The air is admitted through openings in the foundation walls on either side of the building, passes through openings in the floor of the outer bin, circulates freely between the two, and escapes through a ventilator at the top. The openings in the foundation are so placed that the air from the windward side is necessarily forced through them, thus insuring a low temperature within the inner bin. The air is excluded from the latter by double floors above and below, also double boarding on the sides, with a space between, which is filled with a non-conducting material. This filling is continuous, extending entirely around the bin, and with no break or opening except the doors. Mr. Moulton states that any bin in order to effectually preserve lime must have the doors and frame so made and adjusted as to render it impossible for the air to pass through or around them. The bin in question is provided with a ventilating tube which may be opened and closed at pleasure, thus allowing the hot air and gases which may be in the lime when first placed in the bin to escape. The bin should be built with a hopper bottom so that the lime may be conveyed to the discharging door and be within easy reach of the shoveler. Provision is also made for a crane by which the measured lime may be elevated and dumped into a cart or wagon. Mr. Moulton refers to his lime bin as being easily, quickly and cheaply built, and with the exception of the sills, which are merely halved together, and the roof, there is no framing. He states that it can be built within four or five days by an ordinary carpenter provided with a saw, an axe, a square and a hammer, and that only about 3500 feet of lumber are required.

The Rich Sash Trimmer.

A machine embodying many interesting features of construction and designed by experienced sash manufacturers for coping the ends of the bars and muntings used in making diamond and all irregular sash is shown in Fig. 2 of the engravings. The machine carries cutters which it is claimed will trim the ends of these pieces to the exact shape to make perfect joints, no matter what the angle of intersection may be, while at the same time each piece can be cut to the length required to properly fit the particular place in which it is to go. An inspection of the illustration will show that the machine consists of a base and column on which is mounted a vertically sliding head carrying two specially shaped cutters and a face plate provided with swinging tables, on which the work is placed. A foot treadle is provided for operating the sliding head. The cutters are right and left, and being made the exact shape of the molded outline of the sash cut recesses in the ends of the bars or muntings which make perfect joints at the angle required. The manufacturers state that they are sharpened in the same way as a common chisel, without danger of losing the proper shape, and will last for a long time. In operating the machine the bar or munting is laid on a wooden bed piece which is grooved to fit its outline and which supports its lower edge at the moment of cutting, so as to prevent any breaking down or splintering of the edges. These bed pieces are carried on swinging tables, which are so made as to be instantly adjustable to any angle up to 75 de-

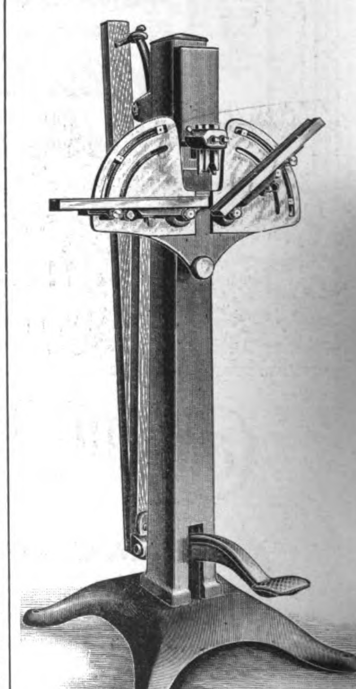


Fig. 2.—The Rich Sash Trimmer.

grees. Each table is provided with three adjustable spring stops, so that after once setting it can be changed from one angle to another and returned without any delay in resetting. It is stated that the value of this machine over hand work is indicated by the fact that one man can cut in and make 150 to 200 diamond lights per day, while all whittling with knife and chisel is dispensed with. Reference is also made to the labor saving qualities of the machine, even in cases where only a few sash are to be made, for the reason that it is unnecessary to lay out a plan of the whole in order to get the lengths of the bars and muntings, as each can be cut at once to the exact length required. On curved work the machine is, as the manufacturers put it, "almost a necessity, as there is no difficulty in holding the pieces and cutting to the correct bevel, which saves much expensive whittling." Still another important feature of the machine is its value for coping moldings, as they can be made to fit as easily as they can be mitered, with the added advantage that the joint is not so likely to be drawn open when nailing in place. The machine stands 5 feet in hight, occupies a floor space 2 x 2½ feet and is manufactured by L. S. Heald & Son of Barre, Mass.

New Warner Steel Rim Lock.

The United States Steel Lock Company, manufacturers of the Warner steel locks, Clinton, Iowa, have brought out an improved rim lock, known as No. 1105 in their series, in which the principal feature of improvement is the simplicity in reversing the latch bolt. When the cover is removed the forward part of the latch may be lifted up and turned over without disturbing any of the other parts or the springs in the lock case. It is very substantially made, locks on both sides of the latch slide, and has bearing on the case and cover of the lock. Another point is making the corner post hollow, thus permitting the wood screw which fastens the lock to the door to go through the post, thus preventing the cap and case coming together under pressure, which would bind the latch bolt. The hub hole, it is remarked, instead of having the sharp edge of the steel working against the hub, is now drawn, making a serviceable and mechanical bearing for the hub to work on. The improvements made in this rim lock, it is stated, will be appreciated by carpenters and builders into whose hands it comes.

Ornamental Steel Ceilings.

Sheet steel, when made up in appropriate designs, is fast supplanting the old fashioned lath, plaster and wood ceilings, possessing as it does essential advantages of beauty, durability and fire proof qualities. The designs which are turned out in this material are suitable for all kinds of buildings, such as storerooms, factories offices, asylums, hospitals, churches, school houses, &c., and are of such a character that they can be used in places where plastered ceilings are unsuitable on account of their cracking and falling off, as well as from their liability to become detached by any cause that produces jarring or concussion on the floor above. Some of the designs of sheet metal ceilings which are being turned out by J. H. Eller & Co., with office at 218 East Fifth street, Canton, Ohio, are exceedingly handsome in the effects produced, and their work is meeting with popular favor wherever introduced. One of the contracts for ceilings which the company have just finished is that in connection with the Hotel Middlekoff, at Paxton, Ill., and a very good idea of the work may be gathered from an inspection of Fig. 4, which is a half-tone reproduction from photograph of the interior. We understand that the company have ready for distribution a handsome catalogue in which is presented a large number of new designs of sheet metal work, and the new volume will be of special interest and value to architects, builders, contractors and house owners generally.

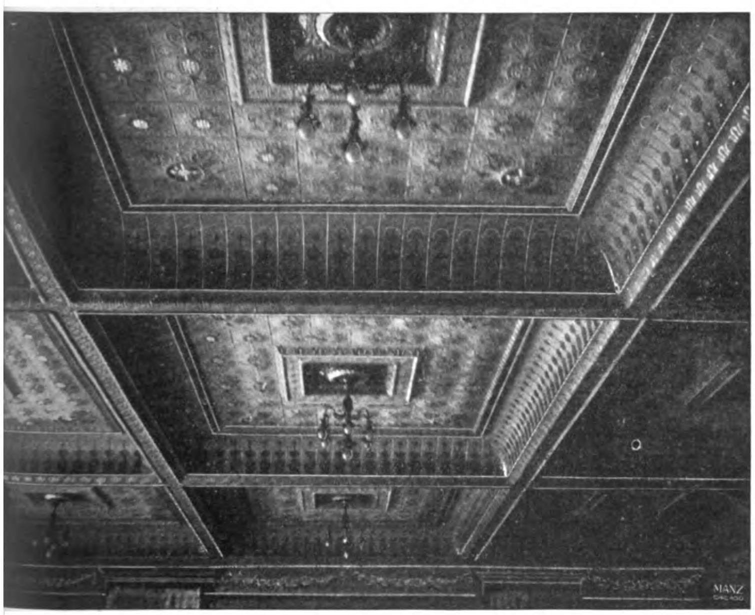
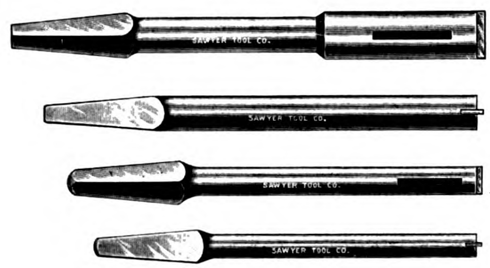


Fig. 4.—Ornamental Steel Ceilings.—View Showing Ceiling in Hotel Middlekoff, Paxton, Ill.

Samson Screw Driver Bits.

We take pleasure in laying before our readers in Fig. 3 of the illustrations several views of screw drivers adapted to bit stock use, placed on the market by the Sawyer Tool Company of Fitchburg, Mass. The bits are of similar construction to the Samson screw driver made by the company and illustrated in these columns in the issue for March of the present year. The manufacturers explain that in testing the bits they take any size of flat head wood screw whose slot is adapted to the bit used, placing the point of the screw against the smooth surface of a rock maple plank and turning the screw into it until the head is flush, if the screw is strong enough to stand it. A broken blade can be quickly replaced by a new one, three extra blades and a key being furnished with each bit. The bits run in regular sizes corresponding to the average sizes of wood and machine screws. It is pointed out that the blade, being parallel, bears as much at the bottom of the slot as it does at the outside, thus preventing turning burrs, splitting screws, slipping of the bit and marring of work.



Novelties.—Fig. 3. Samson Screw Driver Bits.

"Neponset Building Papers"

form the subject matter of a unique booklet distributed by F. W. Bird & Son, East Walpole, Mass., the manufacturers of these papers. The stiff cover of the circular is made of samples of Neponset red rope roofing and Neponset black building paper, and the interior pages, printed in black and brown on light terra cotta colored paper, interspersed with thumb nail sketches, are devoted to a description of the paper, its uses and merits, with directions for its application for roofing, siding, sheathing, back plastering and other purposes. The papers are put up in rolls 36 inches wide, of two sizes, one containing 500 square feet and the other 250 square feet.

The Montross Metal Shingle Company

of Camden, N. J., have recently made shipments of their metal shingles to Mexico, South America and the West Indies, and more recently have sent two carloads to South Africa, and have just received an additional order from that country. They have also made a shipment to the East of 15,000 square feet of the Eastlake shingles, and another to the West of 8000 square feet of the Diamond and Gothic tiles. They claim that their Eastlake and Octagon shingles embody superior points of excellence, are ornamental in appearance, and will last double the time the same metal would if put on in the old way, as there is no strain on the shingles by contraction and expansion. The company claim that the shingles have a storm proof side lock, large overlap, and are properly secured along their lower edges and held in place permanently. They are laid completely without solder; no repairs required, as the joints cannot break. Hammer and snips are the only tools required to lay them. They are thoroughly painted on both sides with the best oil paint, and are constructed on scientific principles, providing for contraction and expansion of the metal. The business of the firm has increased more than 50 per cent. over last year.

Fire Test of Plaster Products.

A very interesting and at the same time successful public test of the merits of their fire proof floor construction and their Keystone plaster boards was recently made by the Keystone Plaster Company, at Chester, Pa. A brick structure 10 x 12 feet in size was erected, roofed with the company's plaster floor construction and supported by two 5-foot iron columns, covered with the fire proof plaster on the interior of the spans, the latter being loaded with 330 and 250 pounds of brick respectively to the square foot. The sides of the building were lined with Keystone fire proof blocks. A fire was then started in the brick structure and maintained at a high temperature for several hours, when water was turned into the building, and after the flames had been subdued the interior was thoroughly examined. The roof and sides are said to have been found in excellent state, and the test in every way satisfactory. One of the most interesting features of the test was in connection with the carrying capacity of the floor construction. The latter consisted of blocks with skewback fittings and covered the bottom flange to a depth of 2½ inches. Between the skewbacks was a filling block composed of patent fire proof material. These blocks were fitted without the use of plaster such as would ordinarily be used in a building, while the iron spans were not braced. With this disadvantage, however, the test was made and the floor loaded with more than 7000 pounds, but the statement is made that not until the weight reached an average of 850 pounds to the square foot did it give way. Even then it was said to be due to the spread of the iron girders, as the architects who were present expressed the opinion that had this not occurred the floor would have stood a test of 1000 pounds per square foot.

TRADE NOTES.

THE HAYDENVILLE COMPANY, manufacturers of high grade plumbers' brass work, at Haydenville, Mass., have recently reorganized, and the business is now conducted under a new management with principal office at the place named. The company's mills are among the largest in the country, and are equipped in a very complete and thorough manner for the manufacture of all classes of bibs, stops, basin and double bath cocks, and a large variety of special lavatory and bathtub appliances. The company are prepared at all times to take up new articles of special design and dimensions, being particularly equipped for such special work. The officers of the company are experienced brass men, and are C. J. Hillis, president; C. K. Sanborn, vice-president, and A. S. Hillis, treasurer.

THE LUXFER PRISM COMPANY, Chicago, Ill., have issued a handsome morocco pocketbook for architects, engineers and builders, containing useful information and tables relating to the use of their prisms. The book contains a series of illustrations and diagrams calculated to show how Luxfer prisms may be used and to aid in their application. In the series of tables given information will be found sufficient to determine the kind and quantity of prisms suitable for any given case. Views are given showing cases where they have been applied as well as testimonials from those who have used them. The book will be appreciated by architects and builders as a practical reference book on the subject.

THE C. H. PEASE COMPANY, Cincinnati, Ohio, manufacturers of Pease patent Venetian blinds, report that these goods are proving very popular with the trade in all parts of the country and that they are very busy at present, with plenty of orders ahead. The company have issued a handsome catalogue showing the different styles of their goods, and they will be glad to send a copy to any one sufficiently interested to make application.

THE annual meeting of the stockholders of the Joseph Dixon Crucible Company was held at the company's main office, Jersey City, N. J., Monday, April 17, when the old Board of Directors, consisting of Edward F. C. Young, John A. Walker, Daniel T. Hoag, Richard Butler, William Murray, Alexander T. McGill and Joseph D Bedle, were re-elected. The directors also re-elected E. F. C. Young, president; John A. Walker, vice-president and treasurer, and George E. Long, secretary.

THE SAWYER TOOL COMPANY, Fitchburgh, Mass., show in another part of this issue some illustrations of the Samson screw driver and screw driver bits, for which they make many claims. It is pointed out that the screw driver saves time, screws and labor, does not mar the work, split screws or turn burrs, while the end of the driver is coped so that it will center a round headed screw and not slip. The company have issued a catalogue relating to the goods and will take pleasure in sending a copy to any one sufficiently interested to make application.

THE International Correspondence Schools at Scranton, Pa., have issued an important notice to the effect that students in scholarships that include drawing, who wish to save time by learning drawing while they are studying the instruction papers, are permitted to commence the work in drawing as soon as they have finished the section on decimals in arithmetic. The management request that prospective students indicate their desire to follow this course by answering "yes" to question "(B) 1" in the application for enrollment. Such students will then receive the first work in drawing, together with the instruction paper on arithmetic.

THE FLANAGAN & BIEDENWEG COMPANY, 57-63 Illinois street, Chicago, Ill., make a specialty of stained glass for churches and residences, and in another part of this issue state that they will mail a catalogue to any address on application to Department A of their company.

MILLERS FALLS COMPANY, 93 Reade street, New York City, manufacturers of mechanics' tools, have moved into very much larger quarters at 28 Warren street, where they have the street floor and two basements, each about 25 x 100 feet. This will give them much better facilities for storing and shipping goods than were available at the old address.

EUREKA SASH LOCK COMPANY, Cincinnati, Ohio, are offering something new and novel in the sash lock line that works on a new plan. The company will send sample to any one interested.

THE NEW JERSEY ZINC COMPANY, 71 Broadway, New York City, have issued a very interesting little pamphlet by Stanton Dudley entitled "Paints in Architecture," and state that they will send a copy free to any address. In another part of this issue the company publish the opinion of an architect well known to our readers regarding the matter in question.

THE PNEUMATIC SUPPLY & EQUIPMENT COMPANY have been organized under the laws of the State of New York and have opened an office at 120 Liberty street, New York. It is the purpose of this company, as their name implies, to deal generally in compressed air equipment, and they will make a specialty of the installation of complete plants, eliminating the division of responsibility which has heretofore existed in the trade. J. W. Duntley, the president of the Chicago Pneumatic Tool Company, is the president of the new company; E. B. Gallaher, formerly with Patterson, Gottfried & Hunter, is the vice-president and engineer, and W. P. Pressinger, formerly manager of the Clayton Air Compressor Works, is secretary and treasurer

IN another part of this issue Owen B. Maginnis of 310 West 128th street, New York City, calls attention to some books in which many of our readers are likely to be interested. These include "Roof Framing Made Easy" and "How to Frame a House," of both of which Mr. Maginnis is the author.

"DIXON'S TEACHERS' NOTE BOOK," a little work just put forth by the Joseph Dixon Crucible Company, Jersey City, N. J., in the interest of Dixon's American graphite pencils, is fully up to the high level of all the firm's advertising publications. As its title implies, the booklet is designed to appeal principally to the members of the pedagogic profession. But its entertaining pages will be read with interest and amusement by any one who takes it up. Interspersed with solid information about lead pencils and graphite are funny anecdotes, puzzles, scraps of verse and interesting odds and ends, which insure the book against the fate of most advertising literature—consignment to the waste paper basket. Every other page is left blank for notes. Not the least diverting feature of the book are the clever perversions of familiar maxims which adorn the top of each page. To guard the young from failure of respect for these maxims it would be well for teachers to keep the book out of their reach.

IN order to meet the increasing demands of their rapidly growing business in the wood working machinery line, the J. A. Fay & Egan Company of Cincinnati, Ohio, are erecting a large addition to their plant and equipping it with the latest improved tools. The company also announce that taking effect May 1 they increased the wages of their employees 10 per cent., this step being taken without solicitation from the men.

J. B. COLT & CO., 3-7 West Twenty-ninth street, New York City, report a very good demand for Criterion aceytlene gas generators for the lighting of private residences, and state that recent orders have included some unusually large machines. Among the contracts which they have just filled was one for a 100-light acetylene gas plant, No. 35 Model A generator, to A. A. Anderson of Greenwich, Conn., which will be used for lighting his magnificent residence at that place. The company also announce that they recently made an extensive shipment of house lighting generators for export.

F. E. KIDDER of 628 Fourteenth street, Denver, Col., announces in another part of this issue that he makes a specialty of computing the strength of all forms of building construction for architects and builders. Roof trusses are designed and proportioned to suit any conditions, and those who are interested or have to do with work of the character indicated can obtain a schedule of charges on application.

THE NAEHER MFG. COMPANY, Cincinnati, Ohio, builders of fire and burglar proof safes, have added a line of secret or wall safes, fire and burglar proof, and made on a new principle. They will be pleased to send their new and complete catalogue showing the various styles and sizes to any one interested.

CHARLES P. POND, the well-known contractor and builder of Camden, N. Y., is desirous of receiving from dealers in house building materials copies of catalogues, circulars and price-lists which they may have recently issued.

THE ACME CEMENT PLASTER COMPANY, formerly of St. Joseph, Mo., have removed their general offices to St. Louis, Mo., where they occupy an extensive suite in the Century Building. Their mill at Acme, Texas, has been rebuilt on a more extensive scale than the one which was destroyed by fire. Business is reported as unusually good, and having enlarged facilities shipments are being made with promptness.

S. S. MILES & CO., with factory and office at 526-528 Livingston street, Cincinnati, Ohio, are offering an interesting variety of hand and foot power machinery for wood workers, and in their advertising space they show a general view of their foot power mortiser, which is referred to as simple, inexpensive and very powerful. They also direct attention to the fact that they manufacture a complete line of machines for carpenters, furniture makers and wood workers in general, pointing out that their combination rip and cross cut saws, foot power mortiser, edge molders, emery grinders, mitering and trimming machines are of special interest in this connection.

C. F. THAUWALD & CO., Cincinnati, Ohio, manufacturers of wood mantels for the trade, say that business with them is exceptionally good. They are running to their full capacity and will be pleased to send those interested in something artistic in wood mantels a copy of their catalogue showing the latest designs and styles.

GOODELL'S improved gauge and square for door hanging is the subject of an announcement presented in another part of this issue by the H. H. Mayhew Company, Shelburne Falls, Mass. The manufacturers claim that this is the only tool that can be used on all doors, and suggest that those who are interested send for prices as well as for a catalogue of carpenters and mechanics' tools.

THE MCCRARY REFRIGERATOR & COLD STORAGE COMPANY, Kendallville, Ind., with Chicago office at 152 West Van Buren street, have issued Catalogue No. 50, describing their extensive line of manufactures. A variety of styles of coolers of different patterns are illustrated in the opening pages full descriptions of the systems embodied in the coolers being given. Many elaborate constructions are illustrated, and later on plainer and smaller styles are noted, the closing pages of the catalogue referring to refrigerators for stores and household use.

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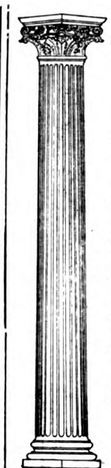

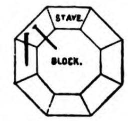

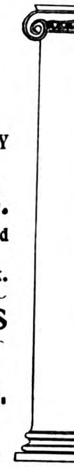

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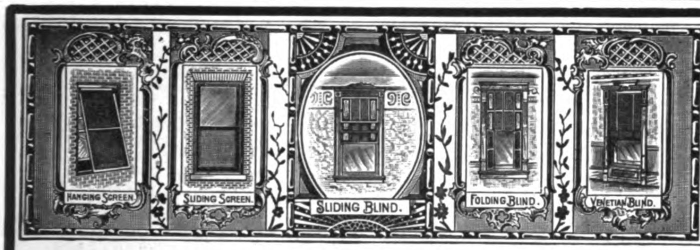

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VOL. XXI. No. 7. NEW YORK, JULY, 1899. Ten Cents a Copy. One Dollar a Year

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THE BUILDERS' EXCHANGE.

DAVID WILLIAMS COMPANY, - - PUBLISHERS AND PROPRIETORS
232-238 WILLIAM STREET, NEW YORK.

JULY, 1899.

Fighting Fire in Tall Buildings.

A series of important tests of the ability of the New York Fire Department to fight fires in tall buildings by forcing water to the roof through stand pipes have been carried out at intervals during the past month or six weeks, the latest and most severe test being that conducted at the St. Paul Building, situated on the corner of Broadway and Ann street. The building, which is 317 feet high, has a six-inch stand pipe running to the roof. It was found that an engine, by making connection with the stand pipe, could force water to the roof with sufficient pressure to throw it across Broadway. A pressure of two hundred and eighty pounds at the engine and ninety pounds on the roof was developed. This, in the opinion of the Fire Department officials, was enough to demonstrate that a fire in a building three hundred feet or more high can be fought and extinguished as easily as can one in a low building, provided it is furnished with a stand pipe. The result of these tests has given great satisfaction to the owners of such property as well as to the fire insurance companies, and preparations are being made to equip nearly all the tall office structures in the city with the necessary six-inch stand pipes.

Model Tenements as Investments.

Evidence is accumulating of the fact that the provision of improved housing for the poor of large cities is a profitable investment from a strictly business point of view. At the annual meeting of the City and Suburban Homes Company, held a few weeks ago in this city, the report of Dr. E. R. L. Gould, the president of the corporation, strongly emphasized the view held by practical philanthropists and sociologists in this country and England that it pays to erect in the congested districts of our great cities model tenements in which the poorer classes may obtain clean, sanitary, comfortable homes. The company referred to were formed three years ago with a capital of $2,000,000, to improve the housing of working people by building model tenements in the city of New York and cottages in the suburbs. They are already paying dividends at the rate of 3 per cent. on the entire capital, although only about one half of it is as yet productively invested, and the directors are convinced from their experience that, within a short time, the company will pay the stockholders at least 5 per cent. on their investments, if not more. The most important part of their work, so far, has been done on the west side of the city at West Sixty-eighth and Sixty-ninth streets between Amsterdam and West End avenues, where the Alfred Corning Clark Buildings, consisting of three hundred and seventy three apartments, four stories and an office, were completed about a year ago. They were filled with tenants by September, 1898, and in the ensuing six months the rentals were sufficient to cover all expenses of maintenance, interest on the mortgage, 5 per cent. on the capital stock represented in the investment, 50 per cent. of the general expenses of the company, and leave a surplus of $1671, although the average rentals are only 92½ cents a room a week. The loss during the six months from vacancies and irrecoverable arrears of rent was only 3 per cent. of the total possible rental.

Some New Model Tenements.

The company are now building a similar large block of model tenements on the east side of the city at East Sixty-fourth and Sixty-fifth streets and First avenue, which will be finished late in the summer. Their experience in this line has been, in fact, so satisfactory that, in due time, the additional capital stock will be utilized largely for investment in model tenements. But not the least gratifying issue from the enterprise is the fact that it is leading to emulation. The company's plans and methods, we are told, are being constantly copied and carefully studied by representatives of estates, architects and builders, and new enterprises on similar lines are being stimulated by the results they have already accomplished. The value of an extended movement toward improved tenement building in the city cannot be overestimated. There is hardly any other agency that is better calculated to benefit the poor than the provision of a decent, wholesome, comfortable home.

Ancient Sky Scrapers.

According to recent investigations of the building laws in force in ancient Rome which have been made by Professor Lanciani, the Italian archæologist, the sky scraper of our cities is neither a modern nor an American institution. In the course of his research he discovered some curious restrictive legislation aimed at the excessively tall buildings which were a feature of Rome in the time of Augustus Cæsar. The Senate of that day passed a law fixing the hight of new structures at 60 feet on the street front, the reasons being doubtless much the same as are advanced in New York to-day—namely, danger from fire, deterioration of the fabric of the structures themselves, complaints of darkened streets, &c. The number of stories on the street front of the Roman buildings was generally 10 to 12 with 14 or 15 in the rear. The lowest stories were 8 or 10 feet in hight, but from accounts given by the writers of that time the stories appear to have gradually diminished as the hight above the ground increased, so that the topmost tenants lived in quarters where very often they could not stand erect. In some instances the stories were often less than 5 feet, as is shown by the discoveries in Pompeii, where in a house inhabited presumably by poor tenants a story 4 feet 3 inches in hight was discovered. This was a living room, too, for in it were found all the articles pertaining to Roman housekeeping which, with the bones of the family, furnished indisputable evidence that the rooms had been occupied. Another interesting feature in connection with the Roman tenement buildings is that the rear of the building often rose several stories higher than the front, so that from a distant hight a row of tenement buildings in Rome presented the appearance of terraces, highest in the rear and descending by stories toward the front. They towered at least 100 feet above the street and probably 125 to 130 feet in the rear. How many stories were contained in these tenements is open to conjecture, but if the upper stories were no higher than those in the house in Pompeii, the Roman tenements may have contained as many, or more, stories than some of the modern office buildings which are to be found in the larger cities of this country. These tall structures naturally came to be regarded as inimical to public safety, and a law was passed fixing the maximum hight of all new structures as above stated. Thus it seems that history is merely repeating itself in our modern cities.

Technical Education.

The need of better technical education for operatives is impressing itself upon the minds of those interested in the textile industry, and the conviction is bearing fruit in the establishment of textile schools in the various centers of that trade. One has been in successful operation for some time in Philadelphia and an institution of the kind was established some years ago in Lowell, Mass. A few weeks since the Massachusetts Legislature passed two bills regarding technical education, one of which authorized Fall River to erect a textile school and the other is designed to encourage the establishment of a textile school in any city having a considerable mill interest. These are gratifying evidences of a growing desire to raise the standard of intelligent workmanship in this country. The movement for better trade education, initiated by the late Colonel Auchmuty in the foundation of the New York Trade School 18 years ago has not made the rapid progress that was expected. But it is steadily growing nevertheless, and although as a nation we still lag behind the most enlightened countries of Europe in the facilities afforded for technical and trade education, there are not lacking signs that the country is awakening to the fact that, if we are to gain and keep a commercial and industrial supremacy, the application of intelligence to industry must be fostered and stimulated in every way. The handicrafts are daily becoming more scientific and the education of the craftsman in any industry to-day must be a dual one, mental and manual. The combination of the workshop and the classroom is imperative to complete the education of the intelligent workingman.

Percolation Through Brick.

The results of some experiments to ascertain the most effective material for checking the percolation of water through brick or stone are given by A. W. Hale in a recent number of the *Engineering and Mining Journal.* The investigation was mainly carried out in connection with the new Croton aqueduct of New York, and the substances employed in the experiments were numerous and varied. It was found that Portland cement gave the best results, and that the hydrocarbons, which are commonly regarded as suitable materials for rendering brick or stone impervious to water, oxidized by exposure to air and gradually disappeared. It was also found that a brick was rendered impervious to water by cement more rapidly when the cement was applied as a wash by means of a brush than when applied with a trowel in the usual manner. A brick which had been treated with four cement washes was found at the expiration of two months to be quite impervious to water, even under a pressure of 200 pounds per square inch.

THE type of architecture now generally known as "steel skeleton frame construction," has at last been put to the severest possible test with entirely satisfactory results. In the earthquake at San Francisco, March 30, the destruction was general among buildings constructed in accordance with the old rules of architecture. Solidity of foundations and thickness of walls did not avail as protection against the seismic shocks. But the 19-story Spreckels Building, the tallest in the city, was not injured in the least, though it swayed like a tree in a storm. Nothing could be more conclusive as to the stability of the sky scraper, which, as we all know, is an interlaced skeleton of steel beams veneered with brick, stone or terra cotta. In commenting upon the fact that the sky scraper stood the test so well a contemporary says that "nothing can disturb their equilibrium. The only disaster possible would be an actual yawning of the earth which should engulf them entire. Otherwise they are proof against anything short of bombardment by high power guns."

Appointments of Modern Office Buildings.

A very good idea of the conveniences and appointments of some of the more recently constructed office buildings in this city may be gained from a visit to the Vincent Building, at the corner of Broadway and Duane street. In many ways this is an interesting structure whether viewed from the standpoint of the architect and builder or from that of the prospective tenant. It was erected in a shorter space of time than any building of its size in this city, the concrete foundation having been started in June of last year, the first brick laid on August 26, and the last on December 24. The offices are intended primarily for the convenience of commercial lawyers, to attract whom a law library of 3000 volumes has been brought together on the fifteenth floor for the free use of tenants. Elevators run the entire night, towels and hot and cold water are supplied in every office, and there is a bath on every floor. An intercommunicating telephone system, electric clocks in the principal rooms, and messenger calls and fire alarms in every office are additional elements in a service, which, with the exception of the telephones, is comprised under the head of rent. It is probably safe to say that in its elaborateness of service it is ahead of any building of its kind in this or any other city.

Metallic Cores in Mortar and Concrete.

The results of an investigation by M. Considère to ascertain the value of metallic cores for strengthening mortar and concrete have recently been published in the *Comptes Rendus.* It has been said that metallic cores can have very little strengthening effect upon the mortar, since the mortar cannot undergo an elongation of 1-10 of a millimeter without breaking; but M. Considère has arrived at the conclusion that mortar armed with an iron core can undergo without rupture an elongation 20 times as great as would be possible without the aid of a core. Tests were made with various mortars and concretes, using prisms of square section 60 cm. long and 6 cm. in the side, in which were imbedded rods or wires of iron. M. Considère is of the opinion that injury to buildings by the settling of foundations, unequal expansions and shocks is much less liable to occur when cores are used, and finds that wrought iron and hard steel of the kind used for rails is capable of strengthening mortar and concrete to a much greater extent than is the iron usually employed for cores.

COMMISSIONER-GENERAL PECK, who has lately returned from Paris, brings most favorable reports of the prospect for a fine showing of United States manufactured products at the Paris Exposition of 1900. In the line of machinery and appliances the exhibits from this country promise to eclipse those of every other nation, and in all respects the United States, he says, is likely to make as good an all around showing as any other country. The large amount of space secured for the American exhibits has been already applied for by prospective exhibitors, who include the most representative concerns in various lines of industry. The American exhibition buildings are now being erected, and everything is reported to be in a forward state of progress.

A DOUBLE HOUSE AT RED BANK N. J.

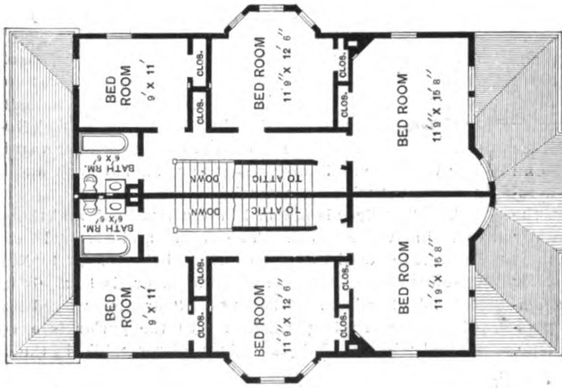
WE take for the subject of our half-tone supplemental plate this month a modern double house, erected not not long since at Red Bank, N. J., for J. S. Throckmorton, Jr. The half-tone engraving clearly shows the appearance of the finished structure and the architectural style in which it has been treated, while an examination of the floor plans, which are presented herewith. reveals seven rooms and bath for each family, the house being divided vertically instead of each family having an entire floor, as is the practice in some sections of the country, more particularly throughout the New England States. We learn from the architect's specifications that the foundation walls are 12-inch brick, plastered on the outside and blocked off to represent stone. The frame of the house is sheathed with hemlock, on which is laid building paper. The first and second stories are covered with 5-inch beveled white pine siding, and the base and gables with 5 x 20 inch sawed cedar shingles, all as shown on the elevations. The roof, including both front and rear porches, is covered with slate underlaid with paper. All the moldings, water table, corner boards, belts, bands, &c., are best quality white pine, as are also the cornices and wood work of the porches. The studding is 2 x 4 inch sound hemlock; the first and second floor beams are 2 x 10 inch, and the attick floor beams 2 x 8 inch spruce with 2 x 6 inch hemlock rafters. All the ornamental work on the outside of the building is stamped metal.

Both sides of the house are alike and both sides are finished the same. The wall dividing the house is filled with brick from cellar to the floor of the attic, the division for the rest of the way in the attick being a boarded stud partition. The front piazza is of the colonial order with heavy 8-inch turned columns, rail and balusters. The piazza is ceiled overhead with narrow beaded North Carolina pine and treated with two coats of Spar varnish. The vestibule and outside doors are made of oak and are also treated with Spar varnish.

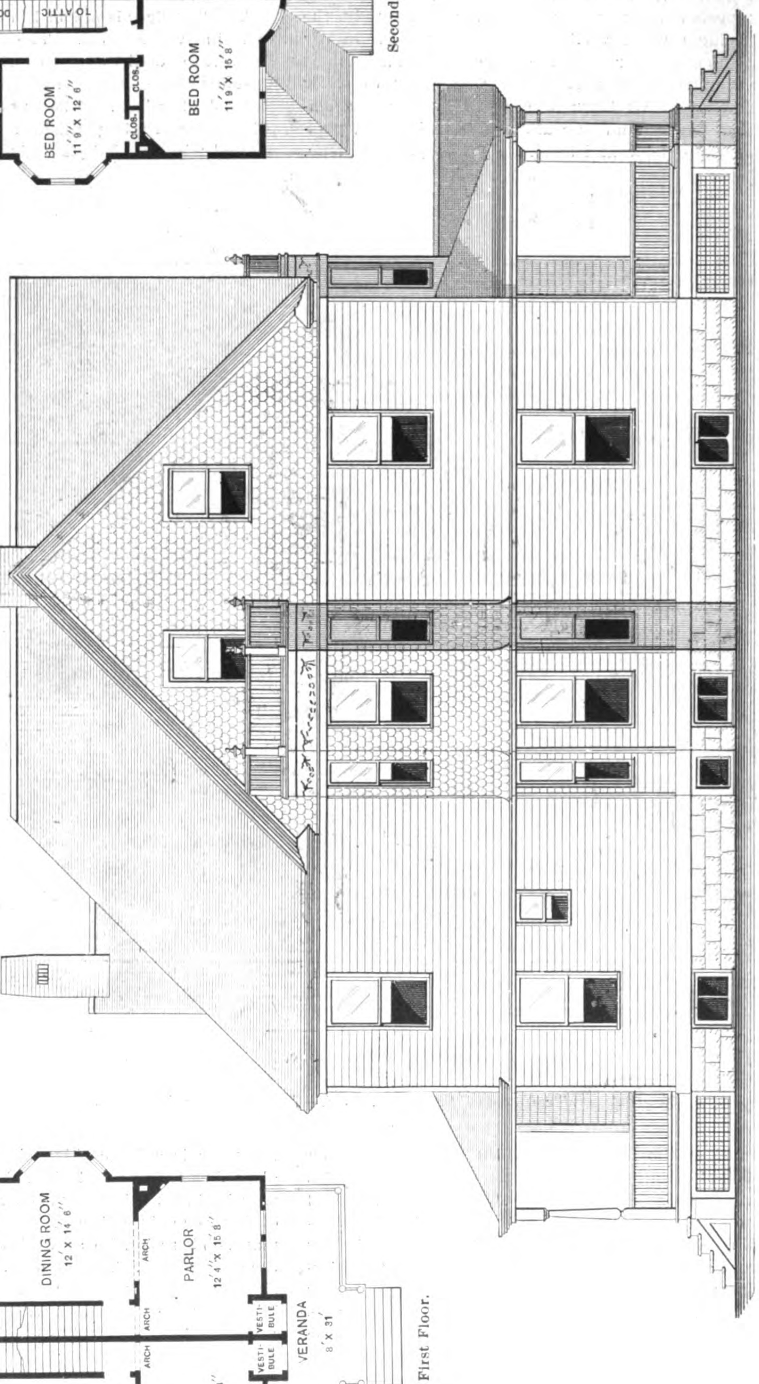
The first floor is finished in quartered oak and the second in white pine. The first and second story floors are double, the flooring being No. 1 North Carolina pine, while the attic floor is 1 x 6 inch dressed hemlock. The first floor is waxed and all wood work is varnished. In the parlor is a neat mantel with beveled plate glass mirror, while in the dining room is a large china closet built in one side with glass doors above and eight drawers below. The stairway leading to the second floor starts at the side of the dining room through an archway, as shown on the floor plans. There is also an arch conecting the parlor with the dining room. The kitchen is fitted with range, boiler, sink, two-part laundry tubs, &c. At one side of the kitchen is a pantry fitted with shelving and lighted by a window. The kitchen has two large windows and a sash door opening on the rear porch, the latter extending the entire width of the house. On this porch is a trap door which leads to the cellar from the outside. The cellar stairs are under the main stairs, which lead to the second floor. In connection with the sleeping rooms on the second floor are ample closets, and there is also a large linen closet opening from the hall. The bathroom is fitted with white porcelain lined bathtub, marble top wash basin and

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

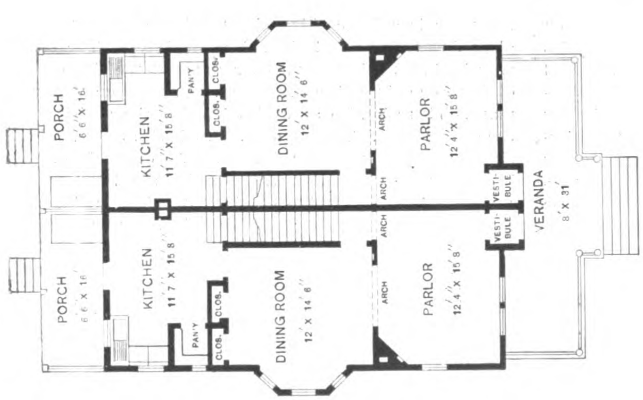
A Double House at Red Bank, N. J.—E. A. Terhune, Architect, Newark, N. J.



Second Floor.



Side (Left) Elevation.



First Floor.

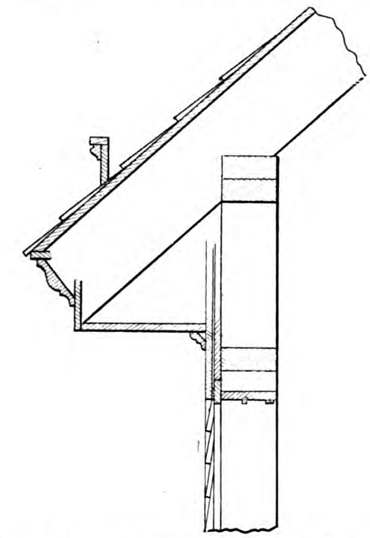
A Double House at Red Bank, N. J.—Floor Plans.—Scale, 1-16 Inch to the Foot.—Elevation.—Scale, 1/8 Inch to the Foot.

DOUBLE HOUSE ERECTED FOR J. S. THROCKMORTON, JR., AT RED BANK, N. J.

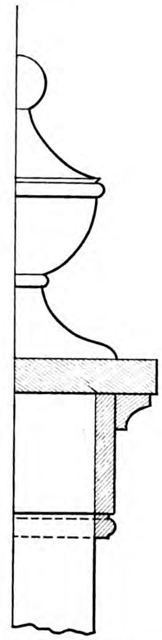
E. A. TERHUNE, ARCHITECT.

porcelain closet, all fixtures being nickel plated and fully exposed. The attic stairs rise directly over the main stairway and have a door at the bottom. In the attic is a large room finished for occupancy. All walls are covered with hard white plaster. The cellar extends under the entire house and contains hot air furnace, coal bins, &c.

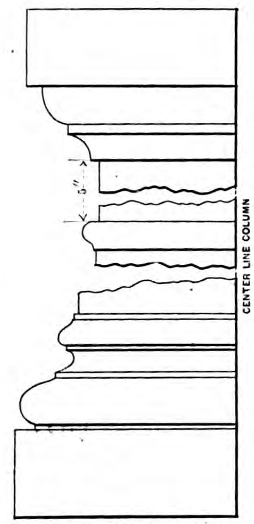
The house here illustrated is painted a bottle green with ivory white trimmings, and was erected at a cost of $3450, ready for occupancy, the drawings having been prepared by Architect Edgar A. Terhune of 10 Central avenue, Newark, N. J.



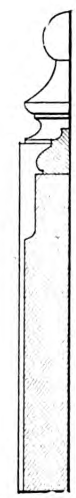
Detail of Main Cornice.—Scale, 1 Inch to the Foot.



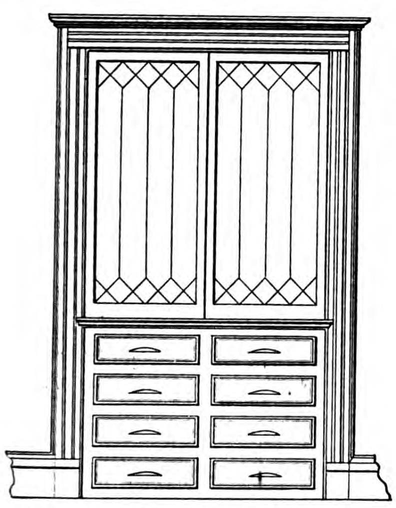
Detail of Newels on Bays — Scale, 3 Inches to the Foot.



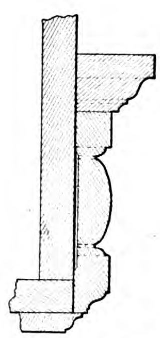
Detail of Porch Column.—Scale, 3 Inches to the Foot.



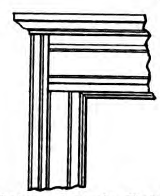
Base and Corner Angle.—Scale, 3 Inches to the Foot.



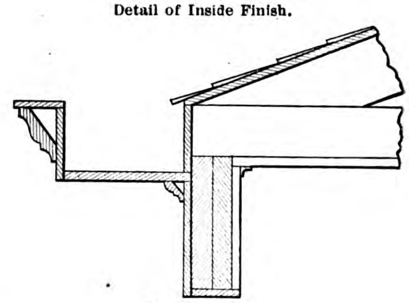
Elevation of China Closet.—Scale, ⅜ Inch to the Foot.



Detail of Door and Window Trim.—Scale, 3 Inches to the Foot.



Detail of Inside Finish.



Porch Cornice.
Scale, 1 Inch to the Foot.

Miscellaneous Constructive Details of Double House at Red Bank, N. J.

Keramo—A New Building Material.

In a recent letter to the State Department Consul Warner, writing from Leipsic, Germany, calls attention to a new building material which has been placed upon that market. It is known as Keramo and is said to be composed principally of glass and is manufactured at Penzig, Silesia. He says: As far as known this material is made from powdered glass waste, which is hardened by a special devitrifying process and combined by means of strong pressure. In this way the transparency, brittleness and fragility of the glass are destroyed, but other prominent properties—extraordinary hardness, stability against exposure to the weather, nonconduction of heat, noninflammability, insensibility to oil, grease, acids, &c.—are retained in this new material.

Keramo can be used with good results for wainscotings in the interior of buildings, for covering floors in houses, kitchens, washing rooms, verandas, balconies, &c., and for rough casting of walls exposed to the weather, as well as for staircases which are to be fire proof. The color depends upon the color of the glass used in the manufacture. The price of Keramo is about $1.60 per square yard, and, so far, the trials which have been made with this product have been most successful.

AN English writer says that white lead is the best filler in the paint shop. Nothing else has its body, elasticity or durability. It has too dense and smooth a body to be used alone. Some substance less dense and solid has to be mixed with it to make it rub or grind without clotting or filling up the stone with which it is being rubbed. If white lead could be made to rub well nothing else would be needed to fill and paint a white job.

PLAIN AND ORNAMENTAL PLASTERING.

AMONG the papers presented at the eleventh convention of the Ontario Association of Architects was one by W. J. Hynes, dealing with the subject indicated above, in such a way as to be of interest to many readers of this journal, and we take pleasure in presenting the following extracts:

I purpose making a short review of materials before taking up their use and application. The first is lath. My experience calls for great care in the selection of this material. A soft white pine, that will stay where it is nailed, is my preference. It should be seasoned, but not necessarily dry, and have a straight grain. When a dry lath is coated with mortar it must necessarily swell, and when it dries again it must shrink. A lath which is not thoroughly dry will not have so much shrinkage and will have a more secure key. Wire lath nails 1⅛ inches long are what we generally use; there is no advantage in having them heavy, but they must have a good flatted head. Metal lath is now offered in many forms. I do not intend to indicate my preference; there are several good articles on the market. I will merely ask you to examine samples in the full sheet—note the stiffening. They should be rigid every way. Satisfy yourself as to the key and effect upon it of a settlement or shrinkage in the building, and always have it painted or galvanized. Wire lath is good—it is almost all key. It is more expensive to buy, apply and cover than metal lath, and for that reason is not so much used.

Lime mortar is in general use, and most of our specifications for the preparation are taken from English authorities. Good work can be done with lime, but it is a very variable article. We are well served in Toronto, but some very bad limes are used in the country. Our mortars are mostly made from gray lime. They are cool in working and should be given ample time to thoroughly slack before mixing with sand. Haste upon the part of the mortar man or a tendency to stir up the mass before it has slacked will most likely result in lime pitting on the finished wall. In some lime, or in fact in all lime, if not properly burned, there is great danger from this. There seems to be an underburnt core which very often disfigures good work. As this generally occurs in winter work the cause is more often with the mortar man than with the lime itself, but be as careful as you may it will occur sometimes.

Lime Putty.

Lime putty is made from white lime, generally called fat or rich lime. It is run in large vats and should stand a month or more before using. This material has no strength in itself and requires to be mixed with sand or gauged with calcined plaster before use.

Hair is necessary for mortar for use on lath work, and a smaller quantity is of decided advantage to the straightening or browning coats. It should be clean, well saved, long, winter cattle hair. Hemp, sisal, palmetto fiber and many substitutes are used instead of hair in other places, but are not offered on our market.

Calcined plaster, the most useful of our materials, is used for many purposes. By mixing one-fifth to bulk with lime putty we obtain the compound for what we call "hard finish." A greater quantity mixed with the same putty allows us to form run moldings. Where the thickness of molding is too great to use putty and plaster the work is cored out with mortar gauged with plaster. Quick work can be done by gauging the first coat of mortar in plastering to admit of finishing at once.

Its greatest use is in molding and casting decorated ornaments, staff and fibrous plaster work. The property it possesses of swelling when setting serves to give us most faithful and accurate copies from any original, hence its extensive use in fine art. In addition to this, calcined plaster forms the basis of nearly all the patent or prepared plasters. By the addition of retarding and hardening compounds its setting is delayed sufficiently to allow of mechanical manipulation, while its ultimate strength gives a much stronger wall at once than can be obtained by using lime. My own conviction is that in time most all our work will be done in those materials or with machine made mortars whose proportions are fixed and accurate. Plaster is also the base for the white cements, such as Keene's, Parian, Martin's and others.

Preparation for Lathing.

Before speaking of lathing I have something to say about the necessary preparation therefor. The genius who first conceived the idea of making the plasterer responsible for the carpenter work by a clause in the specifications calling on him to examine all studding, strapping, &c., before lathing, and if not found correct to stop and report same to the architect, could not have grasped all the facts: 1, The carpenter is a bad man for the plasterer to fall out with; 2, tale bearing is not congenial work; 3, lathing is done at the rate of 2 or 3 cents per yard by a boss lather who is hustling a gang to make his work pay. It is easier and cheaper for him to get over the carpenter's bad work than to lose time and report it. If the angles are not solidly nailed the lather is not likely to do it; if a line of joisting demands the cutting of 8 or 10 inches off the lath for a long distance, the chances are the lather will find a convenient board or scantling, place it where the joists or stud should have been, and make his nailing to this loose piece, trusting to the lath nails to hold it until plastered. This is bad—very bad; but who is to blame? I say the architect. If joisting and studding are not sized and one bulges below or forward of the others, it is easier to add on a few laths and give the wall or ceiling a graceful but incurable curve than to wait on a carpenter to trim it. Kindly examine the carpenter work yourself; don't dodge or depute your responsibility.

Have your lath laid in bays with breaks every 15 inches. Have a ⅜ key on walls and slightly larger on ceilings. Don't allow carpenter work to force the use of vertical lath. Have heavy timbers counter lathed. Don't allow laths to break over door post; slamming that door will break the plaster. Use plenty of bridging on joisting and studding. Strap all ceilings. Have false arches and beams made very rigid with as little timber in their make as possible. See that all junctions of wood and brick work are nailed very solid, and have them covered with metal lath; 16-inch centers is the greatest distance that should be allowed for 1⅜ lath; it is too great for 1-inch lath; they should have 12-inch centers. Try and have your work so correctly planned that the lather can make money; he will give you a good job with pleasure. The only way I know to do this is to have that greatest of all boons on a building, a good carpenter—the only way to get one is to give him a good paying price. He wants to live, too.

Now before the mortar is applied, before even the lathing is started, any ordinary good job should be well prepared by grounds. This is generally done badly, and the results are always to be seen before completion. The entire details of the interior finish should be made before this work is done; it's the only way if you want it correct. I wish to impress upon you that good plastering demands solid, firm and well prepared work to secure it. I am not here to tell you what bad plastering requires, but your chances of holding up bad work are good if work is prepared properly.

(To be continued.)

A MARKET building of more than ordinary proportions is about to be erected in this city from plans which have been prepared by David W. King. The drawings call for a ten-story and basement brick and terra cotta market building, covering an area of about 126 x 125 x 150 feet, to be erected at the corner of Eighth avenue and Forty-ninth street, at a cost of $175,000. The plans were filed by the Cushman Syndicate, and we understand that the American Market Company will lease the building when completed.

MAKING WOOD PATTERNS.—III.

BY CHARLES J. WOODSEND.

THE next pattern will be one for a cast iron sill suitable to go with the lintel previously described. The outside width of the sill is 10 inches, of which 6 inches is beveled to give a fall of ¾ inch. An isometrical view of such a sill is presented in Fig. 22 of the engravings. The thickness shown upon a line with the face of the brick work when the sill is in its position—that is, 1½ inches back from the front face of the sill—is 5¼ inches. In making the pattern for this sill we have several questions that require consideration, having regard to the finished product. The first consideration is, that the finished sill shall not cost more than is absolutely necessary, consequently we must be on the lookout and make reductions in the metal wherever possible. The second consideration is, that the finished sill shall be true and out of wind, at least so far as regards the pattern maker's work; and the third consideration is how to make the pattern " draw."

The sill is to show a 5¼-inch face on a line with the face of the brick work and project out from that 1½ inches. In making a sill 4½ or 5 feet long this projection would represent a considerable mass of metal—more so than there is any necessity for—and which in the cooling would warp the other part of the sill out of shape unless ends of the front must show 1½ inches thick, as that is the amount of the projection from the face of the brickwork. The methods of doing this are shown in Figs. 23, 24, 25, 26 and 27. By examining these figures it will be noticed that there are hollowed pieces in all the interior angles.

These hollows are not "coves," neither are they "scotia," but by pattern makers are called "fillets." These are ½-inch fillets—that is, their radius is ½ inch. In striking these fillets upon the drawing board it is necessary to have one of the points of the compasses round and the other point sharpened similar to a drawing pen, so that the mark made shall be a cut instead of a scratch. After the section has been marked upon the drawing board take some finely powdered white chalk and sprinkle over it. Next, with a piece of fine sandpaper, rub the chalk well over the board where the drawing is. Brush off the surplus chalk and with a moderately hard pencil, sharpened to a fine chisel point (not a round point) go over all the lines of the drawing. This will give a correct drawing from which to work and one that is not easily rubbed out.

The pattern is best made of white pine, selected, free from knots and soft in the grain.

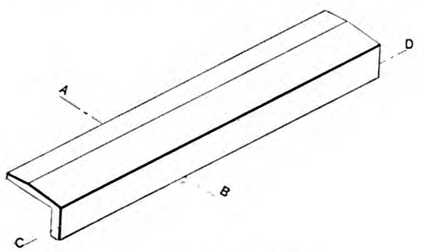


Fig. 22.—Isometrical View of Sill.

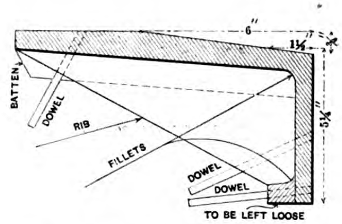


Fig. 23.—Enlarged Section of Pattern of Sill on Line A B of Previous Figure.

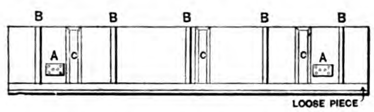


Fig. 24.—View of Under Side of Pattern of Sill.

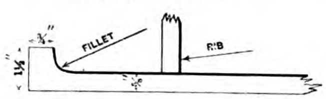


Fig. 25.—Partial Section, Enlarged, of Pattern of Sill on Line C D of Fig. 22.

Making Wood Patterns

it was made heavy in proportion. Now in this case, as there is no very great amount of strength required, we must seek in what places we can make reductions in the metal; in what way we can do it and at the same time have the pattern to " draw." The method of doing this and at the same time fulfilling our obligations is clearly indicated in Figs. 23, 25 and 26.

Before making this pattern it is advisable to lay down a full size section upon a drawing board, using the shrinkage rule, and making all the dimensions the same as it is intended the pattern shall have. In this connection it is essential to learn to be exact in the measurements, remembering that even a line has breadth. Lay down the drawing with a knife, which will enable one to work closer than a pencil might do, while at the same time the lines are not so easily obliterated. If we make the upper part of this sill 1 inch thick in the thickest portion it will be sufficiently strong for the purpose for which it is required. The whole amount of the bevel is ¾ inch, but if we take all off toward one edge, there will only be ¼ inch of the metal left, which would be too little, so we will take off ⅜ inch toward both edges of the top. This is ample for the purpose. Now as the edges of the top will be ⅝ inch thick we must make the body portion of the plates the same thickness so as to allow as nearly as possible of uniform cooling. The lower edge and the two

The top of the sill is to be worked first, planing the under side of it perfectly straight and out of wind. Plane the edges straight to the proper bevel and width. Now make a template the exact shape of the section of the top as marked upon the drawing board. Transfer this to the two ends of the stuff, marking neatly with a knife. A fine gauge mark may be run upon each edge, giving the proper thickness. The other part is to be planed down until a straightedge touches the mark at both ends and all along the board. Of course it goes without saying that the bench should be perfectly true.

Now take the front, which must be planed true, out of wind and straight; gauge to a width, bevel the edges and gauge to the thickness shown upon the section. Cut off the top and front to the required lengths by the shrinkage rule and nail the two together, putting a little glue in the joint. The top should nail on to the front. Nail securely and see to it that the bevel is correct. Plane the ends smooth and give both pieces 1-32-inch draft to the outsides. Note that when speaking of the outsides it is intended to mean those parts of the pattern which, in the finished sill, will be outward and upward when it is in position.

The next step is to get out the loose piece to make the lower edge of the front, showing 1½ inches in thickness. This piece is clearly indicated in Figs. 23, 24 and 26. Notice particularly in Fig. 26 how this piece is worked.

There must be "draft" given in the direction of the arrow, and it will also be noticed that the fillet where it touches the front is not worked quite down to a feather edge. If it were so worked down it would be liable to injury in handling and a little unevenness in this position will not make any difference; even if it did, the molder could clean it up in the sand—"strike it off," as they would say. This loose piece must run the full length of the pattern; the ends cut off even with the ends of the front, and draft must be given them in a reverse direction to the draft upon the ends of the front. Fig. 27 shows what is intended. Tack this piece in its place, making it firm, but leave the nails so that they may be easily drawn. Now work the two pieces that will nail across the ends of the plates, these being shown in Figs. 25 and 27. They will be similar to the loose pieces already described and are intended to so form the front as to show the 1½ inches projection required. These pieces should be worked out roughly, cut into their places, coping them neatly up to the loose piece; glue and nail them securely and then work down as in Fig. 27, making a draft as piece ⅜ inch each way. Plane off to the bevel formed by the gauge marks; screw or nail them together so that the bevels shall form a V down one edge. This "shooting board," when laid upon the bench and a screw put in for a stop, is very useful for jointing thin pieces of stuff. The material is held down by the left hand upon the highest step of the board, while the plane is laid upon its side upon the lower step with its face toward the operator and worked with the right hand. By placing the "shooting board" in the bench vise with the V upward and having a small screw for a stop we have a handy arrangement for working fillets as well as dowels.

Having gauged up the fillet for the pattern, lay it in the V of the "shooting board" and take off the corner as indicated in Fig. 31. Now cope this over the fillets at the two ends of the front, glue it into its place, and if so desired a few small wire nails may be put in. In gluing for pattern work use the glue thin and put it where it is needed and nowhere else. A little care and practice will enable one to readily do this.

The fillet, we will say, is now in position, and the glue quite dry. Work it down to the template with the gouge, making it a regular curve, as shown in Fig. 32. Sandpaper the work already done so that it will be nice and smooth. Putty up the nail holes and then give it two coats of shellac. Rub down again with No. 0 sandpaper; then give one final coat of shellac.

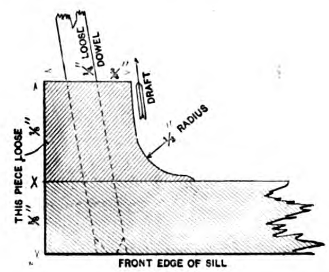


Fig 26.—Broken Section of Pattern—Three-Quarters Full Size.

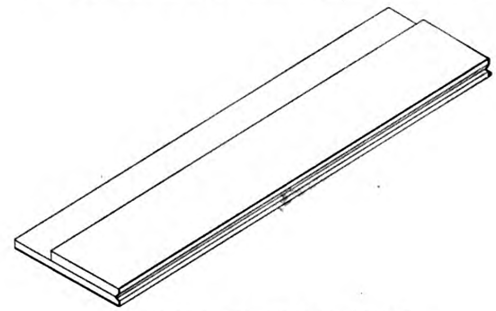


Fig. 29.—View of a "Shooting Board."

Fig. 28.—Pattern Makers' Gouge.

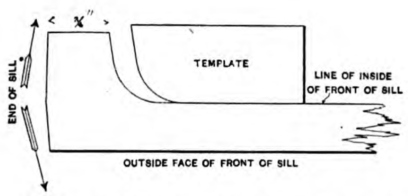


Fig. 27.—Partial Section, Showing Use of Template.

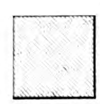


Fig 30.—Fillet Gauged Up ½ Inch Each Way.

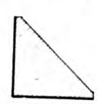


Fig. 31.—Fillet with Corner Taken Off.

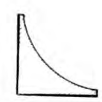


Fig. 32.—Fillet Worked Down to Template.

Making Wood Patterns.

shown. The inside should be worked to a template, Fig. 27, this template being neatly made of very thin stuff and applied as shown in the drawing.

These fillets are best worked out with a pattern maker's gouge, which is far ahead of any planes for this purpose. Pattern makers' gouges are similar to what joiners call a "coping gouge," only longer in the blade, the bevel or basil being upon the inside. Some are straight in the shank and others are bent. A pattern maker's gouge with a bent shank is shown in Fig. 28. The tool is made in all sweeps (curves) and widths.

The next thing to be done is the fillet upon the inside of the pattern at the angle of the front and top, Fig. 23. Fit a piece of stuff neatly to the angle, then gauge it up ½ inch each way, as shown in Fig. 30. In connection with this it may be well to mention a very useful article used by pattern makers and called a "shooting board," a view of which is shown in Fig. 29. This shooting board is made of two thicknesses of ⅞-inch white pine in different widths, the narrow piece being about 9 inches and the wide one about 12 inches in width, while 3 or 3½ feet is a handy length. The two edges wheer the V groove is should be jointed straight; the others may also be pointed, but it is not necessary. Both pieces should be out of wind. Run a gauge along one side and one edge of each

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IN his testimony before the Industrial Commission at Washington the secretary of the United Brotherhood of Carpenters and Joiners stated that since 1883 the carpenters of the country had participated in 1026 strikes, of which they had won 898, compromised 67 and lost 61. In the past three years they had struck 83 times, won 74, compromised 7 and lost 2. Although wages were about the same in money, they had increased in purchasing power from 30 to 40 per cent. during the past 30 years. This increased purchasing power, which is in reality an increase in wages, has benefited all wage earners. They live in better houses, eat better food and have warmer and better clothing. The full meaning of this improvement has doubtless been lost sight of by many in the desire which it has created for an even greater advance. This social advance has been accompanied by increased intellectual activity which has made many people dissatisfied with their condition and position in life.

CONTRACTS AND CONTRACTORS.

A SUBJECT upon which a great deal has been written and about which a great deal more may profitably be said is that of "contracts" and those who are called upon to execute them. In a recent issue of the *Brick-builder* appeared an article by John L. Faxon, which dealt with this question in a most interesting manner, and we present extracts of it herewith. At the outset the author explains that by the word "contractor" he means to imply those who contract for work of any kind and includes both principal and sub-contractors, although the evils of the present system which he discusses relate more particularly to the sub-contractors. He says:

It may be said with truth, I think, that all contractors would, individually, decidedly object to an owner's attempt to beat the contractor out of from 1 to 5 per cent. of the contract price, and yet many contractors think it quite legitimate business to beat the owner out of from 1 to 5 per cent. of the work, materials and labor for which he has contracted. Contracts generally are of two forms —oral and written (sometimes implied, but implied contracts are rare, except as parts of an oral or written contract,) and usually both embrace some things implied and not specifically spoken or written.

Oral Contracts.

An oral contract may be and is just as binding as a written one, provided the terms are simple, direct and made before two or more witnesses. For instance: If A agrees with B to furnish something in six months from date, for a stated sum or consideration, it matters not whether the value of the thing to be furnished by A goes up or down: if it goes up, A cannot plead that he cannot or will not fill his part of the agreement because he will lose money; and on the other hand, if the value goes down, B cannot plead that he will not fill his part of the agreement because the thing can be procured for less money; the original terms constitute the contract. A cannot furnish a poorer thing, and B must pay the full sum or consideration. The law will hold A and B to the bargain, if reputable witnesses are at hand to prove the terms of the contract. A contract *per se* is an agreement by and between two parties to do certain specific acts, each party agreeing to do or provide something which is to stand as an equivalent for that which the other party is to do or is to provide.

Specific Contracts.

The nature of the specific contract (legally) may not imply, or provide, mean, or guarantee, that what one party is to do or provide is to be, or if necessity must be, a full equivalent for what the other party is to do or provide (morally, of course, it should be so; and on the other hand, morally, a contract once made, its terms should be faithfully performed whether they are equivalent or not providing the making of it was not gained by fraud). The contract is *prima facie* evidence that the things to be done or provided by the parties were considered, at the time of making the contract, as equivalent; and the terms must be fully performed by both parties. If X contracts with Y to deliver a ton of beans, of specific grade and quality, for $1, the contract is just as binding as if Y was to pay the full market value of the beans. X must furnish the kind of beans specified, Y must pay the dollar; and the same would be the case if Y had agreed to pay twice what the beans were worth. The law, rightly and judicially, cannot go back of the specific terms of the contract, providing said terms have not been modified, and have been strictly adhered to; if Y ordered X to furnish 2 tons of beans and then refused to pay for them. Y can be made to pay, for the additional ton, at fair market rate, provided it was not understood to the contrary—the second ton of beans would be "an extra," so to speak; and on the other hand, X is bound to furnish 100 per cent. of a ton of beans, and not 99 or 95 per cent.

So also, if a contractor duly agrees to erect a building for a specified sum, it matters not whether the sum to be paid is a fair market value for the building; either way, the execution of the contract is *prima facie* evidence that both parties knew what they were about and doing at the execution of the contract; and the law will hold the parties to it, so far as it goes, taking into account the evident nature and use of the building and the evident intent and meaning of the contract, as applied to the particular building in question.

Building Contracts.

A building contract, or one that pertains to a building, differs materially from all other contracts, because the very nature of it embraces and contemplates innumerable details of essential importance, and many things which of necessity must be implied rather than specifically mentioned or illustrated. It is therefore needful that contractors should know and understand that the greater includes the less; that the contract *per se* includes and governs the plans and specifications, and that the plans and specifications do not govern the contract, only in so far as they are specifically illustrative and explanatory of the contract. The contract goes further than the plans and specifications, for the contract may imply—generally does—things not specifically set forth in plans or specifications, but which are needful and requisite to the due and proper execution of the contract and the erection and completion of the specific building according to its class and destined use. Most contractors do not understand or realize this implied element of contracts, which is, nevertheless, an integral and essential part of all building contracts; and herein comes the need of technical training.

In illustration of the implied condition I recall two separate cases, of parallel nature and effect. Contracts were made for the erection of two houses, which provided that said houses should be "built and completed," or words to the same effect; in the one case, the architect omitted to specify the finish flooring, and in the other, the architect specified the boards, but omitted to specify the laying. The contractors refused to furnish and lay, the cases went to court, and the courts decided against the contractors, and rightly, for in either case (without specific conditions to the contrary) the houses would not have been properly built and completed, or the contracts duly performed, without the finish flooring, properly provided and properly laid; for the courts hold that a contractor cannot take advantage of an evident unintentional omission of the architect which is essential to the due and proper erection and completion of a building, which is general and customary in and for a building of its class. The extent to which details (not specifically set forth in specifications) may be carried depends of course upon the architect (if there is one, as there should be in all cases), and what one architect may or does require has no bearing upon what another architect may require, except in case of disputed contract being taken to court, when the finding will probably rest on the testimony of competent experts; and in such case it would be a question of extent and quality and not of outright omission. Nine times out of ten contractors had best rest their case with a reputable architect rather than take it to the courts. The architect's technical knowledge and his faculty of looking at all sides of a question best fit him to decide such matters.

Duty of Architects.

And herein comes the professional duty of the architect to see that his plans, contracts and specifications are clear, specific and technically intelligible. Architects are not responsible for lack of knowledge in contractors, as to the reading of plans or the technical terminology of contracts and specifications. Plans and specifications are prepared for the intelligence of the trained mind; they are of necessity technical and scientific when properly prepared; all ambiguity and chance for misconstructions should be carefully avoided; the architect should know what he wants, and clearly specify it, and require that and nothing else to be furnished. On this rests his professional reputation, and the solidity, finish and economy of his work. Some architects err in the making of plans less full than what they should be, and in the attempt to "boil down" specifications. This is a mistake, both as regards clients and contractors; while brevity is the soul of wit, brevity is not the most desirable quality in plans and specifications. For as things are, competition will always be sharp, and the temptation "to get the job" sometimes gets ahead of the judgment of even the best contractors, while others figure to "get the job anyway," trusting to luck, persuasion, or other means to be "let up on" when the building is under way. The architect will therefore avoid misunderstandings, trouble and vexation, by making his plans and specifications specific and careful in detail, so as to facilitate intelligent estimating and avoid misconstructions and "extras."

Some contractors object to plans and specifications "too much in detail," as such plans and specifications do not allow "chances for a lot of extras." This is a mistake on the contractor's part. Clients do not take kindly to "extras." The most satisfactory contract all around, and the strongest for both sides, is that one which is complete in itself, and under which a building is erected and completed without "extras." This is not always feasible or possible, but it is the best policy when possible.

One Contract Bearing on Another.

Another erroneous idea which many contractors have is that the provisions of one contract have a bearing upon another contract; and they try to enforce their argument by what they consider "customary" or "my way of doing it." Now it needs to be clearly understood that such arguments have absolutely nothing whatever to do with a contract; the provisions of two contracts out of the same architect's office have no bearing whatever one upon the other. Each contract is of itself apart, separate from all others, and is to be considered and executed solely in respect to the individual case which it represents. Circumstances alter cases, and it does not follow, because an architect specifies a certain thing, or a specific manner of doing work in one case, that he desires or deems it advisable in the next. The trained architect learns something between one "job" and another which he did not know before; he keeps ahead of himself, so to speak. Contractors should, therefore, carefully examine and read each set of plans and specifications and contracts, and thoroughly digest them, and not take things for granted, or "guess at the cost of it;" the time has gone by for such things.

Profit and Loss.

The immoral effect of profit or loss on the contractor and its reaction on the architect is another evil of the present system; it may be argued that contractors need, must, take into account profit and loss; granted, but the time to take this into account is at time of estimating and before the contract is executed, not afterward. No law compels a contractor to take a contract at a loss; he is a free agent in the matter; but after the contract is executed the question of profit or loss has absolutely nothing whatever to do with the matter, and should not be referred to or considered, either by contractor or architect. The altogether too prevalent custom of endeavoring to influence the architect's judgment and requirements by reference to profit or loss is distinctly immoral and reprehensible, and lowers the tone of that integrity which should be the guiding rule of action in such matters. There may arise honest differences of opinion as to details; these should be settled *per se*, without reference to profit or loss, and by the determination of the architect, he being the only competent person to rightly interpret the plans, specifications and contract. It may be claimed that "architects are sometimes exacting, overexacting;" nevertheless I do not think that such claim can be substantiated, certainly not to any material extent, and certainly not with any architect who is well qualified for practice of his profession. The difference lies in the different points of view of contractors and architects, and I think, as a general proposition, it may be said that there is more need of contractors advancing to the architects's point of view than the reverse.

Another consideration which should be taken into account is, that every architect who demands and requires the honorable and full execution of contracts in his hands is doing just so much to drive "low bidders" and irresponsible and incompetent contractors out of the field, and is doing just so much of good and benefit to every reputable and responsible contractor, and doing much toward establishing honest work at a fair price. Architects should bear in mind that poorly prepared plans and loose, ambiguous and carelessly drawn specifications and contracts are a boon to the low bidder and irresponsible contractor.

Reputable architects desire to deal with reputable contractors, who can be depended upon to carry out the architect's plans and directions in a friendly spirit of honorable compliance, and take pride in doing so; and to such contractors architects wish them a fair price with a fair profit. The best work is done none too good, and is the only kind which will redound to the credit of the contractors and architects, and is the only kind which is for the client's interest.

America at the Paris Exposition.

Some very interesting information as to what the United States is doing at the Paris Exposition was presented in a recent address by Commissioner-General Peck, who stated among other things that the plans for all the United States buildings have been approved by the French authorities, and work upon them is now under way. There will be five United States buildings in the main grounds and two in the Bois de Vincennes, the annex to the exposition. The National pavilion, which will be the only expensive building this country will erect, will be on the bank of the Seine, alongside of the structures of numerous other nations, with Austria on one side and Turkey on the other. Our other buildings will be annexes to the main structures built by the French administration, and will be for exhibiting purposes only. At Vincennes we shall build a structure for American machinery in operation, and a building for our life-saving service. We shall divide, with the French Exposition Company, the cost of the building for railroad exhibits and for automobiles, and we have secured a site upon which our bicycle manufacturers will erect a beautiful structure. The Bois de Vincennes is about six miles from the main grounds, and will be reached by railroads and by the River Seine, connecting with a tramway for one mile, which latter route will be known as the American route, the boats and cars carrying the American flag. I believe, said Mr. Peck, that a large proportion of the visitors to the Paris Exposition will go to Vincennes, as it will be made most attractive, and the trip, especially by the river route, will be delightful. Some 20 per cent. has been added to the wall space allowed for the American Fine Art Exhibit, and besides the privilege has been obtained of exhibiting sculpture throughout all of our sections. Everything is expected to be ready ahead of time.

IT would be hard to beat the recent record in town building made by Mountainview, Washita County, Okla. On Monday the town site was a prairie. The same day it was surveyed and platted and a large portion of it sold and settled upon. Washita River was bridged, and a vast amount of accumulated freight was moved and located. The town was organized and officered, and all lines of business and professions started in lines of organized society. The town in one day became a city of nearly 800, with Mayor, Treasurer and Police Judge, and a full complement of Councilmen and minor officers of an organized town. Some of the lots sold as high as $900 within 30 minutes of the time the surveyor drove his stakes.

BOND IN BRICK WORK.

BY BRICKBAT.

GOOD brick work can only result from a proper bonding of the bricks in the wall, and the bricklayer who does not pay proper attention to this branch of his work cannot possibly make the best of his opportunities. Properly speaking there are only two sets of bonds in brick work—that is, old English, so called, and Flemish.

English bond consists in laying a wall in courses of alternate headers and stretchers. The first course is generally formed of headers, the second of stretchers, and so on to the top of the wall.

In Flemish bond, each course is formed of headers and stretchers alternately, as shown in Fig. 1, which exhibits an external angle of a brick and a half wall. Fig. 2 shows an external angle of a two-brick wall with Flemish bond on face. The inside face of wall in both these examples is laid up in English bond, as will be noticed, for if a wall be more than one brick thick and faced with Flemish bond on both sides, the body, or section of the work, must necessarily be composed of a conglomeration of "bats," with scarcely anything to hold the wall together longitudinally but the mortar. In a 9-inch wall, the wall. To remedy this defect, the facing bricks should be slightly thicker than the rest; but, even then, the coarser joints in the body of the wall will settle more than the face work, so that bricks and joints of a uniform thickness throughout the whole body of the wall ought to be insisted on.

Figs. 4 and 5 show the alternate courses of a 9-inch wall laid in English bond. They also show both an external and internal angle, and the manner of finishing them by making use of a "queen closer," O O. A "queen closer" is a half of a brick and is formed by splitting a brick in two along the center of its width. This closer is necessary at regular intervals in the header course, because in this course the joints are twice the number of those in the stretcher course, and but for the queen closer the joint in the header course would, sooner or later, stand over a joint in the stretcher course—work that could not be permitted. The figures presented show this bond to be formed by alternate layers of headers and stretchers, one wing in each figure showing a course of headers, and other wing showing stretchers.

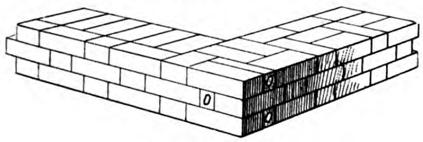


Fig. 1.—Example of Flemish Bond.

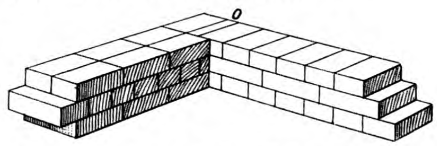


Fig. 5.—Internal Angle of 9-Inch Wall in English Bond.

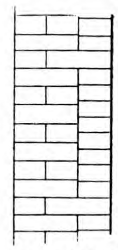


Fig. 3.—Showing Contrast Between Face Work and the Remaining Portions.

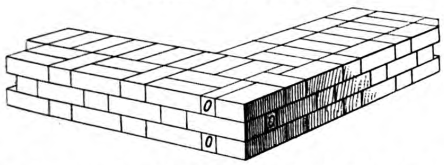


Fig. 2.—External Angle of Wall with Flemish Bond on Face.

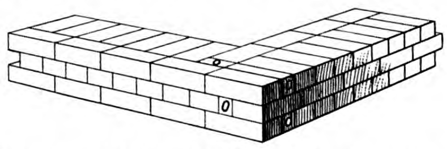


Fig. 6.—External Angle of a 14-Inch Wall in English Bond

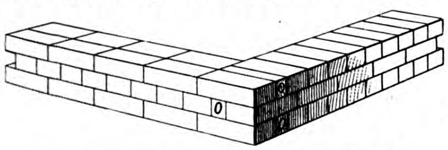


Fig. 4.—External Angle of 9 Inch Wall Laid in English Bond.

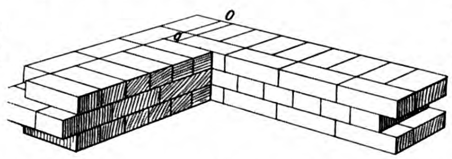


Fig. 7.—Internal Angle of 14-Inch Wall in English Bond.

Bond in Brick Work.

or single brick wall, both sides may be built up with Flemish face without the wall being weakened.

"Flemish bond," says Seddon, "forms a fertile source of unsound work. It has led to a practice of using better bricks and thinner mortar joints in the face work than in the rest of the wall, which frequently gives rise to unequal settlement; in addition to which, unless carefully watched, the bricklayers will economize the superior bricks by cutting the greater number of headers in half, and using 'bats 'or 'false headers,' thus destroying the bond between the face and back of the wall." Besides these disadvantages, the thickness of the courses of the faces, where the best bricks are used and finer joints made, will rarely coincide with those laid with coarser mortar joints in the rest of the wall; consequently seven or eight courses of face work may only occupy the hight of six or seven courses of the rest of the work, as shown in Fig. 3, in which case no true headers can be used to tie the face to the back of the wall, except at intervals when the face and back happen to run up to one level. Moreover, even the tails of these few headers are liable to be broken off by an unequal settlement taking place in consequence of the different number and thickness of the joints in the face and back of

Figs. 6 and 7 show a 14-inch or brick and a half wall in English bond. The queen closers are in evidence at O O, as in the single brick wall. The figures show how to bond both an internal and external angle and show the manner of laying the alternate courses. "English bond," says *Building Construction*, "is, upon the whole, to be preferred to Flemish bond for strength, as it contains a larger proportion of headers. The only advantage claimed for Flemish bond is its appearance, which is preferred by many, and has led to its use in buildings of a superior class."

In 9-inch walls a better face can be shown on both sides by Flemish than by English bond, as the unequal length of headers causes a rough face when there are many of them. In walls 14 inches thick the wall is not weakened very much by using Flemish bond, but in thicker walls English bond should be used, or, at any rate, the wall should be backed up with bricks laid in English bond.

A RELEASE by a contractor of his lien for erecting a building, as against a mortgagee receiving his mortgage on the faith of same, covers his claims for all work done before or after the release was executed.

THE APPRENTICESHIP QUESTION IN ENGLAND.

SOME time ago the London County Council appointed a special sub-committee to make an "inquiry into the educational requirements of members of the building trades," and to this end testimony was obtained from contractors, builders, carpenters, manual training instructors and others connected with this branch of industry. According to the report rendered by this sub-committee, which, by the way, was adopted by the Technical Education Board, great importance is attached to manual training, drawing and to theoretical classes. It was shown from inquiries instituted among the larger concerns engaged in the building industry that as a general thing London employers are averse to taking boys as apprentices, or to provide for them any means of instruction. Out of a large number of employees a very small percentage are apprentices, and the bulk of those who enter trades are in fact recruited from without the city. These youths, says the *Building News*, in commenting upon the report of the sub-committee, are in many cases ill-fitted for the occupation, and they find it difficult to get into situations where they can learn anything. The masters want hands, and take raw youths who are willing to pick up what they can without trouble or expense to themselves. It is this kind of recruits which answers the speculative builder and many large building firms the best. Employers object to any responsibility with regard to instruction.

Changed Conditions.

Things are now a little changed. Building trade classes have sprung up: the polytechnics are fairly filled with students wishing to improve themselves, especially in trades like those of the carpenter and joiner, bricklayer and mason. The report observes there are over a thousand entries in building construction at the polytechnics alone, and the number of artisans attending classes in practical plane and solid geometry are on the increase. In addition, workshop classes in the several trades are opened at several centers, carpentry and joinery being the largest in number, plumbing coming next, followed by painters and decorators, bricklayers, &c. It is estimated that at least 1500 youths and men engaged in the trades have been attending the classes during the present session, in addition to those attending the science and art department classes. These figures are satisfactory; but, after all, they represent a very small percentage of the whole number of youths, apprentices and journeymen in the trades. The class-goers will be found to be those of studious habits; but the great majority are beyond control.

Making Instruction Attractive.

We believe the practical work done by the students themselves is the most attractive part of the scheme of instruction in all trades. The elementary and advanced classes take the best among the more studious; but it has been found rather difficult, we understand, to interest the average student in elementary subjects, or even to get the apprentices, who prefer practical exercises, to attend the lectures or the classes in drawing, science construction, arithmetic and subjects of this kind. The practical student in brick cutting prefers to set out arches, gauged work, niches, moldings and to execute them in brick and putty, than to learn the theory or the drawing necessary; so the apprentice who just begins to master his tools is more inclined to practice his hands at making models of roofs and domes, of staircase winders, wreathed handrails, scroll steps, spiral stairs, or frame doors, &c.. than he is to master the elementary principles of carpentry, the mechanics of stresses. This preference may be noticed at most of the polytechnic institutions. The ordinary student is impatient of theoretical training and principles, or even geometry and drawing; these subjects have little interest for him.

This inclination for doing practical work, for turning out speciments of manual skill, ought to suggest to the teaching staff of these institutions the need of teaching the theoretical through the practical; in other words, of persuading the students of each trade to prepare the detail drawings of the work they are about to execute. The plan adopted by some of the polytechnics—namely, to get every student to set out or draw the details of his work ought to be generally followed. It is particularly necessary in trades like the bricklayer and cutter, carpenter and joiner and mason; it also applies to other trades as well. The plasterer should, of course, be taught to model his work, and practical instruction in the plastering of walls and ceilings of ordinary materials, as well as on expanded metal and other iron construction and metal lathing, should be given.

The co-operation of elementary knowledge with practical exercises seems to be not generally recognized; they are too often regarded as separate things, both by the instructor and the pupil.

Inducements.

The scheme adopted in many instances is to encourage the students of practical work to attend the classes in geometry and drawing, and in most cases members of the practical classes are admitted to the lectures free. This is quite right, but the better course would be to attach to every elementary and drawing class a workshop or laboratory. The facts appear, at any rate, to point to the success of the special workshop classes. Of course, there wil always be a technical and mechanical side and an artistic side to every craft, and while some will devote themselves to actual work, others will be disposed to follow the artistic part. The School of Arts and Crafts favors the latter side of the trades, and to it the trade schools must look for guiding principles. The practice of getting pupils and apprentices to design for themselves seems to be the most hopeful course to pursue. Set designs are useful at first, but the pupil who comes from a builder's workshop and has any enthusiasm for his work will be glad to show his ability.

The report also refers to the difficulty that exists of securing for boys who desire to enter a building trade a suitable training. Employers in the trades are not in favor of taking apprentices; they look out for men who are able to earn full wages and can turn their labor to profit. It has been found from inquiry that "the great expenses connected with a building workshop in London necessitate that every branch should be employed in producing the most valuable output." These are serious obstacles to any system of instruction in London. In some cases, as in bricklaying, there are other difficulties in the way of an apprentice learning; he is not old enough to work on scaffolds, and the societies and trade unions put restrictions which are unfavorable to the system. The plumbers are better off in this respect, as the practice of sending a mate with a plumber opens the door for a clever and enterprising apprentice. The obstacles in the way of apprenticeship are indeed serious, and we do not see how the practical teaching of any trade can be effectually learned in any other way.

As the report shows, "the technical institutes do not afford an avenue by which a boy can enter a trade;" while they improve his condition when he is in the trade, and tend to improve his technical skill, they fail to provide means by which the trade can be recruited. The conditions of London life and work are certainly most unfavorable to the system. London employers can import provincial workmen ready trained, and while they can do this it is not likely that they will produce workmen in London, where rents are dear and space is restricted.

WE understand that sketches are being prepared by Bruce Price for a 20-story store and office building, to occupy the triangular site known as the "Flat Iron," at Fifth avenue, Twenty-third street and Broadway, New York City.

COMPETITION IN $1500 FRAME HOUSES.

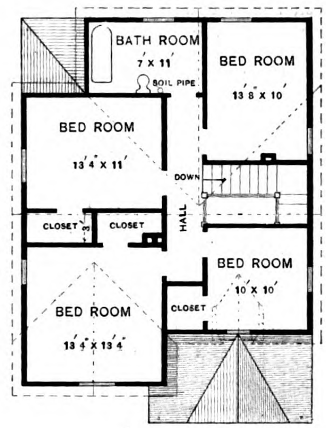
SECOND PRIZE DESIGN.

WE take pleasure in laying before our readers the drawings receiving the second prize in the competition for $1500 frame houses, the author being Charles N. Christen of Decatur. Ind. An inspection of the floor plans shows provision for four rooms upon the first floor and four sleeping rooms and bath upon the second floor.

According to the author's specifications the foundations are to be of blue limestone, with footings of one course of stone laid in mortar. All stone above grade is to be laid in courses with hammered joints. The chimneys are to be of hard burned brick, and all joints flushed with mortar. All work showing above the roof is to be of No. 1 face brick laid in white mortar with struck joints.

covered with No. 8 kiln dried 6-inch poplar siding, laid 4½ inches to the weather. The roof is to be covered with 1 x 4 inch pine or hemlock sheathing placed 3 inches apart, and then with 16-inch red cedar shingles, laid 4¾ inches to the weather, two nails to each shingle. The cornice is to be of poplar and the corner strips to be of the same material, 1⅛ inches thick.

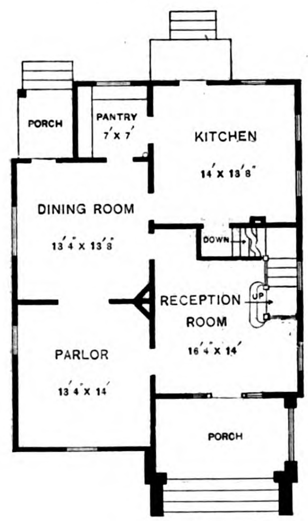
All outside door and window frames are to be of poplar; the casings 5 x 1⅛ inches; the jambs, 1⅛ inches



Second Floor.

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

Competition in $1500 Frame Houses.—Second Prize Design.—Charles N. Christen, Architect, Decatur, Ind.



First Floor.

Scale, 1-16 Inch to the Foot.

The plaster is to be three-coat work, the first to have plenty of good cattle hair mixed with it, and the second coat to immediately follow the first. After drying the work is to be finished with lime putty well troweled, making a hard finsh.

All gutters and conductors are to be of No. 26 galvanized iron, the conductors to consist of 3-inch corrugated pipe. All valleys, flashings and counter flashings are to be of I C tin, and painted on both sides before using.

The first and second floor joists are to be 2 x 10 inches; the collar beams, 2 x 6 inches; the studding, 2 x 4 inches; rafters, 2 x 6 inches; porch joist, 2 x 8 inches, and the porch ceiling joist and rafters, 2 x 4 inches. The rafters on the main building, as well as the studding and joist, are to be set 16 inches on centers, as are also the porch joist. The porch rafters and ceiling joist are to be 20 inches on centers. All joist 12 feet or over are to have one row of 1¼ x 3 inch bridging, nailed at each end with two 8d. nails.

The outside of the frame is to be covered with ⅞-inch pine lining, nailed at each bearing, this in turn to be

and sills 2 inches, finished with water table and 2-inch molding at the top. The window frames are to have cast iron pulleys and pockets for weights.

All flooring is to be 4-inch Georgia pine, secret nailed, and the porches are to be ceiled with ⅜-inch Georgia pine ceiling. All outside steps, balusters and rail are to be of poplar; the steps 1⅛ inches thick and the risers ⅞ inch thick.

The inside finish of the reception room, parlor and dining room is to be of red oak, and as shown on the details. All other finish is to be of Georgia pine, and the base is to be plain. All door jambs are to be 1⅛ inches thick with 1½ inch door stop. All inside finish is to be hand smoothed and sandpapered. All closets are to have strips for hooks, and the pantry is to have a row of shelving 12 inches wide.

All doors in the reception room, parlor and dining room are to be five paneled veneered oak, and all other doors four paneled white pine. All window sash are to be of white pine 1⅜ inches thick, except plate glass sash, which will be 1¾ inches thick.

The stairs are to be of red oak, and made as shown on the details, the steps being 1⅛ inches; risers, ⅞ inch and the strings 1¼ inches.

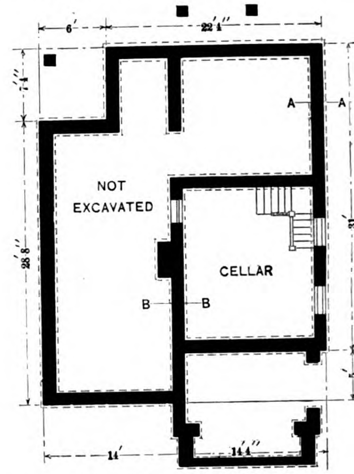
The outside of the house is to have three coats of lead and oil, and all tin and other metal to be cleaned and treated with one coat of metallic paint and two coats of lead and oil. The inside trim is to have three coats of varnish, each coat rubbed down with curled hair. The painter is to do all necessary glazing.

All doors 7 feet 6 inches high are to have three, and all other doors two, 4 x 4 butts, the butts to be of japanned steel. All two light windows are to be hung with Silver Lake sash cord, and weights to balance and be fitted with Ives' patent sash lock and lift. The transom in the kitchen is to be hung on hinges at the bottom and provided with transom lifter.

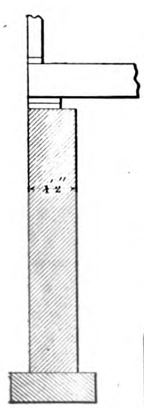
The bathroom is to be fitted with cast iron enameled bathtub with rolled rim and siphon jet water closet. The plumber will run soil pipe from sewer through bath room to 4 feet above the roof, the top to have a screen. The water closet is to be connected to the soil pipe by a Y. The flush tank of the water closet is to be supplied with water from the city water works. The bathtub is to have 1½-inch waste pipe to soil pipe; all waste pipe to have traps, and all traps to be back vented.

Estimate of Cost.

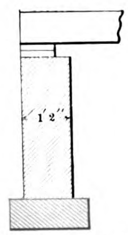
In considering the detailed estimate of cost it may not be out of place to refer to the fact that the competition expired early in the present year, when the prices of building materials of all kinds were at a much lower level than now rule. The figures submitted by the author are as follows:



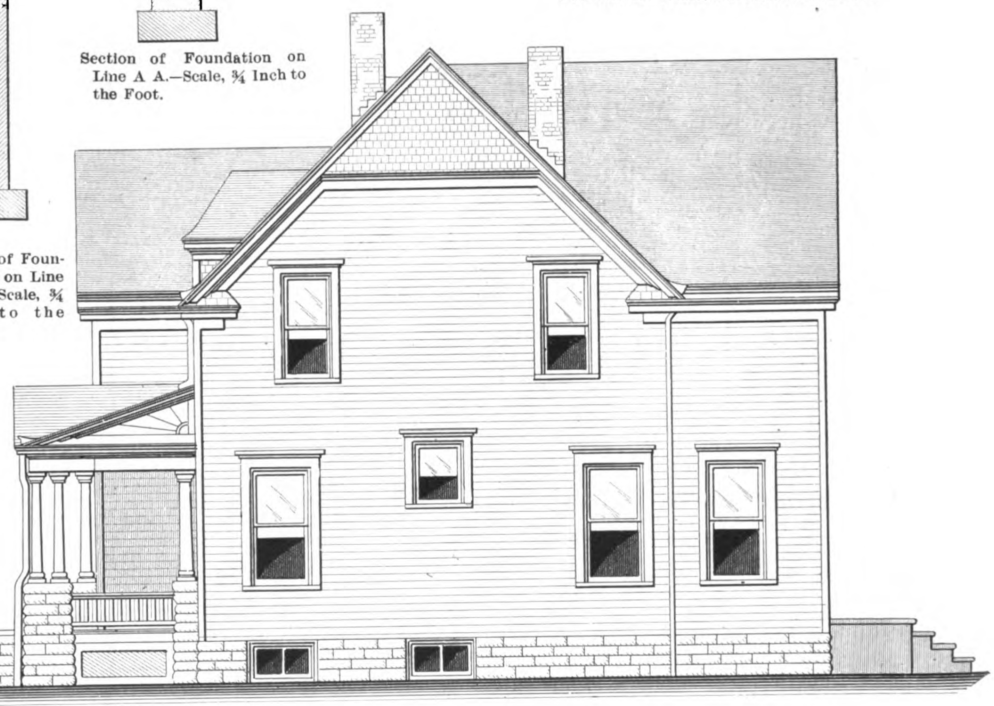
Foundation.—Scale, 1-16 Inch to the Foot



Section of Foundation on Line B B.—Scale, ¾ Inch to the Foot.



Section of Foundation on Line A A.—Scale, ¾ Inch to the Foot.

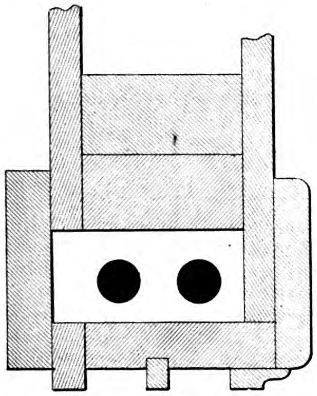


Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.

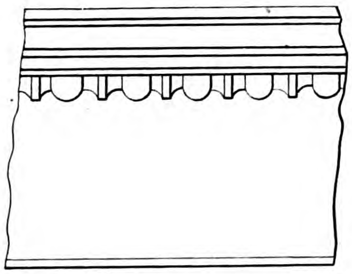
Competition in $1500 Frame Houses.—Second Prize Design.

Excavating 75 yards	$15.00	
Drain	15.00	
Stone laid in mortar	159 00	$189.00
2150 brick, mortar and mason work	$41.00	
10,800 lath put on walls and ceiling	37.80	
777 yards plastering	78 20	157.00
7460 feet piece stuff	$104.50	
3768 feet sheathing and lining	51.00	
3000 feet siding	45.00	
2600 feet flooring	40.00	
14,000 shingles	33 00	
160 feet ceiling	3.00	
630 feet 2-inch molding	9.45	
19 window frames at $1	19.00	

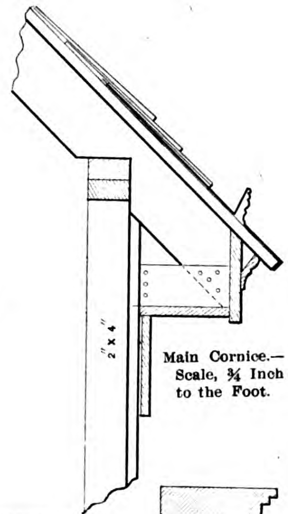
3 outside door frames at $1.15	3.45
Base and quarter-round	15.00
Stair lumber	10 00
Rail and balusters	8 00
Cellar stairs	3 00
Outside steps	8 00
8 columns	24.00
Casing and door jambs	19.00



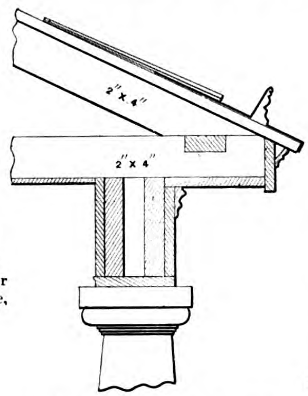
Horizontal Section through Window Frame.—Scale, 3 Inches to the Foot.



Detail of Finish in Reception Room, Parlor and Dining Room.—Scale, 3 Inches to the Foot.



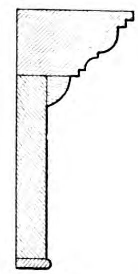
Main Cornice.—Scale, ¾ Inch to the Foot.



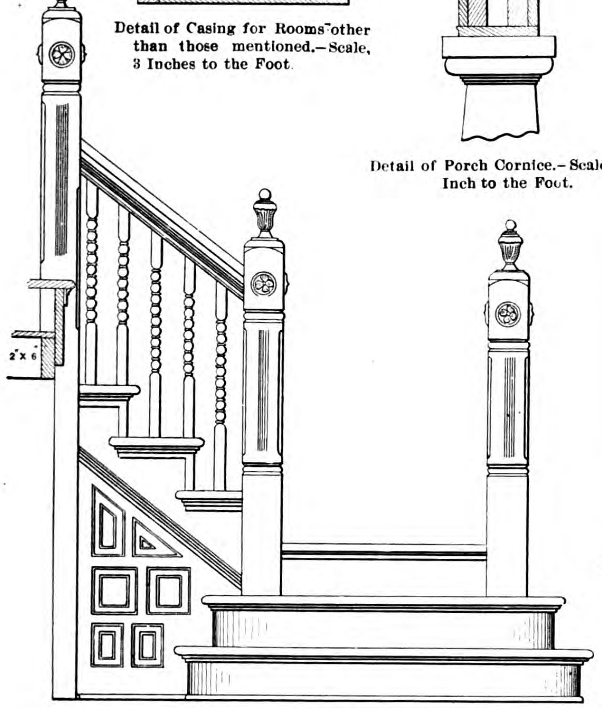
Detail of Porch Cornice.—Scale ¾ Inch to the Foot.

Detail of Casing for Rooms other than those mentioned.—Scale, 3 Inches to the Foot.

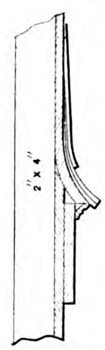
Section of Hand Rail.—Scale, 3 Inches to the Foot.



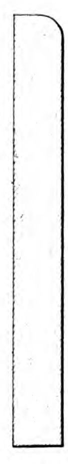
Section of Inside Finish.—Scale, 3 Inches to the Foot.



Detail of Main Stairs.—Scale, ⅛ Inch to the Foot.



Detail of Belt Course on Side Gable.—Scale, ¾ Inch to the Foot.



Section of Plinth.—Scale, 3 Inches to the Foot.

Base.—Scale, 3 Inches to the Foot.

Competition in $1500 Frame Houses.—Miscellaneous Constructive Details of Second Prize Design.

Cornice and corner strips	22.00	
Incidentals	6 80	
		424 20
Carpenter work	$300.00	
Nails	12.00	
Hardware	98 00	
		410 00
Painting		95.00
Tinning and plumbing		198 00
		$1,473 20

Suggestions for Students in Estimating Quantities.

In estimating quantities accurately there are three distinct operations necessary—viz.: 1, Taking dimensions, or "taking off," as it is called: 2, abstracting—*i. e.*, condensing the figures, and, 3, billing, or making the list of items.

There is no royal road or short-cut methods for the student; it is only experience, based upon a sure foundation, that will enable you to safely shorten the labor of estimating quantities.

Ruled paper, of three kinds, called Dimension, Abstract and Bill, is convenient to use.

In figuring always commence at one point on a plan, says a writer in the *Pacific Builder*, and follow the same order in all plans, and always take the dimensions in the same order. 1, The length; 2, width; 3, depth or hight—length, width, depth.

Take plenty of room, don't crowd your paper or book, as nothing is so conducive to mistakes as confusion. Preserve every dimension you take for future reference.

First, commence your work by writing plainly the name or title of the job and location, name of architect and (if figuring as a subcontractor) name of general contractor. Date and hour when drawings were received, and when returned, and to whom. Then examine drawings, compare plans, sections and elevations with each other, note any differences or discrepancies existing, and get early information from the architect upon any points not made perfectly clear. If it be found to be impossible to get satisfactory explanations then measure from that particular drawing which shows most work, always giving the contractor the benefit of the doubt; in other words, take no chances. Aim rather at accuracy and safety.

Sometimes discrepancies exist between the specification and notes on drawings. Look sharply after these. Above all, never guess at anything in taking quantities. Have a reason for every dimension you take, and put down the location of every item, so that you may easily refer to it at any time in the future, if it be necessary.

In taking quantities it makes no difference whether you want to submit a low, medium or high figure, there is just so much work to be measured, and if you work accurately you cannot make it any more or any less, material or labor; in other words, the prices only as put against the items must determine whether the bid be a high or a low one, and if you specially desire to obtain any particular job, get it by consistently low prices, if you can, but never by low, or as it is technically called by short, quantities.

Remember, it is not always the best estimator who gets in the lowest bid, which is creditable to him rather than the reverse. You cannot control the errors or omissions made by your competitors.

THE plans have recently been filed with the Department of Buildings for a ten-story apartment house, which is to be erected at the corner of Seventy-first street and Central Park West, of this city, at an estimated cost of $625,000. The building will cover an area about 93 x 125 feet, and will be constructed of brick, limestone and terra cotta. The owner and architect is Alonzo B. Kight.

FOUNDATIONS MADE OF BRICK.

A CORRESPONDENT in one of our contemporaries, writing under the *nom de plume* "Architect," states that he has often been asked why brick are not more often used in laying up foundations. The reply to this inquiry has invariably been "because custom has established the use of stone for the purpose and because of the clinging by bricklayers to the methods of their fathers." On several occasions I have "forced brick foundations," by specifying such, and in every case the departure proved quite satisfactory. Of course I made it a point to have good hard burned brick selected for laying in the wall below ground, and in every case had good footings provided either of stone or well prepared concrete—preferably the latter for brick work—and in most of these cases the brick foundation proved to be the most economical of the two.

The use of brick in foundations requires greater care to provide against the small bearing area of the material and the strength of the brick themselves. Good mortar or cement adds a large percentage to the solidity of brick work, especially if it has attained age. In an inspection of the brick work of several Roman buildings, more particularly the Coliseum at Rome, the compactness and solidity of the work were marvelous and quite convincing—even though 1900 years had come and gone since the walls were built—that the lasting qualities of good brick and mortar exceeded those of any other building materials. This wonderful building is elliptical in form and is constructed mainly of brick, the greater axis of the ellipse being 627 feet, and the lesser 520 feet, the perpendicular hight of the enclosing walls being 156 feet, and from 5 to 14 feet in thickness. The weight of a lineal foot of this wall is estimated at 180,000 pounds, or 90 tons, using the formula of 15 pounds to the square inch as a safe bearing. It is estimated the footings of this stupendous building are 83 feet wide and are mostly constructed of brick. At least this is true of the upper courses of the foundation.

One of the greatest elements of strength in Roman brick is their size, as many used in this building ranged from 7½ inches square by 1½ inches thick, up to 16½ inches square by 2½ to 3 inches thick. The smaller were to face certain portions of the work, and as binders, being cut in two, triangular-shaped, the long side being laid to the face of the wall, while the point was directed toward the center. The larger brick were used in piers and for arches and portions where it was necessary to discharge the superincumbent weight. Many brick to be found in Roman masonry are 18 inches long by 12 inches broad, and 2 to 3 inches thick. The clay used in making these brick was the same, chemically, as the clay used in this country, but special pains had been taken in the burning, as there seemed to be a uniformity of hardness that is absent in all American brick.

Another element of strength of Roman brick work was the excellent quality of the cement and the remarkable manner in which it was used. If the Romans ever tolerated "jerry building," no specimens of it have come down to our times. The effect of absorption especially, if brick are made of poor clay and slightly burned, make them dangerous materials for foundations, especially if laid below water level.

The following rules should be observed in the selection of brick, when used to carry much superincumbent weight or used in foundations:

Reject all bad shaped and unsound brick; good brick are regular in shape, with plain surfaces and sharp, true angles or arris. They give a clear, ringing sound when struck; when broken they show a compact form and uniform structure. Good brick should not absorb more than one-fifteenth their weight in water.

In the use of brick for foundations care must be taken to have the footing sufficiently wide, whether they be of stone or concrete, for it is not wise to have the brick footings that are first laid on the main footings project more than 6 or 7 inches beyond the line of the face of the wall. For though the weight of wall might seem to spread itself over the area of a footing and thus equalize itself upon all parts of a foundation alike, as a matter of fact the main pressure will always remain directly under the line of the wall, and the spread of the footings assist only in sustaining the wall in proportion to the strength of their resisting power before breaking, and in clays or other yielding bottoms, it is only the strength of the brick projecting beyond the wall that could be depended upon.

For frame buildings, or for dwellings not more than three stories high built of brick, a foundation quite sufficient may be obtained by the use of brick, and much more handsome results can be obtained with a considerable saving in cost. I have never hesitated to specify brick for foundation walls where the ground has been dry and the bottom good, and in no instance have I had a failure.

CORRESPONDENCE.

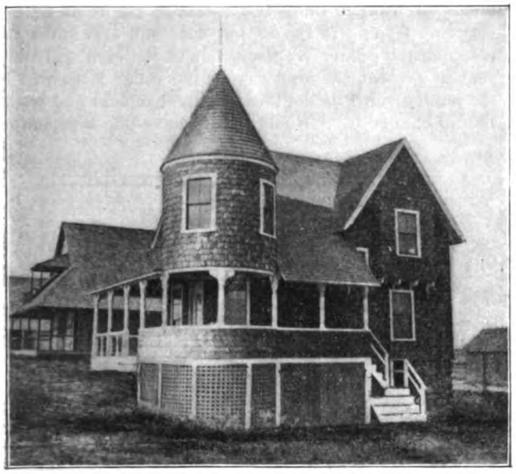
A Cottage for the Sea Shore.

From C. G. Stanton, *Westerly, R. I.*—As being of possible interest to some of the many readers of *Carpentry and Building*, I forward photographs, showing two views, also floor plans, of a beach cottage. I have found it so comfortable and the cost was so little I thought it might serve as a help to some other "poor" mortal. The design is my own and the location is two miles east, on the beach, from Watch Hill, R. I. The place is called "Pleasant View," and the name of the cottage "Bohemia." The formation of the ground was such as to leave a clear hight of over 6 feet along the east side. I therefore constructed a cellar under the northeast corner, built of moss covered pasture stone. These walls are laid in cement, and carried up solid to the floor. The bottom of the cellar is paved with beach stone and covered with cement, thus providing a rat-proof place,—a very desirable adjunct to a shore house, especially when the place is not occupied. The other portions of the foundations are of cedar posts, deeply planted and secured to the sills with iron straps. The timber, which is spruce, was of good quality, planed and kept clean. The planking is also of spruce, square edged, planed on the inside and laid with close joints, both roof and sides. The walls and roof are covered with cedar shingles, those for the sides having been dipped in stain.

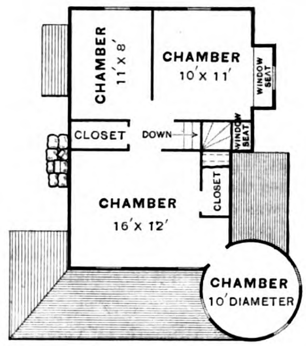
The floors are spruce, the second floor being planed both sides and finished in the principal rooms with stain and polished with wax. The timbers, trim and doors in the sea-room and dining room, as well as the material used in the stairs, are stained, the dining room being in green and the sea-room and stairs in a dull red.

The chimney, which is shown, is 3 feet by 7 feet at the base on the outside and built of the same sort of stone as the cellar wall, being laid in cement and pointed with Portland cement colored red. This is also the case with the breast, which shows in the sea-room, and the outside of the cellar wall. The latter is built 18 inches thick, and the chimney solid with two brick lined flues, one for the fire place and the other for the kitchen stove.

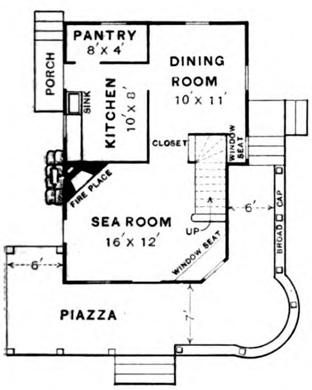
The fire place is selected pasture stone, brick lined, and bridged with an old broken stone, showing no tool marks. At the hight of the shelf the face of the chimney is dropped back 8 inches and then carried straight up to the chamber floor above, after which it is entirely outside the house. The shelf is a souvenir of a wreck—an oak plank 14 inches wide, polished. The partitions are of planed spruce. The cost was, approximately, as follows: Stone work, $150; other foundations, $20; carpenter work, $750; painting, $80; making a total of $1000.



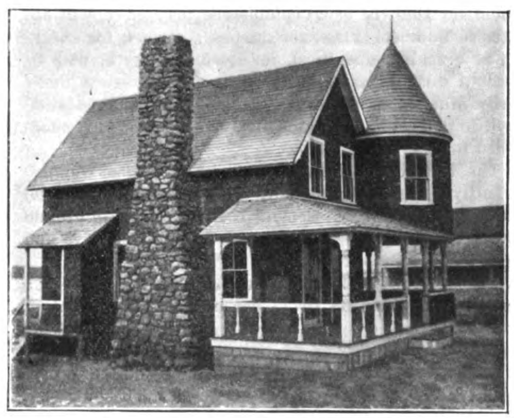
View Looking Toward the Tower.



Second Floor.



First Floor.



Front and Left Side Views.

A Cottage for the Sea Shore.—Designed by C. G. Stanton, Westerly, R. I.

The Use of Red Cedar Shingles.

From B. F. C., *Chicago, Ill.*—I notice in the June issue that "C. K. S." asks how long red cedar shingles have been used in the Middle and Eastern States, if they are more durable than pine, and what causes the nails to rust in cedar so much quicker than in any other kind of a shingle. I would like to answer these question, because I am interested in them, and would say that there is no particular difference in the durability of the Washington red cedar, heart white pine or the best quality of white cedar. Red cedar has been in use in the Middle

West about 15 years, and shingles put on the roofs of houses in this section of the country show up as well to-day as any other shingle on the market. The correspondent has evidently gotten hold of the wrong end of the stick. The trouble is likely with the nails and not with the shingles, as he intimates that nails will rust quicker in these shingles than in any other kind. This is not the fact. If the old-fashioned cut nails are used they will last as long as any shingle, but if the steel wire nails are used they will not last more than five or eight years, according to the locality. If near the coast they will not last longer than three years, and if put on a roof near a smelter the gases will destroy the nails inside of 18 months. These wire nails are made by the Bessemer process, and all the sulphuric acid is blown out so that there is no sulphur in the chemical composition to counteract the effect of the sulphur supplied by the natural process of absorption from the surrounding air. If "C. K. S." will take a handful of wire nails and throw them out into the street where it is damp, allowing them to remain overnight, he will find that they will corrode, and if the atmosphere is all right they will probably be stuck together in the morning. The steel nail is of no use when it is exposed to the atmosphere. We have only had the steel nail a few years, and when it came to the front the old iron shingle nail was discarded almost entirely. During the last three years, however, there has been a decided change, and now the iron nail is being used again. The idea that there is an acid in the shingles that eats the nails was exploded long ago, and the statement can be easily proven by discarding the steel wire nail and going back to the old iron cut nail, which has demonstrated its worth in all kinds of shingles by trials of half a century at a time.

Test and Strength of Cement.

From Seyou, *Portsmouth, Va.*—Answering the inquiry of "W. W. S.," Brockton, Mass., in the April number, I would say that the usual commercial tests of cement are three in number: First, for fineness; second, for checking or cracking, and third, for tensile strength, with or without mixture of sand. Expert cement testers make many others, but these are commonly considered sufficient to determine the value of a cement if of any established brand.

The test for fineness is made by sifting a weighed quantity, the sieves commonly used being of 50, 100 and 200 wires to the inch. Cement is now commonly ground so fine that 95 per cent. will pass the No. 100 sieve and 80 per cent. the No. 200 sieve.

The test for checking or cracking is made by mixing cement with from 18 to 25 per cent. of its weight of water, the object being to obtain a mixture of the consistency of a well worked putty, and from this make cakes, or pats, about 3 inches in diameter and ½ inch thick, with the edges worked down thin. These are put in water as soon as set hard and examined occasionally up to 28 days.

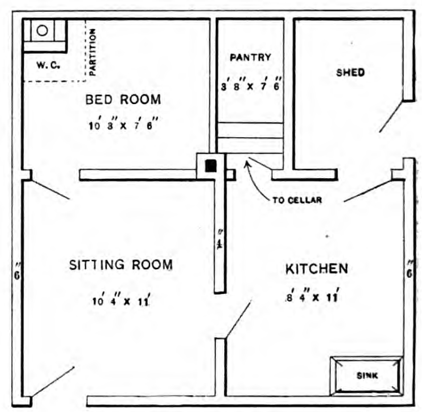
The test for tensile strength may be of neat cement, or of cement with sand. For neat cement the mixture is made as above, and the briquettes are put in water as soon as set hard, when they are to be tested in 24 hours, or after 24 hours in air, when they are to be tested at 7 or 28 days, or for a longer time. For neat Rosendale, or natural cements, the tests are usually made at 24 hours and 7 days. For sand mixtures of Rosendale and for neat and sand mixtures of Portlands, the tests are usually made of 7 and 28 days. Briquettes are molded in form so as to have 1 square inch section at the middle.

The strength per square inch in tension should average about as follows—Rosendale cements: Neat, 24 hours, 60 to 100 pounds; 7 days, 100 to 175 pounds; 28 days, 150 to 250 pounds; 2 parts sand to 1 part cement by weight, 7 days, 25 to 75 pounds; 28 days, 75 to 150 pounds. Portland cement: Neat, 7 days, 350 to 700 pounds; 28 days, 450 to 900 pounds; 3 parts sand to 1 part cement by weight, 7 days, 100 to 150 pounds; 28 days, 125 to 200 pounds.

As a rule cements which will make a low 7-day test should show a much larger percentage of increase at 28 days than those which test high earlier. Any good cement, natural or Portland, should hold whatever strength it has at any time, though after one year the gain, if any, is very slow. If "W. W. S." will visit his city engineer's office, they will, no doubt, show him the briquettes as made and also the machines for testing.

Remodeling a House.

From H. R., *St. Paul, Minn.*—I send a rough outline of the floor plan of the house in which I am now living, and desire to lay it before the readers of *Carpentry and Building* with a view to obtaining suggestions as to the manner in which I can remodel it to meet my present requirements. I want to build two rooms in the front with a stairway leading to the second floor and also stairs for reaching the cellar. An inspection of the plan will show that at present the stairway to the cellar is located in the pantry, but I do not like this arrangement and would like to change it. I would like to have one bedroom on



Remodeling a House.—Plan Submitted by "H. R."

the first floor in place of the one now shown and have it provided with a clothes closet. The bedroom on the plan is intended to be a bathroom later on. I should like to have on the first floor a front room, a bedroom, dining room, kitchen and bathroom, with stairs leading to the second story. The lot is small, being only 25 x 100 feet, and the house as it now stands is 20 feet square, so that I have not very much space in which to operate. I trust some kind reader will help me out in this matter.

Hanging Inside Blinds.

From C. H. C., *Jackson, Miss.*—In regard to hanging inside blinds, about which "F. P. R.," Citronville, Ala., asked information, I would say that a very good way is to first place the set of blinds on horses, leaving the proper spaces between each one. Then take a rod and get the width of the opening at the top and bottom. Place the rod on the blinds and take off half the over-width from each outside blind. Do the same for the length, but first see if the opening is square. Tack a strip across top and bottom, then fit the whole set in the opening. Lay back on the horses and put on all hinges on the surface of the blinds, using 2 x 2 or 2 x 2½ brass hinges. Place in the opening, adjust properly and then remove the strips. If the blinds are to be sawed in half take a straight edge and mark across, sawing to the mark.

Raising Heavy Timber Frames.

From C. C. L., *Litchfield, Mich.*—Will some kind reader of *Carpentry and Building* give a plan for raising heavy timber frames by machinery ?

Making Blue Prints and the Printing Frame.

From FREDERICK REISSMANN, *West Point, N. Y.*—More or less has been said in the columns of the paper about blue prints and the process of making them, and I have also noticed some inquiries about the printing frame to be used in connection therewith. I have taken the liberty of preparing a description of the method employed here for making blue prints, and, thinking it may be of interest to some of the readers, I forward the matter for publication. At the outset I would say that in order to make good blue prints three things are essential, 1, good paper; 2, proper chemicals for coating the paper, and, 3, a good printing frame. There are several kinds of printing frames on the market, but the one of which I inclose drawings is of such simple construction that any carpenter can readily make one. The frame illustrated is intended to hold a tracing 21 x 21 inches or less. Referring to the drawings, Fig. 1 represents a plan view of the frame, Fig. 2 a sectional view and Fig. 3 a perspective view with half of the back raised. The brass springs A A are intended to keep the hinged back B B pressed close against the prepared paper, tracing and glass, the latter being indicated at C of Fig. 2. Any good clear, double thick American glass will answer the purpose.

The back is made in two sections and hinged together, this being done in order to enable the operator to lift one-half of the back and inspect the prepared paper, so as to ascertain if the print is of the right color. This proceeding is very often necessary, especially in cloudy weather, when, in order to obtain a good print, the prepared paper has often to remain in the frame from 30 to 60 minutes before satisfactory results can be obtained. The inside surface of the back, or that side which presses against the prepared paper, is always covered by felt or three or four layers of canton flannel which are glued to it. This is necessary in order to form a perfect back between the prepared paper, tracing and glass, otherwise the lines on the print when finished instead of being of a pure white will show up faint and any figures on the print cannot be distinguished. The springs A A are held in place by a screw in the center of the back and at the outer ends by iron washers, one of which is indicated at D of Fig. 2. These springs can be made of brass, steel or hickory, according to preference or convenience. If made of hickory they should be about ¾ inch thick in the center and should taper down to ¼ inch at the ends, as indicated in Fig. 4 of the sketches.

Paper which has a glossy or starched surface should never be used, as the blue print solution when applied to the paper will intermix with the starch and the result will be poor prints. Drawing paper or blue print paper (unprepared), which may be obtained at any dealer in drawing materials, give the best results. Paper already prepared can also be purchased, but will not answer nearly as well, as it does not keep for any length of time. It is therefore desirable to prepare your own paper and do this the day before you desire to print.

I use the following preparations for coating the paper, both of which give good results, although the first named is the best for good and quick work: The first preparation consists of 1 ounce of green citrate of iron and ammonia diluted in 4¼ ounces of water and ⅝ ounce of red prussiate of potassium diluted in 4¼ ounces of water. Keep each solution in a dark bottle until ready to use, when equal proportions of each are mixed together and applied to the paper with a soft sponge.

My second preparation consists of 1 ounce of brown citrate of iron and ammonia diluted in 6 ounces of water and 1 ounce of red prussiate of potassium diluted in 6 ounces of water. Keep each solution in a dark bottle until ready to use, when equal proportions of each are mixed together and applied to the paper with a soft sponge.

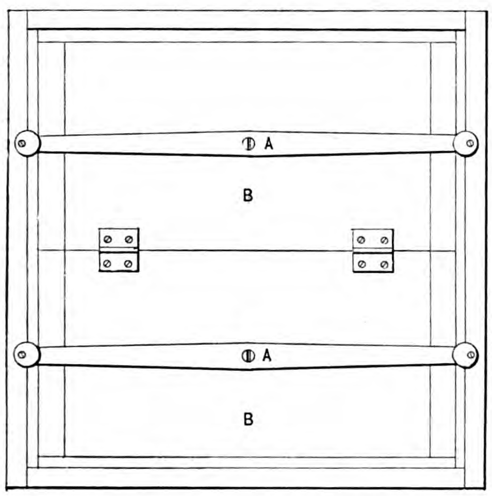


Fig. 1.—Plan of the Printing Frame.

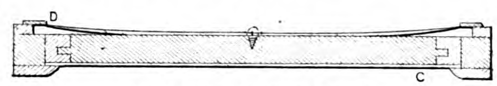


Fig. 2.—Cross Section of Frame.

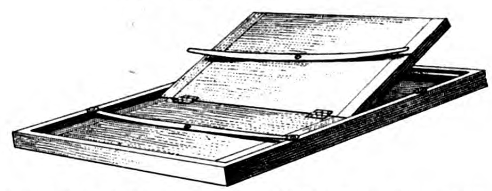


Fig 3.—Perspective View with Half of Back Partially Raised.

Fig. 4.—Plan and Side Views of Wooden Springs.

Making Blue Prints and the Printing Frame.—Scale, 1¼ Inches to the Foot.

When ready to coat the paper proceed as follows: Cut the paper to be coated to the proper size, and if a number of prints are desired it is always best to form a pad of the paper, which is done by putting a little mucilage between the extreme four corners of each sheet and placing the sheets on top of each other until a pad is formed from the sheets to be coated. By doing this the sheets will be prevented from rolling or curling up when the solution is applied to the surface.

When ready to proceed pull down the window shades in the room so as to exclude nearly all the light, then pour equal quantities of the above mentioned solutions into a cup, take a soft sponge and apply the solution to the surface of the paper; rub it well in and let it set for a few seconds, then remove the sheet and hang it up to dry, which generally takes about five minutes in a room well heated. While waiting for the first sheet to dry proceed with the second and so on until all the sheets are coated.

If any of the preparation should be left in the cup after all the sheets are coated do not return it to the bottles but throw it out, as it will not keep more than 24 hours when mixed together. When the prepared sheets are dry place them on top of each other and wrap several sheets of common wrapping or newspaper around them so as to exclude all light. Return the bottles containing the solutions to a dark place ready for some future day, pull up the window shades and let the prepared paper rest until the next day, when you proceed as follows:

Remove the hinged back from the printing frame, place the tracing with the inked side against the glass, then take a sheet of the prepared paper and place it over the tracing with the prepared side down. Replace the back and fasten securely by springs; expose the glass to the sunlight for two or three minutes, and when the prepared paper (which, by the way, should always be a trifle larger than the tracing, so as to leave a small margin all around) assumes a mouse gray color the print is ready to be taken out. Have ready a zinc pan about 3 inches deep and otherwise large enough to hold the print, with a 1-inch hole in the bottom so that the water may run out; place the tray under a hydrant or in the kitchen sink, turn on the faucet and keep the water running. The hole in the bottom of the pan will prevent the water from overflowing and at the same time keep it clean, which otherwise would get soiled in washing the prints. Place the print in the pan and leave it there for three or four minutes, which will be sufficient to bring out all the white lines, and more so if the water is kept running and clean. After the sheet is taken out of the bath it may be hung up anywhere to dry and afterward all the prints may be trimmed nicely with a ruler and knife.

White lines on blue prints can be made by dipping your right line pen in Chinese white, which may be obtained from any dealer in drawing materials.

Grade Marks on Lumber.

From S., *Story City, Iowa.*—I have been reading the paper for many years and have obtained from its columns information worth many times the cost of subscription. There is one thing about which I desire to inquire, and that is in regard to the way the saw mills mark lumber in grading. Sometimes I get good lumber for the grade and sometimes bad. Sometimes I notice one mark on the lumber and sometimes the same grade is indicated by a different mark. This makes trouble for us common people to understand. There are some lumber yards who pick out the best lumber and call it one grade better. Some lumber yards tell us contractors that certain yards or mills in the West mark the lumber one grade lower than they should. It appears to me that the lumber yards are rather down on the contractor, because we ship the lumber from outside of the lumber trust. What I am particularly anxious to know is the marks or figures which the majority of the mills use, or should use, to indicate specific grades. If some of the lumber men will take up the subject I think it would prove of interest to many readers of the paper.

Raising the Roof of a House.

From M. F. B., *Waterloo, N. Y.*—In answer to the request of "H. M.," Doon, Iowa, in the June issue, I send sketches showing the method which I use of raising the roof of a building. In Fig. 1, A A represents kerosene barrels, which I employ when I can get them, as they are lighter than blocking and are very strong. I usually employ four in a place where the roof is a heavy one. B B represents the blocking and C is a stick of timber, 4 x 4 or 4 x 6, which is used to tie the cribs together to prevent weaving. At F are two sticks of timber 4 x 6 inches, placed 1 foot apart and tacked to the plate, one side resting on a block and the other on a jack screw. I usually raise one side of the roof about 16 or 18 inches, then raise the other side and alternate in this manner until the roof is at the desired hight. I have raised heavy roofs in this way, and have raised them in a single day, and they would not vary ½ inch out of the way. In Fig. 2 of the sketches is a plan view, showing the position of the barrels and also of the tie timbers.

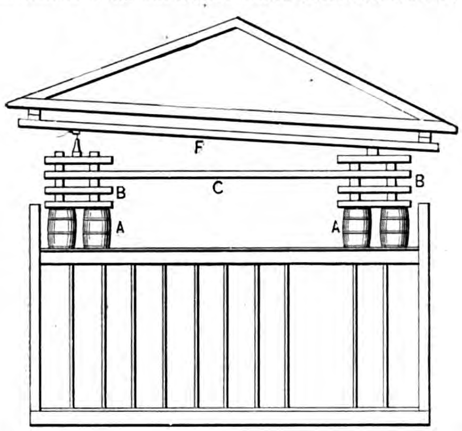


Fig. 1.—Method Employed by "M. F. B." for Raising Roof

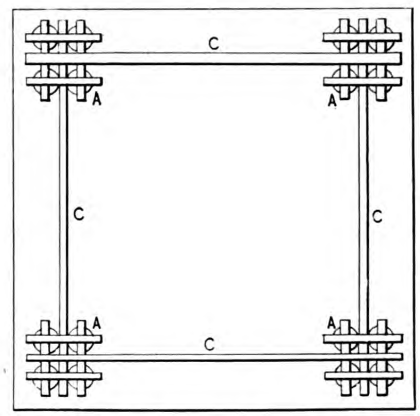


Fig. 2.—Plan View, Showing Position of Barrels and Cribbing.

Raising the Roof of a House.

Some Words of Criticism.

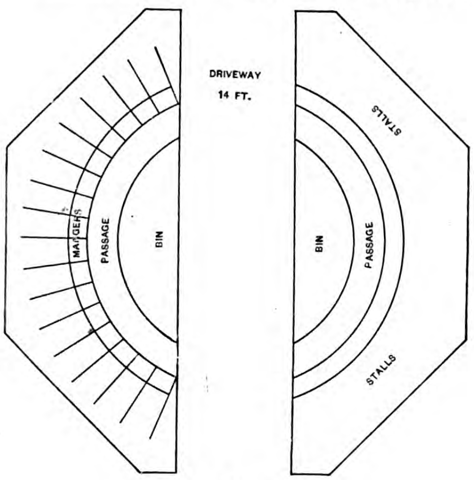
From YOUNG CHIP, *Montreal, Canada.*—In a foot note to "T. W. N.'s" criticism in the May issue of *Carpentry and Building* the editor states that he will be glad to hear from other readers of the paper touching the prize designs. Now, Mr. Editor, I have taken *Carpentry and Building* for seven years, before I was a carpenter at all, in fact, and am getting tired of these everlasting-same-old-over-and-over-again prize designs. Of course my opinion matters very little in the vast army of *Carpentry and Building* readers, but I do not think the competitions are exactly fair to the majority of us. We cannot all be architects, and those among us who want to build $750 or $1000 houses are, I fancy, very much in the minority, and they are the only people whom the competitions benefit.

There are hundreds of subjects in the workman's own line for which a prize might be offered. For instance, "F. P. R.," Citronelle, Ala., in the May issue asks for information with regard to fitting inside blinds. What is the matter with offering a prize for an article dealing with the setting out, making, fitting and hanging a set of inside blinds? There must be a lot of "Young Chips" among the readers, Mr. Editor, and if they are anything like me, they would just jump at that article.

While I am in the humor for kicking I may as well say that I was very much disappointed (I had almost said disgusted) to see the papers on Wood Turning finish up so soon. A good book on wood turning is something for which I have been looking for years. The papers in question were being written better and plainer than any I ever saw, and just as we were beginning to like them the author chops them off and says perhaps at some future time he will tell us more. Now, Mr. Editor, I do not want you to think that I am writing this just for the purpose of finding fault; far from it. I believe *Carpentry and Building* is the king pin of all papers, and I want to see it right on top of the pile. It is to papers like it that we young fellows are obliged to look for information nowadays, and we have to give you a nudge now and then to show you that we are listening to all that is being said. So no more at present, as the pig said when he emptied the trough.

Note.—We are glad to have the letter of this correspondent, as its publication may be instrumental in drawing out expressions of opinion from others, for it is only by such means that the editor can hope to keep in touch with the readers and learn of those things in which they are most interested. We have repeatedly called attention to the fact that the columns are open to all for a full and free discussion of any and all topics connected with the building industry, and we hope our readers will come forward and express their views, whether they be of practical comment or friendly criticism.

We fully appreciate what "Young Chip" has to say about offering prizes for articles dealing with some of the many practical subjects in which the men in the trade are interested, and also his suggestions with regard to a



Plan for Octagon Barn.

continuation of the serial on "Wood Turning." Should there be many others among our readers sufficiently interested in the subject of wood turning to write us to that effect we shall take pleasure in considering the matter in the near future.

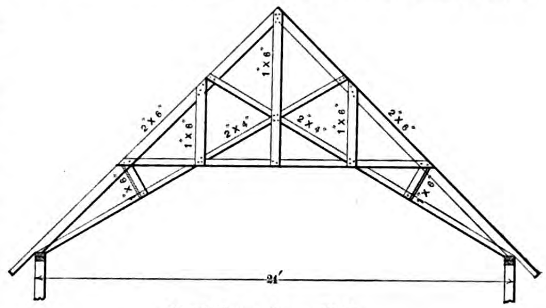
Plan for Octagon Barn.

From H. K. R., *Larned, Kan.*—Replying to "J. M. N.," Alderly, Wis., in *Carpentry and Building* for June, I inclose tracing of rough floor plan of an octagon barn, the radius of the circule of which is 30 feet. If the correspondent will state more explicitly what he requires I will endeavor to help him out. The plan inclosed gives ample room for 32 head of stock besides grain bins and hay bay overhead.

Roof for an Armory.

From R. M. B., *Alliance, Ohio.*—Allow me a little space in reply to the Denver parties who find so much fault with the truss which I described in the April number of the paper. In the first place Mr. Kidder says that the main or end strut comes too far in from the main support, which was meant to be 22 inches from the end of the tie beam. I can say in reply to this that most of the trusses in this section are framed that way, and I have never heard of bad results from any of them as yet. In the next place he says that the center rod is not right. I had intended this to carry the ceiling, as we always plaster the ceilings of armories in this section, and it requires a heavy rod to support them. We also brace such trusses to the walls when we do not plaster the ceilings.

"E. R. R.," also of Denver, says that I had no conception as to what the truss was intended for, and I wish to have him understand that I have been building such



Roof Truss for a Hall.

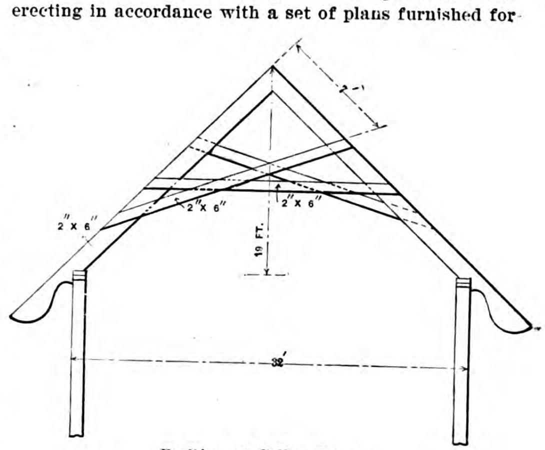
trusses, and have seen others build them, for the last 20 years, and never knew of one of them which did not give perfect satisfaction. The readers of *Carpentry and Building* need not fear, therefore, to try such a truss. Plank trusses will not be accepted in this section under any circumstances, as they are known to collapse.

Roof Truss for a Hall.

From J. B. P., *Hawkeye, Iowa.*—In answer to "F. T." in the April number I inclose a sketch of a rafter truss which I think will answer his purpose. At all events we used it with satisfactory results on an I. O. O. F. hall at Randalid, Iowa, that was 24 x 45 feet in size, with a 13-foot ceiling in the center and about 9 feet at the side walls. The building covered an area of 24 x 70 feet and had 22 foot posts, with storeroom below the hall. We wired the plates together before we commenced to raise the rafters, and, by the way, we put them together over a pattern and raised them in one piece, making the center one a little narrow, so that they drew on the plate. I do not believe the frame moved ⅛ inch after we loosened the wires.

Position of Collar Beam.

From J. C. H., *Taylor, Pa.*—As I am a subscriber to *Carpentry and Building*, I would like to ask the advice of the readers with regard to the accompanying sketch showing roof construction. The sketch shows the method called for in connection with a building which I am erecting in accordance with a set of plans furnished for

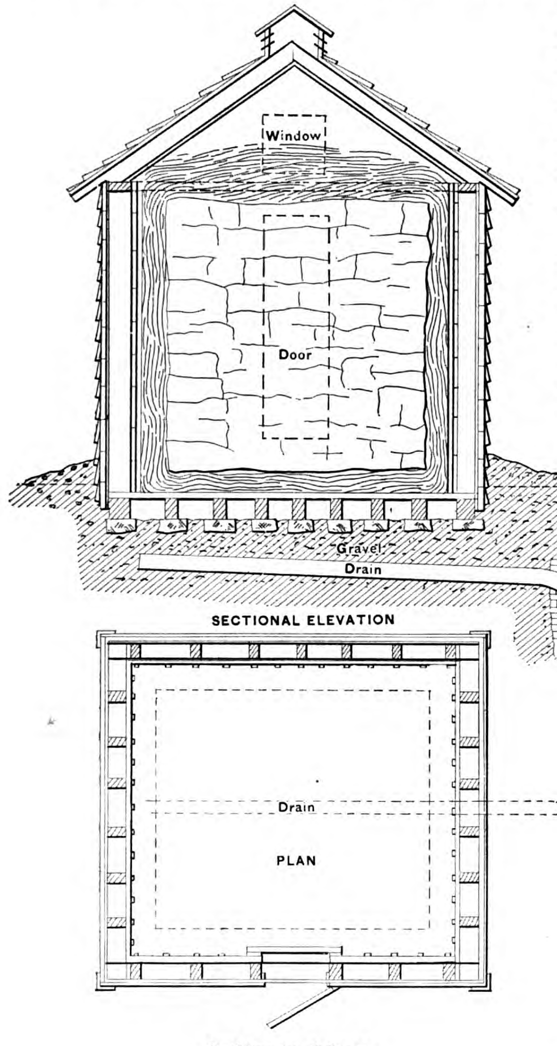


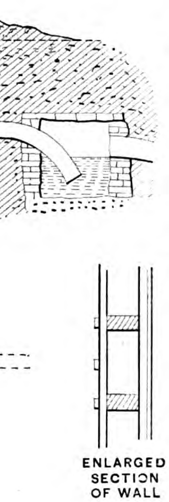
Position of Collar Beam.

the job. I would like to know if it would make any difference in the strength of the roof if the collar joist was moved down 1 foot. As the roof now is it will not keep the building from spreading. I trust my brother carpenters will give this attention by expressing their views freely and fully.

Arrangement and Equipment of Small Wood Working Shops.

From W. P. B., *Omaha, Neb.*—I would like to have some of the experienced readers of *Carpentry and Building* submit plans of, as well as discuss, the best size of shop fitted with machinery operated by hand power, steam, electricity, gas or gasoline engines, and for doing all classes of light wood work, such as the making of frames, cornice work, light cutting and ripping, sticking, shaping out moldings and doing general all around small work. It would be interesting to learn of their experience with different machines made for such purposes, and the different sizes best adapted for the work. I have





Building an Icehouse.

been a reader of the paper for more than 16 years, and feel that a full and free discussion of this subject would prove highly valuable and instructive.

Note.—The subject which our correspondent brings to the attention of the practical readers of the paper is one which offers an opportunity for a most interesting discussion, and we trust that they will accept of the invitation extended and express their views freely, at the same time giving their experience in connection with work of the character indicated.

Estimating the Amount of Excavation for a Cellar.

A correspondent who is evidently too modest to sign his letter, either with his name or initials, sends us the following: How many yards of dirt will have to be taken out of a cellar if it is 76 x 16½ feet, and is excavated to a depth of 6 inches?

Answer.—This is an example in finding the cubical contents of the area named, and is solved by multiplying 76 by 16½ feet by 6 inches, which gives 752¾ cubic feet. Dividing this by 27, the number of cubic feet in a cubic yard, gives 27.87 yards of dirt to be excavated.

Building an Icehouse.

From F. L., *Renova, Pa.*—I would like to see described in the paper a simple way to build an icehouse without using sawdust.

Answer.—As our correspondent gives no information as to size of house or quantity of ice to be stored, we can only give general directions, supposing the icehouse to be built on the ground surface. The most favorable location for an icehouse is on a slope or hillside facing the north or in the shadow of large trees or a grove. If the ground is loose and gravelly a drain should be laid not less than 2 feet below the gravel bed on which the house is built, with branches if the house is large and a seal or trap outside to keep out air, as shown in the illustration. On the leveled gravel bed may be laid 4 x 4 or 4 x 6 timbers, according to the size of the house, on which a 2-inch floor of rough plank should be laid with loose joints. Upon this sills may be laid 4 x 6, flat wise and spiked to the plank floor, and a frame set up of 4 x 6 scantling, 20-inch centers, to inclose an air space 6 inches thick all around. Cover the outside with rough boards on asphalt roofing paper and clapboard on the sheathing. Board up the inside, filling the space as the boarding goes up with straw, hay or any cheap fibrous material mixed with as much pulverized charcoal as can be conveniently used, which will prevent the fibrous material from fermenting and rotting when the house is empty. The filling should be put in closely packed and carried up to the roof plate. For a better insulation asphalt paper may be laid on the inside sheathing and batten strips nailed over it in a vertical position a few inches apart. The roof may be made in the usual way and extended well over the sides 1 or 2 feet. It should be lined on the inside with rough boards and the space filled in with straw or hay well packed. An outside door should be made 2 feet 4 inches high, hung on the outside at the gable end, reaching from 2 feet above the floor to just below the plate. A small door is also provided in the gable for filling in straw or hay on top of the ice when the house is full. Jambs may be made in the door frame for setting short boards outside of a board lining resting against the inside of the door frame, the space between the boards to be well packed with straw or hay as the ice goes in. In filling the icehouse, straw should first be laid on the floor 8 inches thick and a space all around the ice packed with straw 1 foot thick as the ice is put in. Two and one-half feet in depth of straw well tramped down should cover the top. The space under the roof should be ventilated by holes in the gables or a peak ventilator.

Are Chimneys the Mason's or Plasterer's Work?

From C. B. C., *Charlottetown, P. E. I.*—In answer to "Young Chip," Wilno, Minn., in the May issue, I would say that chimney building is a part of the mason's or bricklayer's work in all countries.

Lettering for Plans.

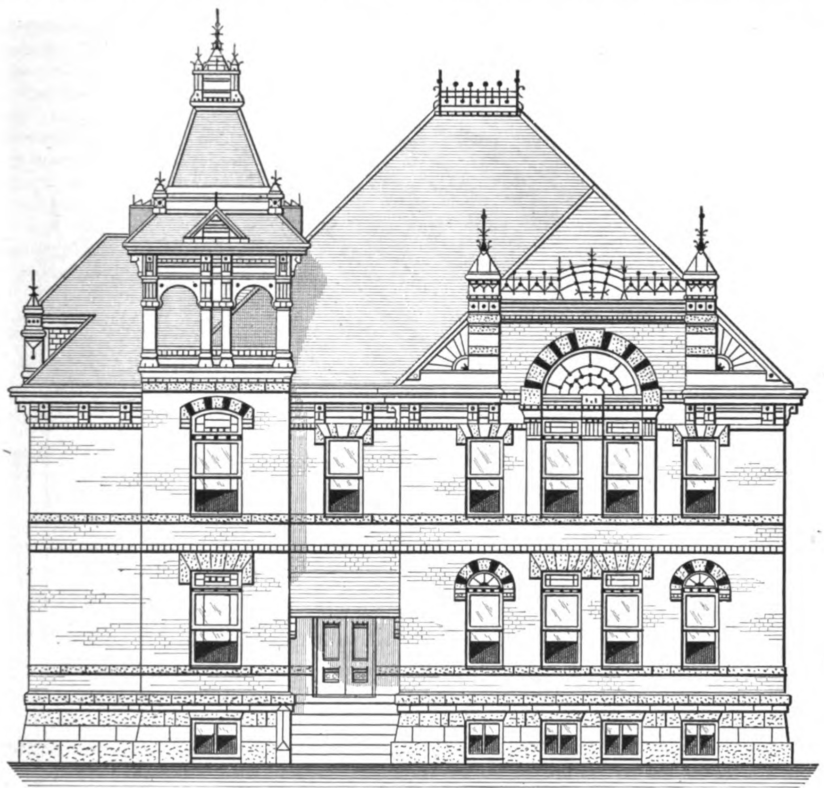
From W. H. M., *Clebourne, Texas.*—I would like to see in the columns of the paper some neat designs of lettering for plans, &c., and trust that the draftsmen will give the matter early attention.

DESIGN FOR A FIVE-ROOM SCHOOL HOUSE.

IN one of the early issues of the year an inquiry was presented by a correspondent, "H. L. A." Wilmington, Vt., asking for the publication of plans for a five-room school house, and in reply to this request we have received from W. G. Mumma, Warrensburg, Mo., the plans and elevations which are presented herewith. In submitting the drawings the author calls attention to the fact that the plans show two class rooms on the first floor and three rooms on the second floor, each room having a wardrobe for cloaks, hats, &c. In each wardrobe is a partition made of 1-inch lumber with suitable base and cap, starting 6 inches from the floor and extending to a hight of 6 feet, this partition being provided with a suitable number of hooks for the clothing of the pupils. The walls are also provided with a suitable number of hooks for the same purpose. Each class room is of a size to give a seating capacity of about 50 scholars, with the seats so arranged that the light will come from the back and left.

The first floor has a room for recitation, teachers' use, or it can be devoted to library purposes as well as general business. A closet and toilet room are provided in connection therewith. The first floor has a convenient stairway, and there is also a rear hallway, giving access to the basement or to the outside of the building. In the basement there is ample room for water closets, urinals, &c., as well as for the heating apparatus, which may be steam (direct) or hot air, as may be desired. Each room has a suitable number of vent shafts for purposes of ventilation.

The general construction of the building is to be of brick with cut stone trimmings, the basement story above grade to be of stone, pitched face. The general design is not intended to be severely plain, but to embody some ornamental features so as to produce pleasing effects. The building is surmounted at the front with a tower and belfry and the roof is covered with slate. Some of the windows are intended to have transoms for the purpose of assisting in the lighting and ventilation of the rooms. Mr. Mumma states that the approximate cost of the structure here shown would be in the neighborhood of $10,000.



Front Elevation —Scale, 1-16 Inch to the Foot.

Design for a Five-Room School House —W. G. Mumma, Architect, Warrensburg, Mo.

Clay as a Roofing Material.

At the thirteenth annual convention of the National Brick Manufacturers' Association, held in Columbus, Ohio, in February, one of the papers read before that body was on the "Utility of Clay as a Roofing Material," the author being Charles T. Harris of Alfred, N. Y. The paper covered points of interest to the building trades, and we present the following extracts:

I have decided to place what I have to say as to the utility of clay, in this subject, under the following divisions: Its usefulness, its advantages, its benefits and its profitableness.

First, then, no other product of the hands of man has been more permanent in form and more universal in its use than his work in clay. It has helped to secure for him shelter and to utilize water and fire in ways that he could not otherwise have controlled had it not been for materials made from clay.

One writer has said that "the light thrown by ceramic work of the commonest kind upon history may be as serviceable as language itself in promoting our knowledge of the origin of the races, their military expeditions and their commercial relations," and there can be no question that "an improved kind of earthenware for cooking purposes must have closely followed the invention of fire." So, also, as soon as man began to build for himself a house, because his multiplication crowded him out of his cave life, or his local surroundings afforded him no caves for shelter, he naturally turned to this material, which had already been found so useful in other ways, to provide for himself a covering from the storms of summer and the snows of winter.

The most primitive tile used for this purpose was no doubt quite similar to the prevailing type of the present day, which is a simple half circle, laid two under and one over.

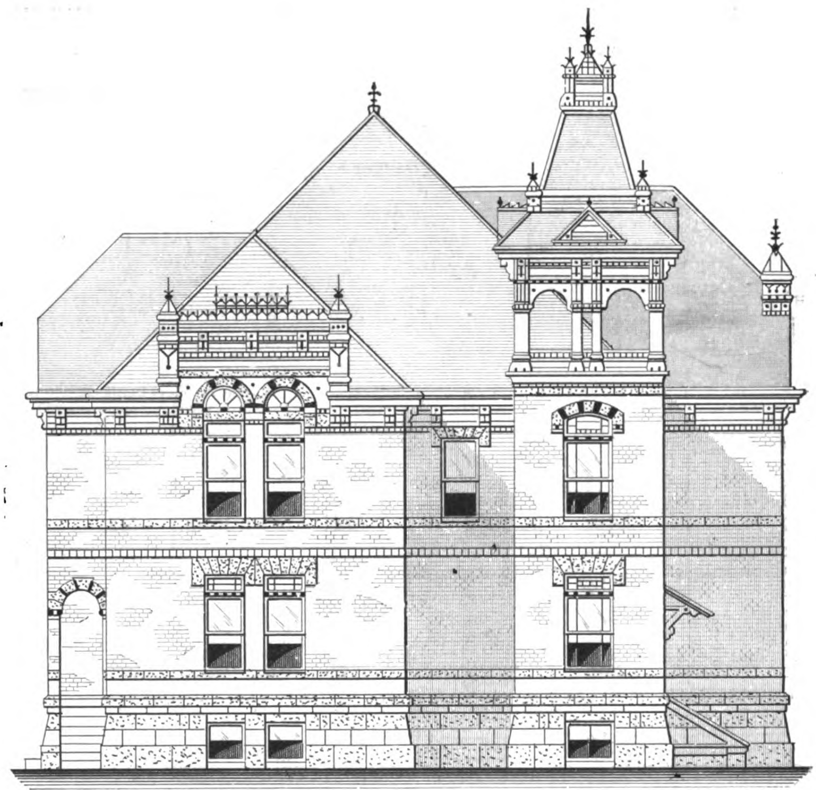
It has been said that this form of tile in the shape of a half roll may have been suggested to the primitive clay worker by the shape of the bark which he had previously learned to peel from the trees and overlap on rude supports to keep off the sun. But I am more inclined to the belief that the clay worker in even prehistoric times soon discovered what we all know to be true, that it was much easier to model and dry and burn a semicircular piece of clay than a flat one. I have no doubt that his first attempts were along the line of a flat slab of clay, which spread out as adobe, became sun dried and sun baked, and in that form served the purpose of flat roofs of the primitive buildings in that section where man is supposed to have originated, a section that was free from snows and subjected to limited rains.

But when early man moved westward into a variable climate, and had to protect himself against storms and stress of weather, he early adopted a form of tile more protective and more practical; so that instead of trying to dry a flat slab without its cracking and burn without warping, he soon found that he could secure what he was after much more quickly and economically by forming his flat slab into a half circle, which would dry sound and burn true.

The Roofing Tile.

The use of roofing tile was probably fully developed by the Chinese as a nation at large, just as much else that we have of value in our modern civilization was originated and perfected by them. Roofing tiles seem to have been used there from the most remote antiquity, and the present perfect condition in their shape and color has been prevalent with them for long preceding the historical era. They have adhered in shape to the simple and primal forms of the curved tile, and in no other country have they reached such a degree of perfection and ornamentation as in China and Japan. They have covered their eaves and ridges and hips with tiles of the most unique patterns and the most exquisite enamelings, in shades of bright reds and oranges and greens and blues. From the specimens of Japanese tile that I saw and investigated at the World's Fair, I think it will be a long time before we can hope to secure any such color effects or striking shapes as theirs; but they have one great advantage—they are old in the clay working business, and I learned that often their piles of clay, carefully weathered and tempered, are handed down from generation to generation as heirlooms, or capital already invested in the business, which passes regularly from father to son, so that all that skill and experience and readiness can do to secure perfect results are present with them.

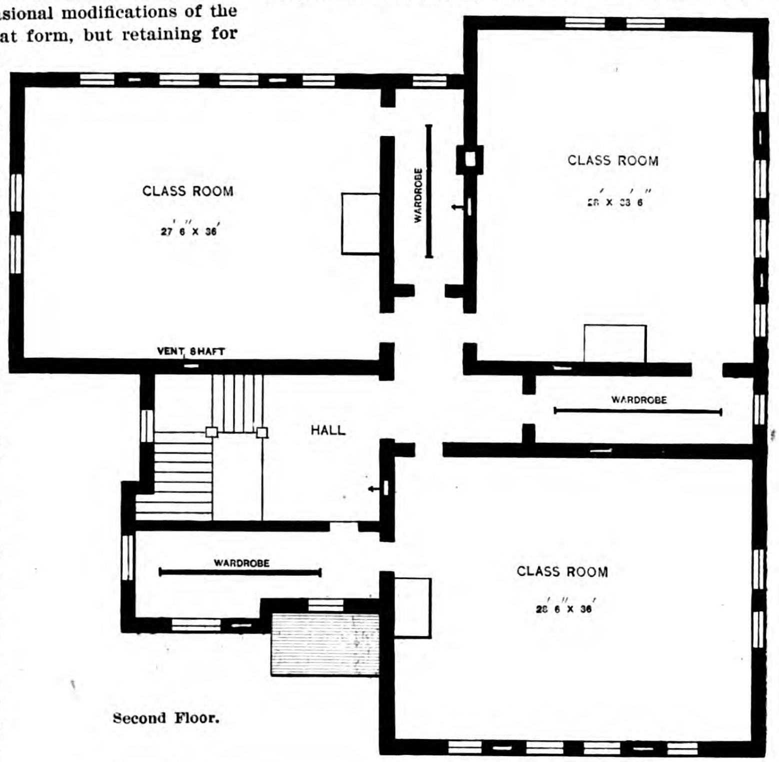
From the Orient the roof tile found its way into Southern Europe through Greece and Rome, both of which used the primitive form of Eastern tile, with some slight modifications. Instead of making the upper and under tile of the same size and both of considerable breadth, as is the case with the Chinese tile, they modified the upper tile into a smaller roll, which gave a



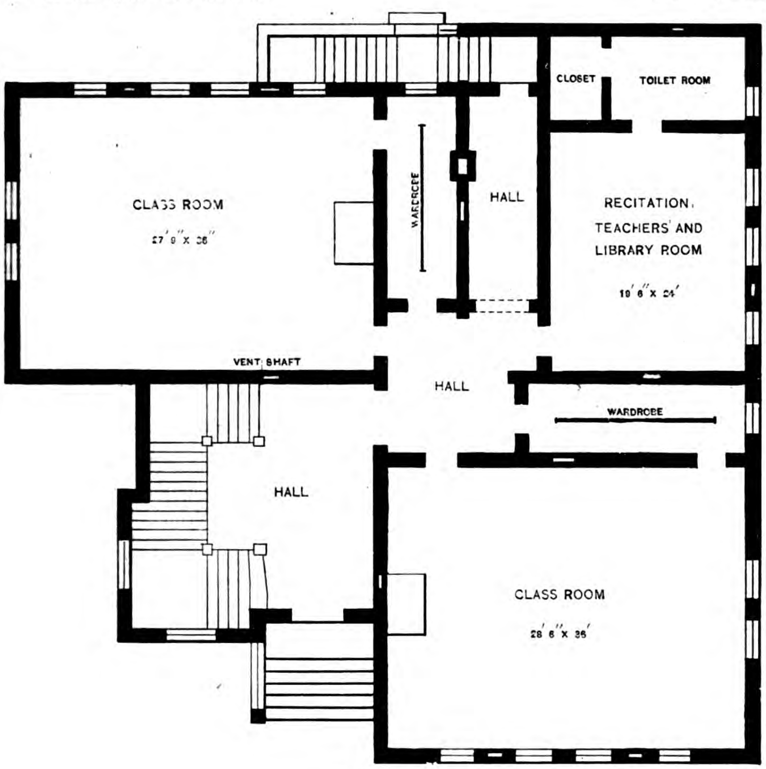
Side (Left) Elevation.—Scale, 1-16 Inch to the Foot.

Design for a Five-Room School House.

materially different effect on the roof, as thus the spacing was made apparently much wider and the alignment less conspicuous. The Romans followed along the same forms as the Greeks, with ocasional modifications of the under tile from a roll to a flat form, but retaining for the most part the effect of smaller relief and broader lines than the Oriental tiles. But in the western dependencies of the Roman Empire, as Spain and Southern France, the smaller top tile of the Greeks and Romans came to be used for both the upper and lower tile, so that the appearance of the roof was changed from a broad alignment to a crowded one of perpendicular lines, up and down the roof, more or less irregular in apearance, owing to the warped and uneven character of the tiles used. This is the shape of the tile that was brought by the Spanish conquerors into the Spanish-American sections of this continent, and is known to-day in Lower California and Mexico as the old Mission tile, because of its universal use on those buildings erected by the Church for schools and worship, under the aggressiveness and fostering care of that sect when Spain ruled the greater part of this continent. So far we have followed the use of roofiing tile along about the same lines of latitude, approximately, with where they originated, and where the climatic conditions were essentially the same, and all comparatively mild; but when mankind began to people the more northern latitudes and to build themselves houses therein, the climatic conditions required a roof covering that should be tighter and more impervious than had been required in Southern Europe, and so the Hollanders and other dwellers in the more northerly section came to combine the double tiles of the Orient into one tile, which, with their sense of economy in work and material, could be made more cheaply to cover exactly the same space, and at the same time give a greater weather protection. Thus the so-called "pan tile" or "Dutch" tile was produced. These were the forms of tile that were earliest introduced into England, where they are even yet known as Belgic tiles, which shows their origin conclusively.



Second Floor.



Main Floor.

Design for a Five-Room School House.—Plans—Scale, 1-16 Inch to the Foot.

But England was never partial to the rolled tile in her architectural development, either for effect or efficiency, and early learned to make a good flat or shingle tile, which has thus been more largely used there than on the Continent, and which seems much more appropriate to her prevailing styles of architecture.

This country can hardly be said to have done much in the way of developing the use of roofing tile as yet, as the oldest plant now successfully operated in this country is not yet 25 years old. Most of our work has been along the welll defined lines, so far as shapes are concerned, already touched upon, though some of us are aiming to produce a tile that, while it shall conform to the architects' requirements for trueness to the style on which they want to use it, shall at the same time be able to contend successfully with the very severe and changeable weather conditions that have to be met over the great extent of this country, without being obliged to depend upon cement or other extraneous materials for a weather proof roof aside from the tiles themselves. Of these modifications in shapes and their various merits, this is not the time nor I the man to speak. What I have said serves to show the great extent in time and space of the use of tiles for roof coverings, and hence their usefulness therein.

I take it that there is not much of interest or novelty to be said to you with reference to the advantages of the material. The stock arguments in favor of all well burned clays, with which we are all familiar, holds true especially regarding roofing tiles. We know that it is the most durable of all roof materials, when properly made and laid; that it cannot be broken by hail or split by alternating freezings and thawings or slivered by heat like slate. But it is also a fact that it is a more comfortable roofing, because it is a non-conductor of heat and cold, and keeps a house, therefore, cooler in summer and warmer in winter, and tends to reduce the difficulties of condensation, from which all roofs suffer to a greater or less extent. For southern latitudes this makes it an especially desirable roof covering, as well as the fact that it is not a germ producer or harborer, and, therefore, more sanitary. In these days, when microbes with wonderful names and fearful conditions are multiplying at a rate that defies competition, and many new diseases are springing up as concomitants of our complex civilization, it is worth something to us to know that we clay workers are the only fellows that can supply a material impervious to these microscopic conditions of disease and death, and that a house built with clay throughout is, after all, the only real and pure and proper and safe domicile for a man to live in.

Fire Proof Qualities.

With a tile roof you are safe against chances of catching fire from some other fellow's careless conflagration, and in these days of electrical disturbances of great atmospheric severity you are safe from all chance of being touched by lightning after you have been touched by the tile maker, for your tile roof is an absolute non-conductor of electricity, and saves the original expense of several unsightly rods stuck above it to impale the lightning at the same time that they decorate the dwelling with arrow points.

In addition to all these advantages there is a benefit to be derived from the use of roofing tile which is inseparable from the home building of every man, whether he be a savant or a savage. So far as his development carries him he wants the home of his family to be attractive; he wants it to be not only a protection against weather conditions without and a source of comfort and happiness within, but he also wants to secure these results with an accompaniment of beauty and attractiveness, so far as his means will allow, and when, by the multiplication of plants to make this product, and the consequent reduction in handling and freight charges, and the greater facilities in securing economical production, the use of tile has been brought more largely within the reach of all than is now the case, the tile roof will have added many degrees of finish and worth and beauty to the homes and public buildings scattered over our country, of which the average man is proud and in which he takes delight.

The first American cottages erected in Venezuela have just been completed in the little village of Macuto, the principal seaside resort of that republic, which lies at the foot of the mountains, a few miles from the port of La Guaira. One of the houses is for the President of Venezuela, another is for the Minister of Public Works and the third is for the Minister of the Interior. The plans of the houses were prepared by Wilson Brothers & Co. of Philadelphia, Pa., and all the materials were shipped from this country as well as the skilled workmen who erected the buildings. The framing throughout is of wood, and the walls and partitions throughout are of cement and concrete, placed upon expanded metal lathing, making a form of construction that is not only strong and durable, but safe from the attacks of insects which destroy any soft wood that is used in Venezuela. The contracts for the houses were placed by H. T. Duke, an American, who has been for some years a resident in Venezuela.

Clustered Columns.

The clustered column is one of the most prominent features of a Gothic vaulted room, and is therefore always set forth as a leading characteristic of the style. But the clustering of a pier is not merely a kind of enriched fluting, for every shaft and molding which compose it bears a definite relation to the parts which lie above it, every one of which receives, in the decorative sense, an independent support from some member of the cluster. Notwithstanding the apparent variety of these groups, a remarkable degree of system may be detected by the comparison of them. If it were merely for the illustration of the subject, says a writer in a London contemporary, it would be worth while to attempt to recover the laws and rules by which this system was governed; but when we discover in addition to its uniformity in one age and country that it was practiced in different manners in different ages and countries, that its various parts may be traced from different districts, some from the earliest ages, others of later invention, the whole being gradually brought together with increasing complication, a new interest is excited, and the investigation becomes absolutely necessary to the history of architecture. We have said, "recover the laws," because the possibility of detecting them proves that they were recognized by the artists, and there is no doubt that the parts of Gothic decoration were as well defined in their own age as the division of a Roman entablature into architrave, frieze and cornice, which, had Vitruvius been lost, we must have picked out for ourselves from a comparison of examples. Clusters are largely employed for the support of arches, as in rich doorways or the pier arches of churches. An archway of this kind may either be considered as a single arch decorated with a quantity of moldings disposed in succession on its slanting surface and supported by a group of shafts and molded pier edges, or it may be resolved into a number of concentric archways successively placed within and behind each other. When these arches are considered as a whole, the variety of them appears so great and the decoration so various that no systematic description can be applied to them, and as many drawings therefore as there are examples are required to convey an accurate idea of them; but by dividing them into separate arches it will be found that the treatment of these is reducible to a few simple principles, of which a correct idea may be conveyed by figures, and that it is by variously combining these arches that so many different ones are produced, all of which may easily lend themselves to the language of description when the elementary notions are thoroughly acquired.

The duration of slate roofs is variously placed, but is usually given as 60 years. A resident of Bangor, Maine, informs a contemporary, however, that in 1863, when he was living in England, he assisted in removing the slate from the roof of a building of the Plymouth dock yards that was known to have stood over 300 years. After the old building had been torn down a new structure was erected on the same site, and the slates, after being redressed, were placed on the new roof, and at last accounts were still there.

WHAT BUILDERS ARE DOING.

THE reports which reach us from various points of the country indicate a continuation of the gratifying activity noted last month as prevailing in all branches of the building business. In some places the amount of work in progress is such as to almost reach the proportions of a "boom," with the outlook encouraging for the season's business. One of the noticeable features is the scarcity of competent mechanics in certain localities, carpenters being especially in demand.

While there have been numerous labor disturbances the effects have not in any sense been widespread, and the indications favor a comparatively speedy adjustment of many of the existing differences between employers and workmen.

Auburn, Me.

The members of the Builders' Exchange were tendered a banquet on the evening of June 7 at the handsome residence of W. B. Barnes, 158 State street. While the exchange has been in existence only about a year it has a good membership, including carpenters, masons, plumbers, tinsmiths, painters and decorators. A large number were present at the banquet and an enjoyable time was had by all. The committee in charge of the affair consisted of A. W. Roseboom, John L. Almitt, Fred F. Irish, Frank F. Lee, George W. Everts and Harry Huhtswan.

The exchange has rooms at 84 Genesee street and meets the first, third and fifth Wednesdays of each month. The officers are: President, W. B. Barnes; vice-president, A. W. Roseboom; treasurer, J. J. Gardner; recording secretary, L. L. Carl, and financial secretary, J. L. Almitt.

Baltimore, Md.

E. D. Miller, secretary of the Builders' Exchange, informs us that at the annual meeting, held June 6, the following officers and directors were elected for the year ending May 31, 1900:

President, P. M. Womble, Jr.	Third Vice-President, J. H. Short.
First Vice-President, J. J. Walsh.	Secretary, E. D. Miller.
Second Vice-President, August Wehr.	Treasurer, B. F. Bennett.

Directors,

E. D. Crook,	E. M. Noel,	George Knipp,
Jos. T. Lawton,	George J. Dufur,	Wm. Garthe,
Jos. H. Hellen,	C. H. Classen,	Hugh Sisson,
W. H. Morrow,	H. A. Seim,	Theodore Mottu.

After transacting routine business, electing officers and listening to the reading of reports, the members enjoyed a fine collation. In his report President P. M. Womble, Jr., referred to the advance in prices of materials of all kinds, as well as in the wages of labor, which had ranged from 10 to 25 per cent. His prediction was for several years of increased prosperity in all branches of the building trades. He expressed the belief that the repeal of the Mechanics' Lien Law, so far as materials were concerned, has checked if not entirely stopped the bonus on advanced building, much to the benefit of all concerned.

Boston, Mass.

Building operations during the month of May showed a decided improvement as compared with the corresponding period last year. An especially noticeable feature was the increased number of brick buildings, the record being ahead of that of any corresponding period during the last five years. The number of permits issued during May was 256, which compares with 125 in May, 1898, and 252 in May, 1897. Out of the total of 82 brick structures for which permits were issued, 61 were for dwelling houses, that is, domiciles for three families or less. Of the 174 frame buildings, 144 were for dwelling purposes, affording accommodations for 332 families, making the total number of families for which provision was made in both classes of buildings during the month 506.

A noticeable feature of the situation is the increasing use of brick as compared with wood as a building material in the city. In May, 1895, only 10 per cent. of all the new buildings for which permits were granted were of brick. In 1896 the percentage rose to 25, in 1897 it was 23, in 1898 it was 28 per cent. and the present year it is 32 per cent., while taking the aggregate for the first five months of the present year 35 per cent. of the new buildings were brick.

There have been few labor disturbances during the month, the only one of note being the strike of the plasterers' tenders, who early in June went out on the refusal of the demand for a working week of 44 hours and wages 35 cents per hour.

Bridgeport, Conn.

There is a very noticeable increase of activity among contractors and builders, and new houses are going up in large numbers in various sections of the city. It is stated that there are in course of erection about 200 new houses in the neighborhood of Old Mill Green and in the northern part of the city, and that the West End is the scene of a great deal of building. Lumber concerns are doing a good business, and it is stated that never in their history has there been such activity in their line. The architects are doing a great deal of work both in and out of the city.

Buffalo, N. Y.

The building situation in and about Buffalo is comparatively quiet; in fact, less is doing than at any time during the past three years. With the Pan-American Exposition, however, and one or two other large enterprises which it is now believed will certainly materialize, the outlook is showing improvement, and builders and contractors are looking forward to increased activity the latter part of the summer and fall.

At the annual election of the Builders' Exchange Association, which is the stock company owning the building occupied by the Builders' Exchange, the following were elected directors for the ensuing year: H. C. Harrower, Henry Schaefer, Alfred Lyth, Jacob Reimann, John Feist, George W. Schmidt, A. A. Berrick, B. I. Crooker and Emil Machwirth.

At a meeting of the directors the following officers were elected: President, H. C. Harrower; vice-president, B. I. Crooker; treasurer, Alfred Lyth; secretary, J. C. Almendinger.

Chicago, Ill.

The amount of building projected during the month of May shows a gratifying increase as compared with the same period for three years past. Permits were issued for 460 buildings, involving an expenditure of $2,610,475, which is an increase of 97 in the number of buildings and $1,184,275 in the cost as compared with the same month last year.

There have been some minor labor disturbances since our last issue, one occurring on the North Side, where work on a number of jobs was stopped because the building contractors were using non-union made brick. The men in some of the wood working mills also went out on strike early in June.

In discussing the labor situation, noting the fact that practically all the strikes in the city have been amicably adjusted and the half holiday strictly enforced in all branches of the building trades, a recent issue of a Chicago paper gives the following as the scale of wages: Carpenters, $3.40; electricians, $3.75; tin and sheet iron workers, $3.20; plumbers, $4; steam fitters, $3.75; elevator constructors, $3; hoisting engineers, $4; derrick men, $2.80; gas fitters, $3.75; plasterers, $4; marble cutters, $3; gravel roofers, $2.80; stone sawyers and rubbers, $3; marble enamel glass workers' helpers, $2.25; slate and tile roofers, $3.80; marble setters' helpers', $2; steam fitters' helpers, $2; stone cutters (8 hours, no overtime work), $4; stone carvers, not less than $5 (no overtime work); bricklayers, $4; painters, $3.50 (time and a half for overtime); hodcarriers, $2 (overtime, time and a half); plasterers' hodcarriers, $2.40 (overtime, time and a half); mosaic and encaustic tile layers, $4 (only a certain amount of work allowed to be performed per day), and helpers for the foregoing, $2.40.

Cleveland, Ohio.

The Builders' Exchange took possesion of their new quarters on the third floor of the Chamber of Commerce Building on the first of June. In the exhibition department practically all space allotments have been taken and in many instances special displays have been manufactured for the exclusive purposes of the exhibit. It is expected that some time during the latter part of June a reception will be held of a dedicatory nature, when an elaborate programme will be carried out.

The secretary, Edward A. Roberts, has issued a neat little publication of 34 pages, in which is illustrated and described the new home of the exchange, its permanent exhibition, and reference is also made to the value of membership. An interesting feature is an enumeration of the aims and objects of the Builders' Exchange and a list of members arranged according to the branch of the building industry in which they are engaged.

The amount of building in progress shows a gratifying increase over the same period last year, and it is stated that the estimated cost of the buildings for which permits were taken out in April and May was $1,837,000. A great deal of activity exists in the suburbs just outside the municipal limits, the houses being for people doing business in Cleveland.

The architects who held a convention in the city early in June, organized an association known as the Architectural League of America, embracing the principal architectural clubs of all the important cities of the country. The officers elected were: President, Albert Kelsey of Philadelphia; first vice-president, William E. Ittner of St. Louis; second vice-president, J. W. Case of Detroit; secretary, H. W. Tomlinson of Chicago, and treasurer, Herbert B. Briggs of Cleveland. Papers on architectural subjects were read, and when the convention adjourned it was to hold their meeting next year in Chicago, June 7, 8 and 9. During the closing session Peter B. Wight, secretary of the Illinois Board of Examiners of Architects, and who was present as the delegate from the Illinois Chapter of the American Institute of Architects, described at length the operation of the architects' license law which is in force in that State. Mr. Wight stated that the law is proving very satisfactory to architects and contractors and has tended to elevate the standard of architecture in that State.

Indianapolis, Ind.

At the annual meeting of the Builders' Exchange, held on June 2, the following directors were elected: J. H. Schumacher, Charles R. Balke, Theodore S. Smither, Samuel W. Cochrane, J. A. Sims, George Eldridge, Charles Wehking, Michael Danmel and Levi S. Pierson.

At a subsequent meeting of the directors Conrad Bender was chosen to the office of president and O. B. Shover to that of vice-president.

New Orleans, La.

C. E. Dirmeyer, secretary of the Mechanics', Dealers' and Lumberman's Exchange, has recently prepared a comparative report of buildings and general repairs, covering a period from August 1, 1898, to May 31 of the present year. This report shows that during that time there were 1170 frame buildings and 128 brick structures erected, aggregating a cost of $1,244,454. Of the number named 486 buildings were for dwelling purposes, costing $285,220. A comparative report from August 1, 1897, to May 1, 1898, shows a total of 1304 buildings erected, costing $1,144,662.

New York City.

There is very little change to note in the building situation from that reported last month. Building operations continue on a fairly liberal scale in all the various boroughs constituting the Greater New York. The most active sections are to be found in the boroughs of Manhattan, Bronx and Kings, or Brooklyn. The number of buildings projected in Manhattan and the Bronx from the first of the year up to the close of the first week in June was 2311, estimated to cost $59.547,672, as against 1397 buildings involving an expenditure of $31,602,150 for the corresponding period of 1898. In Brooklyn the number of new buildings projected was 1929, estimated to cost $11,191,553, as compared with 1404 buildings, costing $6,020,510 in the same time of 1898.

The new agreement which was recently signed in the rooms of the Building Trades Club by the Mason Builders' Association makes the wages of the masons' helpers from June 1, 1899 to May 31, 1900 33 cents an hour for eight hours, five days of the week and four hours on Saturday. This, we understand, is an increase of 3 cents an hour over the old rate.

Philadelphia, Pa.

One of the leading features of the last quarterly meeting of the Master Builders' Exchange was an address on "American Architecture—Its Future and its Styles," by Prof. Rudolph Buti, late of Rome, but now a resident of Baltimore. The lecture was very interesting and instructive, and in closing his remarks the professor declared "that progress cannot be denied when we say that the American people are free from the prejudices of old Europe." In referring to the construction of public buildings he referred to the excessive use of iron as a very striking feature and its absence in private dwellings. "In Europe, where iron is more expensive, you see all floors of a fire proof system, with iron beams and brick vaultings, but here, where iron is so cheap, floors are of wood, and when a fire begins all is over in a few minutes. Stone is only a casing to conceal the iron. If it is not possible to have in the future a peculiar style for this country, every true style can be used, provided we are well acquainted with it. There are in America some good schools for architecture, but also many of them in which a student in architecture is graduated in a short time and with superficial instruction. It would be a great improvement to send, as does the French Government, the best young students to spend at least two years in Italy and the Continent to study its architectural monuments."

At a special meeting of the Board of Directors of the Master Builders' Exchange it was recommended that a uniform contract between general and sub-contractors be adopted in carrying out work.

Pittsburgh, Pa.

All branches of the building business are showing a gratifying degree of activity, although contracts are being taken at comparatively low figures considering the recent advance in prices of labor and materials. The continued advance in the price of nearly every article that enters into the construction of a building threatens to check business to some extent, as in many cases the increase is regarded as somewhat speculative. The strikes threatened by the various journeymen's unions have been satisfactorily settled, and there is nothing now on the horizon to interfere with a good season's business.

According to the record of the Bureau of Building Inspection the amount of building for the month of May exceeded that of any corresponding period. Superintendent J. A. A. Brown shows in his report that the total for the month was $1,166,049. There were 237 buildings erected, 115 being of brick, 93 of frame, 13 of veneer, 10 brick and stone, 2 brick and frame, 2 of iron construction, 1 iron clad and 1 steel. There were 98 permits issued for additions and 107 for alterations aggregating an outlay of nearly $200,000. The figures show a marked increase over last year, but yet do not fully indicate the real amount of building that is in progress, for the reason that the records cover only buildings erected in the corporate limits of Pittsburgh and of Allegheny. There is, however, a large amount of work in progress in the adjoining boroughs of Bellevue, Avalon, Ben Avon, Sharpsburg, Aspinwall, Sheriden, McKee's Rocks, Esplen, &c.

Seattle, Wash.

A builders' and traders' exchange has just been organized in the city of Seattle, with rooms in the New York Block. The members consist of the leading concerns in the building industry, and the exchange will be glad to have copies of catalogues of building materials for placing on file.

Springfield, Mass.

The Builders' Exchange has recently been considering the differences existing between mason contractors and the carpenter contractors composing the membership. It is given out that the members are now thinking of enacting a rule which shall forbid masons from taking a contract for carpentry work and having the work done by men hired by the day, the rule likewise forbidding carpenters from hiring masons by the day to do contract work. A case is cited where a local mason contractor erected a public building in the city, hiring journeymen by the day to do the carpentry. The job was figured low, and the carpenters' work done in such a cheap way as to allow a profit on the whole. Such work the members of the exchange claim is an injury to their business, and they wish to put a stop to it if possible.

Notes.

The dispute between the carpenters and their employers at Toronto, Canada, has been settled by leaving the question of wages to be adjusted by each employer in his own case.

Nashville, Tenn., is enjoying a gratifying degree of building activity, and a large number of handsome structures are in process of erection. Architects report a healthy increase in business over last year, and have considerable work ahead.

The strike of the lathers in Paterson, N. J., has been declared off, and the men returned to work on the morning of June 5. A compromise was effected on the basis of $1.40 per 1000 laths, this being 10 cents less than the strikers demanded, but a material advance over the wages formerly paid.

A building boom is in process at Onset, Mass., where between 20 and 30 cottages are in process of erection.

The Detroit Builders' Exchange have recently received a communication from the Polish Labor Alliance, stating that unless the laborers employed by the various contractors and builders in the city were given an increase of 2 cents an hour in their pay there would be a general strike. It is understood that most of the contractors and builders will agree to the demands as, except in cases of large contracts, it will not make a very great difference.

A carpenters' strike which has been in progress for over four weeks in Marion, Ind., and which resulted in a sympathetic strike of bricklayers and plumbers, has now spread to the painters, decorators and paper hangers.

The mason's tenders at Bangor, Maine, went out on strike June 5 for higher wages and shorter hours. The men have been getting $1.75 for ten hours' work, and they now demand $2 for nine hours. This, it is said, is the first strike of any consequence in Bangor since the labor unions were formed.

Milford, Del., claims to have the greatest building boom which it has enjoyed for 15 years, and the demand for carpenters and bricklayers is such that it has been necessary to send to other places in order to secure a sufficient number of workmen to carry on the work.

Camden, N. J., is showing a good deal of business activity, and a number of structures, aggregating in cost half a million dollars, will soon occupy sites on some of the principal streets. The new buildings include offices, dwelling houses, schools and municipal buildings.

W. H. Kimball, president of the Master Builders' Exchange at Lowell, Mass., died on June 2, aged 54. He was well known in the trade, and carried on an extensive business in stair building.

The bricklayers in Reading, Pa., have had their wages advanced from 25 to 30 cents an hour.

Reports from Chester, Pa., are to the effect that contractors are having trouble in securing carpenters, and the same reports come from Kankakee, Ill.

Law in the Building Trades.

DUTY TO ADJOINING OWNER IN DIGGING FOUNDATIONS.

It is the duty of one putting up a building, if necessary to go beneath the foundation of a party wall in making an excavation for a cellar under such building, to notify the adjoining owner of his intentions, and to have the work done promptly and by skillful persons, and this is especially true where the work is being done in winter season. Where he fails to do this he is liable in damages.—Krish *vs.* Ford, Kentucky, 43 S. W. Rep., 237.

ILLEGALITY OF CONTRACTS AS TO BIDDING ON PUBLIC WORK.

Where parties combine to stifle competition in bidding on public work and the contract for same is secured by one of them, a further agreement between them to share the losses and profits under it is tainted with illegality, and unenforceable.—Hoffman *vs.* McMullen, U. S. Cir. Ct. of App., 83 Federal Rep., 372.

LIABILITY OF CONTRACTOR ON USING OTHER MATERIAL.

Where a building contract requires the contractor to use pine, and instead of doing so he uses hemlock, the owner may, in an action against him on the contract, show the relative values of the two materials, the difference in value between a house built of pine and one built of hemlock, and the cost of replacing the hemlock with pine.—Haist *vs.* Bell, New York, 48 N. Y. Supp. Rep., 405.

LIABILITY OF OWNER WHO IMPEDES WORK.

A contractor may recover the price agreed for the brick work of a building, though he has not finished the chimneys, where such failure was due to the refusal of the owner to perform his contract by putting on the roof timbers, so that the work might proceed.—Vaughn *vs.* Digman, Kentucky, 43 S. W. Rep., 251.

MAKING A TUSK TENON.

A WRITER in one of the English building journals describes a method of making a tusk tenon, which may not be without interest to some carpenters and builders in this country. He says: The usual rule for cutting a common tenon is to make it one-third the width of the timber, and this rule should be followed as far as possible in designing a tusk tenon. The projection of the tenon from the beam out of which it is cut is called its root and the surfaces immediately adjacent to its root on the sides are called the shoulders.

The tusk tenon was devised in order to give the tenon a deep bearing at the root without greatly increasing the size of the mortise. Making the mortise unduly large would, of course, weaken the girder. The desired deep bearing is secured by adding below the tenon a tusk having a shoulder which in trimmer work penetrates to a depth about one-sixth the thickness of the joist. Above the tenon is formed what is called a "horn," the lower end of which penetrates to the same extent as the tusk. By this arrangement the strength of the tenon is greatly increased as compared with the common form, while the mortise is not made very much larger. In order to hold the parts together the tenon is extended through the girder and pinned on the outside as shown in Figs. 1 and 2 of the illustrations.

So much for a description of the tusk tenon as it is theoretically and as illustrated in Fig. 2. Many times, however, the tusk tenon is attempted upon the lines shown in Fig. 1. For example, if the beams are 10 inches deep, it is placed so as to leave 6 inches beneath. This does not secure the maximum of strength. The tenon is made square on the shoulder, which is not the best that might be done, and has below the root the bearing indicated by A in the sketch.

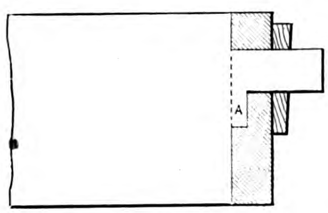


Fig. 1.—Tenon Which Does Not Secure the Maximum of Strength.

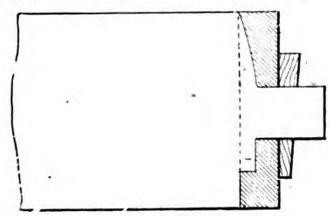


Fig. 2.—Tenon of Maximum Strength.

Making a Tusk Tenon.

The object in view with this joint, where applied to small timbers, as, for example, headers in floor beams, as well as in heavy framing, is to secure a perfect bearing at all points. In the application of it to floor beams the special object it to weaken the trimmer as little as possible.

It is scarcely necessary to remind the reader that a beam weighed and supported like a trimmer has the fibers on the bottom in tension, while those at the top are in compression. If this is conceded, then it becomes evident that whatever is to be cut out of the beam ought to be cut out as near the center as possible. The root of the tenon should pierce the beam at a point as nearly on the neutral axis as may be. The nearer it is placed to the bottom of the beam that is to be connected with the trimmer the less likely the tenon is to split off, and as near the middle of the beam from top to bottom as possible is the proper point for the tenon. There is some liability of the tenon splitting off, however, wherever it is placed, and it is for this reason that the shoulder D, Fig. 2, is introduced. The bearing E also helps to strengthen the construction.

IN the course of a paper on "Tall Office Buildings," read at the recent convention of the American Society of Mechanical Engineers in Washington, Reginald Pelham Bolton gave some interesting statistics of the skyscrapers of New York. In the lower part of the city, he said, in a space 1 mile long and 2-3 mile wide, there are 56 buildings 180 feet high and a few which range between 200 and 325 feet above the sidewalk. He estimated that these tall structures have added not less than 7,500,000 square feet to the habitable area of the district. At the same time the competition between the great office buildings, as they have increased in number, has reduced the minimum cost from $3 to less than $2 per square foot of office space, this charge including light, heat, attendance and cleaning.

Zinc for Roofing.

A writer in one of the English architectural papers discusses the subject of zinc roofs, and among other things says: Zinc is much used as a roof covering, and is lighter and cheaper than lead. The method of laying zinc sheets is similar; the sheets are about 6, 7 and 8 feet long by 2 feet 8 inches and 3 feet wide. Iron, lime or copper should never be placed in contact with zinc, as the moisture creates a destructive action, and sea air is injurious. Zinc should be laid on deal, not oak, boarding and iron nails should be avoided. Freedom for expansion and contraction is important, and soldering is to be sparingly used. The proper gauges for roofing are Nos. 14, 15 and 16; the latter is the most efficient and durable, and should be used for gutters. The edges of wall flashings, sheets projecting over gutters and the like should be turned or doubled to form a half bead, so as to stiffen the edge of sheet and give a finish, while the flashings should be turned into joints 1½ inches. The vertical joints are made by wood fillets or rolls, about 2 feet 10½ inches from centers, the sheets being turned up on each side against the rolls. In connection with the hatched parts the zinc clips are about 2 inches wide, and placed about 3 feet apart. The side edges of sheets turned up are secured by the clips by doubling, without rigidly fixing the sheets. A cap of zinc is then placed over the roll, and this is secured by "fork connections," or pieces of pointed zinc 3 inches long, one end of which is soldered to the inner surface of cap on each side, the other point being free to engage onto the clip as the roll cap slides over.

In connection with the welt or fold joint the clip is doubled in between the edges of the sheets in such a way that by this mode of connection play is left for expansion. Upon slopes of less than one-seventh span drips should be formed, the stopped end of the roll cap being bent over with the edge of the sheet. For slopes of over one-seventh the sheets may be joined by welts, or folded together at the horizontal joints.

Corrugated zinc roofs are sometimes used, the center of ribs or corrugations being about 1 foot 3 inches from centers, or a sheet 2 feet 6 inches wide is made to cover three of the ribs or rafters. The zinc should be laid on boarding, and the sheets be secured by patent hold down clips.

New Publications.

SUCCESSFUL HOUSES. By Oliver Coleman. Size, 7 x 8¾ inches; 165 pages; profusely illustrated with half-tone engravings; bound in illuminated board covers; published by Herbert S. Stone & Co.; price, $1.50.

This work is an interesting treatise on the subject of the decoration and furnishing of a modern home, and in setting about the task the author has attempted to describe certain undeniable principles, to indicate their application, and to illustrate the result by pictures of the interiors of eminently good houses. Some of these are inexpensive and some comparatively costly, but all are the homes of private citizens without any especial pretense of great wealth. The matter is comprised in 14 chapters, the first of which deals with the hall of the house, and then in regular order is taken up the drawing room, the dining room, the library, the den, or smoking room, and the bedrooms. The style is entertaining, and what might by some be regarded as a dry subject is handled in a way to interest not alone the owner of the house, but architects, decorators and builders as well. Other chapters are devoted to the proper treatment of walls and ceilings, floors, windows and doors, and then comes a chapter by Donald Warren on the use and misuse of portieres, and another by Alfred H. Granger on the use of soft woods. The closing chapters have to do with the disposition of small ornaments which form the finishing touches of every room, the means of artificial lighting and, finally, some comments upon the walls and hedges which surround the house.

American Methods for Moving European Buildings.

The success which has attended many notable operations in this country by which large structures of frame, brick and stone have been moved from one site to another seems to have become noised abroad to such an extent that the authorities of Buda-Pesth, Hungary, have placed the contract with a Chicago concern for changing the location of nine of the ancient structures in that ancient city. When the municipal authorities decided to beautify their city upon the general lines of Paris, the officials were confronted with the necessity of tearing down millions of dollars' worth of buildings, which stood upon the ground selected for the new boulevards, or else to remove them to new sites. The American system of removing buildings having come to their notice, an investigation was instituted, which resulted in American engineers being invited to bid upon the moving of public and other structures. The concern which has been selected to undertake the work are the L. P. Friestedt Company of Chicago, and some of the buildings which they are to move include the Drehr Palace, 135 x 348 feet in size and five stories in hight; the Holy Ann Memorial Church, fine example of twelfth century Byzantine architecture, 80 x 160 feet; the Palace of the President of the Ministry, 140 x 125 feet and four stories in hight; a school house, 125 x 125 feet and three stories high; a parochial church of the Franciscan Monks, a beautiful example of the Byzantine architecture of the tenth century, to be raised 3 feet and moved 48 feet; the City Hall, 150 x 150 feet and five stories in hight; Count Karolyi's Palace, 102 x 200 feet and four stories high, and the Jewish Memorial Synagogue, 90 x 180 feet, to be raised 11 feet and moved 19 feet. The Drehr Palace is to be moved back 31 feet, the Memorial Church is to be raised 6 feet and some of the others are to be moved varying distances up to 65 feet. The weight of the Drehr Palace is computed by Government engineers at 31,000 tons. In speaking of the work, Mr. Friestedt states that notwithstanding the fact that the process of raising heavy buildings upon jacks and moving them on steel rollers to the new foundations has been explained by photographs and scientific reports, the Hungarian Ministry is skeptical and would not sign a contract until the company had filed bonds to the amount of double the value of the buildings. As a consequence the company were compelled to file bonds to the extent of $700,000 while the amount of their contract was only $343,000.

WE are indebted to Edward Herbert Davis of Scranton, Pa., for a copy of a very handsome souvenir which he has recently issued, illustrating some of the more striking examples of work which has been executed in Scranton in accordance with designs prepared by him. The engravings are half-tones, showing both interiors and exteriors of attractive examples of architecture, embracing school houses, churches and private dwellings. Covering each plate and of the regular size of page is a sheet of tissue paper, bearing in its center, in small type, the name and location of the building which it covers. This is the only text relating to the illustrations, although a number of pages following the engravings are devoted to announcements of some of the leading concerns in Scranton engaged in lines of business likely to interest those contemplating building. The volume measures about 11 x 14 inches, is handsomely bound in white board covers, stitched with heavy white silken cord, and bears as a side title in gold letters the inscription, "Some of the Works of Edward Herbert Davis, Architect, Scranton, Pa."

CONTENTS.

— STORM AT SEA.—It was terrible. The tempest beat the sea into a horrid fury; the waves were mountain high, and they swept over the frail craft ceaselessly. "My flesh creeps," he cried. "My complexion runs," shrieked she. For it is the lot of women to suffer most.—*Detroit Journal.*

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Novelties.

Fox Sash Pulleys Nos. 7 and 9.

The Fox Machine Company of Grand Rapids, Mich., have just added to their already extensive line of sash pulleys two new patterns known respectively as Nos. 7 and 9. We show in Fig. 1 a general view of the No. 7

Novelties.—Fox Sash Pulleys Nos. 7 and 9.—Fig. 1.—View of Pulley No. 7.

pulley, which is made from one piece of steel drawn in shape, having the ends rounded so that they will fit a hole bored by a 13 16 inch bit. It will readily be seen that the pulley will fit into an oblong mortise made by a pulley mortising machine, or will fit equally as well into four holes bored ⅝ inch on centers by means of a bit of the size above named. The pulley has a flange all around the top giving a neat appearance, while at the same time preventing it from passing through the mortise. The pulley being drawn in a die and the flange drawn at right angles to the top makes it all the more rigid as regards its construction and renders it impossible to spring the metal against the wheel so as to cause it to bind. In this respect the

Fig. 2.—View of the No. 9 Pulley as it Appears in the Block.

manufacturers state that their No. 7 pulley is different from anything in this line heretofore produced. In Fig. 2 of the engravings is shown the Fox No. 9 pulley as it looks inserted in a block, and gives a good idea of its appearance in the window frame. This pulley is made with a 1¾-inch wheel entering an oblong slot or fitting into three holes bored ⅝ inch on centers with a 13-16 inch bit. The wheel is of the well known form which this company employ in connection with their pulleys, having the double shouldered steel bushing which, in connection with the steel rivet, allows the pulley to run smoothly without noise and with friction reduced to a minimum. The construction of the wheel was clearly indicated in an illustrated notice of the company's No. 5 pulley which appeared in the April issue of this journal. In putting the pulley in place it is unnecessary to use nails or screws, but as the shell is small it is driven down flush with the top of the jamb and then the locking set, which we illustrated in the May number, forces the ears at the end of the shell out and into the wood, thus not only preventing the pulley from being withdrawn, but also securing the wood so as to prevent any possibility of its splitting. One stroke of the hammer at each end of the shell is sufficient to securely lock the pulley in place.

Carved Moldings.

The Grand Rapids Carved Molding Company, Grand Rapids, Mich., are manufacturing machine carved moldings out of a great variety of wood which are adapted to all purposes requiring the most artistic finish. An illustration is presented in Fig. 3 of a specimen of the work done by this company. The work is not pressed, being done on a very different machine from that making pressed work. The grain of the wood is not mashed and expressionless, but is as clean, sharp and effective as hand work. A beautiful catalogue of art moldings has been issued by the company, which gives 28 pages of reproductions from photographs of part of the great variety of moldings they offer to the trade.

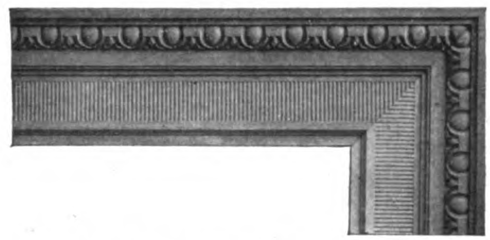


Fig. 3.—Example of Carved Door and Window Molding as Made by the Grand Rapids Carved Molding Co.

The Youngstown Corrugated Expanded Lath.

The attention of architects, builders and plasterers is being directed to a new lath which has recently been placed upon the market by the Youngstown Iron & Steel Roofing Company, with home office at Youngstown, Ohio, and with branches in Chicago and Philadelphia. The manufacturers state that the lath differs from the common expanded lath in that "it is constructed on a purely scientific basis." The meshes are corrugated at right angles to their expansion, and in this manner a clinch is formed, which, it is claimed, will never allow of the plaster being jarred loose or broken off. The construction is such that the plaster cannot be pushed through the key or clinch so as to drop off and waste, but passes down into the expanded pockets and over the rear side of the lath, covering the rear edges and preventing oxidation. In other words, the lath is completely bedded in plaster. It is pointed out that this form of lath is especially well adapted for use on extensive ceilings where the heavy downward weight of plaster calls for an absolutely perfect clinch. In Fig. 4 of the illustrations is presented a face view of the lath, showing the pockets for the plaster. The manufacturers claim for this lath that it does not sag with the weight of wet mortar; that there is no rusting on the rear side; that the transverse corrugations give great stiffness; that the depth of web furnishes a perfect key or clinch, and that it requires no leveling up in finishing. The lath is furnished in sheets 27 x 48 inches, or 1 square yard each, and in any gauge of material from 24 to 28. The company report a good demand for the lath, and state that they are running their works night and day in order to keep up with orders. They also turn out all kinds of roofing and siding, bridge and fire proof flooring and the

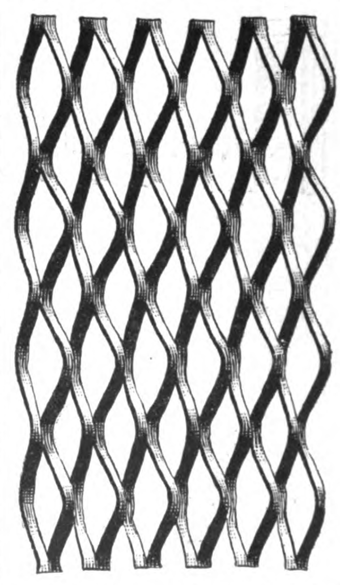
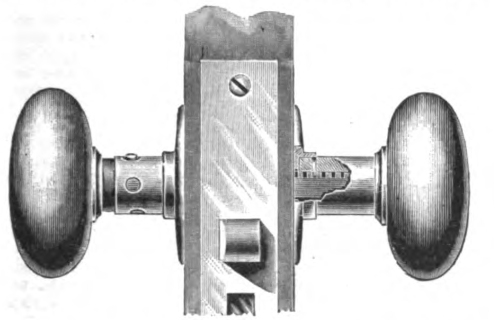


Fig. 4.—Face View of the Youngstown Corrugated Expanded Lath, Showing Pockets for Plaster.

Union metal corner bead for plaster corners.

Victor Screwless Door Knob.

Architects, builders, carpenters, and house owners generally are likely to be interested in the Victor screwless door knob, manufactured by L. T. Snow, New Haven, Conn., and illustrated in Fig. 5 of the accompanying engravings. The mechanism is simple and can be easily understood and operated by persons of average skill, while the cost of the knob is little if any more than the ordinary or side screw knob. Particular attention is called to the fact that it is manufactured in all grades of jet, porcelain, wood and bronze, and in all styles of finish, and can be used with any make of knob lock. One of the knobs is made fast to the spindle and is provided with a movable sleeve, Fig. 6, which in position for applying to the door is drawn back to the base of the knob neck. This sleeve is capable of extension beyond the end of the knob neck and has a series of holes at varying distances from its inner end adapted to receive a locking pin located in the neck of the knob. The opposite knob moves freely on the spindle. In the neck of this knob is a latch, Fig. 7 which, the spindle having been passed through the door and the knob run on, can be shut into one of the series of notches, securing the knob in a position of comparative adjustment to the door. The sleeve on the fast knob is then moved out toward the door, drawing the latch knob forward and securing the latch under the flange of the rose. The locking pin engages automatically with one of the holes in the sleeve and completes the adjustment to the door, locking all the parts in solid engagement with each other, thus avoiding all play and consequent wear. The knob, when adjusted to the door, cannot be removed from the outside. Mr. Snow is also manufacturing a line of Victor mortise knob locks constructed on a new arrangement of lever action, having the latch in a line with the knob, and so arranged as to require a very short movement of the knob in operating the latch, saving wear on both lock and knob and making it much pleasanter to the hand in opening or closing the door. Combined rose and escutcheons of wrought bronze and steel of new designs will also soon be added to the line. The manufacturer will on request forward sample knobs to architects and builders interested, while samples of the goods can also be seen at the New York office, 107 Chambers street, E. G. Shepard, agent.



Novelties.—Victor Screwless Door Knob.—Fig. 5.—View of Knob

Fig. 6.—Movable Sleeve and Locking Pin.

New 36-Inch Band Saw.

The John T. Towsley Mfg. Company of Cincinnati, Ohio, have recently placed upon the market a new 36-inch band saw, a view of which is shown in Fig. 8 of the engravings. The frame is cast in one piece and cored hollow. The table, 28 x 34 inches in size, is of iron, and is adjustable to any angle up to 45 degrees. The wheels are 36 inches in diameter with 2-inch faces, metal hubs and 12 solid polished steel spokes and laminated wood rims with rubber bands. The upper shaft, 1 7-16 inches in diameter, is of steel, as is also the lower shaft which is 1 11-16 inches in diameter. The guide bar is 1¼ inches square, counterbalanced by a weighted lever. The hand wheel regulating the tension of the saw, also the one lining the upper wheel, are operated from the front of the machine, and can be adjusted while the saw is in motion. The vertical adjustment of the upper wheel is 7 inches. The space between the guide bar and the table is 15½ inches, and between the saw and the frame 36 inches. The tight and loose pulleys are 14 inches in diameter with 3¼-inch faces, and should make from 375 to 400 revolutions per minute.

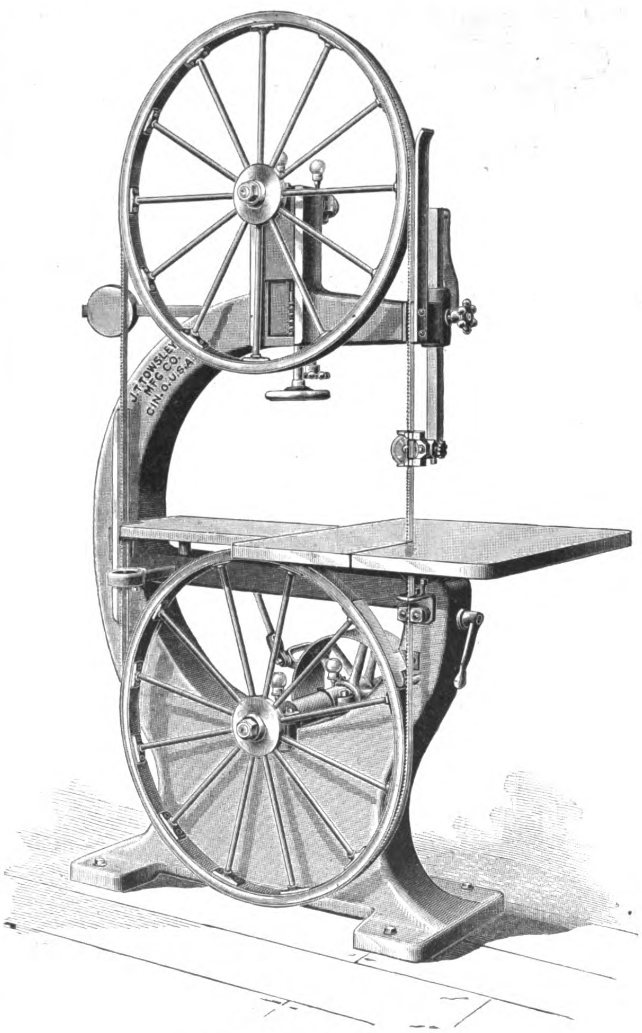


Fig. 8.—New 36-Inch Band Saw.

Fig. 7.—Latch on Free Knob.

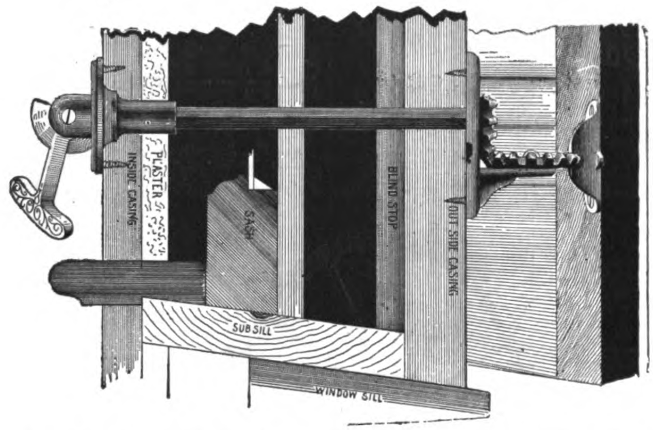
Fine Tool Chests.

C. E. Jennings & Co., 101 Reade street, New York, make a line of tool chests for professionals and amateurs, both with and without tools, and frequently get orders for special chests, one of which they have just finished. It is beautifully made of selected antique oak, handsomely marked, the grain being brought out by fine polishing. The outside dimensions are

35 x 17½ x 20¾ inches. The top is mitered and paneled, the joints are dovetailed and all work done by hand. The trimmings, including chest handles, hinges, cylinder lock and hinged lid supports, are of bronze. Inside are two sliding trays and a saw rack. The chest weighs 80 pounds, and was ordered by a gentleman amateur.

Pitney Shutter Worker.

The Sessinghaus Novelty Company of 706 Chestnut street, St. Louis, Mo., are marketing the Pitney shutter worker, the construction and operation of which are shown by means of the sectional view in Fig. 9 of the engravings. It is designed for manipulating shutters from an interior without raising windows, removing screens, or disturbing flowers, curtains or hangings, by merely turning a lever on the inner side. In this way shutters can be locked open, shut or at any intermediate point with little effort or loss of time. On the inside the only part visible is a nickel plated handle of an ornamental character. A cam on the handle, pressed down, holds the shutter in place at any point, preventing slamming or rattling. It operates on the gearing principle and requires little muscular effort. It can be used in connection with old or new work.



Novelties.—Fig. 9.—Sectional View, Showing Construction and Operation of the Pitney Shutter Worker.

New Hand Planer and Jointer.

What is referred to by the manufacturers as an advanced type of extra heavy hand planer and jointer has just been placed upon the market by the Egan Company, 221-241 West Front street, Cincinnati, Ohio. It is known as their new No. 3 hand planer and jointer, and is shown in general view in Fig. 10 of the engravings. The frame is one casting, and being extra heavy enables the machine to run smoothly and without vibration. The front table is 4 feet long, and the frame with inclines coming under the tables give them full support to the outer ends, which, the manufacturers claim, is better than overhanging tables. The cylinder and journals are of forged steel. Two sides of the head are plain to receive the long knives, and the other two are slotted for the use of beading, molding and other cutters. The movement of the front table is always ready, and is operated by the large wheel in front, the arrangement being such that the operator can set from the front or from the end without loosening any bolts. Both tables are fitted with steel lips where they approach the cutters, allowing them to be brought closer together than would otherwise be the case. In using hand planers the expert operator stands close to the machine—in fact, one foot must project inside or under, and the manufacturers call attention to the fact that the frame of the machine here illustrated is recessed on the front side, thus giving the operator greater advantages for steadiness and quick work. In bringing this machine to the attention of the trade the manufacturers point out that it is the latest achievement of their large corps of experts, and it is put upon the market with the fullest confidence that it embodies in its design and construction the company's very latest talent and experience.

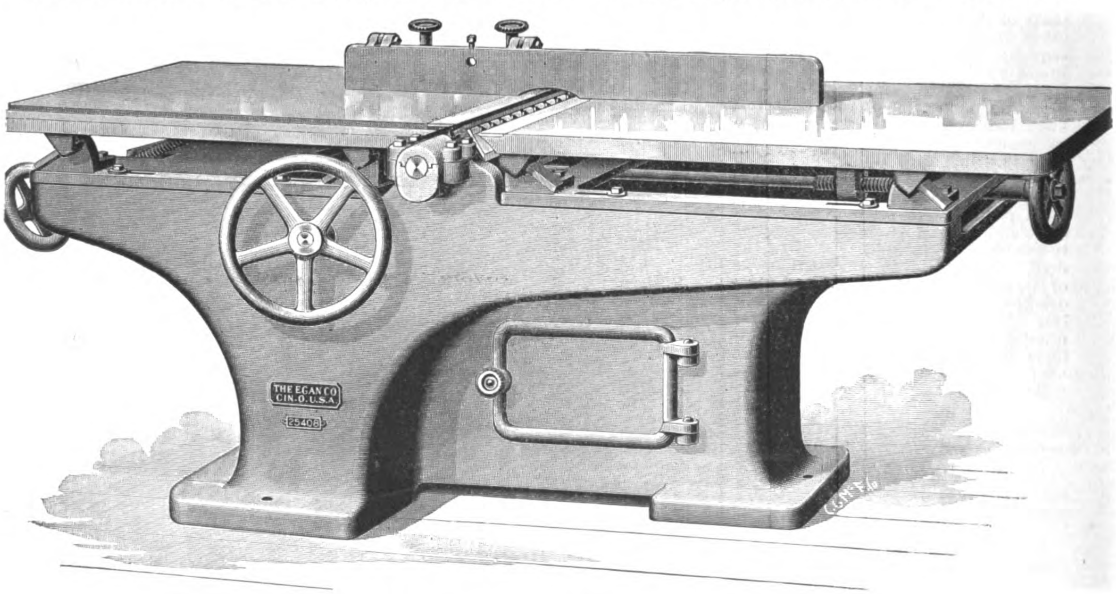


Fig. 10.—New Hand Planer and Jointer.

Wright's Trade Directory and Gazetteer.

We are indebted to George Wright of 121 Fulton street, New York City, for a copy of Wright's Trade Directory and Gazetteer, the fifth edition of which has just been issued. It is a volume of over 4000 pages, each 6 x 9½ inches, and gives the trades, professions, population and resources of the principal foreign countries. For more convenient reference it is subdivided into 12 sections of different colored papers. On the front edge of the book are printed the various countries about which information is presented. It is about 6 inches thick, nearly a third of it being devoted to a buyers' guide of Great Britain and America, in which the principal manufacturers more fully call attention to their products. The book not only gives a comprehensive list of the different trades and professions in the countries named, but serves as a gazetteer for each county, city, town and village, especially useful to merchants and manufacturers seeking an extension of trade.

TRADE NOTES.

ARCHITECT F. R. COMSTOCK, some very interesting examples of whose work have been at intervals illustrated in these columns, has recently closed his office in Hartford, Conn., as well as his branch office in this city and moved his entire offices and residence to 124 West Forty-fifth street, New York City, between Broadway and Sixth avenue. This step has been rendered necessary by the increase of his New York business, and the change of base will also enable him to be in direct communication with his extensive practice in the South and West, his operations at the present time covering 18 different States.

THE KANNEBERG ROOFING COMPANY of Canton, Ohio, refer in their advertising space this month to their stamped steel ceilings which are made in designs to suit all requirements. They state that in point of artistic beauty the ceilings are distinctly in advance of any yet produced, and that they are of special interest to architects and builders. The company have recently issued a special ceiling catalogue, which will be mailed to any one sufficiently interested to make application to them for it.

IN pointing out the merits of the Star ventilator the manufacturers, Merchant & Co., Incorporated, of Philadelphia, Pa., and with branch offices in New York and Chicago, emphasize the fact that the functions of the ventilator are to give a free discharge of air from within a building while preventing the entrance of air through it to the building, and at the same time being storm proof and free from drip due to condensation. By means of the Star ventilator good ventilation is claimed to be secured, the merits of the device for the purpose named being well illustrated by the large order recently placed with the company by the United States Government for Cuba. The ventilator is made with or without a glass top as may be required.

NORTH BROTHERS MFG. COMPANY, Lebigh avenue and American street, Philadelphia, Pa., and with New York office at 113 Chambers street, are furnishing dealers handling their tools with metal display signs calling attention to the "Yankee" goods. These signs measure about 4½ x 9¾ inches and are provided with a cord for hanging up. There are three signs to a set, one having embossed in colors, to represent as nearly as possible the finished tool, with lettering in blue and red, the "Yankee Spiral Ratchet Screw Driver;" the second showing the "Yankee Automatic Drill" and the third the "Yankee Ratchet Screw Driver." These signs are gotten up in very neat and attractive style, being painted on both sides and finished with a raised border. The lettering and the representations of the tools are very effective and cannot fail to attract attention when displayed in the dealer's store.

PITNEY'S SHUTTER WORKER is the subject of an announcement presented in their advertising space this month by the Sessinghaus Novelty Company, 706 Chestnut street, St. Louis, Mo. With this device, it is stated, the shutter can be closed from the inside, nothing being visible except an attractive nickel plated handle which can be used to hold back window curtains, as illustrated by the picture presented in connection with the announcement. A cam on the handle pressed down holds the shutter in place at any point thus preventing slamming and rattling. It operates on the gearing principle, requires little muscular effort, and can be used in connection with old or new work. Circulars, prices, &c., can be obtained from the company on application.

THE ALIGNUM COMPANY, manufacturers of fire proof and sanitary material for wainscoting halls and vestibules, also for ceilings, flooring, tiling, bathrooms, &c., have removed to 330 to 334 East Ninety-eighth street, New York City, where they occupy the entire building. The structure has been specially fitted up to meet the requirements of their business, the removal having been found necessary by reason of the increasing demand for their specialties. The company are the successors to the Wheeler Mfg. Company, reference to which was made in these columns some months ago.

WE LEARN from the Nicholson File Company, Providence, R. I., that the little work which they published a few months ago under the title of "File Filosophy" has proven so popular as to render necessary a second and much increased edition. The little book has been widely distributed to file users throughout this country and abroad. Treating as it does of files and how to use them it is useful to those interested in that class of tools. Copies may be had free upon application to the company.

THE C. W. TRAINER MFG. COMPANY, 89-91 Pearl street, Boston, Mass., call attention to the silver anniversary of the establishment of their business by issuing an attractive announcement of 24 pages bound in purple covers, with side title in silver effects. The letter press relates to the specialties of the company, including Asbestine water proof cold water paint for outside use, Trainer's natural asphalt portable gravel roofing and Asbestico for use over plastered and hard finished walls and ceilings. In a second little pamphlet which the company have issued are found directions for applying the roofings named, together with prices, &c.

THE AKRON LEVEL COMPANY of Akron, Ohio, are directing the attention of carpenters and builders to the Akron Level, for which strong claims are made. The tool is offered in three-piece cherry for $2 and three-piece mahogany for $2.50. An illustration of the device appears in the company's advertising space this month.

CHARLES A. KING in charge of Manual training and wood work at Berea College, Berea, Ky., informs us that a number of new buildings have been planned for erection in the near future, and that as regular repairs upon the present structures require a constant supply of every kind of building material he will be glad to receive from those engaged in this line such catalogues, circulars, prices, &c., as they may have recently issued.

MERCHANT & CO., INCORPORATED, of Philadelphia, Pa., send us an eight-page pamphlet bound in durable paper covers and bearing the suggestive title "Not 'Equally as Good,' but Positively Better." This obviously has reference to their high grade roofing plates, which are described in a way to convince the most skeptical of the merits which the manufacturers claim for them. A bird's-eye view of the company's works constitutes a frontispiece and the illustrations in the body of the pamphlet show the appearance of plates made by the hand dipped or Welsh process and also by the process employed by Merchant & Co.

THE E. D. ALBRO COMPANY, Cincinnati, Ohio, manufacturers of veneers and fine cabinet woods, are receiving numerous inquiries from the wood working centers of Europe. Their mills are well equipped for manufacturing all grades of veneers and the company do an immense business in all the fine hard woods used in the wood working industries.

THE G. DROUVE COMPANY, 14 and 16 Clinton street, Bridgeport, Conn., are furnishing builders with roofing tin put up in rolls for valleys and gutters. The tin is painted on both sides, is thoroughly soldered and is all ready for putting on the building. There are 100 square feet in each roll, the 14-inch rolls being 86 feet in length, the 20-inch rolls being 60 feet long and those 28 inches wide being 43 feet long. The company state that no resquaring is needed and that the seams are well soldered by hand. Reference is also made to their galvanized iron, which is not painted and which is put up in rolls 28 inches wide and 43 feet long. These materials are specially desirable for carpenters and builders, as the tin is ready for use upon arrival at the building. The company state that it is always carried in stock and is ready for shipment on receipt of orders.

GARA, MCGINLEY & CO. of Philadelphia, Pa., call attention to Wood's steel corner for plaster walls by means of a tastefully illustrated circular entitled "Just Around the Corner." Illustrations of the steel corner are shown and descriptions of its special merits given. The same company also send out thumb tacks carrying miniature views of these corners.

THE ADAMS & ELTING COMPANY, 155 Washington boulevard, Chicago, Ill., call attention to their Plymouth Rock floor wax, which is intended to be used on floors after the company's wood filler is applied. After the floors have been properly filled the Plymouth Rock wax is put on with a woolen cloth and allowed to dry for about 20 minutes. The company recommend two coats of the wax, which should be spread as thin as possible. One pound of wax is enough to cover 200 square feet, and they state that no more than this quantity should be used. The wax is put up in 1, 2 and 4 pound cans ready for use. The company are manufacturers of paint specialties and pay particular attention to wood finishers' supplies.

THE E. S. WHEELER & CO., 256 Water street, New Haven, Conn., are directing the attention of architects, builders and house owners generally to the Careg slate washtubs or trays, which are referred to as being put together in the best possible manner and as being very superior to soapstone or other soft stones. The Careg is said to be non-absorbent, very durable and is furnished in all sizes of trays and in combinations, as well as in all sizes of sinks. At the company's new and commodious quarters, 12-14 Cliff street, New York, these goods are on exhibition, as well as a varied line of high grade plumbing fixtures, including sample baths, closets, trays and other supplies. In addition to the store in Cliff street the company have showrooms in the Mohawk Building, 80 Fifth avenue, New York City.

THE JOHN T. TOWSLEY MFG. COMPANY, Cincinnati, Ohio, manufacturers of wood working machinery, &c., are now located in their new plant at the head of Evans street, where they occupy a new brick structure 50 x 200 feet. The new shop is a model of light and convenience of arrangement. A new warehouse will be erected in the rear at an early date to accommodate the finished product. A line of newly designed band saws embodying many improvements and convenient features has just been brought out.

WE have received from William Connors, Troy, N. Y., manufacturer of stove cement and the American seal paints, a little book, on the first page of which is Mr. Connors' portrait. The other pages show portraits of President McKinley and Admiral Dewey and the "Olympia." Pictures are given of other naval heroes and their ships and of Governor Roosevelt, General Miles, General Shafter, General Wheeler and other military heroes. The cover shows a picture of the American seal paint plant. The book is well worth preserving for the pictures, and as a souvenir of the 1899 Industrial and Mercantile Exhibition of the Commercial Travelers' Association of Troy.

THE HARTMAN MFG. COMPANY of Ellwood City, Pa., and with New York office in Room 1000 at 309 Broadway, are manufacturing the Hartman steel rod lawn fence, which is intended for lawns, cemeteries, schools, churches, grove plots and public and private grounds generally. In their announcement presented in another part of this issue is a half-tone representation of a picture entitled "Milking Time," a copy of which, printed on heavy paper, will, we understand, be sent by the company to any address on receipt of a 2-cent stamp.

THE GOETZ BOX ANCHOR COMPANY, New Albany, Ind., write us that a number of improvements have been made in their box anchor, and that a carload of the goods has just been shipped to Milwaukee. A battery of oil furnaces has been installed in the company's plant, which enables them to increase the daily output about 30 per cent., operating nine hours. The demand for anchors since January 1 is said to have been constantly on the increase.

LANE BROS. COMPANY, Poughkeepsie, N. Y., makers of Lane's steel jacks, have added a new and smaller size, known as No. 0. This size is referred to as available for a great amount of light work and is offered at such a price that a large sale of it is confidently expected by the manufacturers. All sizes of the jacks are now also offered galvanized. The company advise us that their trade in this line is steadily increasing.

WE have before us a catalogue of 44 pages illustrating Seymour's patent rotary ventilating fans, which are manufactured in a great variety by Seymour & Whitlock, James M. Seymour, proprietor, of 43 Lawrence street, Newark, N. J. These fans are intended to insure positive and reliable ventilation in the rooms in which they are placed and also for keeping rooms free of flies. This latter is accomplished by what is known as the frictional motion, which while imparting sufficient motion to the fans to accomplish the purpose, yet does not even in cool weather create an unpleasant circulation. The illustrations show some of the ways in which the fans may be employed, while numerous tables give the sizes and prices of fans and accessories. The concluding pages of the catalogue are devoted to a description of the Parabolic water motor, useful in driving church organs, ice cream freezers, printing presses, elevators, coffee mills and, in fact, all kinds of light machinery.

THE INTERIOR HARDWOOD COMPANY of Indianapolis, Ind., call attention to the fact that their parquette floors are made of the finest woods, and will be supplied plain or ornamental, thick or thin. The company state that their location in the center of the finest hard wood lumber district of the United States enables them to serve their patrons to their advantage both in quality and price. They have representatives and stocks of floors in the leading cities, and announce in their advertising space that they will furnish colored floor plates and prices free on application.

WILLIAM D. WARNER, No. 50 Exchange place, Providence, R. I., is offering a cold water paint known as Herculene, which is made in four different tints and pure white and is ready for immediate use by mixing with cold water. It is applied by means of a soft kalsomine brush, and it is claimed it will remain in good working order a long time after it has been mixed. We understand that prices and samples will be sent on application.

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We have just received direct from the West Coast of Mexico the finest cargo we have ever handled of this most Popular Wood, it being far above the average in lengths, widths, color and texture, and we are now prepared to furnish it in quantities and thicknesses to suit the trade. Architects and builders are invited to correspond with us in regard to it, and also in regard to all other woods used for Interior Finish and Decoration.

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Our stock of Mexican, Cuba and San Domingo Mahogany cannot be excelled in Grade, Texture or Color, and our prices are based on first cost without Storage Charges or Commissions to middle men. We assure you it will be to your advantage to give us a trial. New York Branch, Cor 6th and Lewis Sts. **THE E. D. ALBRO CO., Cincinnati, Ohio, U. S. A.**

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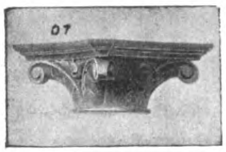

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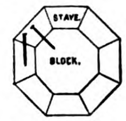

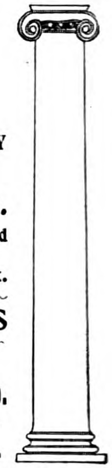

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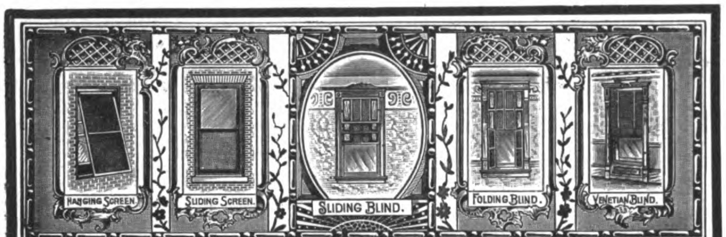

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Slats finished to match any color before put together.
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We will furnish you the blinds made complete, or, if you wish to make the frames yourself, will furnish you the slat-panels finished complete to fit in your frames. These blinds, being made by special machinery, we can compete in price with any first-class blind.

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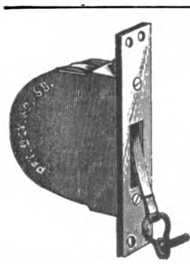

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Applied to old buildings without altering sash or frame.
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Prepared for the Steam and Hot Water Heating Course at the New York Trade School, with Supplementary Chapters on House Heating, Specifications and Surface Estimating.

BY THOMAS E. McNEILL.

140 Pages, Numerous Illustrations and Diagrams, 5 x 7 inches, Cloth, $1.00.

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has no superior at any price. Not adjustable but accurate. Three piece cherry $2.00. Three piece mahogany $2.25.

Akron Level Works,
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Carpentry and Building

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The Builders' Exchange

VOL. XXI. NO. 8. NEW YORK, AUGUST 1899. Ten Cents a Copy. One Dollar a Year

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Alphabetical Index to Advertisers.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

DAVID WILLIAMS COMPANY, - - PUBLISHERS AND PROPRIETORS
232-238 WILLIAM STREET, NEW YORK.

AUGUST, 1899.

General Business Situation.

From every quarter come evidences of a business activity which marks out the present time as a period of prosperity practically unparalleled in the history of the country. From Maine to California and from the far Northwest to Florida the trade reports reviewing the first half of the year bring cheerful news of well being and satisfaction with the results achieved, as well as of serene confidence in the outlook. Except for a few cases of labor troubles here and there, which, it is thought, are unlikely to be prolonged, the situation presents no disturbing feature. The consumption of goods of all kinds is larger than ever before; labor is fully employed at higher wages than for years past; money is abundant, prices in general have risen to a much more remunerative level; our exports of merchandise have broken all records; confidence is completely restored; and there is a general feeling of security and buoyancy, which presents a remarkable contrast to the perplexity and doubt which have haunted the business man for several years past. In casting up the accounts of the half year just closed there are two absolutely reliable pieces of evidence which illustrate in the most convincing way the remarkable improvement in business conditions developed during that period. The returns of bank clearings are regarded as an accurate index of the condition of business activity in the various centers of trade throughout the country. For the six months ended June 30, 1899, the aggregate bank clearings were far and away the heaviest ever recorded. According to *Bradstreet's* they amounted to $48,073,459,121, a gain of 46 per cent. over the first half of last year, of 94 per cent. over the corresponding period of 1897, of 117 per cent. over 1894 and of 57.5 per cent. over the first six months of 1892, the last previous year of good business. Thus the first half of 1899 showed a volume of business materially larger than that of the entire year 1894. No more convincing proof could be given of the great increase of trade which places this year's record above that of all previous years in the commercial annals of the country. Moreover the gain is not confined to any favored sections, but is shown in practically every part of the Union.

Another Model Tenement Scheme.

Apropos of the remarks which have recently appeared in these columns relative to movements in progress for housing the poorer classes in the metropolis, it is interesting to note a scheme now on foot to establish in this city a model tenement on a plan which those interested believe will revolutionize the system now in vogue for providing living quarters for the poorer element among the working classes of the population. The originator of the plan is one who has had a great deal of experience in the management of tenement houses in large cities, and has made a special study of the conditions which obtain in the tenement districts, where thousands of respectable working people are compelled to live owing to their inability to pay for better accommodations. The scheme, as outlined by Prof. C. J. Fairchild of the Hartford Theological Seminary, is in effect to erect on an entire block one house 11 stories high, constructed of steel and other materials, which will add to the fire proof qualities of the building, and having a large inner court roofed with glass. It is intended to have only one entrance to the house and this through a spacious hallway leading to a system of elevators in the court. Professor Fairchild considers the ordinary stairways and hallways an unnecessary waste of space, and instead of these it is purposed to have a balcony on each floor running all around the court, and from which bridges will converge to the elevators in the center. Each flat will have its entrance on the balcony, which will thus form in effect an elevated street. The flats will extend straight through from the court to the outer side of the building, the arrangement being such that they will have plenty of light and air, both front and rear, and at the same time be entirely private. The suites will consist of two spacious or three smaller rooms, and there will also be others occupying the space of two ordinary flats for the accommodation of larger families. In the basement it is intended to have baths, laundry, heating and electric lighting apparatus and a cold storage plant to supply refrigerators let into the kitchen wall of each flat.

A Good Investment.

It is not intended that the enterprise shall be a charitable one in any sense, but will be conducted on strict business principles, and it is expected that it will prove a good paying investment. The originator of the scheme advances the argument that the great saving effected by transforming the whole block into one building, instead of dividing it into several houses, and centralizing the management in a single office at the only entrance to the structure, will enable the promoters to provide all the conveniences mentioned. In referring to the chief defects of the present system of tenement house construction the point is made that the courts and air shafts are narrow, resulting in poor ventilation, insufficient light and unhealthy conditions generally, while at the same time the apartments are crowded together in such a manner that windows of adjacent houses open into one another and frequently doors open into a common hallway, thereby destroying the privacy which is necessary for true home life. The use of steel and the elevator have revolutionized the construction of office and hotel buildings, and there seems to be no reason why an attempt should not be made to utilize these agencies in housing the city's poor, and here, in the estimation of the projectors of the new enterprise, is the field for its greatest development.

Pittsburgh's New Office Building.

For some time past certain important interests in Pittsburgh have been considering the question of putting up an office building which would rank among the finest of the sky scrapers in that section of the country, and according to latest advices it now looks as if the scheme would be carried to a successful termination. It is announced by the Central Safety Deposit Company that a 14-story structure, costing in the neighborhood of $800,000 and to be finished early next spring, will be erected on the site of the Central Hotel in that city. The plans, which have been prepared by Architect Charles Bickel, call for a structure having a frontage of 160 feet on Smithfield street, 112 feet on Second avenue and 96 feet on Third avenue. It will be of the steel frame skeleton construction, with the interior finished throughout in mahogany. There will be an entrance on Smithfield street and another on Third avenue, while the lobby on the first floor will extend through from Smithfield street to the rear. This will be finished in marble and there will be a double stairway leading to the second floor. The elevator facilities will consist of six for passengers and one for freight. We understand that the work will be done by the Federal Construction of St. Louis, Mo., and first mortgage bonds are to be issued for carrying through the enterprise.

The Plasterers' Strike in London.

The strike which has been in progress for some time past among the plasterers of London was recently brought to an end, and in commenting upon the terms under which the men returned to work one of the London architectural papers says:

"If the plasterers have at last succumbed, it was owing not only to the resolution and union of the builders, but in a large measure to the failure to find allies among the other building trades. The latter may have considered the time was not ripe for a great strike, but at present we can assume that the policy of allowing the plasterers to remain isolated was dictated by good sense. At present there is the consolation of an assurance that a year in which the losses of its predecessors can be compensated will be allowed to run its course without any social obstacle suddenly appearing. The conference between representatives of employers and plasterers was held in London on Tuesday. A chairman was found in E. T. Cook, of the *Daily News*, who was without any interest to make him partial to either party. It was decided that the cause of all the woe—viz., the claim that only foremen who belonged to the Plasterers' Association should be employed, must be formally abandoned. The determination of the number of apprentices is to be referred to a special joint committee, but it was suggested that the difficulty could be solved by means of a provision for having every apprentice legally bound. The men have resolved to avoid boycotting and blacklisting in all cases where the employers adhere to the rules, and the employers have undertaken to strictly enforce the rules in all parts of their contracts. Joint committees are to be established in various districts to define the demarcation in cases where there is any dispute between plasterers and other trades about the right to do certain classes of work. Pending reference to the committee, there is to be no strike or lock-out. In cases of objection on the part of members of the Plasterers' Association to work with non-members who had made themselves specially objectionable, notice is to be given, and a truce of six days is to be allowed to enable representatives of masters and men to arrive at an amicable settlement. Finally, the employers agreed that where they can secure British plasterers the foreigners employed during the dispute will be dispensed with as their contracts expire, and members of the association will not be required to work on the same buildings with them. The members, on their part, are not to object to fixing work prepared by the foreigners. The men have yet to indorse the arrangements. We hope both parties will respect the agreement, which is advantageous for the building trades in this country."

Buildings of the Paris Exposition.

(*With Supplement.*)

We have received from Paris a series of photographs of wash drawings which furnish a good conception of some of the principal features of the Paris Exposition, which is to be held next year. Architecturally the greatest group is to be the new buildings near the Champs Elysees, comprising the Grand Palace of Fine Arts and the Small Palace of Fine Arts. The magnitude of the former is well illustrated by the two pictures of the interior and exterior which we show this month on our double page supplement. Both of the buildings are to be permanent additions to the architecture of Paris.

Near them, crossing the Seine, is the famous Alexander III Bridge, of which French engineers and architects are deservedly proud.

We present also a picture of the Seine, looking down stream over the series of palaces and pavilions of foreign powers on the left, and the exhibition buildings for horticulture and agriculture on the right, with the Eiffel Tower and the Trocadero in the distance.

Main Building of Philadelphia Exposition.

The main building of the National Export Exposition, which is to be held in Philadelphia, Pa., from September 14 to November 30 of the present year, is 1000 feet long and 400 feet wide. It includes three pavilions two stories in hight and a spacious auditorium with a seating capacity of 5000. In this auditorium the sessions of the International Commercial Congress will be held and concerts will be given every afternoon and evening by the leading musical organizations of the country. The building covers an area of nine acres, and there is an area of floor space aggregating 12½ acres.

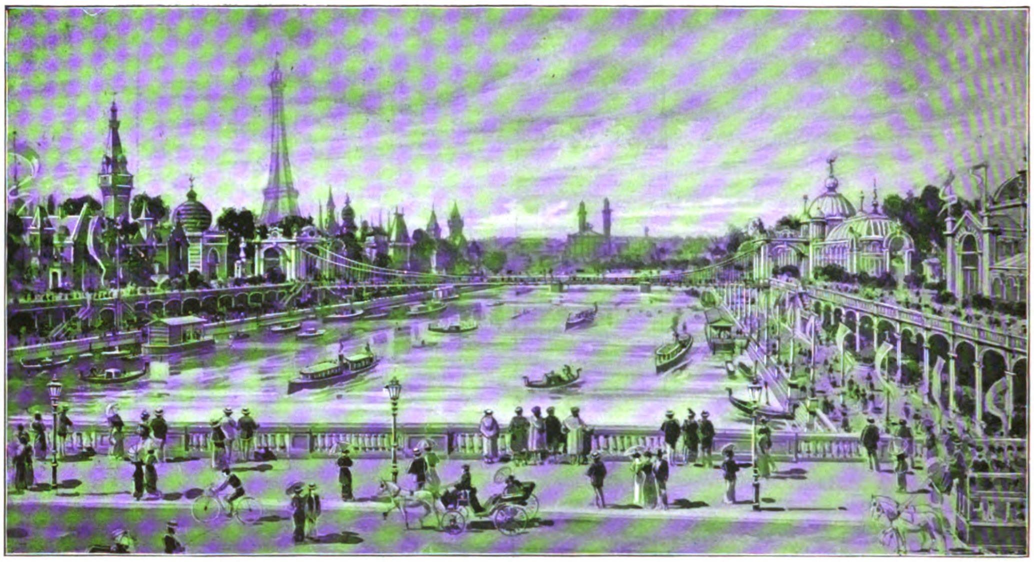
The main entrance is in the north pavilion, opening into a lobby 60 x 90 feet, beyond which and between the north and central pavilion is the auditorium, 200 feet long and 140 feet wide. On either side of this auditorium are arcades for exhibits.

The pavilions are constructed of brick and structural steel and are each 90 x 380 feet. Each are two stories high, the second floor of the northern pavilion to be devoted to the offices of the exposition; the second floors of the other pavilions will be given up to exhibits.

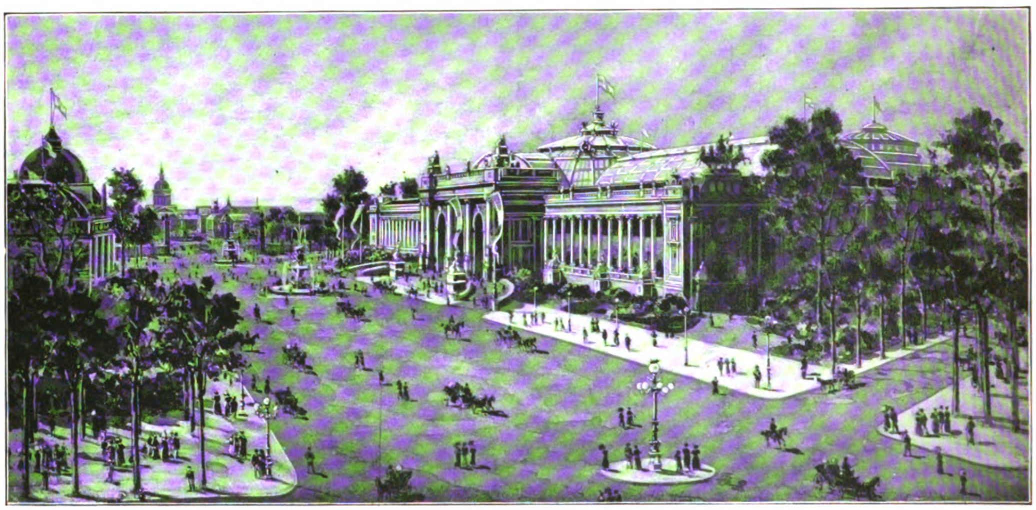
Each of the entrances to the main building are flanked by pedestals, on which are groups of statuary, representing various industries and the pediments over the various entrances of all of the buildings contain heroic figures, symbolizing various aspects of manufacture and commerce. The walls of the main building are covered with a coating of white "staff" and the cornices are made of the same material. Around the roof runs an iron balustrade of rich design and from the numerous staffs on the roof float the flags of all the nations who will be represented in the International Commercial Congress.

THE plans have recently been filed with the Department of Buildings in this city calling for the construction of a ten-story brick fireproof office building, with stores, at the northwest corner of Broad and Front streets. The new building is estimated to cost $140,000.

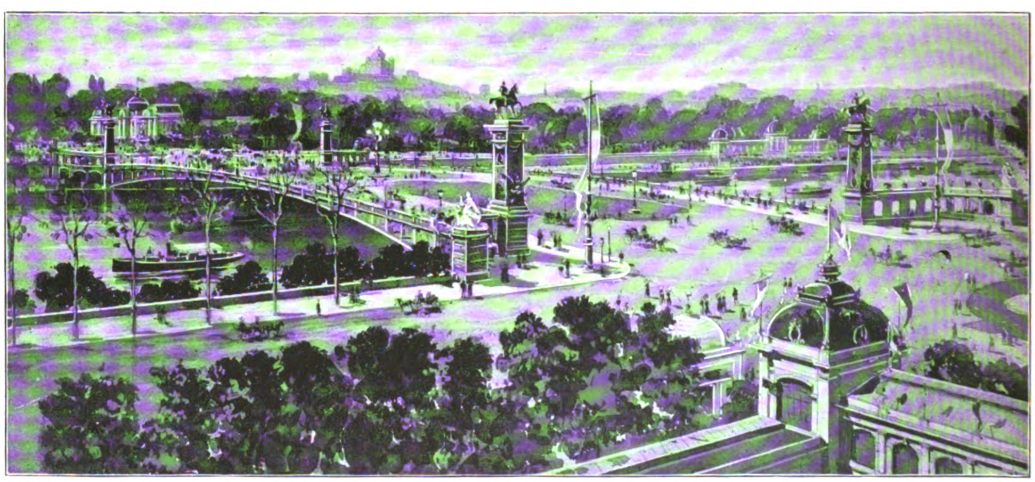
THERE is still standing in Jamestown, on the Potomac River, the bell tower of a church erected by the first colonists of Virginia in 1610—three years only after the settlement of that place. The building was 60 feet in length by 24 feet in breadth, and constructed of brick. It had "a baptismal font, a tall pulpit, a chancel of red cedar, and in the tower two bells." The tower, which is still as firm as stone, stood over the vestibule, which had an arched entrance.



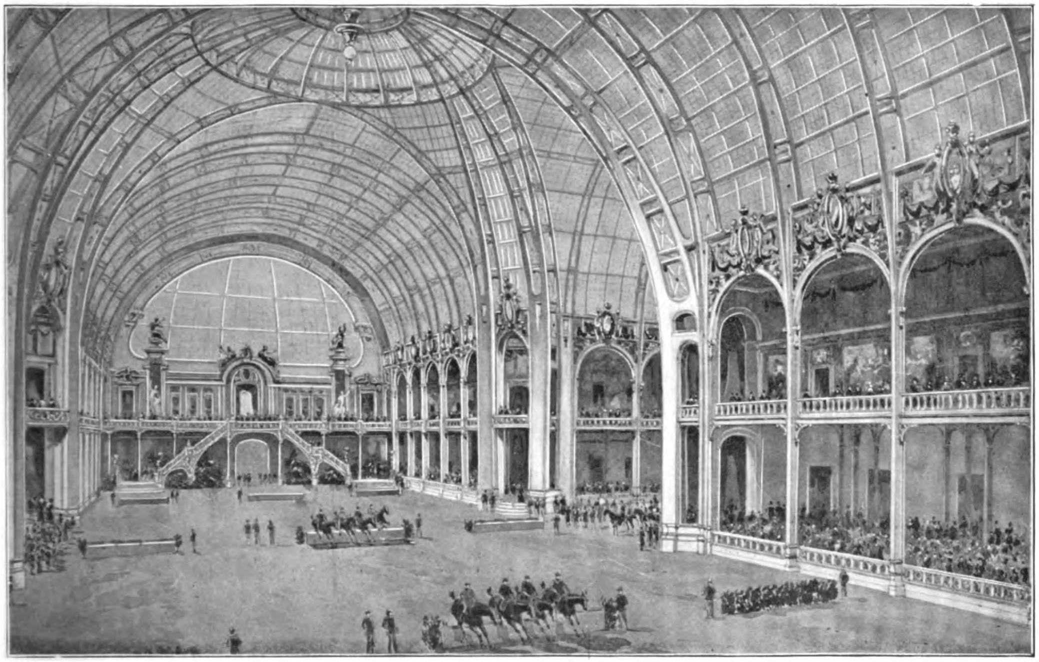
VIEW LOOKING DOWN THE RIVER SEINE.



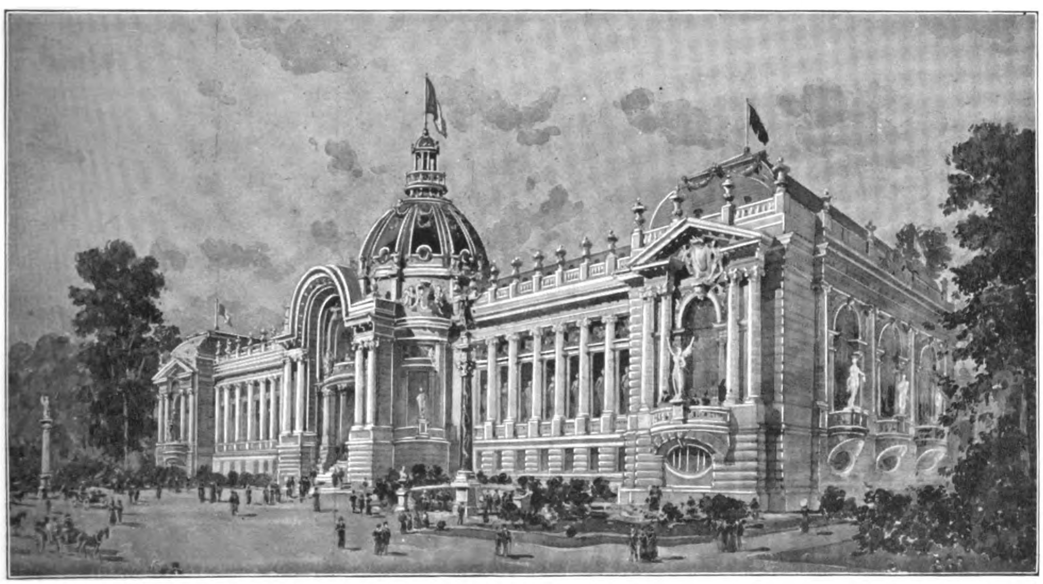
THE GRAND PALACE OF FINE ARTS.



PERSPECTIVE OF THE ALEXANDER III BRIDGE.



NAVE OF THE GRAND PALACE OF FINE ARTS.



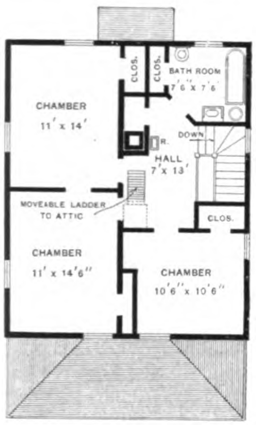
THE SMALL PALACE OF FINE ARTS.

VIEWS OF SOME OF THE MORE IMPORTANT BUILDINGS IN CONNECTION WITH THE PARIS EXPOSITION OF 1900.

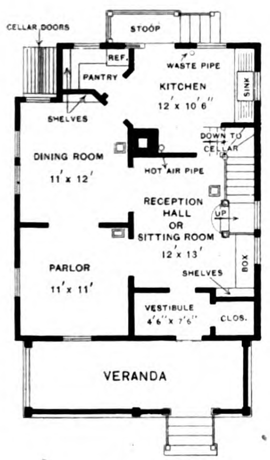
COMPETITION IN $1500 FRAME HOUSES.

THIRD PRIZE DESIGN.

IN this issue we lay before our readers the design to which was awarded the third prize in the competition for $1500 frame houses, the author being Mr. Karl G. Johanson of 197 Middle street, New Bedford, Mass. According to his specifications the foundations are to be constructed of uncoursed rubble, faced on the outside above grade with hammer dressed building stone, the joints well filled with spawls and cement mortar and pointed both inside and out. The walls are to be 18 inches at the bottom and 12 inches thick above grade.



Second Floor.



First Floor.

Scale, 1-16 Inch to the Foot.

The piers in the cellar and under the porch are to be of brick with foundation stone for the front and rear steps. The chimney is to have an 8 x 8 inch flue and is to be plastered before the furring is done. The plastering is to be two-coat work, the first coat of mortar to be in the proportion of one barrel of lime thoroughly slaked and strained to three barrels of clean, sharp sand, free from lime and salt, and twenty-five pounds of cattle hair well soaked and mixed in. The mortar is to be stacked five days before using. All ceilings are to have a coat of hard finish composed of lime putty, white sand and plaster of paris.

The frame of the house is to be of spruce, with porch floor, ledger boards and treads of outside steps of hard pine, which material is also to be used for the casing around the bathtub and washbowl, and for the partition under the lower shelf in the pantry. The cellar floor, siding and roof boards are to be of hemlock, also the under floors, coal bin and furring. The outside frame, with the exception of the gables, is to be covered with spruce clapboards, while the gables are covered with cedar shingles laid 5½ inches to the weather. The trough, corner boards and all outside trim are to be of white pine. The roof is to be shingled, the same as the gables, the shingles to be laid 4¾ inches to the weather. The porch is also to be shingled and is to have a matched hard pine floor and ceiling. The top floors in the first and second stories are to be of matched spruce with an 8-inch base board and 1½-inch top molding. All inside finish, except as stated, is to be of soft pine, finished in oil and shellac. All rooms, except the closets and pantry, are to be papered. The pantry is to be fitted with

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

Competition in $1500 Frame Houses. Third Prize Design.—Karl G. Johanson, Architect, New Bedford, Mass.

shelving, the first shelf being 22 inches wide and 26 inches from the floor, with partition underneath. There are to be five shelves above the first one, with an opening provided with a slide 18 x 18 inches in the outside wall, for the entrance of ice to the refrigerator. In the dining room closet are to be five shelves all flush with the wall. In the various clothes closets are to be two shelves with strips provided for hooks.

A rough footway is to be provided leading to the skylight over the hall on the second floor, with a step ladder reaching from the floor to the opening in the ceiling and fastened with screw eyes and hooks. The lower end is to be balanced with weights under the roof so that the ladder may be pulled close up to the ceiling when not in use. The windows of the first and second floors are to be balanced by cords and weights and fastened with sash locks.

The outside of the building, except the roof, is to have two coats of linseed oil paint.

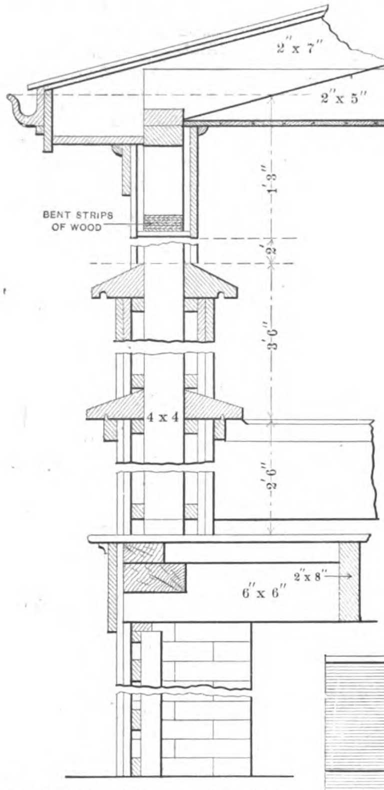
Under the head of plumbing, the author specifies that the bathroom is to have a 5-foot, 14-ounce copper bathtub, a combination embossed water closet with finished hardwood tank and seat, a marble slab 20 x 24 inches and a back piece 10 inches high, with 14-inch P. O. bowl. The pantry is to have one 3½-foot iron sink. The kitchen is to have one 30-gallon Brown Brothers' copper boiler and one iron sink 3 feet 6 inches, which, with the bath-tub and washbowl in bathroom, are to be provided with hot and cold water connections. The wood wash trays in the cellar are to be connected with the drain room, sitting room, parlor, hall on second floor and bathroom. The builder is to provide a cold air box.

Detailed Estimate of Cost.

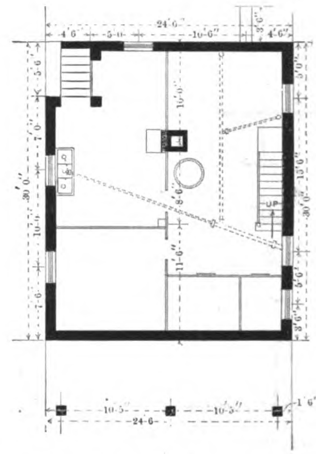
The figures showing the estimate of cost in detail are as follows:

EXCAVATION.

Batter boards..	$3.00	
115 yards excavation	38.75	
30 perch of rubble, laid dry	45.00	
20 perch of hammer dressed building stone	45.00	
		$131.75



Details of Porch Construction.—Scale, ¾ Inch to the Foot.



Foundation.—Scale, 1-16 Inch to the Foot.

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

Competition in $1500 Frame Houses.—Third Prize Design.

and furnished with one cold water faucet. The cold water pipes are to be ⅝-inch lead, 3 pounds to the foot, and the hot water pipes are to be of brass, ½-inch iron pipe size. All plumbing is to be done in a thorough and workmanlike manner and in accordance with the rules of the Board of Health.

The heat is to be furnished by a No. 721 Richmond warm air furnace with five registers, one each in dining

MASON WORK.

2,000 bricks	$18.25	
Thimbles, flashing and ash pit door	3.00	
500 yards of plastering	56.00	
7,800 laths, put on	36.50	
		113.75

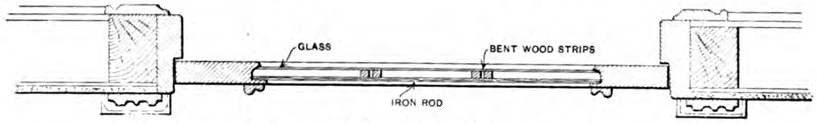
CARPENTER WORK.

5,500 feet of spruce frame..	$82.50
5,000 feet of hemlock boards	75.00
1,500 feet of spruce flooring	27.00
11,500 cedar shingles	34.50
700 clapboards	21.00

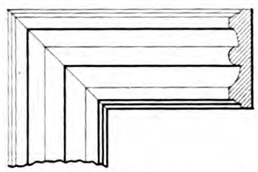
92 feet trough	8.28
300 feet Georgia pine for porch and kitchen floors	9.00
500 feet hard pine for porch ceiling, &c.	10.00
450 feet white pine for finish	18.00
Grounds and molding	8.00
Cellar windows, frames and sash	15.00
Window frames, sash weights, &c.	48.50
Door and frames	30.00
Interior door and window finish	10 00
Stairs and steps	30.00
Nails	20.00
Hardware	30.00
Carpenter labor	310.00
Incidentals	27.72
	814.50
Painting	125.00
Plumbing	230 00
Heating	85.00
Total	$1,500.00

The builder's certificate is signed by H. McB. Smith of 4 Florence street, and the heating and plumbing estimates are furnished by A. Knowles of 635 Purchase street, New Bedford, Mass.

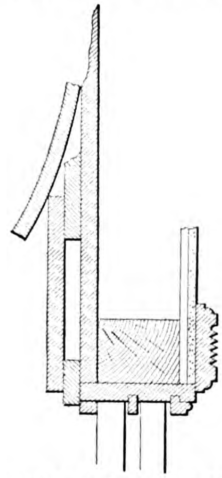
THE tests of cements carried out in Austria during 1898 have been recently published. Most of the tests were made in accordance with the directions issued by the Architects' and Engineers' Union of Austria. Of 26 Portland cements, only two failed to satisfy the tensile strength test of seven days after gauging, and only one the compression test. More than half of the 19 Roman cements, however, failed to satisfy the conditions of the tensile strength test at seven days, although after four weeks only one-fourth failed in tensile strength, and one-third in resistance to compression.



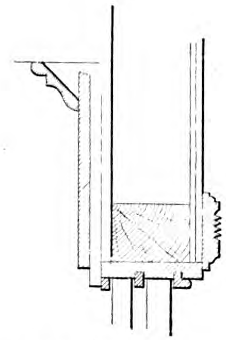
Horizontal Section through Front Door.—Scale, 1½ Inches to the Foot.



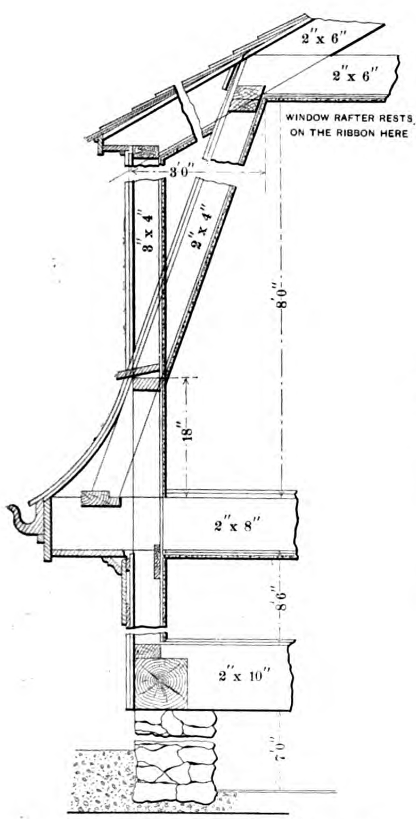
Detail of Inside Trim.—Scale, 1½ Inches to the Foot.



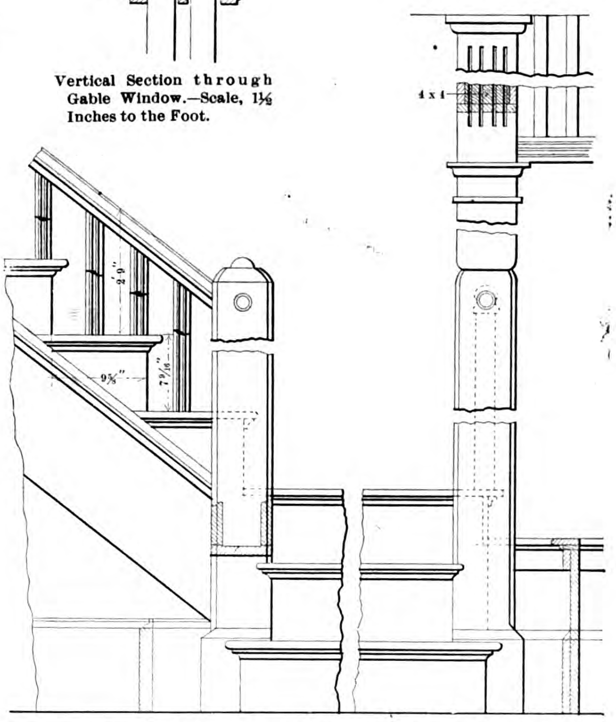
Vertical Section through Gable Window.—Scale, 1½ Inches to the Foot.



Section Under Cornice.—Scale, 1½ Inches to the Foot.



Section through Main Wall of Building.—Scale, ⅛ Inch to the Foot.



Detail of Main Stairs.—Scale, ¾ Inch to the Foot.

Miscellaneous Constructive Details of Third Prize Design in Competition for $1500 Frame Houses.

GREENHOUSE HEATING.

THE following is an extract from a paper read before the Missouri State Horticultural Society by L. R. Taft of the Agricultural College of Michigan :

For heating small ranges of greenhouses some of the cast iron hot water boilers, although they are comparatively high priced, will prove satisfactory and in the end economical, as they will be more durable than wrought iron boilers, especially if the latter are made in the form of box coils from ordinary gas pipe. The joints of the latter being screwed together will expose more or less of the threads, and as a result may not last more than two or three years, although with heavy pipe the life of the pipe boiler may be seven or eight years, if care is taken not to have any of the threads exposed. For larger ranges, where hot water is used, tubular boilers may be employed and will give good satisfaction, especially if the tubes are placed so as to fill the shell of the boiler. Although these boilers are made of wrought iron, the tubes are thicker than those commonly used for coil boilers and the tubes, being riveted rather than screwed into the boiler heads, will be quite durable. Although not to be recommended for very small ranges, a considerable saving in the amount of pipe required for radiating surface in the houses can be made if the system is placed under pressure. Although there is hardly any limit to the size of the plant in which hot water under pressure may be used, a majority of greenhouse men prefer steam for ranges of the size that will make the use of a night fireman desirable. While it will require rather more careful attention than a hot water system, steam as a means of heating greenhouses has some advantages.

For ranges of houses with less than 10,000 square feet of glass only one heater will be desirable, but if the amount of glass exceeds this two or more should be employed. The heaters should be so arranged that either one can be cut out from the system in case of accident and for the purpose of making repairs. Having more than one heater, under such conditions, will oftentimes prevent serious loss. During the fall and spring months only one heater will be required, the other being held in reserve for use during the severe weather in winter.

Piping.

For piping houses for hot water circulation there has been a marked change in the kind of pipe used in the last 20 years. Instead of the old fashioned 4-inch cast iron pipes, wrought iron pipes from 1¼ to 2 inches in diameter are used for the coils. In some cases the coils include both the flow and return pipes, but more commonly the water is carried to the further end of the house in pipes of a somewhat larger size, which are there connected with the returns. Although larger pipes are occasionally used the usual size for the flow pipes is either 2 or 2½ inches, the former being used for coils containing about 200 square feet of radiation, while the latter will supply 350 feet. When the heater can be sunk so as to be below the level of the greenhouse floor a fairly good circulation can be secured with all of the pipes under the benches, but better results can be obtained when the flow pipes are carried as high as possible, and the use of overhead flows becomes almost necessary where it is not possible to lower the heater. One or two of the flow pipes can be carried upon each of the rows of purlin and ridge posts, and others, if necessary, upon the walls. The radiation supplied by the returns will be rather more effective when arranged in horizontal coils than when the pipes are placed one above the other, but from the fact that when the coils, in whole or in part, are carried upon the posts of the side walls they are out of the way, the vertical coil is often used. While good results will be secured whether the flow pipe is carried with an upward or a downward slope the results, if anything, seem to favor a down hill system. The slope should be merely enough to free the pipes of air, for which an outlet must be provided at the highest point. It is an excellent plan, especially when the closed system is used, to connect the highest point of each flow pipe, or the highest point of the common system, with the expansion tank. The returns should always be laid with a slight slope toward the boiler, but if the larger sized pipes are used and are properly supported this need not be more than 1 inch in 20 feet, the object being to carry the pipes as high as possible and at the same time have a sufficient slope to permit the air to escape.

Heating by Steam.

The arrangement of the pipes where steam is employed is quite similar to that in the hot water system, the particular difference being that the size is considerably smaller for both the flows and returns. The return pipes need not be larger than 1¼ inches, and for small houses very good results can be secured with 1 inch pipe. As a rule, a 2-inch supply pipe will answer for an ordinary house 20 x 100 feet, except where high temperatures are desired. In the steam system there should be an automatic air valve at the lower end of each of the coils and for controlling the heat valves are necessary upon both the supply and drip pipes, while in the hot water system only one valve is necessary, although two will be desirable in case there should be occasion at any time to cut off the coil in order to make repairs upon it. In the steam coils it is also well to have several of the pipes provided with valves in order that one or more of them may be cut off to control the heat. In estimating the amount of radiating surface that will be required, it is customary to consider that 1 square foot of surface will be sufficient for 3 of exposed glass, if the house is to be carried at 60 degrees, with hot water, and that it will answer for 4 or 5 if 50 or 40 degrees, respectively, is to be maintained. With steam heat 1 foot of radiation will be ample for 5½ square feet of glass in houses to be heated to 60 degrees, for 7½ if 50 degrees is to be maintained, while only 1 foot of radiating surface to 9 square feet of glass will be required in houses that are to be heated to 40 degrees. The above figures will be found substantially correct in sections where the usual winter temperature does not drop below zero, and where the houses are well built and with a comparatively small amount of wall surface. In sections where the temperature drops much below zero or where the character of the house makes it difficult to heat these figures will need to be slightly modified.

Rule for Figuring Joist, Studding, &c., Required in a Building.

A writer in one of the London building papers asked if there was not some simple and rapid way of finding the number of joists, studs, furring, &c., for any given length of floor or walls, where the centers are placed 16 inches apart, and in reply the following is given: Multiply the length of the building in feet by three, and divide the product by four. For instance, a building is 124 feet long, then $124 \times 3 = 372 \div 4 = 93$, the number of joists or studs required. This rule holds good no matter what the thickness of joists may be, as long as they are spaced 16 inches from center to center. Allow one extra for a starter, except where a sill or other timber forms a starter. The same rule applies also to furring or stripping, or any other work, when 16 inches form the distances from centers. In estimating the number of rafters or other timbers that are set 2 feet 6 inches to centers, results may readily be obtained by multiplying the length of building by two and dividing the amount by five. The result will show the number of pairs of rafters required, less one pair, which must be added. Again, if we want to place joists of timbers of any kind 18 inches from centers, all we have to do is to multiply the length in feet by two, and divide the product by three, pieces required less one, which must always be added. In the first instance, the foot is divided into three parts of 4 inches each, and in the two latter examples the foot is divided into two parts of 6 inches each. The principle is quite plain and, when properly understood, may be applied to many cases in estimating.

MAKING WOOD PATTERNS.—IV.

BY CHARLES J. WOODSEND.

WE will now work the ribs shown in Figs. 35 and 36, also in Figs. 23 and 24. In Fig. 24 B, B, B, &c., indicate the positions of the ribs, five in number, which are made from ¾-inch stuff. Get out each piece, or, if preferred, one piece ¾ inch thick of the required width and sufficiently long to make the five. Square up both edges, and upon one edge run gauge marks ⅛ inch from each side. Plane down from nothing upon one edge to the gauge marks on the other and perfectly straight across. Now make a template by which to mark them, the long edge of the template to be laid parallel with the thin edge of the stuff. This stuff is toward A of the line A B of Fig. 35, so that the thickest part of the rib shall be toward B of the same line. Next fit each rib in its proper place, fitting them so that they shall stand vertically, having the bevel equal upon each side. Round up the edge, as shown in Fig. 36. Sandpaper and shellac as for other parts of the pattern, then bore ¼-inch holes and put into their or warp, and this must be guarded against in the following manner:

By referring to Fig. 23 it will be noticed that there is one piece marked "batten," and that in Fig. 24 these battens are indicated by the letter C. They are to be made of ⅞ x 3 or 3½ inch white pine, the grain to run lengthwise across the under side of the top of the sill. The side next to the pattern must be planed perfectly straight and out of wind. Fit one end over the fillet toward the front. Bevel the two edges and the other end, giving them plenty of bevel. Screw down securely in place, but do not countersink the screws—just turn them in flush. There is no necessity for the battens to be shellacked, as by leaving them in the white the molder will know that they are not to form a part of the casting and will "stop" them off.

The pattern is now ready for the foundry. The same flasks can be used for the sills as were made for the

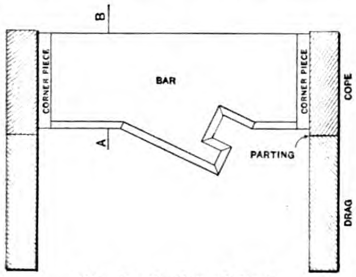


Fig. 33.—Section of Flask.

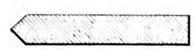


Fig. 34.—Enlarged Section of Bar on Line A B of Fig. 33.

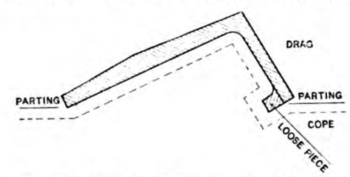


Fig. 37.—Section of Pattern with Dotted Lines Showing Shape for the Bars.

Fig. 36.—Section of Rib on Line A B of Fig. 35.

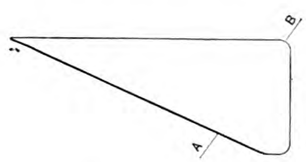


Fig. 35.—Plan of Rib.

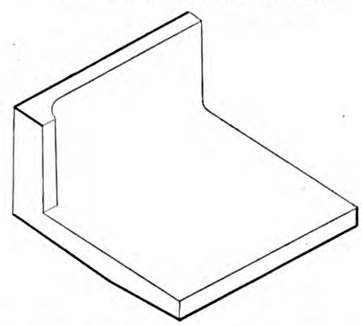


Fig. 38.—Isometrical View of Section of Pattern with Fillets.

Making Wood Patterns.

places dowels, as shown in Fig. 23. Bore right through both ribs and pattern. The dowels should be hardwood and work freely, so the molder will not have any trouble in drawing them. After this has been done bore ¼-inch holes in the loose piece shown in Figs. 23 and 26, boring through the piece and pattern as well. These dowels should also be of hardwood and work freely. Draw out the nails from the loose piece; mark the ribs distinctly with black shellac in the place where each one belongs, and on the ribs and the pattern place some distinctive marks which can be readily seen by the molder without the necessity of his having to hunt especially for them.

Now let in the rapping and lifting plates. It may not be out of place at this point to state that rapping and lifting plates can in some places be bought ready made, also the dowels. There are other attachments for patterns that are manufactured for the trade, but these papers were prepared for the general readers of *Carpentry and Building*, and to a majority of them these ready made goods are not readily available. The rapping and lifting plates from the lintel pattern can be used for this pattern as well. Do not forget to bore holes through the pattern in the places where the rapping and lifting irons come. This pattern in its present shape if put into the sand would in all probability curl

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lintel, but the bars will require to be changed and replaced by others of suitable shape to meet the requirements of the present pattern. These bars are shown in Figs. 33 and 34. In order to obtain the correct shape of these bars remove the rib and loose piece from the pattern—see Figs. 23, 24 and 26. Make a drawing—a pencil drawing will do—of the section of the pattern as it appears with the loose parts removed. Draw a line from the two inner edges of the section forming an hypotenuse to the triangle made by the under side of the section of the pattern. This line will be the parting line between the cope and the drag, as shown in Fig. 37. It will be noticed that a part of this piece projects below the line of the parting between the cope and the drag, which is perfectly correct. Now by drawing line ⅝ inch from the parting lines and from the under side of the section of the pattern the proper shape for the bars will be obtained. In Fig. 37 the broken lines are the ones for the bars. Before cutting these bars to a length it may be well to consult the molder as to where he wants his "gates"—that is, channels for guiding the metal to the mold, for it is necessary to so cut the bars as to allow the pattern to be placed in the center of the flask, nearer to one side than the other, or nearer to one end than the other, as the case may be. The bars may be placed from 5 to 7 inches on centers, and should not come nearer to a rib than ¾ inch, neither should they come over the battens. In case, however, that it is necessary to place one over a batten it must be reduced to suit.

The same molding board will do for the sill as for the lintel, only the blocks C C and D D of Figs. 17 and 18 must be removed and other blocks made in place of them. The shape of these blocks can be obtained from Fig. 37 upon removing the loose piece. The lines forming the inside of the sill will give the proper shape for the blocks D D, &c., the lines marked "parting" representing the upper side of the molding board. The blocks C C must then be worked to suit.

It will be proper here to give a rough idea of how the molder will go to work to mold this pattern, and by so doing give an insight into the why and wherefore of many things that may not have previously been understood. In molding this, or in fact any other pattern, the molding board is laid upon the floor and made perfectly straight. Then all loose pieces are removed from the pattern, the latter being then laid upon the molding board and resting upon blocks D D. The drag is then laid upon the molding board with the parting edge down, as indicated in Fig. 33, also in Figs. 9, 10 and 12, and rammed up—that is, filled with sand and well rammed. The bottom of the drag is struck off straight across with a straight edge, and one of the rough battens is laid upon it and the drag reversed. The molding board is then removed; the parting of the sand is cleaned up and the loose pieces are all put into their proper places upon the pattern. The cope is then placed in position; sand is packed well to the loose pieces, and the dowels in them are removed, after which the balance of the cope is rammed up and the cope is lifted from the drag to remove the patterns, all the loose pieces lifting with the cope.

It will be seen from this description of the molder's work why the draft upon all the pieces constituting the pattern is made in the way explained. It may possibly be desired to have sills of different lengths, all having the same cross section. If so, one pattern will be sufficient, making it suit the longest length, as the others can be "stopped off." In this case, however, we can only stop off at one end. It is better, however, to consult the molder in regard to which end he prefers to stop off.

Having the molder's opinion upon the subject, we will proceed to prepare the pattern. The first thing to be done is to make a short piece similar in section to the long loose piece, Figs. 23 and 26, except that there must be draft upon both sides of it, the same as to the pieces at the ends of the pattern. Fit this piece to the required length of sill, allowing for shrinkage, and make it parallel with the ends, neatly coping over the fillet of the long loose piece, and also the fillet in the angle of the top and front. Fit neatly but not tight. Screw it into place, leaving the screws just flush. This piece should be shellacked and rubbed down the same as the rest of the pattern.

The next thing is to make a piece, say, from 10 to 18 inches long, and an exact section of the pattern, fillets included, and when finished it should be the same as shown in Fig. 38, which is an isometrical view of the completed piece. Putty up the nail holes, shellac and rub down the same as for the pattern.

The uses of these pieces are as follows: The piece that is screwed upon the pattern will mark the sand in the place where the stopping off is to be done. After the pattern is rammed up and the coping and drag parted, the molder will lift and draw the pattern from the sand; then he will lay the stopping off piece into the mold and fill up with sand all parts of the mold left outside the end of the stopping off piece.

MORTAR IN MASONRY.

IN an important contribution to the literature of the subject indicated above, George S. Morrison writes as follows: The simplest form of mortar is a well-worked clay, such as adobes are laid up in, and with which the brick chimneys of many of the older farm houses in our country were formerly built; but the use of clay has practically gone by except in furnaces and ovens where the heat resisting capacity of fire clay is more important than the superior strength of a good mortar.

Mortars are generally formed of lime or cement and sand. A lime mortar does not set, but hardens slowly. A cement mortar sets quickly and then continues to harden. The hardening of the lime mortar is a slow chemical action between the lime and other elements, the best results being obtained by mixing the mortar some weeks before it is used and not subjecting it to any great strain till a considerable time after it is laid. The action of cement is different; the cement itself contains all the elements necessary to the setting and hardening; a briquette of pure cement will set harder and be stronger than a briquette containing even a small portion of sand. The function of sand in a cement mortar is simply that of a dilutant and is precisely similar to that of broken stone or coarse gravel in concrete. In a cement mortar there should be enough cement to fill all voids between the grains of sand, which implies a coating of the entire surface of every grain, and enough more than this to provide for the contingency of imperfect mixing. The more perfect the mixture the less the amount of cement that will be required, and the finer the cement is ground the less cement it will take to coat every particle of sand.

In both lime mortar and cement mortar the best results are due to work; the more complete the incorporation of the ingredients the better the mortar will be. In lime mortar, which hardens slowly, time need not be considered, and this incorporation can be done slowly. In cement mortar, where a set takes place early, it is important that too much time should not be spent in mixing. In the alluvial deposits of the Ganges is found a kind of limestone of irregular shape known as kunker; the Hindoos make a mortar of kunker, lime and brick dust which becomes as hard as Portland cement; the piers of the great bridge across the Ganges at Benares are laid in this; its excellence is due to work. A similar excellence is found in all their mortars; when the lime has been slacked they grind it in a hand mill; then they grind the sand in a similar mill and then they grind the lime and sand together, all of this work being done by women; the mixture is then wet and ground in a mortar mill with bullocks, and when it is used it is pounded for hours. They will take this mortar, plaster a wall, pound it and rub it down, and the final result of their patient work is a plastered wall with a polished surface as smooth as that of porcelain, which will stand the weather of their frostless climate for more than a century. The secret of good mortar is work. In India, where labor is hardly worth 5 cents a day, this can be done by hand; in this country we cannot afford it; it is cheaper to use the most costly cements, but even cement mortars are better if thoroughly worked, and I hope to see the time when machine mortar mixers are as common on masonry walls as power riveters are now in bridge shops.

THE drawings for the new armory and barracks to be built by the Venezuelan Government at Caracas have been prepared by Wilson Brothers & Co., architects of Philadelphia, Pa., who recently won in the competition for the work.

PUTTING UP LIGHTNING CONDUCTORS.

BY W. N.

In what follows the writer will endeavor to explain the method employed for rodding frame or brick buildings, and showing at the same time the simple appliances required, so that any builder, tinner or sheet iron worker can put up any style of lightning rod that circumstances may require. There are certain rules to be followed which make the operation of putting up rods very simple. The writer does not intend to enter into any discussion of electricity, but will describe methods of rodding buildings that will give good results.

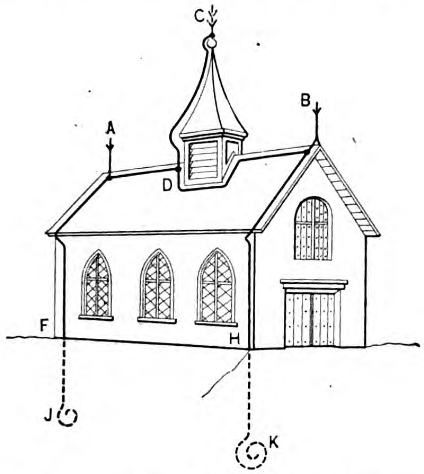


Fig. 1.—Country Church Properly Protected by Circuit Conductors.

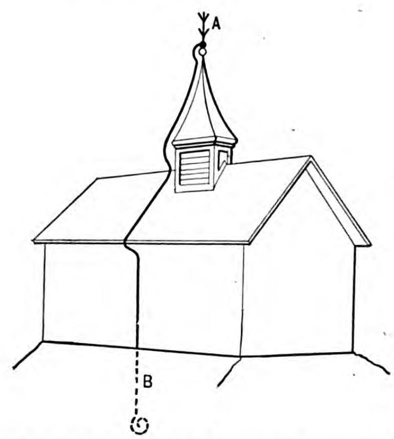


Fig. 2.—The Same Building Improperly Protected.

and wrong, but the introduction of a few extracts from the writings of well-known electricians may prove it to be as old as the lightning rod itself and sustained by the highest authorities.

Said Benjamin Franklin in 1753: "It has pleased God in His goodness to mankind at length to discover to them the means of securing their habitations and other buildings from mischief by thunder and lightning. Attach the rods to buildings by means of a few small staples."

Prof. Joseph Henry, secretary of the Smithsonian Institute, Washington, says: "In a house properly provided with lightning rods, however many discharges may fall on it, we are well assured from full experience and established principles no damage can come to the occupants within. Solder rods to metallic roofs and attach rods to wooden buildings by means of iron hooks or eyes."

Sir David Brewster, the highest English authority, also says: "In securing buildings capacious channels of

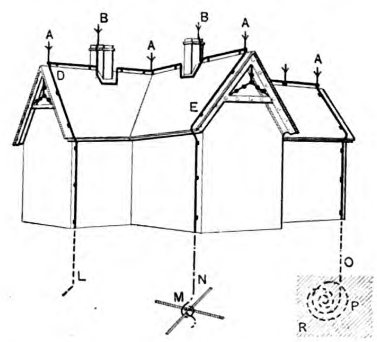


Fig. 3.—View of Building, Showing Proper Protection by Circuit Conductors and Different Ground Terminations.

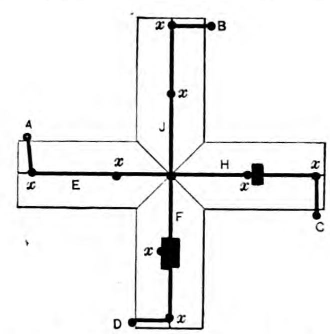


Fig. 4.—Roof Plan of a Building Having Four Gables and Showing Points and Discharging Rods.

Putting Up Lightning Conductors.

As the reader may know, a lightning conductor consists of copper or galvanized iron rods, being of square, spiral or band form, although the most popular in use are cable rods formed from a number of wire strands. The writer in his experience has mostly used the seven strand copper cable, each strand being ⅛ inch thick. No matter what may be the form or shape of lightning rod the method hereinafter described is applicable to any rod. We often hear of rods being insulated—that is, run through glass rings to avoid the rods coming in contact with the building. This is wrong. In all cases the rod should be attached directly to the object to be protected and not pass through rings of glass or rest on glass or other insulators. Many persons believe the theory of non-insulation to be new

conduction should be applied systematically along the walls. These may be carried down either within or without the building. These lines of conduction should be secured immediately against the building and not be placed at a distance from it or pass through rings of glass or other insulators. The closer the conductor is applied to the walls the better."

When putting up lightning rods care should be taken to erect points at sufficient hights above chimneys and gables, as the heated air arising from the chimney, and the gable being prominent, they offer an attraction to the lightning. When erecting points along the ridge or copings of a building there should not be a space of more than 15 feet between points. In determining the number of discharging rods required on a building the size and form of the structure must be taken into consideration. Thus where two or not more than three points are to be erected the rod should pass over and around the structure, and have each end go into the ground below the foundation wall. These are what are known as circuit conductors and are illustrated in Fig. 1, which represents a small country church properly protected by them. In the illustration A, B and C represent the three gilded points, the rod being shown passing around the base of the belfry and connecting at the point D. The two discharging rods F and H terminate in the ground at J and K. If the ground is moist then a coil at J and K is all that is required for the free escape of the electric fluid. In some cases there are chances of having the copper rod pulled up from the ground, and to avoid this two pieces of iron pipe are laid crosswise, as shown at M in Fig. 3. This also adds to the discharging capacity of the rod, as there is more metal surface in contact with the soil.

In Fig. 2 the building indicated in Fig. 1 is represented improperly protected. A point is shown on the spire of the belfry at A, the rod going down and discharging into the earth at B, leaving the gables unprotected and liable to receive a stroke of lightning at any time.

In Fig. 3 is an outline of a building of irregular form, showing proper protection by circuit conductors and different ground terminations. For every additional three points we always add an additional discharging rod. Thus in the illustration seven points are shown, the eighth being hidden, and three discharging rods. The points on the ridge are indicated by A A, and those on the chimneys by B B. The illustration shows how the circuit is led around the base of each chimney, D showing the connection with the point A, while E E shows the rod running down the slope of the roof, making an easy sweep over the cornice, and the three discharging rods entering the earth at L, N and O. Where the ground is very moist a termination as at L is sufficient; where the ground is of a dry nature means must be employed to obtain moisture, which will be explained further on, and the coil P of the discharging rod O should be bedded in a solid layer of charcoal dust, which is a very good conductor. When the ground is permanently moist the electric current can easily dissipate itself without any serious trouble. In Fig. 4 is the roof plan of a building having four gables and is the diagram usually given to the workmen when rodding a building, A B C D showing the four discharging rods, E F H J the circuit rod soldered to the ridge of the roof, while *x x x* represent the points.

(To be continued.)

FACE BONDING OF BROKEN ASHLAR WORK.

SOME very interesting suggestions for masons and builders regarding the face bonding of broken ashlar work are presented by C. A. Martin in a late issue of *The American Architect and Building News*. Among other things he says: If one may judge anything from architects' drawings and from illustrations published in some of our best text-books on the subject of masonry construction, there is much need for observation on the part of those called upon to make or accept such drawings. The word "observation" is used advisedly, for certainly few architects would ever allow face walls to be bonded as many allow them to be shown on drawings; and it would be an ignorant inspector indeed who would pass such work as is used to illustrate the bonding of broken or random ashlar in many of our best works on masonry construction. That we have so much really good rubble and ashlar work in this country is more to the credit of the workmen and the superintendents than to that of the men who make the drawing. However, the purpose of this article is not so much to find fault as to offer a few suggestions that may be of use in drawing, building and inspecting certain kinds of stone walls.

In speaking of bonding here, reference is made only to the bonding of face stones with one another and not to the bond in thickness of the wall, though the latter, of course, is not to be neglected as a measure of good construction. The bonding of a rubble wall offers few difficulties ordinarily, the principal requirements being to keep bed as nearly horizontal as possible and to see that vertical joints are well broken and not too long.

Five Suggestions.

In coursed work the bonding is so simple as practically to care for itself; but it is with broken or random ashlar that the difficulty occurs, and the following suggestions, which have been gradually formulated from a considerable experience as a superintendent, from hints dropped by workmen, and from careful observation of executed work, both good and bad, are offered as a guide for the proper face bonding of this kind of masonry:

1. All stones should be perfectly rectangular, no re-entrant angles being allowed, as such re-entrant angles are never cut except to save a stone that has been damaged by having a corner knocked off and are, therefore, *prima facie* evidence of patchwork.

2. The horizontal dimensions of a stone should always be greater than the vertical dimension, except in the case of quoins, where it is sometimes, though not always, permissible to make the short end less than the vertical hight.

3. No stone should be superimposed directly upon another stone of exactly the same length, thus bringing the end joints of both in the same vertical lines, except in the case of comparatively narrow piers, where this may be necessary to avoid the appearance of coursed work.

4. Stones should not be so laid that four corners come together at a single point.

5. The number of stones abutting upon a single vertical joint (counting stones on both sides of the joint) should usually be three or four and should never exceed five; and the number of stones abutting upon a single horizontal joint should never exceed seven.

Broken range ashlar is exactly the same as broken (or random) ashlar, except that it is laid with numerous long horizontal joints. Aside from this it should be governed by the same rules that govern the laying of broken ashlar.

IN a paper read at the banquet tendered the delegates to the national convention of architectural clubs in Cleveland early in June, George R. Dean discussed the subject of architectural schools as viewed from the standpoint of the architect, and expressed the belief "that the study of the various styles of architecture with the intention of using them in practice is productive of conglomeration and lack of continuity. I believe," he said, "that the study of one style of architecture, with the intention of using it in practice, is productive of absolute death. I believe that the study of the vital styles of architecture with the idea of finding wherein they met the requirements of their periods and the processes of their perfection, productive of mental development and general intelligence."

A NOVEL fire extinguishing apparatus has been introduced in the new telephone company's building at Indianapolis, Ind. Sand is stored in a large tank, from which it can be sifted automatically to any or all parts of the building in such a manner as to smother a fire. It is believed that sand will be less injurious to the electrical apparatus than water or chemicals.

COMPETITION IN $750 FRAME HOUSES.

SECOND PRIZE DESIGN.

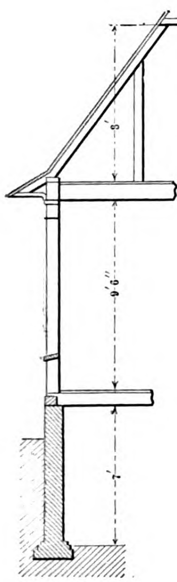
WE present herewith the design securing the second prize in the Competition for $750 Frame Houses, being the XXVth in the series conducted by *Carpentry and Building*. In submitting the study, the author, E. R. Rice, of 430 Seventeenth street, Denver, Col., states in a letter to the editor that he has "tried to design a cottage which would come within the stipulated price and at the same time have an architectural finish which would at once distinguish it from the ordinary 'wood butcher' house which is usually built for $750." How well he has succeeded the readers may judge, and in this connection we would suggest that they freely criticise the designs as they may be published, to the end that a full discussion may be had.

Specifications.

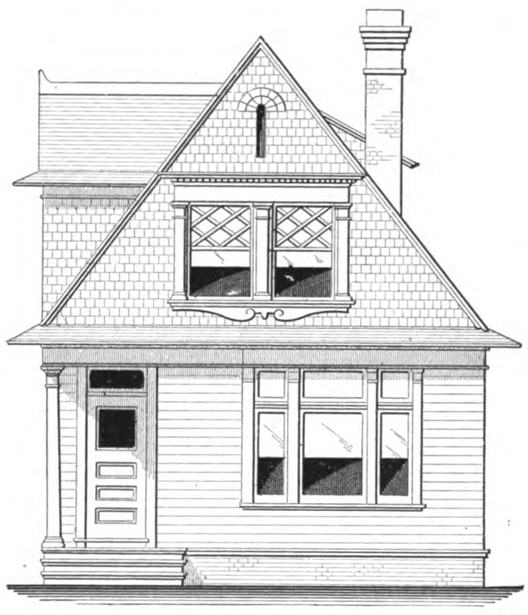
The specifications submitted in connection with the design read as follows:

EXCAVATION.

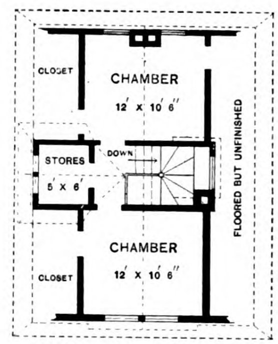
Excavate the cellar to depth shown on plans.



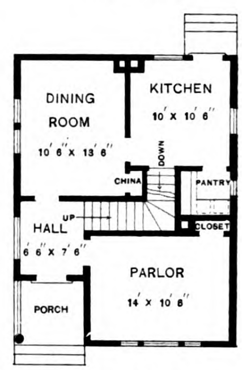
Section.



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



Second Floor.



First Floor.

Scale, 1-16 Inch to the Foot.

Competition in $750 Frame Houses.—Second Prize Design.— E. R. Rice, Architect, Denver, Colo.

Trenches for other foundation walls will be 2 feet deep and 18 inches wide. Refill around walls when directed. All surplus dirt to be removed from premises.

BRICK WORK.

Build foundation walls as per plans, with 9-inch walls; footings spread to 17 inches. Plaster outside of walls to grade. Strike joints in cellar. Build chimneys as shown. Parlor chimney will start 2 feet below ceiling. Plaster chimneys inside and out. All brick will be hard red brick laid in gray lime mortar. Point up all exposed brick in foundation and chimneys with red mortar.

PLASTERING.

Lath all first and second story walls and ceilings with dry pine lath, and plaster three coats to a hard finish.

TINNERS' WORK.

Tin with I C tin tops of windows. Valley tins 14 inches wide, painted both sides. Flash around all angles and breaks in roof. Put up 3½-inch gutters of No. 26 galvanized iron, with two 3-inch down spouts. All with proper hangers.

PAINTING.

All materials best quality. Shellac all knots; putty all nail holes. Paint all exterior and interior surfaced woodwork, except stairs, three coats of lead and oil paint, in tints as directed. Roof, two coats. Gable shingles left natural. Fill all stair work and varnish two coats. Paint all iron and tin two coats.

CARPENTER WORK.

Sills, 6 x 6; girder, 6 x 10; first and second floor joist, 2 x 10; ceiling joist, 2 x 4, 16 inches on centers; studding 2 x 4, 16 inches on centers; rafters, 2 x 4, 16 inches on centers.

Timber.—All of dry native pine. Cover exterior walls and roof with native boards, s. i. s., laid tight, and covered with red rosin-sized building paper.

Shingles.—Shingle roof with No. 1 cedar shingles, laid 4¾ inches to weather. Shingle gables with 6-inch square butt shingles, 4½ inches to weather.

Siding.—Cover first story walls with 6-inch pine clapboards, 4½ inches to weather. Cornice, water table and outside trimming to be of dry white pine. Mitre clapboards at angles.

Windows.—Window frames as per details, of clear white pine. All double hung windows box frame. All sash 1⅜ inches. Glass in parlor and hall transome Venetian, all balance best double strength.

Doors.—Front door 1¾-inch, molded panels below and chipped glass above. All other doors 1⅜-inch, four panel ogee, 2 feet 8 inches by 7 feet below, and 2 feet 6 inches by 6 feet 6 inches above. B stock.

Floors.—All floors will be Texas "star," selected for porch and kitchen, ⅞ x 4 inches, blind nailed.

Finish.—Finish all rooms with ⅞ x 4½ inch molded pine casings, mitered. Wainscot kitchen 3 feet high with ⅝ x 3 inch beaded ceiling, with cap to form continuation of window stools. All other rooms will have ⅞ x 8 inch molded base, and ⅞ x 5 inch aprons to windows.

Pantry.—Fit up pantry with five shelves, two flour bins, four drawers and cupboard. China closet will have five shelves and three drawers. Other closets two shelves each.

Stairs.—Build front stairs as shown, treads 1⅜ inches, risers ⅞ inch, newel 5 inches square, rail 3 x 3 inches, balusters ⅞-inch square, all of No. 1 Texas, quarter sawed. Cellar stairs 1⅛-inch treads, ⅞-inch risers, all Texas, common.

Hardware.—Hang all double hung windows with No. 8 Silver Lake cord and iron weights, with bronzed iron locks and lifts. Front door will have steel butts and good imitation bronze trim, with night latch lock, 3 keys. All inside doors will have steel butts, mortise locks and pressed steel trim, plated. Furnish all nails, screws, &c., necessary; also base knobs and closet hooks.

Estimate.

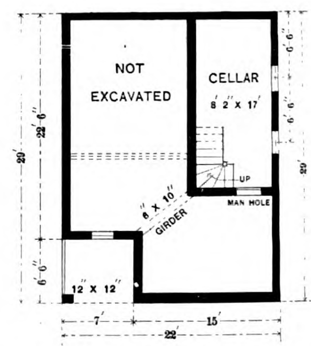
The detailed estimate of cost of the house is as follows, but in laying it before our readers it may not be out of place to state that as it was prepared in January of the present year, this fact should be borne in mind when considering the figures:

48 yards excavating, at 20 cents	$9.60
14,660 brick, laid, at $6.00	87.96
511 yards plastering, at 16 cents	81.76
Tinners' work	13.50
Painting	50.00

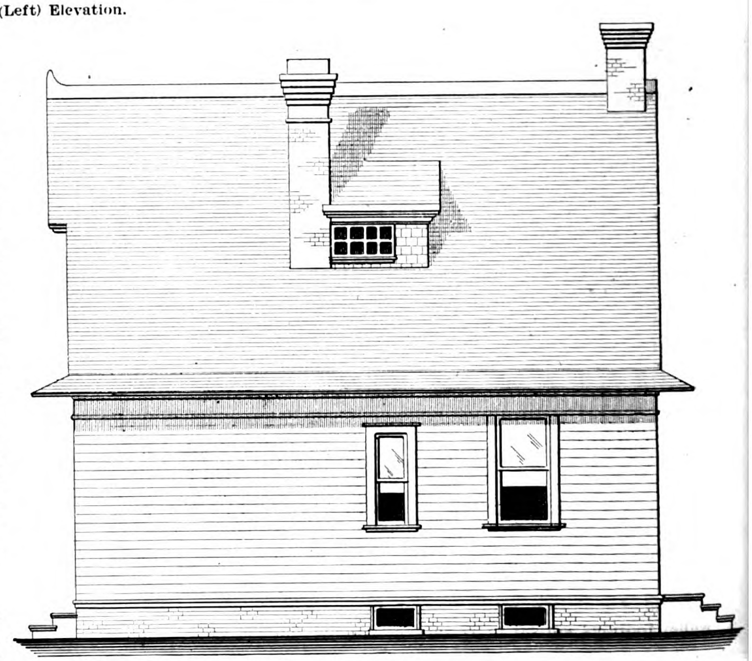
CARPENTER WORK.

4,440 feet native dimension, at $12.50	$55.50
2,300 feet native S. I. S. boards, at $13.00	29.90
Labor	33.70
11,000 shingles, at $2.50	27.50
Labor	15.50
1,200 feet siding, at $25.00	30.00
Labor	10.00
490 feet cornice, water table, &c., at $25.00	12.25
Labor	10.00
1,500 feet stair flooring, at $15.00	22.50
Labor	5.00
285 feet base, at $25.00	7.10
Labor	5.00
Triple window, frame, trim, sash and labor	12.00
11 windows, frame, trim, sash and labor, at $5.50	60.50
Hall window $5.00, dormer $3.00, two cellar $5.00	13.00
12 doors, frame, hardware and labor, at $4.75	57.00
Front door, frame, hardware and labor	13.00
Front stairs $25.00; cellar stairs $6.00	31.00
Pantry and closets	12.00
Kitchen wainscot $5.00; nails and building paper $13.00; front porch $18.00; back steps $2.50	38.50
Total	$743.79

Side (Left) Elevation.



Foundation.—Scale, 1-16 Inch to the Foot.

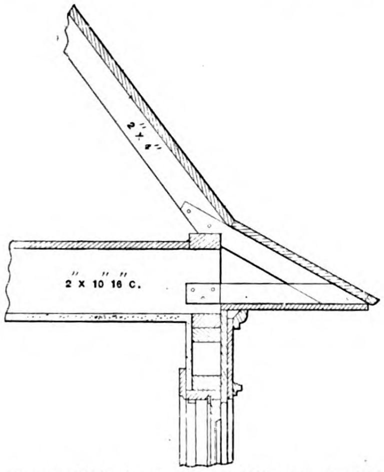


Side (Right) Elevation.

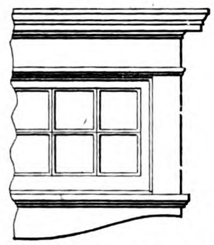
Competition in $750 Frame Houses.—Second Prize Design.—Elevations.—Scale, ⅛ Inch to the Foot.

The builder's certificate was signed by A. Mathers, 1429 South Fourteenth street, Denver, Col.

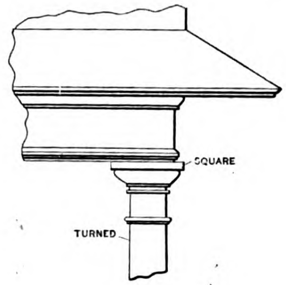
THE erection of a power house for the Third Avenue Railroad Company is about to be commenced at 216th street and Ninth avenue, New York City, which will cost $1,000,000, and cover a plot 319 x 246 feet.

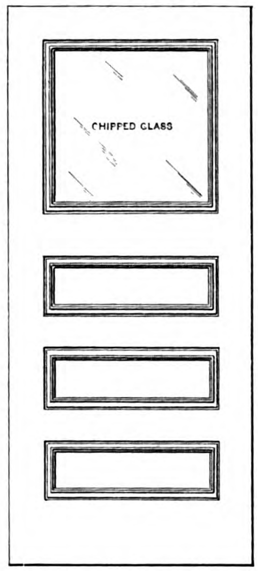


Detail of Main Cornice.—Scale, ¼ Inch to the Foot.

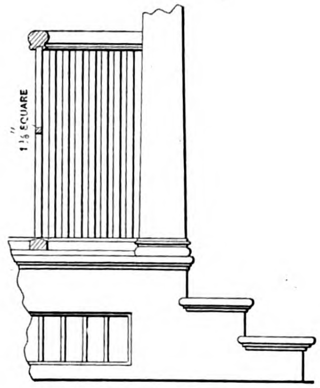


Detail of Hall Window.—Scale, ⅜ Inch to the Foot.

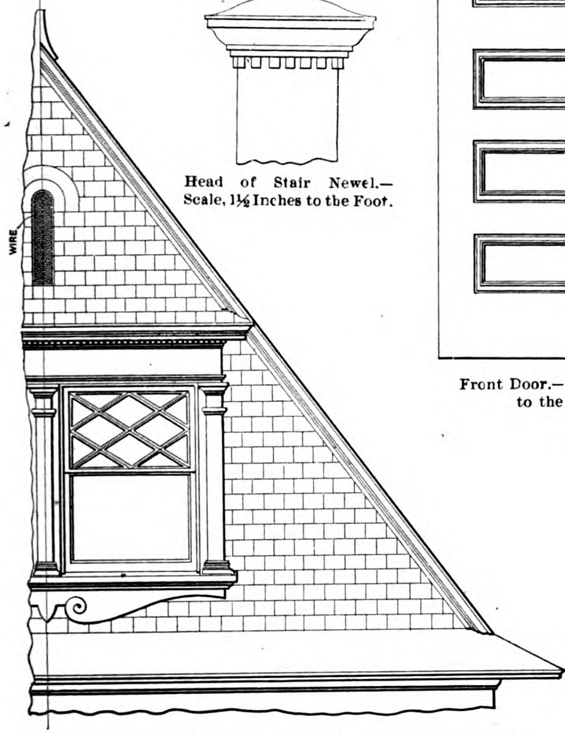




Front Door.—Scale, ⅛ Inch to the Foot.

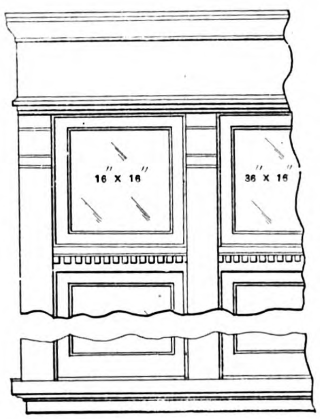


Details of Front Porch.—Scale, ⅜ Inch to the Foot.

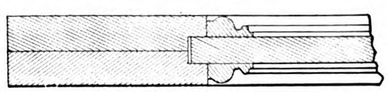


Head of Stair Newel.—Scale, 1½ Inches to the Foot.

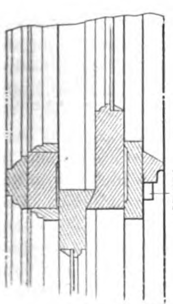
Partial Elevation of Front Gable.—Scale, ¼ Inch to the Foot.



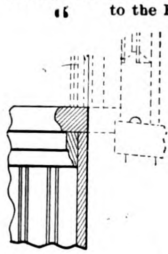
Detail of Parlor Window.—Scale, ½ Inch to the Foot.



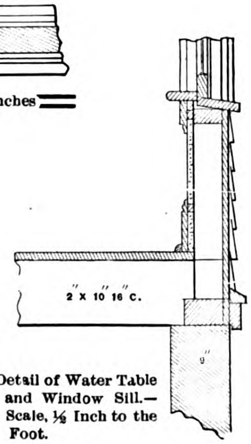
Section of Front Door.—Scale, 3 Inches to the Foot.



Section through Transom Bar of Parlor Window. Scale, 1½ Inches to the Foot



Detail of Wainscoting in Kitchen. — Scale, 1½ Inches to the Foot.



Detail of Water Table and Window Sill.—Scale, ½ Inch to the Foot.

Base.—Scale, 3 Inches to the Foot.

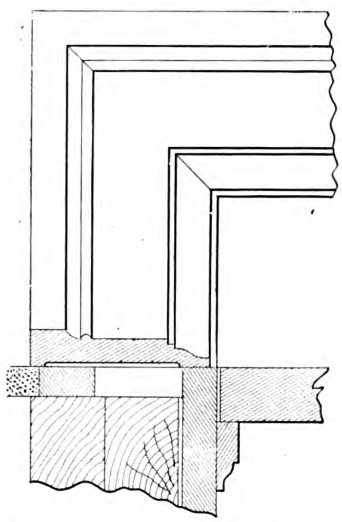
Miscellaneous Details of Second Prize Design in Competition for $750 Frame Houses.

The Weathering of Building Stones.

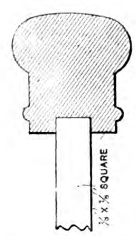
The stones used in building always begin to wear after they have been laid for some time, and gradually diminish in size until they finally fall to dust. The agencies which produce this effect seem to be invisible, although they are ever present; they are principally air and waters, and it is here intended to show how they work in causing decay.

Building stones, according to their kind and composition, behave in different ways when exposed, says H. B. Stocks in a late issue of the *Settmakers' and Stonemakers' Journal*. Foremost among these stones is granite, which has no definite composition. Typical granite is composed of three minerals, quartz, felspar and mica; these are usually spread irregularly through the mass, the felspar in white, pink or red crystals, the mica in sparkling white or black scales, and the quartz in white patches. In some granites the felspar appears in very large crystals, or in veins; in others the mica appears in very large crystals, and these differences naturally produce a great many varieties of the stone. Then, again, there are several kinds of felspar, the commonest being potash felspar (orthoclase); there is also soda felspar (albite) and soda-lime felspar (oligoclase). Two of the several varieties of mica are potash mica (muscovite) and magnesia mica (biotite). Quartz is not variable, and has the same composition as rock crystal—that is, silica (SiO_2). In some granites there is no mica (quartz-porphyry), and many minor differences might be noticed, but it is sufficient to say that granite is a variable stone. Taking, however, the mean of several analyses made by Dr. Houghton, the composition of granite is as follows: Silica, 72.07; alumina, 14.81; oxide of iron, 2.22; potash, 5.11; soda, 2.79; lime, 1.63; magnesia, 0.33; loss on ignition (water, &c.), 1.09; total, 100.05. The mean specific gravity is 2.66. Granite, as a whole, is very durable stone, but the individual minerals in it behave very diversely, when weathered; quartz and mica are practically unaltered, but the felspar is decomposed, which causes the granite to slowly crumble away. This weathering, however, is very feeble and hardly noticeable, except when oligoclase is present, as this is a mineral that weathers somewhat rapidly.

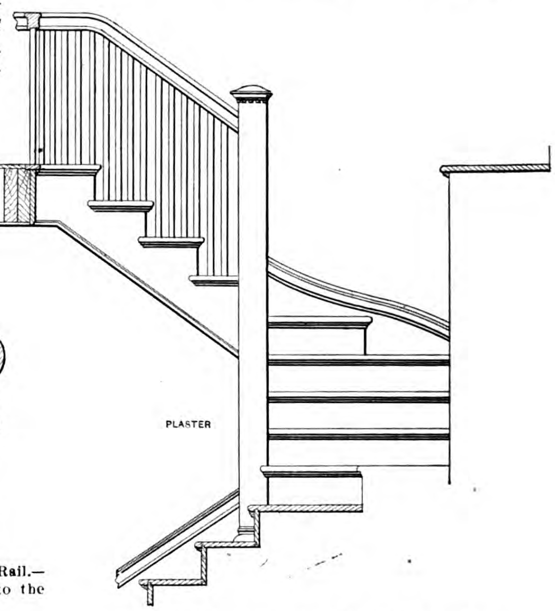
Basalt and greenstone may be classed together. They are igneous rocks like granite, but differ from it very much in appearance and composition. Basalt occurs usually in the forms of columns, as at the Giant's Causeway. It is black, or nearly so, very fine grained, and is composed of several minerals—felspar, augite, magnetic iron, &c. These, however. can rarely be detected with the eye alone. Greenstone, or dolerite, shows larger crystals, and has a green, gray or black color. Basalt and greenstone contain: Silica, 45 to 55 per cent.; Alumina, 10 to 18 per cent.; lime, 7 to 14 per cent.; magnesia, 3 to 10 per cent.; oxides of iron and manganese, 9 to 16 per cent.; potash, ½ to 3 per cent.; soda, 2 to 5 per cent.; and loss on ignition, 1 to 5 per cent. Their specific gravity is from 2.7 to 3.1, and they are therefore heavier than granite. They are durable, but not nearly so good in this respect as granite, owing to their containing more of the bases, iron, lime, &c., and much less silica. They are tougher than granite, and make good setts or road metal, but they are not often used for building purposes, as they cannot be obtained in large pieces and are difficult to trim with the chisel.



Detail of Inside Trim.—Scale, 3 Inches to the Foot.



Section of Hand Rail.—Scale, 3 Inches to the Foot.



Detail of Main Stairs.—Scale, ⅜ Inch to the Foot.

Miscellaneous Details of Second Prize Design in Competition for $750 Frame Houses.

Features of House Building.

According to reports emanating from the National Capital some of the architects and builders of the city are making efforts to bring about reforms in the construction of dwelling houses with a view to rendering them more comfortable in hot weather. The tin covering of roofs, it is well known, is a powerful conductor that is likely to make the sleeping rooms beneath very much like ovens unless there is ample air space between the roof and the ceiling. Some builders are using a substitute for tin, while another mode adopted is to place a lining under the tin.

A feature adopted in some houses designed by Appleton P. Clark, Jr., architect, is a cold storage room in the basement, the walls and ceiling of which are made double and lined with a perfect non-conductor. The doors are double, and there are no windows. The room is well ventilated by a pipe leading in from the outside, and another leading up through the walls to the roof of the house. These houses are arranged for three stories, basement and attic. The latter is lighted by dormer windows, floored and reached by stairway, affording not only ample storage room, but additional protection from heat in summer and cold in winter.

SOME PECULIARITIES OF PAINTS.

EVERY paint user knows that for a painted surface to be successfully accomplished, great care and attention have to be exercised in the selection of one of the materials used. It is pretty generally acknowledged, says a writer in the *Building News*, that when a man has failed at any other trade he can wield the brush as a painter. This wielding of the brush is a very simple matter of manual labor only—one which requires but little skill, and capable of being performed by any one of average ability. But it is not everybody who wields a brush that can or does understand the nature and vagaries of the paint he is using. The conditions of use are so diverse that it is only the skilled craftsman—the man who has been a painter by trade all his life—who can give a rational explanation of any defects in a painted surface. What causes blisters in paint? What causes the colors to sink in? What causes paint to remain soft underneath while the exterior surface is bone dry and fairly hard? What, in fact, causes any and all of the "deviltree" a painted surface exhibits six months after the paint has been laid on? The jobbing hand, the nondescript sort of fellow, who has tried every trade and failed at all, cannot tell his employer why the paint he has laid on exhibits the above mentioned or any other defect. It is only the "old hand," the skilled workman, who can offer an explanation. But even with him the explanation offered is not always the correct one. It requires the aid of the chemist as well as the craftsman to interpret all the reactive changes that a coat of paint undergoes. It is the writer's purpose, therefore, to explain the nature, qualities, reactive changes that occur in the paint pot and the coat of paint laid on the surface of any material. In the present instance we will consider the sinking in of colors.

Before doing so, however, it will be best to explain the actual composition of this compound called paint.

Composition of Paint.

Essentially a paint is composed of linseed oil, pigment, driers and turps. The oil used is generally boiled oil—that is, the raw linseed oil has been subjected to a particular treatment whereby it loses its raw or native qualities and becomes converted into a different body in many of its characteristics. The boiling process consists in heating the raw oil to a temperature of over 500 degrees F., whereby a lot of water that is inherently present in the oil is expelled. The oil is then either oxidized by passing steam or air through it, or it is boiled with some sort of a mineral such as litharge (an oxide of lead), borate of manganese, calcium sulphate of zinc, or some other body which will react on the fatty acids of the oil to oxidize them and thereby change the fluid from a limpid oil to a viscous varnish. (To illustrate the difference between an oil and varnish, drop a drop of each fluid on a piece of glass or porcelain, and note the difference in the drying power; the oil, if in the raw state, will remain fluid a very long time before it shows any signs of drying or hardening, and then it is only on its exterior surface that the drying occurs, forming a skin thereon; whereas, with the spot of varnish, that begins to dry and harden immediately it is exposed to the air. Now, the object of boiling the oil has been to render the oil of a more drying nature—raw oil takes three months to dry when exposed to the air, but boiled oil does not take as many weeks. The pigment of a paint consists of a dry powder color which imparts the tint to the paint; this is ground up in the oil vehicle, whereby each dry particle of paint becomes coated with a layer of drying oil, whence such mixtures, when spread out thinly on a surface, will dry to form a thin layer or coat of paint. If the mixture of pigment and oil is not sufficiently siccative, the painter mixes in some driers, which enables the compound to dry at a quicker rate. The addition of turpentine to a paint is made so as to render the paint of a thinner or more fluid consistence, whereby the paint can be easily spread by means of a brush. These details are of necessity known to most painters; but this explanation is needed here, so as to render perfectly comprehensible what is to follow.

Nature of "Driers."

Now, apart from the chemical nature of the pigment used—whether it be a sulphide, oxide, chromate, silicate, carbonate, &c., of a metal—it will be noted, from the above, that the nature of the driers mixed with the paint has also to be reckoned with, and, lastly, the mixture of the turpentine. Consequently a pot of paint, or coat of ditto, is not a simple compound. Quite the opposite, in fact; for, although the oil of turpentine used is always of the same nature, putting out of consideration for the moment the idea of adulteration or substitutes, the chemical composition of the pigment is not always the same; neither is the drier always the same. We shall have occasion to consider these points in other articles. At present we will confine attention to the loss of brightness, or "sinking in," as it is called, of colors.

Let us consider the nature of a coat of paint. It consists of pigment, an oil varnish (*i. e.*, the boiled oil), drier and turps. When this layer is exposed to the air (that is, when the painter has ceased spreading it with his brush) the oil vehicle begins to become decomposed, whereby it is separated with its components, oleic, palmate, &c., acids, and at the same time the base of glycerin, to which these components are attached in the undecomposed oil, is eliminated. As these chemical changes occur, the atmospheric oxygen seizes on the olein and converts it into linolein, which is a solid, tough, elastic, transparent body. The other fatty parts of the oil are more or less absorbed by the pigments, or else they are pushed to the surface of the coat of paint (as will be explained *infra*). The glycerin, however, does not become absorbed.

As the exterior surface of the coat of paint becomes oxidized as above explained, the particles of solid linolein sink to the undermost parts of the coat of paint, and thus a fresh layer of the oil vehicle is pushed up to the exterior surface of the coat of paint, to be similarly converted by the atmospheric oxygen into solid linolein. When all the oil has become thus converted, we can conceive that as each particle of solid linolein sank down, the particle of pigment was left denuded of a pellicle, or covering of oil. Also, we can conceive that the interstices between the particles of solid linolein and those of the pigment become filled with air, and also with the glycerin that has been eliminated from the oil by the decomposition it has undergone.

Glycerin and Moisture.

Now, glycerin is a greedy absorber of moisture, and, as a consequence, side by side with the transparent shining particles of solid linolein there are particles of water or moisture. We can now conceive the coat of paint to be in this condition. First, there is most of the oil next to the surface on which the paint is laid; above this we can conceive its pigmentary particles almost uncovered with oil, and side by side, or permeating the mass, is a quantity of aqueous particles. Now, the color of the pigment is, of course, dull or bereft of sparkling brilliancy, and it is the object, or should be, of the oil vehicles to clothe each particle of pigment with a layer of shining oil. This, however, is not the case for the conception above foreshadowed. Now, when all the oil has become converted into solid transparent linolein, this linolein will rise to the surface if it has not become too hard and solid (that is, if it has been quickly formed); but as it rises above the pigment particles they sink down, and becoming mixed with the glycerin and the water it has imbibed, we have a layer of transparent linolein above a layer of pigment, glycerin and water. Now, the oxidation of this linolein still proceeds, and will proceed until it is of a uniform tough skin. To enable it to do so its absorption of oxygen proceeds, and as this oxygen unites the layer of glycerin and water that is imprisoned by the superimposed skin of linolein, the glycerin becomes oxidized to a glyceride, and which more or less permeates the skin of linolein, and thereby causes the latter to lose its transparency and become opaque; consequently the surface of the coat of paint is bereft of brillance, and exhibits a dull appearance.

It will naturally occur to the thoughtful reader that what is wanted to prevent this sinking in of the pigment is either the incorporation of some solid transparent body that will not allow the solid pigment to sink through the oil, or else some process or material that will quickly convert the oil vehicle into solid transparent linolein, for if the oil be converted into this substance before the pigment has had time to settle away from it the linolein as it dries will inclose the particles of pigment in it, and slowly form a transparent layer of linolein round each particle of pigment (the glycerin that has been eliminated would in this case be driven to beneath the pigment and linolein, with what affect we shall see in a future article). Now, if a resin be incorporated with the oil, or a varnish be used as the binding vehicle for grinding up the pigment in, then the colors will not sink in, because side by side with each particle of solid opaque pigment there would be a particle of solid transparent resin which would reflect the light, and consequently cause the coat of paint to exhibit a brillant appearance. Paint grinders, therefore, should grind up their pigment in an oleo-resinous vehicle. There is an additional reason why such a vehicle should be used, because a resin will absorb glycerin, and thus, instead of fluid glycerin and water being beneath a coat of paint, which is often the cause of blistering and peeling off of paint, the coat of paint would be one solid homogeneous mass from exterior to the undermost surface.

PLAIN AND ORNAMENTAL PLASTERING.*

IF, as I have suggested, the details have been prepared, the grounds fixed, a very definite idea will have been formed of the character of each portion of your building and you can definitely specify the proper finish. Two-coat work is most general. It is sufficient for ordinary rooms to execute this work as so often specified—plumb, true and straight is not possible. One coat of mortar only can be finished with that wonderful tool we call a "darby;" it is a great implement for effecting a general leveling up, but don't try a straight edge on work left after it.

Hard white finish is made by gauging lime putty with calcined plaster and troweling it to a finish before it sets. Perhaps some of you have discovered that hard white finish is misnamed—the hardest lime finish is never white. The strength of this coat is improved by the addition of sand.

Now if your work is to be decorated, if expensive paintings and paper are to be applied to it, you should hesitate before placing them upon work that is neither straight nor strong. Three-coat work admits of proper straightening. It will also on ceilings generally guard against the danger of seeing each joist and lath some time after work is finished, and further, it gives you an opportunity to finish it as your work demands.

Troweled Stucco.

The best hard finish is made with lime putty and sand, thoroughly tempered and applied to the straightened coat of mortar. It is first laid true, then very thoroughly water floated, or scoured, and finally troweled and retroweled until a polish is secured. It is then dry brushed. This work is smooth and true enough for any painting, hard and firm enough for any paper.

Bastard stucco is done in very much the same manner, but the troweling only progresses far enough to secure a partially smooth wall. As its name implies it is neither troweled work nor rough stucco. This makes strong work, admirably adapted for either paint or paper.

Rough stucco, used on exteriors, hallways, churches and in public and semi-public places, is generally executed in two coats—the first being heavily scoured, the second brought to a finish in one operation. Three-coat work admits of a better stucco; the work being straightened in the second coat admits of a great variety in texture of the finished stucco. You may have it left very rough with all the indications of floating tool—with the graceful sweeping lines and curves, this work can be made very effective—or you can have it finished of a granular mat surface of great uniformity and evenness. Vaults, domes, intersecting groins—especially where finished without moldings—are best done in this work.

In speaking of stucco I use the term as generally applied by the trade to the rough floated work I have been speaking of. I would like to see the use of this word in specifications somewhat limited. In its literary sense there would seem to be no limit.

Cornices.

My earliest recollections of cornices are of a huge cove following closely to the angle of the room. Below was a heavy mass of moldings—their size, no doubt, the result of a static computation on the amount of dust it could carry. This was completed by a similar collection of heavy moldings on the ceiling. Such a room was not complete without a center flower, which must, of course, conform to the size and shape of the room. We had to fix with plaster huge ornaments 5 and 6 feet oval and circle as was thought necessary, and from 2 to 12 inches deep. These had beautiful strong undercut ornaments that held more dust that was impossible of extraction. Well, some of these are still up; some have caused manslaughter; many have helped the sale of china and furniture. Time taught us this was not safe, and the next result was an attempt, under the sacred name of good Queen Anne, to get as many members as possible into a given space and avoid the pitfall of our predecessors, by making this as light as possible. With this came a revival of the run center, and we were forced to form moldings around gas pipes that were fearfully and wonderfully designed. Those of you who caused these things to be done were, no doubt, like myself when working at this, under the impression that we were executing architectural work instead of perpetuating architectural monstrosities. What I want to impress upon you is that you are the teachers, the leaders—even the Jerry builder looks to you for pointers.

You all know the method of run work, but I would request that you study the limitations of the material and have brackets provided for your moldings and not take risk of the work falling by overweight. The best work should not average 1 inch thick.

Staff.

The World's Fair at Chicago first placed before the profession the merits and demerits of staff. The name was new, the daring use of the material new, but the use of fiber with plaster was familiar to European mechanics for years previous to this.

For staff work you will have to think out your design—studying the material. The best effects are plastic, the true nature of the material. You need not have a smooth molding; by combing and corrugating we vary the texture so that even a plain molding may display its design with a side light without breaks. Our methods are familiar to the terra cotta.

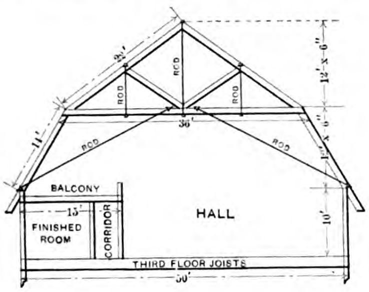
From your detail the model is finished complete in the shop. Upon approval it is cast in plaster. While this mass is setting a large amount of fiber or serim cloth is embedded into it. This enables us to make large and strong casts.

* Continued from page 172, July issue.

CORRESPONDENCE.

Roof Construction for Hall.

From A READER, *West Brattleboro, Vt.*—I have been a reader of the paper for a number of years, and would like a little help in solving the following problem: I have a building 50 x 70 feet, three stories in hight, with a hall on one side of the third story, which I wish to roof in the manner indicated by the sketch, Fig. 1, which I inclose. Can this be done so as to make a satisfactory



Roof Construction for Hall.—Fig. 1.—*Sketch Submitted by "A Reader."*

job, and if so, what sizes of rods, timber and struts should be used? I wish it to be strong enough to carry a slate roof and put the trusses 10 feet apart.

Answer.—It is feasible to construct a roof in the manner shown by the correspondent, although it will be impossible to make quite as rigid a building as if the walls were extended to the top of the room and a truss with horizontal tie beam used. There is no trouble in making the truss strong enough—the only difficulty being in securing the necessary stiffness where the truss rests on the wall plate to resist the wind pressure against the side of the roof. In the building under consideration, it would seem that the left hand wall can be well braced by putting braces in the cross partitions dividing the rooms under gallery. If this side is made stiff, the truss will stiffen the other side, but the posts under the trusses should extend in one piece to the foundation, and be well tied at the second and third floors. The sizes of timbers and rods shown in Fig. 2 are safe for slate roof and plastered ceiling. The joint at A should be made by bolting a solid curved rib in the angle as shown. To further stiffen the roof, the sheathing should be put on diagonally. The long tie rods should be brought as near the center of the truss as practicable. We would not recommend this roof if it were not for the gallery at one side, which gives a chance for bracing the walls.

Comments on Prize Designs.

From K. J. P., *Worcester, Mass.*—I was much amused to read some of the criticisms on the prize designs, especially those in regard to rooms on the second floor of houses having gambrel roofs. According to my way of thinking, one can get better head room under such a roof than any other kind, although, of course, not quite so good as a full two story. I did not regard the criticism of the New York daily paper about the $750 house worth noticing, as the writer evidently did not know what he was talking about. He harped considerably about the roof. That was all nonsense. His points about there being no plumbing were not well taken, as there was some plumbing, and the most absurd part of the criticism was that in regard to the house having a small porch on which the poor workingman could sit and view the landscape.

I was more than pleased with the exterior of the first prize design in the competition for $1000 houses. I think it good, and with little changes in the plans would make a good house. I think the second prize design quite good also, and can probably be built for the price named in the locality in which the author resides far better than could the first prize in the locality in which it was planned. With regard to the other competitions, I am inclined to think any one can make a fortune in this town building for $1500 the design which took the first prize in the competition for $1000 houses, and in building for $1800 or $2000 the design securing the first prize in the $1500 competition, although Ware is not a great distance from Worcester. I would like to know and have it published in the paper if either of the houses above mentioned have been let out to be built for the prices given.

Note.—We understand the author of the drawings securing the first prize in the competition for $1000 houses has furnished several sets of prints of that design for erection in different localities, but we are not informed as to this point in regard to the first prize design in the competition for $1500 frame houses. We shall be glad to have the readers of the paper comment on the designs securing prizes in the various competitions, although it must be borne in mind when considering estimates of cost that building materials of all kinds have made a very appreciable advance in price as compared with six months ago, when the designs were prepared.

Dampness on Brick Walls.

From W. A. W., *West Liberty, Iowa.*—In reply to "A. T. H.," New Bloomfield, Mo., who asked in the April issue

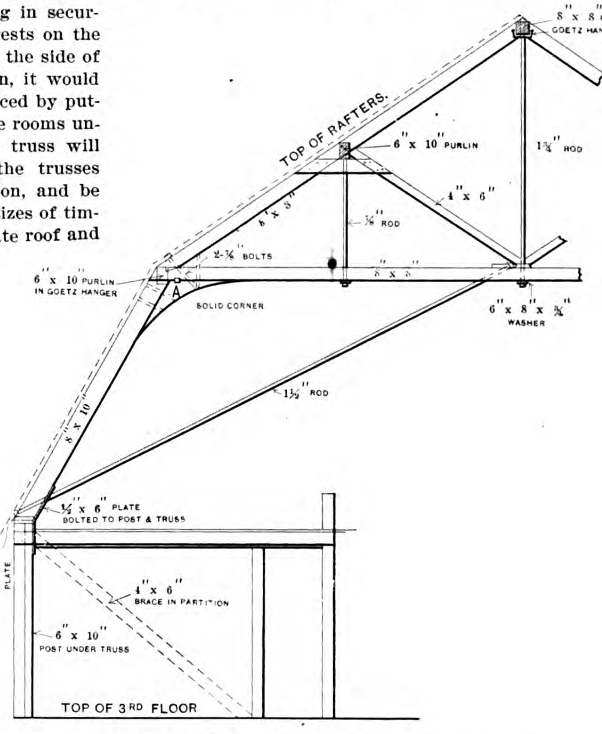


Fig. 2.—*Form of Truss Construction Recommended.*

about the cause of dampness of a brick wall, I would say that the plaster was probably put directly on the brick instead of the latter being stripped out and lathed, as it should have been. The best preventive of which I know in that way of plastering is to lay two courses of stone in the wall when building, the upper course to be above ground at all points, as dampness will work up through one stone, but not through two. Then paint the brick as described in a previous issue of the paper. Unless there is something to stop it, dampness will follow a brick wall to the top, no matter how high it be.

Lettering for Plans.

From DRAFTSMAN, *Elizabeth, N. J.*—In reply to the correspondent who asks in the July issue about lettering for plans, I send herewith three designs, Fig. 1, which I employ in my own work. For blue prints I should prefer the last style of lettering, as it shows up well, and with a little practice is easy to make. A great many draftsmen seem to think very little about the lettering so long as the drawing is well made, but in my estimation this is a mistake, as a good drawing is simply spoiled without neat letters. Pains should therefore be taken in making them.

From ZIPP, *Baltimore, Md.*—I send inclosed, Fig. 2, a suggestion for a style of lettering for plans in answer to the correspondent who recently made inquiry concerning this matter. If "W. H. M." wishes a plain, readable lettering he can find it in the ordinary print, usually making the letters to the size of ⅛ inch on a ¼-inch scale drawing.

From SEYON, *Portsmouth, Va.*—If "W. H. M." of Cleburne, Texas, will secure a copy of the little work known as "Lettering for Draftsmen, Engineers and Students," by Reinhardt, and faithfully follow the directions therein given, he will acquire a very neat system of lettering, well adapted to the purpose which he names. The price of the book is $1.

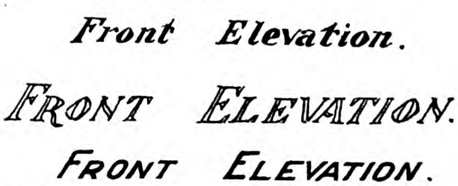


Fig. 1.—Suggestions for Lettering Offered by "Draftsman."

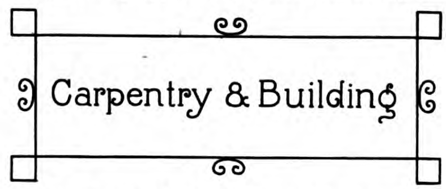


Fig. 2.—Style of Lettering Suggested by "Zipp."

Lettering for Plans.

Note.—In connection with the above we would say that copies of the work in question can be secured through this office, and will be sent postpaid for the price named.

Designs of Attractive Farm Buildings.

From R. C., *Meadville, Pa.*—I would like to see published the floor plans and elevations or photographs of some neat rustic and attractive farm buildings, such as a home-loving farmer would like to build. No doubt some of the readers of the paper have seen such and could send sketches of some of the attractive buildings on farms near their homes. I wish the readers of the paper would take more interest in farm buildings.

Note.—We trust those of our readers who are in a position to do so will adopt the suggestion of this correspondent and send forward for publication drawings of attractive farm buildings, and if possible accompany them by good sharp photographs, showing the completed structures.

A Below-Ground Ice House.

From J. A. H., *Morolock, Va.*—I intend to build a below-ground ice house, and shall be glad to have the readers of the paper who have had experience in this line give me such information as they can. The ice house is to be located on the side of a hill. I want to dig it about 18 feet deep and drain it, but the drain will have to be about 300 feet in length. The soil is sand, but the bottom of the ice house will be rock, so that draining will be necessary.

Note.—This question offers a field for varied discussion on the part of those of our readers who are experienced in this line of ice house construction. Here in the North the houses for the storage of ice are for the most part above ground, and it is possible our correspondent may be interested in the description presented last month of a building of this nature.

White Pine Versus Oregon Cedar Shingles.

From E. H. H., *St. Louis, Mo.*—I believe it would interest others as well as myself to see published in the correspondence department the opinions of some of the readers regarding the merits of white pine and Oregon cedar shingles. The Oregon shingle seems to make a fine roof, but as yet I have been afraid to use it, owing to the fact that I have heard so much about the tannic acid rusting out the nails in a very short time, even if galvanized iron nails are employed. Whether this is so or not I am unable to say.

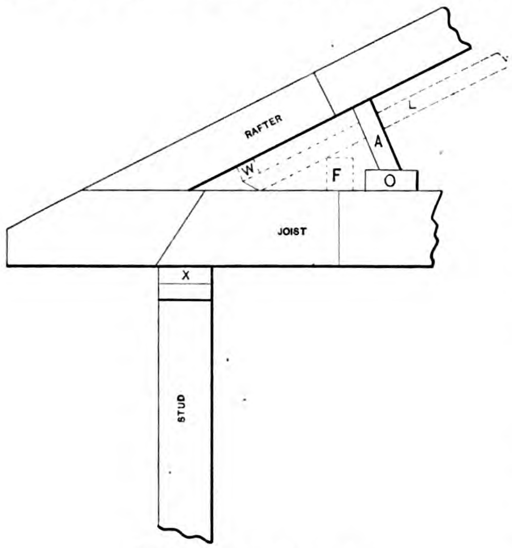
Note.—We lay this inquiry before the readers in compliance with the request of our correspondent, and shall be glad to have them give their views on the subject. Our correspondent will doubtless be interested in the letters of "S. F. B." and "B. F. C.," which bear upon the question of the relative durability of pine and cedar shingles, and which we present in this issue.

Boring and Counterboring in the Lathe.

From WOOD TURNER.—In a recent issue a correspondent asked with regard to the best method of boring and counterboring wood by the aid of a common wood turning lathe. In regard to this matter I would say that when there is a large amount of boring to be done, and a lathe is handy, the material being of such dimensions as can be readily applied or handled, the boring can be done quickly in the lathe. If, however, the work is small, the holes being not more than 2 inches in diameter and the material of such a character that it can be handled on the bearers of the lathe, it will be best to have the boring tool, which may be an ordinary twisted auger, or better still, a Forstner bit, chucked in the head block of the lathe in such a manner that when the lathe mandrel and bit revolve the bit will run perfectly true. The material to be bored may then be pressed tightly against the bit while the lathe is revolving and the hole bored to the required depth. If the material is hard wood the pressure against the bit must not be too heavy, or there will be danger of overworking the bit and wrenching it off. For pine or other soft wood that is dry more pressure may be used. If the holes to be made are large, say anywhere from 2 to 10 or 16 inches, and the material of such a shape that it can be secured to the face plate of the lathe, the hole may be first roughed out with a narrow gouge near to the size required, when it may be finished to the exact size by one of the tools shown in the list of turning tools, illustrated and described in the articles on "The Art of Wood Turning," by Mr. Hodgson, and which recently appeared in the columns of this paper.

If the holes are to be tapered, as is sometimes the case in pattern making, the gouge and inside chisel may be used with effect, but in this kind of work where exactness is required it is always best to make a templet with the exact taper of the hole wrought on it. This templet should be made of thin stuff, and should be often tried in the hole as the work progresses in order to prevent the hole being made too large or misshapen. The depth and diameter of such holes are limited only by the capacity of the lathe and the length of the tools employed.

For countersinking holes bored in the lathe, the work may be done if the material revolves in the lathe, with a gouge or with a side tool, and where the work is particular a templet cut to the proper shape may be employed. If, however, the countersinking is to be done with the tool revolving in the lathe, it will be necessary either to make the hole and countersink at two operations, or provide a special tool for the purpose. This special tool may be a Forstner bit with a movable cutter, adjusted to the spindle of the bit and set at the right distance from the face of the boring tool as well as at the proper angle to give the desired bevel at the countersink. This movable cutter is to be made to grip the stem of the bit and held firmly in place with a set screw or other suitable device. The ingenious mechanic will see quite readily how the cutter may be attached to the revolving bit.



Raising the Roof of a House.

Raising the Roof of a House.

From T. H. F., *Simcoe, Ont.*—It seems to me that "H. M." of Doon, Iowa, has a cinch in his job of raising the roof of his house, if he goes about it in the right way. My method would be first to spike the collar beams to the hight required, allowing, of course, for the additional 4 feet, which is to be added to the hight of the side and end walls. These collar beams should be made firm and have pieces nailed across their top edges at right angles with their faces, in order to brace the roof in such a manner that it will not change its shape while being raised. Braces of 1-inch boards may be temporarily nailed to the foot of the rafters and collar beams, which may be knocked off when the roof is in its proper place. This being done and the roof made perfectly square, the next thing will be to strip off all the cornice, except the fascia, which need not be removed. Then saw all the joists and lookouts on the lines marked on the sketch, running the saw in from below. If the roof is well secured there will be little or no settlement at the saw kerfs to jamb the saws, but in order to provide against settlement of any kind it may be well to run a plank, O, on top of the joist and wedge solid against the rafter a short stud, A, with its lower end resting on the plank O. This will prevent the saw from jamming or sticking in the kerf.

This being done and all the joists cut clear, two men with levers inside, as indicated by the dotted lines, will be able to lift one side of the roof quite easily. It will be best not to raise more than 4 inches on each side of the roof at a time, blocking it up well at each lifting. The blocking can best be done from the plate X between the joists, and the blocks may be "tacked" here and there to prevent their slipping out. The correspondent will find a comparatively easy job if he follows this plan, and it will also prove economical. In the diagram W is a 2 x 4 scantling, with its face against the rafter and its lower side resting on the lever L. This lever should be as long as can be conveniently worked, and should be strong. A good hard wood plank will make the best. There should be four or six of them—two or three on each side of the building. This will save changing the levers from side to side. The fulcrum F may be a piece of timber of any size, but should be long enough to cross four or five joists. If "H. M." can beg, borrow or steal a few screw jacks he may use them instead of the levers, but for my part I should prefer the latter as being handier and quicker of action.

When the roof is up to the proper hight studs should be placed on the old plates and run up to the roof boards, being well spiked to the foot of the rafter and the angle of the lookout or joist end that forms the projection. This will tie the rafters, lookouts and wall together and make a solid job, especially if well done. As the ceiling joists are light, being 2 x 6 inches, it might be necessary to "shore up" the ceiling from the lower floor to prevent the plaster from cracking. This, however, will be a matter of judgment, while the work is progressing. The old cornice can be put on again if care is taken in taking it down.

Laying Out "Nail Ties" for an Ogee Roof.

From Framer.—Perhaps the following suggestions will help "W. H. M." in laying out what he is pleased to term his "nail ties." The concentric rings, shown in the plan, Fig. 2, indicate the position of the rings or ties as given at C, D, E, G and H in the elevation, Fig. 1, and all he has to do is to describe circles or rings with the proper radii and extend them from one rafter to the next, as for example at O X on the plan, Fig. 2. The first ring, H, as shown, if cut in snug between the two rafters, F F, at the points O and X, will do for a pattern for the other seven parts of the ring. The same process adopted at G, E, D and C will answer for the other ribs. I show two pairs of rafters carried up from F to K, the shaded portions showing the intersections of the ribs with the rafters. The lines drawn at right angles to the central plumb line in Fig. 1 show the lines of ribs, and

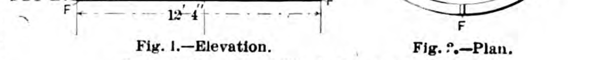


Fig. 1.—Elevation. Fig. 2.—Plan.

Laying Out "Nail Ties" for an Ogee Roof.

correspond with the concentric rings on the plan. If the ribs instead of being inclined on the radial lines of the curves of the rafters were placed with their faces parallel with the base line, their insertion between the rafters will be a very simple matter, as the cuts will consists only of two bevels for all the ribs, whereas in the elevation before us a new set of bevels will be required for each set of ribs, and these bevels are of a complicated nature, for which several drawings and much space would be required to fully explain and illustrate. Ribs laid flat to the horizon could be cut at both ends on the angle shown at O X for the over cut and a single bevel forms the down cut. As "W. H. M." did ont ask for the bevels—only for a scheme of laying out the "nail ties"—perhaps he understands the method of cutting them in.

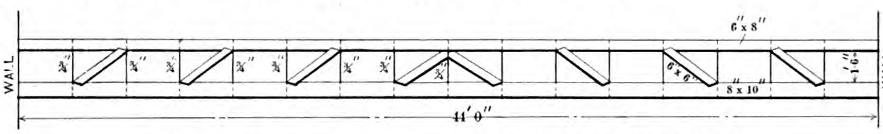
Stability of Roof Truss.

From C. N. C., *Decatur, Ind.*—I send herewith a sketch of a truss which has been used in a three-story building in this place, and I wish to know what the correspondents of the paper think about its stability. The building is 132 feet long and has five trusses, spaced 22 feet on centers. The truss shown in the sketch is the smallest. The larger trusses have less rods, but all rods are ¾ inch. The largest truss has nine rods and is 9 feet between chords. How many pounds will the smallest truss —that is, the one here shown—support ? Will it sag by the weight of the roof and ceiling to carry them both ?

Dampness of Plastered Walls.

From W. A. W., *West Liberty, Iowa.*—In regard to the inquiry of "H. A. F.," Port Antonio, Jamaica, would say that I have noticed the same thing in frosty weather, but only in rooms where there was more or less steam. I think the cause was this: The steam penetrated the wall and formed a frost on the side next to the sheathing; then it thawed and soaked into the plaster and wet the paper. In order to prevent this I would suggest placing a ventilator in the ceiling. I have known glue and paint on the walls to remedy the trouble in some cases.

From O. L. W., *Dallas, Texas.*—Without attempting to solve the problem presented by "H. A. F.," Port Antonio, Jamaica, I will give some of my observations, which may be a help in that direction. From the way his walls are constructed it seems almost impossible for moisture to penetrate them, but I have seen, especially on the Gulf coast, walls become quite damp from moisture, which was evidently condensed from the atmosphere in the room. Of course this only occurs under particular conditions of air and temperature, but it may have occurred often enough to materially assist in causing the trouble of our correspondent. Again, the color of paper may have a great deal to do with it, blue being very easily affected by chemicals and light. I am inclined to think that if the old paper is removed and the walls coated with varnish size as he mentions, his troubles will disappear.



Stability of Roof Truss.—Diagram of Truss Submitted by "C. N. C."

Framing Roofs.

From J. D. P., *Pendleton, Ore.*—I am at present working out in the country, but I manage to get time to look over *Carpentry and Building*, which I like very much. I notice that carpenters can ask questions regarding our trades, so I will ask a few, as I have not had much experience in roof framing. I would like to know how I can find the lengths of hip, jack and valley rafters for roofs of one-quarter, one-third and one-half pitch. What I want is to know the easiest and simplest way to do the work, and how much longer should each jack be than the other? Another point about which I desire to be informed is the best method of obtaining the bevels for jack rafters in connection with roofs of one-third and one-half pitch; also, how I can obtain the backing for hip rafters?

From A. V. F., *Red Lodge, Mon.*—Wil you give me through the medium of your valuable paper some easy method of finding the lengths and cuts of the hips and jack rafters of a cottage shape roof, say, 20 x 20 feet?

Note.—It seems to be the general opinion of those who have had long years of experience in the art of roof framing that the steel square is a prime requisite in quickly and accurately obtaining the lengths and bevels of rafters. The manner in which the work may be accomplished has been described at length a number of times in past issues of the paper, the articles being profusely illustrated with diagrams showing the proper method of applying the square. As the principles are the same in every case, it is only necessary to thoroughly understand their application in plain roof framing in order for the carpenter to be able to execute the most complicated work.

An exhaustive reply at this time to the questions raised by our correspondents would require more columns of space than are at command, and as the subject was comprehensively treated so recently as August, 1895, we think all interests will best be served by referring to the article which commences on page 202 of that issue of the paper. Some time previous to that the entire field of framing was covered in these columns in a series of articles which have since been embodied in book form, under the title of "Hick's Builders' Guide." The chapter on "Roof Framing by the Steel Square" offers the information desired by our correspondents, and we would suggest that they secure a copy of this little book, which can be had post paid for $1.

With all this said, however, we lay the questions before our readers and shall be glad to have them discuss specifically the various phases of the problems as above presented.

Drawing Lessons by Mail.

From J. C., *Sheepshead Bay, Brooklyn, N. Y.*—Being a young chip, I would like to ask advice of the readers of the paper. I am fond of drawing and would like to know the best way to become a good draftsman. Are the results satisfactory where instruction is given by mail as advertised by some of the schools of the country?

Note.—It may be stated in a general way that very much will naturally depend upon the aptitude of the pupil and the persistence with which he applies himself to the subject. Very satisfactory results have been achieved by many who have received instruction by mail from some of the schools making a feature of this method of teaching, and we see no reason why with proper application our correspondent should not succeed in accomplishing what he desires through the medium suggested. By corresponding with some of the schools whose announcements have appeared in the advertising columns of this journal he can secure copies of catalogues and circulars which will give him a good idea of the method of study to be followed where instruction is given by mail, as well as afford him information likely to be of assistance in this general direction.

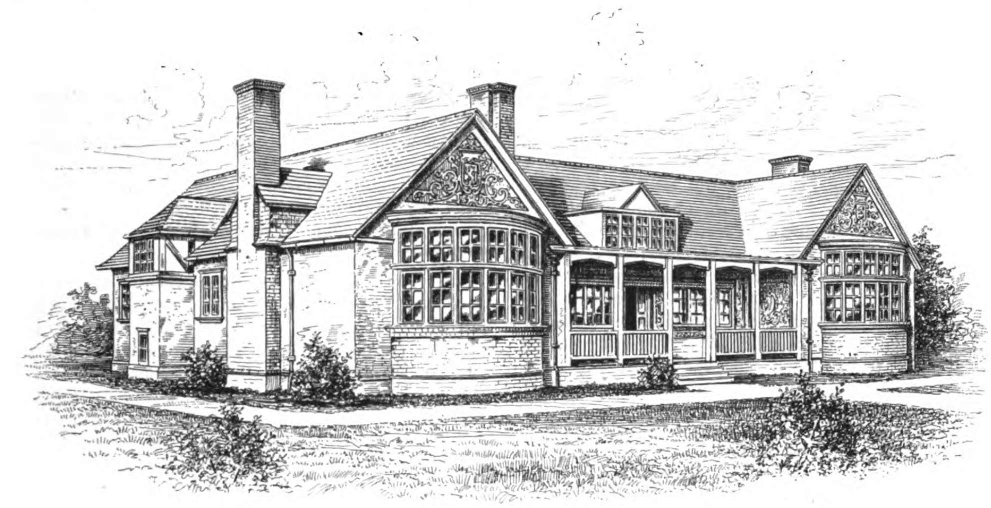
The Use of Red Cedar Shingles.

From S. F. B., *Wellington, Ohio.*—In answer to "C. K. S." of Wayland, Iowa, will say that cedar shingles laid here 20 years are now good, but they spoil the water. They are more durable than pine, and if good live pine timber was made into shingles, they would cost more than slate. I am using white cedar almost exclusively, and they last well.

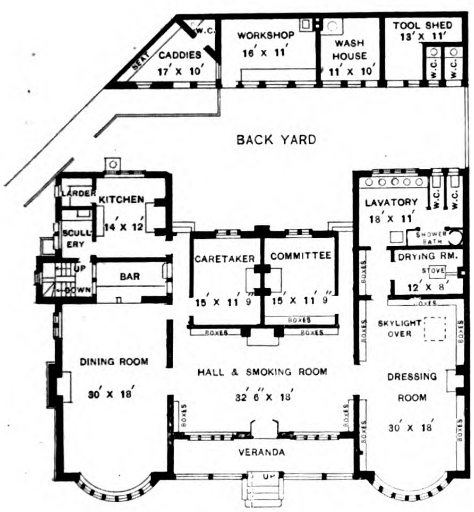
Now as to nails. We must have something different than those at present in vogue, or else quit using shingles. Wire nails rust off in from two to four years in any kind of shingle, and steel cut nails rust off in from six to eight years. Wire nails are worthless anywhere, and cut steel are not much better. I heartily wish we could get back to the good old iron nails. There is only one thing in favor of wire nails and that is the work falls to pieces sooner and gives the carpenter another job, but it is rough on the owner. I shall soon be obliged to recover my house, and shall use galvanized nails and white cedar shingles or slate.

Design for Golf Club House.

The game of golf is becoming so popular in many sections of the country that there is a constantly increasing number of club houses being put up, designed especially to meet the requirements of different golf associations. The architect, the builder and the carpenter are interested in buildings of this kind, the first named because he is likely to be called upon to design them, and the builder and carpenter because they will be the ones to do the work in connection with their construction, and it is with a view of affording suggestions as regards these features, as well as the arrangement of the interior, that we present herewith the plan and elevation of a house constructed last fall on Wimbledon Common, near London, England, for the London Scottish Golf Club. The building is of rather pleasing exterior, in the treatment of which white rough cast work plays an important part. The roof is covered with rough green Westmoreland slate in gauged sizes. Another noticeable feature of the design is found in the swelling bay windows of the dressing and dining rooms. The principal rooms are finished with what is known as Cowrie pine oiled and left plain, while the boxes around the dressing rooms are of Oregon pine. The second floor of the building is utilized for apartments of the caretaker, or, as we designate him in this country, the janitor, while at the rear are the work shops, wash house, room for caddies, &c. The building was designed by Architect H. O. Cresswell, a member of the Royal Institute of British Architects, while the work of construction was performed by Bugler & Co. of Putney.



General View of Club House



Plans of Main Floor and Work Shop.
Design for Golf Club House.

Wages of Building Mechanics in London.

One of the foreign architectural papers gives the following schedule of wages per hour in various branches of the building industry in the city of London. The value in American currency of an English penny may be taken as 2 cents in figuring the rate of wages in the tables below:

	d.
Excavator	6¼
Laborer	6½
Bricklayer	9½
Mason	9½
Fixer	10
Carpenter	9½
Joiner	9½

The following is the rate of wages issued by the London County Council. They are also those of the trade unions in the London district, and comprised within a radius of 12 miles from Charing Cross:

	Per hour d.	(a)	(b)	(c)
Carpenters	9½			
Joiners	9½			
Bricklayers	9½			
Bricklayers (cutting and setting gauged work)	10½			
Plasterers	9½			
Masons	9½	50	47	44½
Masons (fixing)	10¼			
Painters and glaziers	8½			
Smiths, fitters, &c	9 to 10			
Laborers	6½			
Plumbers	11			

Columns *a*, *b*, *c* represent the hours of labor per week; *a* are the summer hours, *b* and *c* are the 14 winter weeks after the first Monday in November; *b* giving the three weeks at beginning and three weeks at end of that period, and *c* the eight middle weeks.

Plumbers work 47 hours in summer, 44½ hours during the three weeks at beginning and end of winter, and 42 hours during the eight middle weeks.

THE Building Code Commission, which has been at work for several months codifying the building regulations of New York City, has prepared a tentative report, which has been printed. In this report are drafts of ordinances covering the entire scope of the commission's powers, and it is said many important changes have been made, especially in the sections relating to hotels, theatres, tenement houses and fire proof construction.

HOMES OF WORKINGMEN IN EUROPE.

IN England the laboring classes are still so badly provided for that we cannot cast a stone at other countries; but at the same time it is interesting to see what our Continental and other neighbors are doing in the matter of housing the workmen, to whom they and we owe so much, says a writer in one of the London papers. Light, air and sufficient space cannot too strongly be insisted upon. Even the first two will do much to prolong life, and make it a pleasure instead of a torment, as it is to so many. And as to space, we shall always be cramped for it in London; but in most towns in the provinces there it at present a good opportunity of profitably investing money in the building of workingmen's homes.

Timber Dwellings in Sweden.

In the north the houses are made of timber when part of the adjoining forest is owned by the employer of labor, and very snug dwellings can thus be made. In the south, where the wood is comparatively scarce, bricks have now been introduced in many places; but still the majority build their houses of a framework of timber, filled in with clay. In this country the wants of the workmen are admirably met. Every mine, factory, &c., has its houses or cottages for its workmen. True, they are built of wood, which some may think strange; but a more comfortable dwelling than one entirely made of wood cannot be had, and there is not so much risk of fire, as we are too apt to take for granted. Tenement houses are also in existence in Gothenburg, and Baron Dickson has given liberally of his great wealth to improve the condition of Swedish workingmen. This, of course, does not apply to the larger towns, where the buildings in wide streets are of an imposing character, and the accommodation for workmen in the immediate suburbs is extensive and increasing.

Houses in Germany.

It is almost impossible to describe in general terms the character of the houses occupied by the working classes, varying so widely as they do in different localities. What may be true of the houses in one place is altogether inapplicable to those of another, and even of others in the same locality, or in the neighborhood. The subjoined account will serve to give an idea of the general class of habitations in which the laboring population live. In the large towns the artisan classes live almost exclusively in lodgings, and it is rare to find even a small tradesman living in a house of his own; whereas in the country and in the small towns the latter is more frequently the rule than the exception. The houses inhabited by the rural artisan are generally of the poorest description. Laborers, factory operatives, miners, &c., are obliged, even in the country, to live in lodgings, or else in a kind of barracks.

German States.

In the Circle of Memel the dwellings of the workmen in the rural districts are poor and inadequate in the extreme. The houses are of one story, built of mud, and some even of grass; the windows are nailed up and never opened. They contain in general one dwelling room and a sleeping room, usually unfloored.

In the Circle of Königsberg the houses of the working classes are usually built for two families, and lately have been built for four families of laborers. Each family has a dwelling room in these, with a stove for cooking, and either a stable or a pig sty. The Building Board of the town of Königsberg insists upon light and space being properly attended to in new erections. In the Circle of Gerdanen many families often live together in the same room; but of late years there has been much improvement in the structure of the houses.

There are bright glimpses here and there, but altogether Posen and Silesia want air, light and room for their artisans' dwellings. At Leyden a workingman's family pays £2 14s. (about $13), in Templin £3 12s., and in Zeldenich £4 10s. per annum house rent. In Saxony, with the exception of the village of Altenburg, where the inhabitants are crowded together more than is consistent with health, the space in the dwelling houses for families is double what it was 40 years ago; but in one circle, that of Schlensingen, several families live together in one room in the populous parts.

Workmen in Hamburg.

The laboring classes in Hamburg live generally within the boundary of the city and suburbs, where, however, the ground is mostly very valuable, so that rows of small dwellings of about two stories high are built for their accommodation at the back of the houses forming the streets, which are reached by long courts of only a few feet in width, and in many cases requiring the ascent and descent of several steps. These houses are divided into several compartments of two or three small rooms each, which are uncomfortable, and often unhealthy, yet rarely remain unoccupied. The rent is about £5 per annum. The better class of workmen often have two or three larger rooms, for which they pay from £7 to £11 per annum, although the rent amounts to one-fifth or one-sixth of their income.

The Dutch Workmen.

In every town one meets with blocks or rows of houses built expressly for the working classes. They are mostly on the same model, the size not allowing of any great variety. The more modern have been built in rows near the outside of the towns; the older are to be seen in the more crowded parts. Passing down a street, one notices here and there a narrow passage, which at first sight might be taken for a back way to one of the adjoining houses; but entering by this narrow passage, one finds himself between a double row of brick houses, inclosing a garden divided by low hedges or palings into a number of small plots three or four paces square, each one belonging to the house opposite to it. The rooms are about 15 feet square, and a single window in front. The chimney is fitted with a small stove (the property of the tenant), on which meals are cooked. The floor is generally boarded, but not always so. The walls, 8 or 9 feet high, are plastered and whitewashed, unless papered by the tenant. An air of propriety pervades the whole establishment, and gives evidence that neatness and cleanliness are regarded among the first of household virtues. For such a house the rent is about 2 shillings or 2 shillings and 6 pence a week in a town like the Hague, and in the country it is, of course, less.

Fees of Architects in London.

In answer to a correspondent who inquired in one of the London architectural papers as to the proper fees of an architect, a writer offers the following information: "If a good architect is employed the correspondent will probably find that the percentage charged will be something like the following, which, I believe, is the scale fixed by the leading architects in London:

	Per cent.
1. Preliminary sketch and designs complete, including measurement of site	1¼
2. General drawings, plans, elevation, sections, specification and approximate estimate	1¼
3. Working and detail drawings	1¼
4. Personal supervision, and supervision and superintendence, exclusive of clerk of works	1¼
Total charge, per cent	5

Traveling expenses and incidentals extra.

"An architect is bound under the 5 per cent. charge to provide one set of drawings and one set of tracings, with duplicate specification, it being understood that the architect is paid for the use only of the same, and that they remain his property at the completion of the work. Payment on account at the rate of 5 per cent. to be made on the installment paid to the builder, or otherwise to halve the commission on the signing of the contract and the remainder by installments as above."

WHAT BUILDERS ARE DOING

THERE is very little change to note since our last issue went to press. Building activity continues in many quarters, and with promise of a busy season for all branches of the trade. In some localities there is a slight lull, but this is traceable in part to the rapid advance in the cost of building materials of all kinds. The general outlook is regarded as encouraging.

Buffalo, N. Y.

Early in July several hundred bricklayers went out on strike for an increase of wages from 36 cents to 45 cents an hour. Up to the hour of going to press the strike shows no sign of a break, and the leaders of the bricklayers' union claim that there will be no work done until their demands are met. One of the contractors for the new school buildings states with regard to the situation that the employers are standing together in the matter for mutual protection, and that there will be no attempt to bring in non-union men, as that would stop all work on the buildings. All have a strike clause in their contracts, so that they are not called upon to forfeit for non-fulfillment of contract.

Cleveland, Ohio.

Just as we go to press the members of the Builders' Exchange are about celebrating the occupation of their new quarters by appropriate dedicatory exercises, the committee having in charge the arrangements for the affair being composed of George Caunter, E. S. Reese and L. A. Osborne. William H. Sayward, secretary of the National Association of Builders, has, we understand, accepted the invitation to make the principal address. It was the original intention to have the exercises early in June, but the excuse for the delay was that the members of the exchange were too busy in getting out contract work to give attention to the matter.

In commening upon the situation about the first of July, Secretary Roberts of the exchange is said to have expressed the belief that the wave of prosperity which has struck Cleveland bids fair to be permanent. "Contractors," he said, "are unable to get building material fast enough. The supply is far short of the demand. Buildings and houses are in course of erection in all parts of the city, included among the number being a great many apartment buildings. It has been claimed by some that the present prosperity will cause a reaction, and that everything will fall flat, and that a crash will come sooner or later. I don't believe this. The building boom has come on gradually. It is the result of a healthy growth and not the result of unnatural conditions. The population of Cleveland is increasing at the rate of 15,000 a year. There are 30 apartment houses under course of erection. Figuring 100 persons to each house we have 3000 people provided for. This would leave about 12,000 unhoused."

In commenting on the request of the journeymen plasterers that the contractors establish a uniform standard of wages, one of the latter expressed himself as in favor of such a standard, and said that nearly all the large contractors were paying their men $3 a day, but some were paying less. The adoption of a uniform scale, he thought, would place all the contractors on an even footing, and that it would in many respects result in a more satisfactory general situation.

Detroit, Mich.

While there is no particular boom in the building business in Detroit, the contractors are more or less busy, although none of them can be said to be overcrowded with work. Plans have been submitted to the Builders' Exchange for out of town work for a large State Normal School at Marquette, Mich., to be erected of Marquette stone, and for a good sized factory at Lorain, Ohio, to be constructed of brick. Architects generally claim that the advance in prices of building materials and in wages have prevented several jobs from being put through, and that plans in many instances are held in abeyance in the hope of prices reaching a lower level.

The anticipated trouble with laborers did not materialize, and there was no necessity for a strike, as the employers adopted such a course as seems to have been regarded as eminently fair and satisfactory to all concerned.

Indianapolis, Ind.

For the first five months of the present year the amount of building in Indianapolis, Ind., showed a slight increase as compared with the corresponding period a year ago. Building Inspector Robertson says that, as a rule, better buildings are constructed this year than last, but the advance in the price of building materials has largely prevented the construction of buildings intended for business purposes. The figures for the first five months of the year aggregate $788,116, as compared with $734,510 a year ago.

Lowell, Mass.

The master builders indulged in a very enjoyable outing a few weeks ago, on what is known as the Mountain Rock Baseball Grounds. The important feature of the programme, which came a little while after the dinner, was the baseball game between teams called the "Never Sweats" and "Hardly Ables." Frank Weaver was selected as umpire, and the result of five innings was 16 for the Never Sweats and 13 for the Hardly Ables. On the return trip the excursionists stopped at Lake View to bowl. A large number attended the outing and the affair was enjoyable in every way.

Milwaukee, Wis.

Building operations in and about Milwaukee are making steady progress, and the members of the Builders' and Traders' Exchange have enough to do to keep them busy. A number of large buildings as well as dwelling houses are in course of construction, and these with the alterations and changes that are constantly in progress afford a gratifying volume of business. The Milwaukee carnival, which was held during the last week of June, created quite a demand for labor in the way of arches, columns and seating stands along the line of march, and was in all respects a grand success. The home of the exchange was in great demand at that time, owing to the fact that all parades passed the building, and every inch of available space was occupied by the members and their friends.

A new feature has been added to the work of the Builders' and Traders' Exchange, which from present indications will prove a most gratifying success. The exchange furnishes a notification blank to architects, upon which the members of the exchange are classified. The architect marks those whose figures he desires and returns the sheet to the secretary of the exchange, who in turn notifies the members by means of cards dropped into their exchange letter boxes. In cases where an open list is wanted the architect simply states that figures are desired for certain work, and this notice is filed on a bulletin board for the use of all members. This system is found to save time and labor both to the architect and to the contractor, while at the same time it tends to increase attendance at the exchange.

The Entertainment Committee of the Exchange has been very active in arranging for a builders' picnic, which will take place July 22 at Keipper's Grove, about 10 miles from Milwaukee, and, judging from the interest already displayed, the affair will be a notable success.

New York City.

Taking the record of permits recently filed with the Department of Buildings as a basis the season is likely to be an active one, with a large commercial building movement in the near future. For the first two weeks of July there was a small increase in the number of buildings projected in the boroughs of Manhattan and Bronx, but the estimated cost shows a heavy gain over the same period a year ago, the figures standing $5,778,750, as against $1,734,926 for the first two weeks of July, 1898.

The most noticeable feature, perhaps, in connection with the building situation is the record for the first half of the present year. In the two boroughs named the estimated cost of the structures for which plans were filed with the Department of Buildings was $67,052,391, which is a new record, the next best being the first half of 1895, when the estimated valuation of the buildings projected was $59,201,804. The larger proportion of the capital invested is in buildings intended for domestic purposes, the plans for apartments and tenements in the two boroughs calling for an expenditure amounting to $42,257,899. The estimated cost of the private dwellings projected the first half of the current year was $7,263,385, and for commercial buildings there was a distinct advance over those of last year, the figures being $15,283,744, as against $11,293,650.

In Brooklyn there was a large building movement the first six months of the current year, the total number projected being 2222, estimated to cost $12,779,743, as against 1682, involving an expenditure of $7,146,852, for the corresponding period of 1898. For the month of June permits were issued for the erection of 457 new buildings and 252 alterations, at an estimated cost of $2,594,975, this being about $1,000,000 in excess of the estimates for the corresponding month of last year.

Pittsburgh, Pa.

The report for the month of June, recently issued by Superintendent J. A. A. Brown of the Bureau of Building Inspection, shows an increase of 53 in the number of buildings projected and a decrease of about $38,000 in the cost, as compared with the corresponding month of last year. The estimated value of operations started during the month of June this year was $821,282, including the cost of new buildings, alterations and repairs. Permits were granted for the erection of 213 new buildings, of which 117 were brick and 80 were frame. These figures, as compared with the previous month, show an appreciable falling off both as regards number and cost of the improvements.

Architects and contractors generally are looking forward to a very active season's business, owing to the fact that a great deal of last year's building was held over until spring, when it was impossible for operators to get to work with a full force. Many of the structures now under way were planned and the contracts awarded last fall, and it is the general opinion that it will probably be September before the bulk of new work is under way. The feature of fall building operations is likely to be a great demand for dwellings of the cheaper class. New manufacturing plants in various districts will be put in operation before the end of the year, and the supply of houses will have to be largely increased. Permits for several large structures have recently been granted by the Bureau of Building Inspection, the most notable among them being one for five apartment houses, which will probably cost $100,000. The designs are modeled after the English style, the structures being three stories in hight and constructed of pressed brick with brownstone trimmings, the entrance being of marble.

It is estimated that not less than 1500 new buildings in the McKeesport district will have been completed before the end of the year. In East McKeesport 250 are said to be in course of construction, and on the White Oak Level Road contracts have been awarded for nearly 30 new ones. The sites have been sold under restrictions which forbid the erection of more than one house to an acre lot or of a building worth less than $2500. Each house is required to be completed by September 1, 1900. Fully 50 dwellings, averaging $1500 each, have been built in Bryn Mawr and 50 more, to cost $2500 each, will be erected during the fall.

Building Inspector John Heckert of Allegheny reports the estimated value of buildings erected during the month of June as $113,600. One of the notable building operations at present under way is the new Third Ward Public School, which, when completed, will be among the finest in the State. It is estimated to cost $500,000, including furnishing and equipment.

Reading, Pa.

The general impression seems to prevail among contractors and builders that there will be plenty of work to keep them all pretty busy until autumn. It is said that there are very few carpenters, painters, bricklayers, hod carriers, masons and plasterers now idle, and while there seems to be no urgent demand for these classes of workmen there is enough going on to give employment to all who seek it. Wages are about the same as last year, except in the cases of bricklayers and hod carriers, where there has been an advance. Up to latest advices carpenters were paid $3 a day, painters from $2 to $2.25, and bricklayers $2.70 for nine hours' work. The hod carriers, stone masons and plasterers were receiving $2.25 per day.

Scranton, Pa.

There is very little change to note in the strike situation in the city, both sides maintaining a firm front. The strike has now been in progress since the first of June and was started by the carpenters demanding an eight hour day and 30 cents an hour. Along about the middle of the month the Building Trades Council ordered a general strike, which caused nearly 3000 workmen to be affected. The branches of trade concerned included carpenters, plasterers, lathers, bricklayers, painters, plumbers, stone masons, tinners, steam fitters and a portion of the wood workers. The latest phase of the situation was the adoption of a resolution at a mass meeting of citizens presided over by Judge Edwards, and held on the evening of July 6, calling upon the Builders' Exchange and the Building Trades Council to each name one member of a commission and these to agree upon a third member, the idea being to hear the claims of each side and make a final and binding adjudication of the difficulties involved.

Notes.

The carpenters who went on strike in Troy, N. Y., for higher wages returned to work about the first of July, after a conference between representatives of the union and the master builders.

The local union of building laborers in Toledo, Ohio, is said to have accepted the agreement of the master bricklayers' association to pay 20 cents per hour for carrying brick and 22½ cents per hour for carrying mortar.

The amount of work projected in Chicago during the month of June showed a slight falling off as compared with the corresponding period a year ago. There were 368 buildings started, estimated to cost $1,854,175, as compared with 327 structures, estimated to cost $1,891,600, for June, 1898.

The attention of the Commissioners of the District of Columbia was recently invited by Architect T. F. Schneider, whom some of our older readers may recall as a prize winner in one of the early competitions conducted by this journal, to the clause in the local building regulations relating to the reservation of certain areas of lots for the circulation of air. In the opinion of Mr. Schneider this clause is a hardship on the owners of lots adjoining wide public alleys, and as a result of a letter to the Commissioners his suggestion has been approved and the clause modified.

Some of the electrical workers went out on strike in Washington, D. C., on July 10 in an effort to secure a uniform wage of $3 a day for eight hours' work, in place of a scale varying from $2 to $3 for a nine-hour day.

The Master Masons' Association of Springfield, Mass., held a meeting on July 10 with a view to reaching some basis of agreement in figuring upon contracts. It is felt by the members that the margins are altogether too close on their contracts, and that it amounts practically to changing an old dollar for a new one at the end of the work.

A Plea for Builders' Exchanges.

A writer, discussing the advantages resulting from the formation of a builders' exchange, points out in a recent issue of the *Canadian Architect and Builder* that workmen by their united action often accomplish many things favorable to themselves that never could have been done without organization. The occasional misuse of the power attained by organization does not alter the fact that through unity of purpose the greatest good for the greatest number can often be accomplished, and in this sense, when employers of skillful and other labor in the building trades are associated together they can do much, by combined effort on reasonable lines, toward warding off the labor disturbances that seem particularly to afflict the building trades.

Under existing circumstances labor organizations have no headquarters to which to submit their grievances, and the individual contractor does not, as a rule, feel justified in conceding to his dissatisfied workman something he imagines would be unjust to himself and fellow contractors. If there was a recognized authority—a Builder's Exchange—in any city or town where dissatisfaction existed between the employers and employed the two parties could easily be brought together, and by talking their differences over and "reasoning together," a rupture might be avoided "and peace with honor" secured by both parties.

The peculiar condition of the building trades, from a business point of view, is that nearly all contracts are secured by competition, and this makes united action on the part of employers difficult to obtain, for the reason that there are always certain builders who will not identify themselves with any movement they may fancy will place their business in temporary jeopardy. As a rule, however, the majority of contractors associate themselves with an exchange when once it is established, knowing that to become members benefits of many kinds are sure to result, but they do not care to take an active part in its establishment, partly from modesty and partly because they imagine it will make serious inroads on their time—and their purses. As a matter of fact, it need take but little of either if proper methods are employed.

LAW IN THE BUILDING TRADES.

LIABILITY OF OWNER OF BUILDING BLOCKING HIGHWAY.

The owner of a building made a contract with a person to move it to another location. After moving the building a short distance upon the highway the contractor abandoned it in the middle of the street, where it remained for more than a month, and seriously obstructed travel. The court held that after the abandonment by the contractor the owner became liable for the obstruction of the highway, and also would have to pay for its removal by the public authorities.—Caldwell *vs.* Town of Pre-emption, Ill., 74 App. Ct. Rep., 32.

LIABILITY FOR INJURY BY BUILDING MATERIAL ON STREET.

A lot owner to whom the city has granted a permit to deposit building material in the street upon the condition that he keep it properly lighted and guarded, cannot escape liability for injuries resulting from failure to light and guard the obstruction by showing that the material was deposited by a contractor over whose operations he had reserved no control.—Reuben *vs.* Swigart, Ohio, 7 O. Dec., 638.

EFFECT OF CONTRACT AGAINST LIENS ON SUBCONTRACTOR.

A provision in a contract that "no lien shall be filed by either the contractor or subcontractors" is binding on the subcontractors, notwithstanding a provision that if required by the owner, the contractor shall, before being paid, give evidence that the premises are free from liens, and that if there shall be a lien the owner may retain enough to indemnify against it.—Morris *vs.* Ross, Pennsylvania, 38 Atlantic Rep., 1084.

LIABILITY FOR DEFECTIVE VAULT COVER IN SIDEWALK.

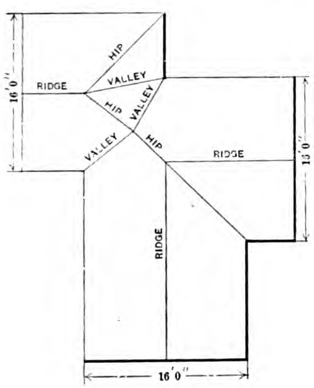
A property owner who constructs a vault under the sidewalk, over which he negligently maintains a defective covering, is liable directly to a pedestrian injured thereby, though the city is required by law to keep the street, which includes sidewalks, in repair.—Morris *vs.* Woodburn, Ohio, 48 N. E. Rep., 1097.

LIABILITY FOR DEFECTIVE CEMENT PLASTERING.

Where cement was sold for use in plastering a dwelling, with a warranty of fitness for that purpose, unskillfulness in the manner of applying same is no defense to an action for breach of warranty, if the manner employed was the one adopted from instructions furnished by the seller. The seller is also liable for expense of cleaning the floors marred by falling of the plaster, or removing doors and casings, preparatory to replastering, and of replastering and replacing the casings; also for expense of patching, before it became evident that it would all fall off.—Nye & Schneider Co. *vs.* Snyder, Nebraska, 77 N. W. Rep., 118.

Some English Methods of Framing Roofs.

In some of the early issues for the current volume we presented illustrations showing plans and elevations for a roof of one-third pitch, these being contributed by various correspondents in reply to an inquiry which appeared in a previous number. Some of these illustrations were reproduced by an English contemporary with an invitation to its readers to furnish sketches showing a better method of framing a roof of the character indicated. The results of this invitation were published in due course, and as they are of a nature to interest American readers, especially those whose communications appeared in our columns, we take the liberty of reproducing some of them herewith. A correspondent of the English paper writing from Glasgow states that the diagrams which were taken from our columns "do not appear to be very practical," and accordingly he sends a few sketches which he considers would be an improvement upon them. These are shown in Figs. 1 and 2, which represent plan and elevation, and as an alternative arrangement he contributes Figs. 3 and 4. In Fig. 3 there are no hips or valleys, but the main ridge extends from front to rear with a small gable at the extreme rear projection. He states that the dotted lines indicate how the roof might be framed. The plan of roof shown in Fig. 5 is contributed by a Liverpool correspondent who first made a model of the roof 16 inches long, 4 inches wide and 2 inches thick. This he beveled to give the proper pitch of roof. He then cut it into pieces, mitering at the intersecting lines of the valleys, with the result shown. He states that the three ridge pieces will be level, and by hipping the gables the gutters will be one level on all sides of the building.



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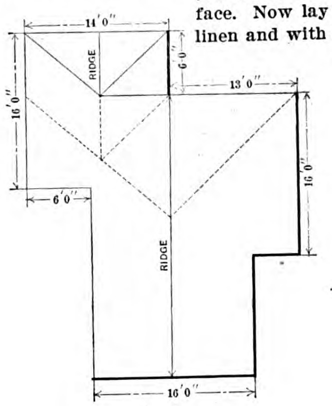

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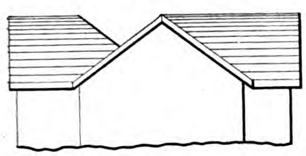

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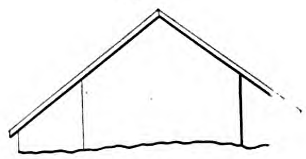

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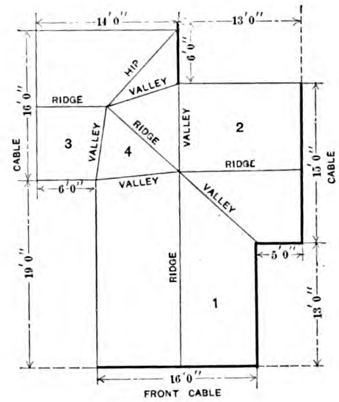

Fig. 5.

Some English Methods of Framing Roofs

The Oldest Brick in Existence.

It is currently reported that at one of the recent meetings of the *Académy des Inscriptions et Belles-Lettres*, in Paris, the keeper of the Louvre, M. Henzey, showed a brick which is undoubtedly the oldest in existence, dating, it is estimated, from the fortieth century, B. C. The brick in question was discovered by the French savant and antiquarian, De Sarzee, during recent excavations at Tello, the ancient Sirpulo in Chaldea. The brick was somewhat curved, and had been baked, but was of such crude form that it evidently had neither been put in a press nor molded. The mark of the maker was simply the imprint of the thumb. It was clearly made very soon after the discovery of the art of brick-making, which art, as is universally admitted, marks the dawn of civilization. Other bricks of a much more recent date were shown. Some of them bore the mark of the coat of arms of Sirpulo, an eagle with the head of a lion. Others again were inscribed with the name of the reigning monarch.

Mounting Drawings on Linen.

A correspondent of one of the English building papers presents the following suggestions for mounting plans on linen: Get a board or table sufficiently large to take the plan and tack the linen down with small tacks, of course minding that no creases occur in the linen. Procure some common flour, to which add the proper proportion of water, and then allow to boil in an ordinary saucepan until the required thickness is obtained. Then with a smooth paint brush besmear the linen evenly with the paste, taking care to remove all lumps from off the surface. Now lay the plan to be mounted carefuly on the linen and with a handkerchief or something of this sort softly press the plan down to enable it to tightly adhere. After this put the board away for two days to allow the plan to dry, at the end of which time the plan will be ready for trimming off with a sharp penknife. I have done lots of plans in my time in this way and find that not only is it cheaper, but the plans will last a lifetime.

Building Stanford University.

According to a recent issue of one of the San Francisco papers another move in the building of Stanford University has been made in the letting of the contract for the stone and brick work on the memorial chapel, which has been under contemplation for so long. Fully a year will be required in the construction of the building, and the total cost will probably reach $275,000. The memorial chapel will be the most magnificent of the university's fine structures, and in fact it is Mrs. Stanford's desire to make of it the most beautiful church in California. The chapel and the entire façade south of the present quadrangle she wishes to see completed without further delay, just as she and Senator Stanford formerly planned them to be.

Of the six buildings of the façade the library and assembly hall are now nearing completion, and the memorial arch was commenced nearly a month ago. The others will be a home for the economics, history and English departments, headquarters for the departments of philosophy, education and psychology and two buildings for the departments of botany, physiology, geology, zoölogy and entomology, similar externally to the new library and assembly hall buildings, but modified internally to suit the demands of the departments occupying them. These last two buildings will be begun next.

The Durability of Paints.

In order to search for the causes of the rapid perishing of painted surfaces, we have to look, says the *Decorators' Gazette* of London, to the potent factors which are at work to bring about such a result. We know that our atmosphere consists of oxygen, carbonic acid, water and nitrogen; that linseed oil is dried or solidified by oxidation—*i. e.*, that it dries by absorbing oxygen—which has been proved by eminent authorities. We also know that in every good oil paint linseed oil is used as a binder and carrier for the pigment. The oil is supposed to cement the particles of pigment or coloring matter together, and make them adhere to the surface to which it is applied. Many have an idea that this forms a chemical combination, but it does not; it is a mechanical mixture only. There are some pigments which have a greater affinity for linseed oil, but none of them enter into a chemical combination with it, not even during the drying process. This goes to show that the disintegrating factors of the atmosphere, which will attack the dry pigments or colors, are powerful enough to destroy paint after the oil has become hard and solidified. There being no chemical combination between pigment and vehicle, it is but reasonable to assert that linseed oil or any other vehicle cannot save the pigment from being destroyed, and this is proved in numerous instances where white lead paint is attacked by local influences, most noticeable where exposed to sulphurous gases. To demonstrate this, some dilute nitric acid may be poured into a dish which has been coated on the inside with white lead paint, and effervescence will be observed, which is produced by the acid destroying the white lead, in spite of the solidified oil binder, and liberating gaseous carbonic acid. Any painter who has ever tested dry white lead for purity with nitric acid will have noticed a similar effect. There are many factors which cause paint to perish, and it is not to be supposed that the binder must perish first in all cases, but it is a well ascertained fact that very often the pigment itself is destroyed before the vehicle. To the practical observer there should be no difficulty in determining the material which succumbs to the destroying influences. It is well known that no oil paint is durable when applied to damp surfaces, and that it will not adhere or stand when used over a ground of coal tar, asphaltum or like substances.

Master Builders' Mechanical Trade School, Philadelphia.

The closing exercises of the ninth term of the Master Builders' Mechanical Trade School of Philadelphia were held on the evening of Tuesday, June 20, at the Builders' Exchange, Seventh and Chestnut streets, when certificates of proficiency were presented to 31 graduates who had attended the classes for instruction in carpentry, bricklaying, painting and plumbing during the past season and passed the necessary examinations. There was a large attendance of pupils and their friends, together with persons interested in the trade school movement. An interesting exhibition of the work of the pupils during the season of 1898-1899 was a feature of the occasion. In the course of the exercises an address was made by George Watson, president of the school, who also presented diplomas to the graduates in the various branches. There were also addresses by Col. M. Richards Muckle, John Atkinson, president of the Master Builders' Exchange; John S. Stevens, vice-president, and William Smith of the Bricklayers' Association.

At the conclusion of the exercises President Atkinson, on behalf of the Board of Directors of the Master Builders' Trades School, presented framed resolutions to President Watson in appreciation of his faithful and successful work; also to W. A. H. Allen, the superintendent of the school, to which both gentlemen made appropriate responses.

It is expected that, with the graduation of these classes, the doors of the school will be closed, owing to the action of the Governor of Pennsylvania in vetoing the School Appropriation bill, thus depriving the institution of its main source of support.

The school was started in 1890 by the aid of Col. Richard T. Auchmuty, a philanthropist, of New York, and was for some years sustained by the Master Builders' Exchange. The school was chartered, and in recent years had received an appropriation of $2500 annually, about half the cost of maintaining it. Last winter an appropriation was unhesitatingly made, and Governor Stone, while praising the school and giving it credit for doing good work, vetoed the appropriation on the ground of economy. During the nine years of its usefulness the school has graduated more than 400 pupils, who have been taught the trades of carpentry, bricklaying, painting, plumbing and plastering. The school took the place of the old and abandoned apprentice system, and its graduates have found great favor with the trades unions.

CONTENTS.

Carpentry and Building

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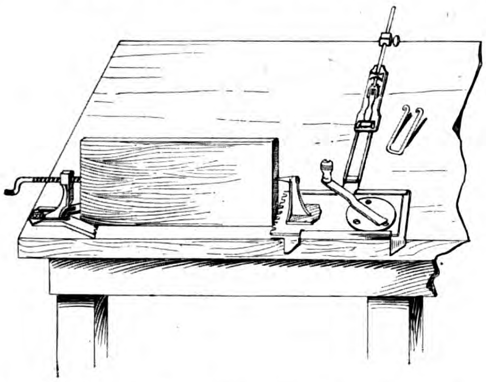
NOVELTIES.

Johnson's Universal Work Holder for Carpenters.

A device which will strongly appeal to the carpenter is a work holder which is being manufactured and introduced to the trade by the Johnson Bench Tool Company of 309 311 Norris street, Escanaba, Mich., and of which some applications are illustrated herewith. The device consists of a claw shaped dog made of malleable iron, utilized upon a temporary work bench and be ready for active operations in a few minutes; that it is unnecessary to nail the work to the temporary bench when the holder is employed; that the device can be conveniently carried in the tool box, where it will not take up much more room than a jack plane; that it can be fastened to or removed from a bench in an instant; is adjustable, so that it can be clamped to any size of bench; that it is obtainable at a small cost; that any size or thickness of work down to ¼ inch can be held fast and dressed



Novelties.—Johnson's Universal Work Holder for Carpenters.—Fig. 1.—Showing Attachments Holding a Board on Edge for Jointing.

which is secured to the front end of a bench with three screws. It is 5-16 inch thick and has toothed ends for work to butt against. On the dog is a removable standard held firmly in place by a sliding latch. The main holder consists of a bit plate ⅛ inch thick, which rests on top of the bench, on the front edge of the plate being formed lugs with an inclined row of transversely extending teeth which engage the side of the bench so as to securely hold the bit plate against any longitudinal movement. On the rear end of this plate is a hook for the clamping arm, which reaches across the bench. On top of the bit plate are guide ways on which slides the main dog plate, and having at its outer end teeth or points which engage the work. Toward the rear end of the dog is formed a circular disk with a spiral groove engaging a friction roller from the bottom plate. A removable crank fits on the disk and when the work is to be fastened the dog is moved up against it and clamped fast to the bench by the lever on the clamping arm. Then by turning the crank to the right the work is fastened to the bench, while a turn to the left releases it. The vise attachment fits in the same recesses on the front and main dogs as do the standard attachments. The bit plate and main dog are made of boiler plate steel and so finished that the device will not rust. In Fig. 1 of the accompanying illustrations the standard attachments are shown holding a board on its edge to be jointed, rabbeted or otherwise operated upon, while Fig. 2 shows the vise attachment holding a board from which dovetails or tenons are being sawed. By moving the main dog back on the bench to the proper length the board can be held horizontally or at any angle as may be desired. By removing the vise attachment boards or plank can be placed flat on the bench and dressed, thus making the device serve as a bench stop. In referring to the advantages to carpenters possessed by this device the manufacturers point out that it can be without striking the plane against the work holder, and that by means of the device narrow work can be fastened flush with the face of the bench, which, it is pointed out, is a great advantage over a cabinet maker's bench, and which is very necessary when working very narrow stuff with a rabbeting or beading plane or making moldings, quarter round, &c.

The McCray System of Refrigerators.

The McCray Refrigerator & Cold Storage Company, Kendallsville, Ind., have issued Catalogue No. 35, comprising 32 pages, handsomely illustrated and giving full details of the company's products. They are owners and manufacturers of the McCray patent system of refrigerators and cooling rooms for hotels, public institutions, markets, stores, &c., and also manufacture wood lined and tile lined refrigerators for domestic use. The catalogue under notice treats of domestic refrigerators. Considerable space is used in setting forth the merits of the McCray system, and especially in criticising the use of zinc in lining refrigerators. The McCray linings are yellow or sweet poplar wood or tile. Illustrations are presented of a variety of wood lined constructions, adapted to all domestic requirements, including special styles for apartment houses.

The company furnish many tile lined refrigerators built to order to suit conditions in private homes. These are usually so made that they can be iced from the outside, avoiding the entrance of an ice man and drippings over the floors. A demand has, however, sprung up for tile lined refrigerators of the conventional form, and the company are therefore manufacturing eight stock sizes, ready for shipment at all times, which are shown in this catalogue. The illustrations and descriptions represent these constructions as particularly well finished and complete in all their appointments. They run from moderate to very large sizes, suitable to ordinary family use or for hotels or other heavy service. Specimens of refrigerators made to order are also presented, giving full details of construction and installation.

Prepared Roofing.

The 1899 catalogue of the Barrett Mfg. Company, 290 Broadway, New York, which has come to hand, gives a great deal of useful information in reference to prepared roofing. The company manufacture a variety of the materials used, and state that they will assist their customers in selecting the proper material for the work they have contracted to do. One page is devoted to coal tar products, explaining the various qualities of pitch used for roofing, paving and concrete work, also the construction of two and three ply roofing felt, showing sectional cuts to make the method understood. Several pages show cuts and give instructions for laying roofs and fitting around chimneys and flashing walls. Roof brushes, nails, roofers' tools, kettles, buckets and dippers are noted. Asphalt roofing materials occupy several pages, with the instructions for applying them, stating that they may also be used for making water tight floors for factories and stables. The last part of the book is devoted to sheathing papers and their use for covering buildings, floors and for carpet lining, with instructions for their application. It is pointed out that in no connection will the adage that the best is the cheapest apply with such force as to sheathing papers, insulat-

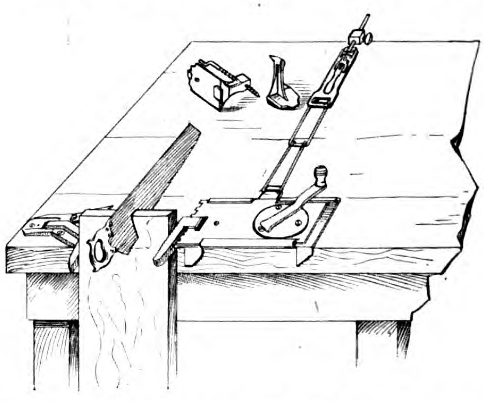
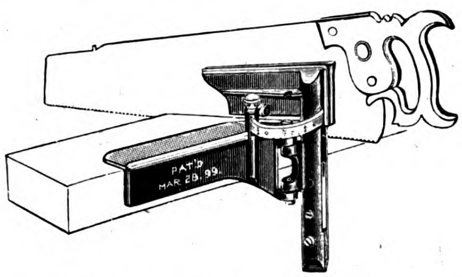


Fig. 2.—Vise Attachment with Board from which Tenons are Being Sawed.

ing papers and sound deadening felt. The Black Diamond trade-mark of the company is a mark of quality and is placed on every article they manufacture.

Seavey's Miter Box and Saw Guide.

The accompanying engravings illustrate Seavey's patent miter box and saw guide, manufactured by Thomson, Cheney & Thomson, 3-5 Davis square, Lowell, Mass. The device will do any work within the scope of the ordinary



Novelties.—Seavey's Miter Box and Saw Guide.—Fig. 3. Miter Box and Guide, Showing Method of Operation.

miter box while so light and compact it is equally effective on bench, horse, building or stage. A feature of the tool is that no special saw is required, any ordinary cross cut saw answering the purpose, while it may be used on material of any width or thickness. This miter box can be applied to the stock to be sawed by placing it on the material and adjusting it so as to secure an exact cut at any predetermined angle. The implement is made of iron and steel in one size only, finished either in japan or nickel, and weighs 1¾ pounds. It can be compactly folded, so as to occupy little space in tool chest or kit, or can be carried in one's pocket, and the parts are interchangeable. Fig. 3 shows it in position on the wood to be sawed and the method of adjusting the saw guide. Fig. 4 is a front view showing the space between the blades. It will be seen that the standards are cut away so as to permit of the movement of the saw teeth without interfering with any metallic part, there being a strip of wood inserted below to prevent injury to the teeth. Fig. 5 is a back view showing the inside of the box, which is to be applied to the stock. In this view is shown the arrangement of the notched segmental arm passing through a slot and over

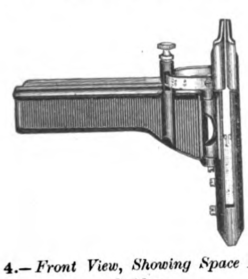


Fig. 4.—Front View, Showing Space Between Guides.

a sharp angle which engages the notch, insuring easy and accurate adjustment.

New York Trade School.

The catalogue of the New York Trade School, First avenue, Sixty-seventh and Sixty-eighth streets, New York City, states that the nineteenth season will commence October 16 of the present year, with evening classes in carpentry, bricklaying, plastering, plumbing, house painting, steam fitting, drawing, sheet metal cornice work, blacksmith's work, printing and sign painting, and with day classes in carpentry, bricklaying, plastering, steam and hot water fitting, house and fresco painting, electrical work, plumbing and sign painting. The little volume is gotten up in a style to show the facilities afforded by the institution, and numerous half-tone engravings represent views in the different departments, in some instances students being shown at work. Under each branch of trade full information is given as to the course of instruction, terms and all particulars likely to be required by any one contemplating attendance. For example, it states that instruction in the evening class in carpentry and joiners' work will be given on Monday, Wednesday and Friday evenings from 7 to 9.30 o'clock, commencing October 16, 1899, and ending

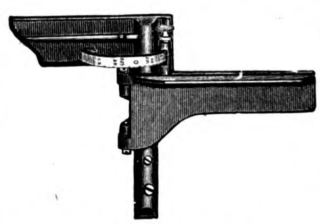
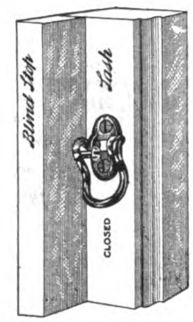


Fig. 5. Back View and Inside of Box as Applied to Stock.

April 4, 1900. For the day class a four months' course of instruction in carpentry, joiners' work and construction, including also the drawing of plans, will be commenced on December 11 of the present year, and certificates will be awarded on April 4 next to those students who pass the examination held during the final week of the term. The course in carpentry at the beginning embraces a variety of bench work which brings into use all tools commonly employed in the trade. The student is then taught how to lay out and construct centers and window frames, make, case and hang doors, lay beams and set bridging in the same, erect stud partitions and lay flooring. A complete course in joinery work is given and the way to lay sheathing and shingles on a frame house is taught. Lectures treating of the scientific side of the trade are given during the progress of the course. Since the New York Trade School was founded over 7000 young men have been instructed, the majority of whom attended on the recommendation of brothers or friends who had preceded them.

The Phenix Hanger and Fastener.

The Phenix Mfg. Company, Milwaukee, Wis., have brought out the devices illustrated in Figs. 6 and 7 for



The Phenix Hanger and Fastener.—Fig. 6. —Right or Left Hand Half Set, as Applied to Sash.

hanging and fastening entire window screens and storm sash. These appliances make a most effective lock, drawing the sash up firmly by the upright stiles to the window frame. Parts A and B are made of wrought steel and the fastener is made of steel wire, all in black rubber japan finish.

The Safety of Criterion Acetylene Gas Generators.

In discussing the safety assured in the use of acetylene gas as compared with kerosene oil, electricity or common gas, it is pointed out that the chance of danger from the escape of acetylene gas at the burner is practically unworthy of serious consideration owing to the peculiarly pungent odor which is characteristic of acetylene, and which will cause its presence to be detected long before a sufficient quantity could escape to cause trouble. The only opportunity for danger lies with the generator employed, and this can be eliminated if one is mindful to select the machine which possesses the element of safety in the highest degree. In this connection it is of interest to note that the Criterion acetylene gas generator manufactured by J. B. Colt & Co., New York City, has received the written approval of the various Boards of Fire Insurance Underwriters which control every section of the United States, and that it has also been indorsed by the United States Government. Much valuable information regarding acetylene gas in

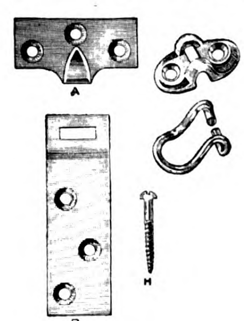


Fig. 7.—Right Hand Half Set.

general and the Criterion generators and accessories may be gleaned from a recent catalogue issued by J. B. Colt & Co., Department 1, New York City, a copy of which will be sent free on application to the address given.

The Dandy Screw Driver.

The Star Brass Works, Kalamazoo, Mich., are putting on the market the Dandy screw driver, herewith illustrated, Fig. 8. The screw driver embraces two sizes in one tool, the handle being constructed in an ingenious manner, so as not to split or become

Novelties.—Fig. 8 —The Dandy Screw Driver.

loose. By turning the handle at right angles with the blade the screw driver can be used in close and difficult places. The blade is made to fit the slot in a screw and does not slip out in use. It is made of cast tool steel specially tempered for driving screws. Two sizes are furnished in one screw driver to make it possible to drive almost any screw.

New No. 3 Sand Belt Machine.

A machine which has recently been designed especially for the wood working shop is the sander illustrated in Fig. 9 of the accompanying engravings. It is pointed out by the manufacturers that it will be found invaluable for sandpapering flat surfaces, and especially such irregular or framed work as may not be readily fed through the triple drum sanders. It is the latest product of the works of

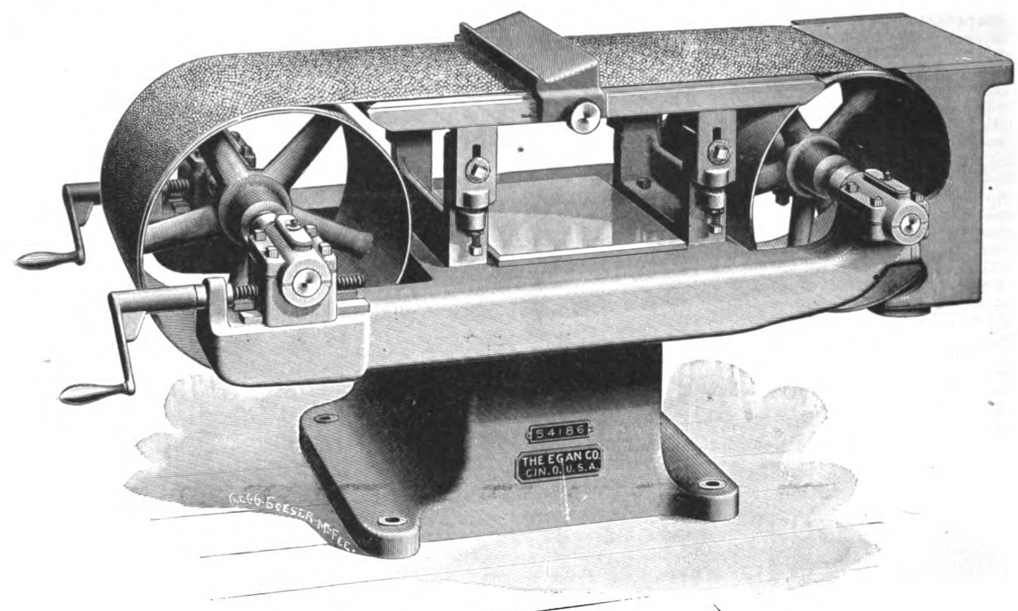


Fig. 9 - New No. 3 Sand Belt Machine.

the Egan Company, 221-241 West Front street, Cincinnati, Ohio, and in its construction features have been embodied which render its operation rapid, as the sandpaper is presented to the full surface of the piece, thus polishing it accurately in the least possible time. The belt passes over an iron table which is planed to a true surface, thus giving in the finished work the most accurate results The machine is constructed of iron and steel throughout, the main frame being cast in one piece, cored out and with a substantial base. The table is 14 inches wide with vertical adjustments to retain alignment and fitted with an adjustable fence, which may be set at any position desired. The table at the extreme end of the machine is flush with the sanding surfaces of the belt and is adjustable for lining up. The drums are of large diameter, so designed that a change of belts can be instantly made, and so adjustable that the belt may be given proper tension. A suitable hood is provided for pipe connection for removing the dust, the hood being hinged so that it may be readily swung around out of the way to facilitate the operation of changing belts. The device is known as the company's New No. 3 sand belt machine, and will be found useful for cabinet makers, desk manufacturers and in planing mills and all classes of wood working establishments.

Can You Read a Drawing?

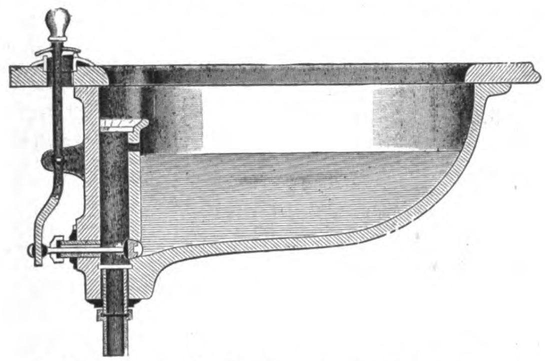
This is the title of an eight page circular just issued by the International Correspondence Schools, Scranton, Pa., and it seeks to bring before the mechanic the necessity of acquiring a knowledge of mechanical drawing if he has any desire to rise in his calling. No man, it is truly urged, can be a first class mechanic until he can read drawings correctly and make fairly accurate drawings or sketches himself. If a workman desires to rise in position and salary he should understand drawing and be able not only to know the meaning of every line and mark, but also to detect errors before incurring expense in work. This statement applies to workmen in every branch of trade. Carpenters, builders, pattern makers, plumbers, gas and steam fitters, sheet metal workers, all must in these days possess this knowledge if they are to become efficient craftsmen. To such the International Correspondence Schools offer a short course in mechanical drawing and guarantee to teach any one to make and read drawings who will follow their directions. The course comprises ten drawing plates, including 63 figures, for practice, all the mechanical details which are taken from actual shop practice. The fee for the course is $10, or $13.50 with a drawing outfit. Pupils can follow the course at home, devoting such time as they can spare, and the instructors communicate with them constantly through the mail.

Lufkin Rule Company

of Saginaw, Mich., have enlarged their quarters in New York City by taking adjoining space in the Stewart Building, which now gives them about three times the area they formerly had. When H. G. Hollis took charge of the branch in this city a few years ago the stock carried was contained in a portable wardrobe used as a cupboard, the company making in addition to a line of board measures, &c., but one tape other than their pocket style. Now they make a comprehensive line of steel, metallic and linen tapes, which are largely handled through the wholesale trade and the higher grades specified for and bought directly by the United States Government. They also make folding steel pocket rules, tinners' rules and a number of specialties for measuring and gauging logs and lumber, farriers' rules, boards for glass cutting, log and cotton calipers, &c.

The Crawford Lavatory.

The desirability of having no exposed metal parts in a lavatory and the overflow chamber so arranged as to be in full view and easily cleaned are features that are presented in the new Crawford lavatory just being put on the market by Joseph H. Young, 224 Franklin street, Boston, Mass. The bowl is made of vitreous ware, having an overflow chamber with the opening into it at the front, and the top provided with a porcelain strainer to form a soap holder. A sectional view is presented in Fig. 10, from which it may be seen that on removing the strainer at the top of the overflow chamber the inner surface may be readily cleaned, forming the basis for the claim that the lavatory is thoroughly sanitary. The bowl is emptied by a lever at the top connecting with the outlet plug, so arranged that none of the metal parts are ever in the water. The lavatory bowl is oval, 15 x 19 inches in size, and can be furnished with supply fixtures. A four-page circular can be secured on application, giving full particulars and prices.



Novelties.—The Cranford Lavatory.—Fig. 10.- Sectional View.

Wrought Iron Fire Escapes and Entrance Gates.

J. E. Bolles Iron & Wire Works of Detroit, Mich., are directing the attention of the trade to a variety of all wrought iron fire escapes, which they are making suitable for hotels, factories, public buildings, &c. In the No. 5 Michigan Standard style, shown in a small illustrated catalogue of their various goods just published, the especial features mentioned are strong balconies, usually made 36 inches in width, with a floor of 2 x 3-16 inch iron slats supported by three angle iron stringers. The railing also has a strong angle iron frame, the top rail of which, together with the brackets, are fastened securely through the wall with nut and washer on the inside, thus securing the greatest strength with a comparatively light construction. The balconies are usually made long enough to take in at least two windows. Where the wall space is not sufficient for stair ladders between the windows, a straight ladder is used, extending from the roof to within 8 feet of the ground, and located a sufficient distance from the wall so that people can descend behind the ladder with comparative safety. The No. 14 stair escape is still another variety of structure, designed more particularly for school buildings, asylums, sanitariums, &c. This concern also make a large variety of fire escapes adapted to different purposes, as well as much ornamental iron, wire and brass work, elevator cages, &c., and have equipped many prominent buildings in this country. A new design in the way of entrance gates to grounds inclosed with stone walls or iron fences has just been brought out and is shown in the catalogue referred to.

TRADE NOTES.

E. T. BARNUM. Detroit, Mich., manufacturer of ornamental iron, wire and brass work, has lately added a number of new and handsome designs in these lines, which are shown in the regular spring editions of his various catalogues, just issued. Mr. Barnum's manufactures cover builders' wire and iron work, iron and steel fencing, jail cells, bank and office railings, vases, and lawn furniture and cemetery vault doors and gates, separate catalogues relating to which are issued.

THE BERGER MFG. COMPANY of Canton, Ohio, have just issued a four-page folder, calling attention to the merits of their iron doors and shutters, one style of which is made of Nos. 18, 20 and 22 gauge corrugated iron and stiffened with angle iron frames, while another style is made of two thicknesses of wood and covered each side with beaded iron, which projects 1 inch at the top and sides of the shutter and is riveted every 3 inches. The manufacturers state that the experience of the past few years has demonstrated to a certainty that shutters and doors constructed in this manner have stood the test of extreme heat much better than solid iron. The fourth page of the folder is devoted to a diagram and directions showing how to properly measure the opening when ordering shutters or doors

THE SLAYMAKER-BARRY COMPANY of Connellsville, Pa., for whom John H. Graham & Co., 113 Chambers street, New York, are direct representatives, have issued a 1900 catalogue, known as Special Catalogue No. 27, devoted exclusively to padlocks, night latches and catches. Every type of padlock made in the United States is said to be illustrated in it, including wrought iron and wrought brass tumbler padlocks, iron, Scandinavian, cast steel and bronze padlocks, dog collar and charm, bicycle and railroad padlocks, with a line of door catches and locks and night latches. A full line of builders' hardware will be shown in a catalogue soon to be issued, rim locks being already illustrated in Catalogue No. 20

THE B. F. STURTEVANT COMPANY of Boston, Mass., have recently issued from the press a publication of 54 pages, consisting of a list of 2500 buildings and sundry steamships where the Sturtevant system of apparatus has been installed for the purpose of ventilating and heating. In referring to the list the manufacturers state that the names are the most emphatic and in fact the only witnesses that the company desire to present as evidence of the successful operation of the Sturtevant system and apparatus. In all the manufactories listed the Sturtevant system has been installed complete, while in many of the higher class buildings the Sturtevant apparatus or fans have been introduced by the designing engineer as a portion of his general scheme of ventilating and heating. The lists have therefore been divided, the company assuming full credit and responsibility only in the case of buildings equipped with the system. The company have issued elaborate special descriptive catalogues or treatises, each relating to an individual subject, as "Ventilating and Heating," "The Ventilation and Heating of School Buildings," "Lumber Drying," Mechanical Draft," and the like, copies of any of which will be sent to those sufficiently interested to make application to the address named. The typography is of the latest style of the printer's art, and the whole make up gives evidence of a great deal of care and attention to details.

J. B. COLT & CO., Department 3, of 7 West Twenty-ninth street, New York City, whose Criterion acetylene gas generators are used and indorsed by the United States Government, have recently received some substantial orders from it for acetylene searchlights for the Signal Service. This apparatus was tested by Government experts during the late Cuban war, and signaling was successfully done at a distance of 45 miles at night, far surpassing, it is said, anything heretofore used in general efficiency.

THE INTERNATIONAL CORRESPONDENCE SCHOOLS of Scranton, Pa., send us a circular cautioning the public against infringements being made on their copyrights, and giving a copy of the motion for preliminary injunction against "The United Correspondence Schools Company, F. W. Ewald, *et al.*" The International Correspondence Schools announce their intention to proceed in the above suits with all possible speed to a final determination, and in case they are successful in establishing their allegations to claim that the use of the infringing pamphlets, whether in the hands of the said schools or in the hands of students, are illegal

THE J. T. TOWSLEY MFG. COMPANY of Evans, Guest and Berlin streets, Cincinnati, Ohio, call the attention of wood workers to their new 36-inch band saw with iron tilting table, which is illustrated in their advertising space this month, and also refer to the modern wood working machinery and glue-room equipments which they are prepared to furnish. They state that they will send free a handsome catalogue illustrating a new line of machines representing the most advanced and rapid methods of working wood, and in sending for a copy of this catalogue the company request that the applicant mention *Carpentry and Building.*

WE ARE INDEBTED to P. & F. Corbin of New Britain, Conn., for a handsomely printed little pamphlet illustrative of the Corbin door lock, which is referred to as being constructed on an entirely new principle. In fact the lock is said to be so radica a departure from all the ideas of lock building heretofore in vogue that it at once rivets the attention of those who see it, while its simplicity, strength, action and design command instant favor. The lock is easy to attach and the little pamphlet which has been issued clearly illustrates the construction, while it also shows the method of applying it to a door. Some of the engravings are direct reproductions from photographs, which add materially to the value of the publication. Several pages at the close are devoted to the ball bearing pin tumbler locking cylinder which is used in the Corbin lock.

THE SAWYER TOOL COMPANY of Fitchburgh, Mass., recommend building mechanics to use the Samson screw driver which they manufacture, and which is illustrated in their advertising space in another part of this issue. This tool possesses features of interest to carpenters and others having occasion to use a screw driver, and a practical demonstration is likely to convince the most skeptical of its merits.

WE HAVE RECEIVED from the Armour Institute of Technology, Chicago, Ill., a copy of the year book for 1898-1899, together with announcements for 1899-1900. It is a volume of 90 pages and presents in comprehensive form a mass of information relative to the history, organization and government, as well as the courses of instruction in the various branches which are taught. The course in architecture covers a period of four years and resembles in all essential particulars the architectural courses of the higher professional schools. Some general information relative to the buildings and equipment, expenses, scholarships, degrees, &c., constitute one of the features of the volume.

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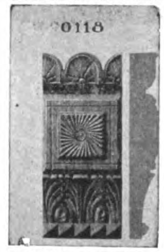

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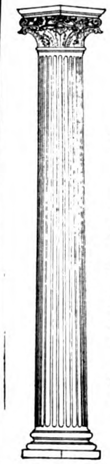

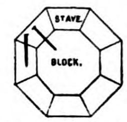

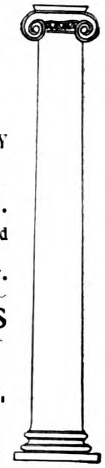

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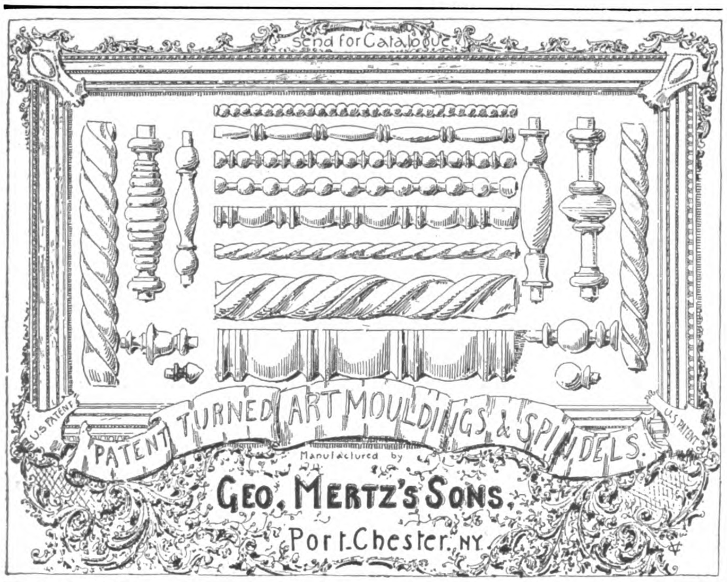

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A complete guide to the art of outdoor and indoor painting: 38 illustrations 183 pages, 5 x 7½ inches: cloth.....$1

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DAVID WILLIAMS CO., Publishers,

232-238 William St., New York.

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The Builders' Exchange

Vol. XXI. No. 9. New York, September 1899. Ten Cents a Copy. One Dollar a Year

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Star Encaustic Tile Co.

Tools.
Gage Tool Co.
Hammacher, Schlemmer & Co.
Jennings, C. E. Co.
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Mayhew, H. H. Co.
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North Bros. Mfg. Co.
Sawyer Tool Co.
Smith, Otis A.
Stanley Rule & Level Co.
Starrett, L. S. Co.
Strelinger, C. A. Co.
Walter's Sons, Wm. P.

Turn'd, Mold'd, Carv'd Wk.
Grand Rapids Carved Moulding Co.
Mertz's, Geo. Sons
Standard Wood Turning Co.
Waddell Mfg. Co.

Varnish.
Devoe, F. W. & Co.

Ventilating Attachment
Ormsby, E. A.

Ventilators.
Doerge, H.
Globe Ventilator Co.

Vises, Woodworkers.
Toles, W. C. & Co.

Wax, Floor.
Butcher Polish Co.

Weather Strips.
Church, E. I. & Co.

Weather Vanes.
Jones, Thos. W.
Mott, J. L. Iron Works.

Window Fasteners.
Stanley Works.

Wood Ornaments.
Waddell Mfg. Co.

Wood Working Machinery.
American Wood Working Machine Co.
Barnes Tool Co.
Barnes, W. F. & John.
Cordesman, Meyer & Co.
Crescent Machine Co.
Fay, J. A. & Co.
Fox Machine Co
Marston, J. M. & Co.
Park, L. F.
Seneca Falls Mfg. Co.
Seymour & Whitlock.
Towsley, J. T. Mfg. Co.
Yerkes & Finan Wood Working Mch. Co.
Witherby, Rugg & Richardson.

Woods, Ornamental.
Albro, E. D. & Co.

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CARPENTRY AND BUILDING

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DAVID WILLIAMS COMPANY, - - PUBLISHERS AND PROPRIETORS
232-238 WILLIAM STREET, NEW YORK.

SEPTEMBER, 1899.

The Scarcity of Workingmen.

The unusual activity which prevails in nearly every branch of industry is causing a scarcity of workmen in many lines. We have lately referred to the difficulty in several locations of obtaining carpenters, owing to the fact that during the recent years of business depression they had engaged in other pursuits, where they were content to remain, as the work was continuous the year round. It is not alone the building industry, however, that is affected in this way, as many estrblishments are unable to get out their full product because of a shortage of men. The scarcity, too, is not confined to skilled workmen, but common laborers are also in extremely short supply, this being more especially the case in the Central West. The lack of skilled labor has been attributed by employers to the efforts of trades unions to cut down the number of apprentices permitted in the different trades. But this view is upset by the fact that the shortage of men is not confined to any class, but appears to be equally felt among those who require no long training. In some sections the scarcity of labor is caused by the activity in railroad work. More men, by many times over, are being employed this year on all kinds of construction work for railroad companies than in any other year since the activity in new construction in the eighties. This year the work being done is not so largely new construction, although more railroad building is going on than for several years, but it consists of track elevation in cities, extensions of existing lines, the laying of additional double tracks, the building of new bridges, the improvement of terminal facilities and miscellaneous work in the direction of improvements, all of which calls for the employment of large bodies of common laborers. But the activity in railroad work is only a part of the general activity in business. All branches are pushing to the utmost limit. Everywhere we see the same pressure either in production for present necessities or preparations for the future. All of this activity causes greater pressure for labor. So seriously is the pressure now felt in some lines that if it continues it is likely to create a demand for the relaxation of the immigration laws.

Pittsburgh's New Empire Building.

A building which will prove when completed a handsome addition to the lengthening list of Pittsburgh's substantial business structures is now under way at the corner of Liberty avenue and Fifth street, in the city named. It covers an area 67 x 112 feet, will be 12 stories in hight and will be as nearly fire proof as possible. Granite and red sandstone will be used for the first two stories, while the remainder will be of Pompeiian brick. The plans, which were prepared by Architects Topp & Craig, call for a steel frame building estimated to cost something in excess of $300,000. The first floor will be used as stores, while the others will be divided into about 200 large, well lighted offices. There will be lavatories on every floor and one large general lavatory on the second, which will also contain well appointed baths. In the basement will be located a still and refrigerating plant. A new vacuum system of heating will be introduced, exhaust steam being employed for the purpose. There will be an individual heat regulator in each room, so that it will be possible for the occupant to regulate the heat of his office regardless of the rest of the building. The main entrance will be in the center of the Liberty avenue front, and the main corridors will be covered with interlocking rubber tiles, while the walls and ceiling will be finished in marble. The finish of the wood work throughout the building will be in old English oak. There will be three elevators, the inclosures around which are to be executed after a special design in statuary bronze, the details of this work and all other details throughout the building being done in the Empire style of architecture. The building will be known as the Empire, and it is from the style of the interior work that the structure takes its name. It is expected that the building will be ready for occupancy about the first of next April.

Educational Work of the Y. M. C. A.

The annual report, just issued, of the educational work carried on by means of evening classes by the Young Men's Christian Associations of North America, and covering the year ending June 30, 1899, shows results of a most gratifying and satisfactory nature. Over 25,000 young men attended the evening classes conducted in 350 associations. These students comprised office men, clerks, mechanics and general tradesmen. From a classified enrollment of about 18,000 pupils the total number of mechanics and tradesmen was 7826, while there were 7550 clerks and office men. These figures show the appreciation in which the definite educational facilities afforded by the associations are held by the class of young men they are designed to benefit. The courses of study in the association schools hitherto have been in arithmetic, bookkeeping, business law, civics, mechanical, architectural and free hand drawing, electricity, algebra, geometry, physiology, English and other fundamental subjects. For the 1899-1900 term, however, the following subjects have been added: German, Spanish, stenography, typewriting, Anglo-American history and politics and social economics. The standard of these courses is maintained by rigid examinations, held annually and simultaneously, under the direction of the International Committee, by a board of examiners which includes some of the foremost educators of the country. Certificates are awarded to those pupils who successfully pass the examinations, and these certificates are recognized by more than 100 colleges and universities as a sufficient qualification for the holder to enter these institutions without further examination. Last year 100 associations participated in the international examinations and over 950 certificates were granted. The utility of the educational work carried on by the Y. M. C. A. along these lines cannot be overestimated. At an almost nominal expense large numbers of young men, already engaged in business or handicrafts by day, are thus enabled to secure the special education needed to fit them to occupy better positions in their business life and to fill them more acceptably.

First Example of "Skeleton" Construction.

An interesting ceremony commemorating the building of the first example of skeleton construction in this city occurred on Wednesday, August 9, when the Society of Architectural Iron Manufacturers placed a bronze tablet on the front wall at the left of the entrance of the Tower Building, No. 50 Broadway. The tablet was unveiled by John Cooper, president of the society, in the presence of other officers of the organization, the architect of the building, Bradford Lee Gilbert, and interested members of the building trades. The tablet bears the following inscription:

> This tablet, placed in 1899, by the Society of Architectural Iron Manufacturers of New York, commemorates the erection, during 1888-9 in this, the Tower Building, of the earliest example of the skeleton construction, in which the entire weight of the walls and floors is borne and transmitted to the foundation by a framework of metallic posts and beams.

The era of high buildings began about 1870, these structures being made serviceable by reason of the rapid development of the elevator, which up to that time had not to any large extent been employed for passenger service. For a long time 10 stories appeared to be the limit of hight to which it was advantageous to go, but the new method of construction opened up possibilities which gave the profession plenty of food for thought. The new method was first called the "steel cage" and later "skeleton construction," which is now the term commonly employed in connection with the lofty buildings which are to be found in the larger cities of the country.

The essential features of a skeleton building had been often used; but attention was drawn to the fact that in the Building Department in New York there were filed on April 17, 1888, by Bradford L. Gilbert, architect, plans for an eleven story building on lot No. 50 Broadway, the building to be 129 feet in hight, from the sidewalk to the main roof, with a frontage of 21 feet 6 inches and a depth in the narrow portion of about 108 feet. The side walls were to be constructed in a peculiar manner. Instead of solid brick walls, vertical lines of cast iron columns were placed at varying distances up to about 18 feet apart, having at the foot of each line a cast iron shoe resting on the foundation walls at the basement floor level. The wind pressure was provided for by diagonal bracing carried across between each of the vertical columns, and so constructed as to transfer to the foundations a possible 116 tons of wind pressure when the wind blows at a hurricane rate of, say, 70 miles an hour. As the building law did not provide for any such composite construction, the application of the architect for a permit to build was referred to the Board of Examiners in the Building Department.

Soon after the Tower Building was authorized and built, or on September 11, 1889, the plans were filed in the Building Department by J. C. Cady & Co. for a 10 story skeleton structure, to be erected on a lot 24 feet 2 inches front by 74 feet 4 inches deep, No. 25 Pine street. In this building Z-bar columns were used. Plans for the third skeleton building were filed January 2, 1890, by Youngs & Cable, this being known as the Columbia building, No. 29 Broadway, and is twelve stories in hight. The columns are of steel, and the curtain walls are 12 inches in thickness. Up to the time of its completion this building was the most prominent and successful of the skeleton structures erected in New York. The drawings for the skeleton were prepared by P. Minturn Smith.

Other skeleton buildings of greater area and greater hight followed, among which may be mentioned the Manhattan Life, 17 stories, with a hight of 242 feet to the main roof, above which a dome and tower rises 108 feet more; the American Surety, 21 stories, 312 feet high; the Park Row Syndicate Building, 26 stories to main roof and a total of 386 feet in hight to top of towers, and the Empire Building, southwest corner of Broadway and Morris street, 21 stories and about 300 feet in hight.

Madrid and Its Architecture.

The great distinctive feature of Madrid which will at once strike the architect who visits this town is what we may term the wonderful liberty of architecture enjoyed in the capital of Spain, says an English exchange. In this Madrid affords a favorable contrast with Paris. At first the traveler is impressed with the grandeur of Paris, the magnificence of its boulevards; but gradually it dawns upon him that these splendid boulevards are all alike; that the houses are all built after the same model; that there is hardly any variety and play for the imagination. The Boulevard St. Germain is almost identical with the Boulevard Magenta, its senior by a few years. Whether situated in the north, the south, the east or the fashionable west, all the new boulevards of Paris are appallingly alike, one to the other. At last a natural reaction sets in, and the visitor, in despair, seeks to relieve his eyes in the narrow streets of the Isle St. Louis, attempts to unearth some remnants of the historical Quartier Latin, or else loses himself hopelessly in the marais. At Madrid there is no necessity for any such violent measures and the visitor need not seek out eccentric quarters of the town to find a little variety. The fashionable districts, such as Prado, consist—apart from the trees, the fountains, the carriage drives, &c., which constitute the promenade—of a succession of what the Spaniards delight in describing as palaces. In England we should, more modestly, term these structures large houses, or, at best, mansions; but in Spain the grandest term the language can afford is always preferred. Nevertheless, it must be admitted that some of these mansions are very beautiful and grandiose in their proportions. The chief charm, however, rests in the variety of designs and structure. If a rich man be fortunate enough to secure a plot of ground, he will combine with his architect some special plan particularly suited to his fancy and convenience, maintaining at the same time a strict watch on his neighbors, so that his house should not be out of keeping with theirs.

Dining Room Finish.

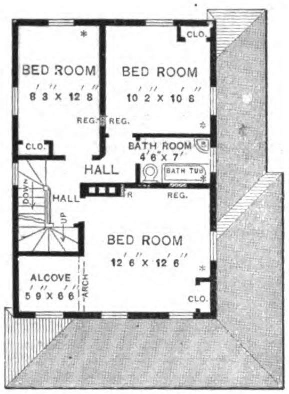
The walls of a Washington dining room are paneled their entire hight with mahogany, the panels being small and square, perfectly flat, with a simple molding surrounding them. The wood has been washed with weak lime water to darken its tone and then has been finished with a dull gloss. The room is lighted from a skylight, which is centered over the table, and is filled with a fantastic tracery in opalescent glass, whose radiance is cast upon the white cloth and the glittering glass and china, lighting it up with gorgeous coloring. In the vertical space under the skylight is a series of panels, filled with a frieze of classic figures in low relief tinted to give the effect of old ivory. The ceiling round the skylight is paneled like the side walls.

SOME samples of cement used in the ancient water conduits about Ephesus and Smyrna were recently subjected to chemical analysis with interesting results. While the different samples were from works that dated from several centuries before Christ to 300 years after, it was found that the composition of all was similar. The chief constituent was carbonate of lime, but mixed with it was from 2 to 8 per cent. of organic material. This was ascertained to consist of a mixture of fatty acids, and it is believed that the cement was the kind which Pliny and Vitruvius mention in their works. Experiments made lead to the belief that a mixture of two-thirds air-slaked lime and one-third olive oil formed the composition of these ancient cements.

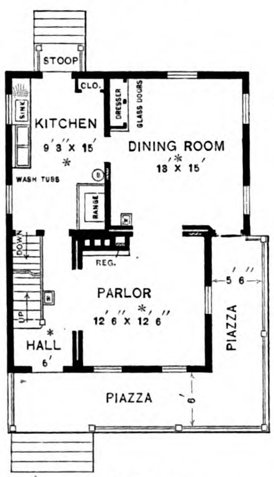
A VERY large building, composed principally of iron, wood and glass, is to be erected at Exmouth, Eng., for horticultural purposes. The structure will be over ¼ mile in length, and of an ornamental character, with dome in center, nearly 80 feet high, with towers at intervals about 45 feet high. The width of the building in the center will be 44 feet and at the narrowest part 26 feet, and it will be heated with hot water.

COTTAGE AT OAK CREST, BROOKLYN, N. Y.

THE subject of our half-tone supplemental plate this month is a modern house of low cost recently completed at Oak Crest, one of the many attractive suburbs of Brooklyn, N. Y. The house is built on a plot of ground 40 x 100 feet, which allows for a driveway on one side. It has on the main floor parlor, dining room and kitchen, with direct communication between the latter and the front hall. In the dining room, which is separated from the parlor by sliding doors, is a dresser with double glass doors for china, &c. A door diagonally opposite the dresser gives access to the piazza, which extends across the front and half way along one side of the house. The kitchen is fitted with range and boiler, washtubs and a steel enameled sink. On the second floor are three sleeping rooms, the front one having an alcove opening under an arch. There is also a bathroom



Second Floor.



First Floor.

Scale, 1-16 Inch to the Foot.

fitted with copper bathtub, wash basin and closet, all plumbing being of the open type.

From the architect's specifications we learn that the house as constructed has plates and sills 4 x 6 inches, corner posts 4 x 6 inches, studs 2 x 4 inches, placed 16 inches on centers; rafters 2 x 6 inches, placed 20 inches on centers, and floor joist 2 x 10 inches.

Under the whole house is a brick cellar with cemented bottom and containing all of the usual fixtures, coal bins, hot air furnace, &c. The entire frame is built of spruce lumber, the exterior walls being sheathed with the boards laid diagonally, on which rests building paper, this in turn being covered with siding, as shown, while the gables are shingled. The whole of the main roof is covered with strips and best quality random width cedar shingles dipped in stains and laid 4½ inches to the weather.

The interior is trimmed out in cypress, with moldings complete, except the stair rails, newels and balusters, which are made of oak. The whole of the interior is filled with one coat of liquid wood filler light, covered with two good coats of best light varnish, and left a perfect and smooth job at completion. The heating is by a No. 40 Thatcher furnace, made by the Thatcher Furnace Company of New York City. The position of the registers is indicated on the floor plans. The house was designed by Stanley A. Dennis, architect, of 150 Nassau street, New York City, and was built complete for $2000 by Abram C. Shelley, contractor, of Brooklyn, N. Y.

Location of Hot Air Registers.

What is the best position in a room or hall to place a hot air register? The general practice among hot air

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

Cottage at Oak Crest, Brooklyn, N. Y—Stanley A. Dennis, Architect, New York City.

heating experts is to place these registers in or near the warmest parts of the room, or close to the inner walls, experience having taught them that the best results in warming the rooms can be attained by this practice. They also avoid running hot air riser pipes to upper rooms in outside walls, preferring inside for this purpose. There are reasons for this practice that will commend it to heating men. Furnaces are generally placed near the center of their work, so that the heat can be delivered into the rooms to be warmed with as little loss as possible by friction and condensation in the hot air pipes. This practice places the registers near the inside walls.

Some heating men place registers near windows, giving as their reasons for so doing that by discharging the warm air in the coldest part of the room and warming it, the inner part of the room must necessarily be kept warm. By doing this they lose sight of the fact that by discharging the warm air under a window the air is cooled quickly, creating a volume of descending cold air in and about the windows, making it very difficult to keep the room heated at an agreeable temperature. This is avoided by discharging the heated air near the inner walls of the rooms. The ascending air, coming in contact with these walls, which are at a much higher temperature than the outside walls, is not subjected to so rapid a cooling process, consequently it circulates in the room at a more even temperature, and, when cooled by contact with the outside walls, falls with less velocity, flowing through channels provided for ventilation, or by leakage to the outside air.

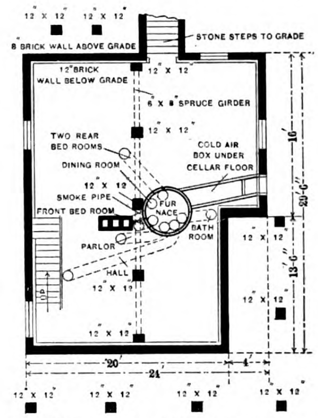
This short review of hot air heating practice, says a writer in an exchange, is suggested after looking over a set of plans lately published by a steam and hot water heating expert, of a large residence, in which is laid out a system of indirect heating by steam, no direct radiators being used in the building. With three exceptions, all the registers on the first floor are placed close to the outside walls and near or under windows, the exceptions being in halls where there are no outside walls. The hot air risers to the second floor are run up in outside walls, with two exceptions, and these are inside, for the reason that they could not be placed in an outside wall.

I can understand the desirability of placing direct radiators against outside walls or under windows—the proper position for them—but why should the hot air from indirect radiators be delivered near or under a window? If it is bad practice to do so with hot air from a furnace, it must also be bad practice from an indirect steam or hot water radiator, and, when installed in this manner the radiator should be considerably enlarged over what would be required were registers placed in the warmest sides of the rooms, in order to make up for the great loss by rapid cooling of the air coming so quickly in contact with the cold surfaces.

Running the hot air stacks to upper floors in outside walls is also an error, even if they are wrapped up with non-conducting material. All outside walls are cold, and extremely cold, at the time when the most heat is required. The wrapping placed on these pipes will, to a certain extent, repel the cold. But how much better to place them in a wall that is not exposed to the cold, when the air can be conveyed to the rooms to be heated with the least loss of temperature possible. Then there is this advantage to be gained: the hot air is delivered in the room at the inner wall, considered by nearly all heating experts the position to gain the best results.

The plan of the indirect system referred to shows a defect in that it is spread all around the outer wall in the basement, not only being contrary to best heating practice to derive the best results, but spoiling the basement by filling it up with an endless display of indirect stacks, cold air ducts and pipes, when, if the principle observed by furnace heating men was carried out and the plant concentrated, and the inside walls used to convey the heated air to the rooms above, a more efficient and compact heating system would have been attained.

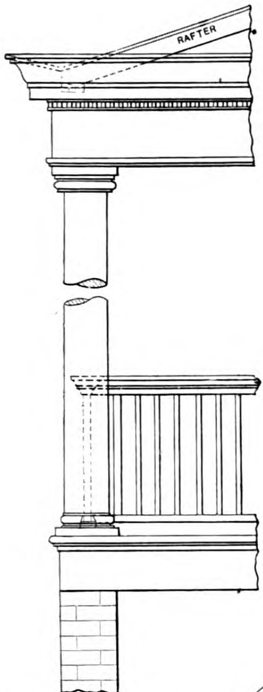
This is the way it looks to a furnace man who cannot see why there should be any different practice in placing hot air registers when the air is heated by coming in contact with steam radiators from what is the usual practice of the furnace hot air expert.



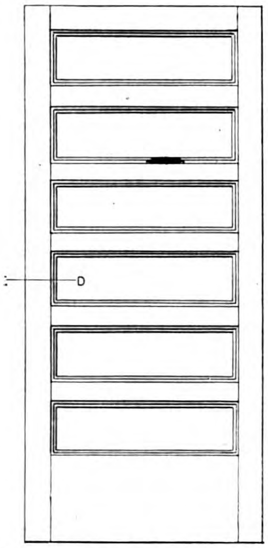
Foundation.—Scale, 1-16 Inch to the Foot.


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

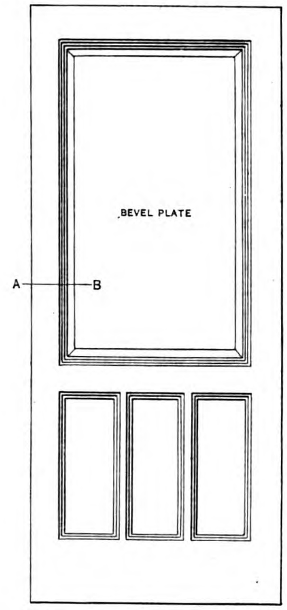
Cottage at Oak Crest, Brooklyn, N. Y.



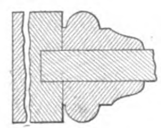
Details of Porch Corni:': Column and Balustrade. —Scale, ⅜ Inch to the Foot.



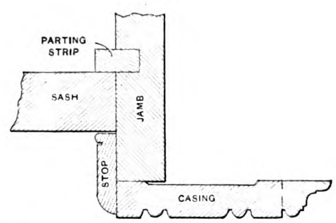
Elevation of Inside Doors.—Scale, ½ Inch to the Foot.



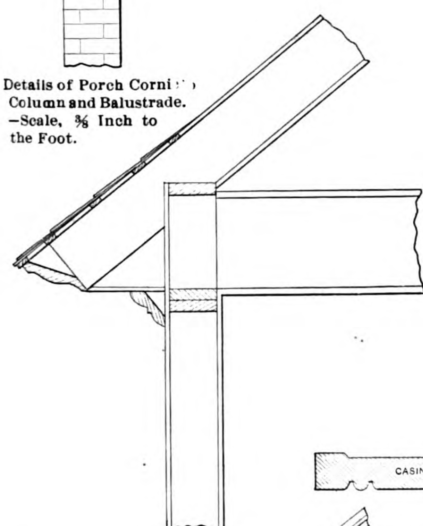
Elevation of Ou'side Door.—Scale, ½ Inch to the Foot.



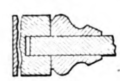
Section of Front Door on Line A B.



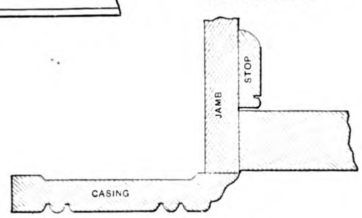
Detail of Window Trim.—Scale, 3 Inches to the Foot.



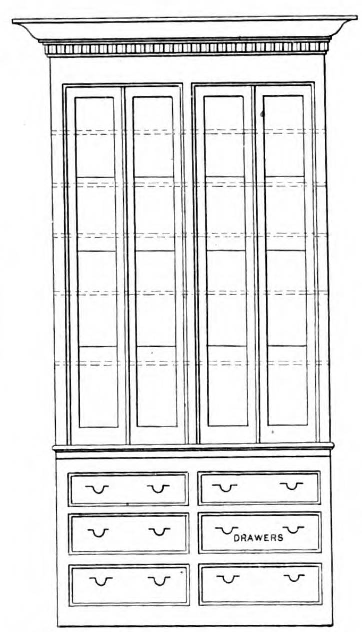
Detail of Main Cornice.—Scale, ¾ Inch to the Foot.



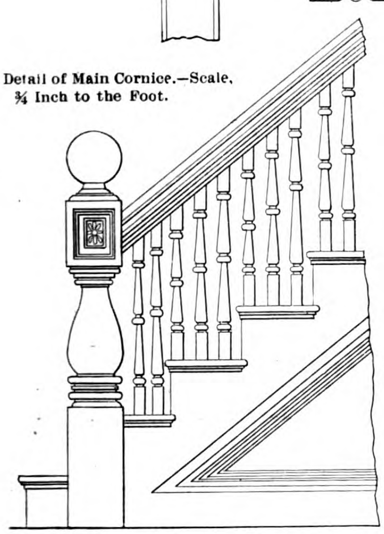
Section of Inside Door on Line E D.



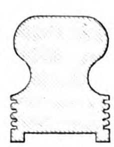
Detail of Door Trim.



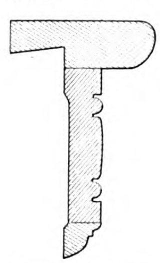
Elevation of Dresser in Dining Room.—Scale, ⅜ Inch to the Foot.



Detail of Main Stairs.—Scale, ½ Inch to the Foot



Section of Hand Rail



Window Stool and Apron.

Base.

Scale, 3 Inches to the Foot.

Miscellaneous Constructive Details of Cottage at Oak Crest, Brooklyn, N. Y.

Piling for Foundations.

There seems to be a tendency on the part of some of Chicago's architectural engineers to abandon the steel and concrete "raft" system of foundations in favor of piling driven to hard pan. Two recent examples of this tendency toward securing solid, non-compressible bearings for large structures are the Methodist and Cable buildings, for the latter of which piles are being driven. The foundations of the Methodist Building, for which H. W. Wheelock is architect, are unique, and promise to be very satisfactory. They consist of circular concrete pillars, 80 feet deep and 4 feet in diameter, with expanded bases 8 feet in diameter, in a very dense hard pan. The excavation was accomplished with the help of sectional caissons, no supports being required in the hard pan. The surface friction of the pillars, in addition to their solid bearing, will, it is expected, preclude the slightest settlement.

The use of concrete in this manner as a substitute for wooden piling would seem to be especially advantageous in all similar cases where adjoining tall buildings might be jarred or caused to settle by pile driving. Moreover, notwithstanding the well established durability of wood under water, it does not seem as fit a support for a steel and masonry structure as does concrete. The building on piles stands on wooden stilts; the other literally is founded upon a rock.

Polishing Marble.

Polishing includes five operations. Smoothing the roughness left on the surface is done by rubbing the marble with a piece of moist sandstone. For moldings either wooden or iron mullers are used, crushed and wet sandstone, or sand, more or less fine, according to the degree of polish required, being thrown under them. The second process is continued rubbing with pieces of pottery without enamel, which have only been baked once, also wet. If a brilliant polish is required Gothland stone instead of pottery is used, and potters' clay or fullers' earth is placed beneath the muller. This operation, says the *Stonemason*, is performed upon granites and porphyry with emery and a lead muller, the upper part of which is incrusted with the mixture until reduced by friction to clay or impalpable powder. As the polish depends almost entirely upon these two operations, care must be taken that they are performed with a regular and steady movement.

When the marble has received the first polish, the flaws, cavities and soft spots are sought out and filled with mastic of a suitable color. This mastic is usually composed of a mixture of yellow wax, resin and burgundy pitch, mixed with a little sulphur and plaster passed through a fine sieve, which gives it the consistency of a thick paste; to color this paste to a tone analogous to the ground tints or natural cement of the material upon which it is placed, lampblack and rouge, with a little of the prevailing color of the material, are added.

For green and red marbles this mastic is sometimes made of gum lac, mixed with Spanish sealing wax of the color of the marble. It is applied with pincers, and these parts are polished with the rest. Sometimes crushed fragments of the marble worked are introduced into the cement, but for fine marbles the same colors are employed which are used in painting, and which will produce the same tone as the ground; the gum lac is added to give it body and brilliancy.

The third operation in polishing consists in rubbing again with a hard pumice stone, under which water is being constantly poured, unmixed with sand. For the fourth process, called softening the ground, lead filings are mixed with the emery mud produced by the polishing of mirrors, or the working of precious stones, and the marble is rubbed by a compact linen cushion well saturated with this mixture; rouge is also used for this polish. For some outside works, and for hearths and paving tiles, marble workers confine themselves to this polish. When the marbles have holes or grains a lead muller is substituted for the linen cushion.

In order to give a perfect brilliancy to the polish the gloss is applied. Well wash the prepared surfaces and leave them until perfectly dry, then take a linen cushion, moistened only with water, and a little powder of calcined tin of the first quality. After rubbing with this for some time, take another cushion of dry rags, rub with it lightly, brush away any foreign substance which might scratch the marble, and a perfect polish will be obtained. A little alum mixed with the water used penetrates the pores of the marble and gives it a speedier polish. This polish spots very easily, and is soon tarnished and destroyed by dampness. It is necessary when purchasing articles of polished marble to subject them to the test of water; if there is too much alum the marble absorbs the water and a whitish spot is left.

Making Bathrooms Attractive.

No matter how small a bathroom may be it can always be made fresh, dainty and comfortable, if properly fitted up with the many labor saving appliances that are now obtainable. It is well to have the walls and floor match if possible. Should tiles or hardwood be too expensive, there are many attractive designs in tile paper that look well on the walls, and by treating the floor with linoleum in a corresponding design a charming effect is produced. Many of the tubs are of porcelain, but if this is not the case they can be made to resemble porcelain by painting them white. In front of a tub nothing is prettier than the fresh looking white bath mat. Sponges can be kept sweet and clean by placing them in open racks suspended over the tub. These racks come in nickel and are most desirable, but those made of the twisted wire answer the purpose exactly as well and are less expensive. They are pretty when enameled to match the tub or the prevailing tone of the room.

Two or three shelves placed conveniently near at hand are not too many, and when enameled with white they give an air of freshness to the room. The china mugs, toothbrush holders, soap dishes, &c., are more dainty than those of silver and much easier to keep clean. Of course there is almost an unlimited number of bathroom conveniences, says a writer in the *Commercial Record*, but with a few dollars and a small outlay of thought bathrooms can be made much more attractive and convenient than they are generally.

The Building Trades in England.

The Library Committee of the Liverpool Corporation have recently issued a report which well exemplifies the condition of the building trade in England. From it there would seem to be an abundance of work in the country, but the workmen are not disposed to co-operate in clearing it off. The Liverpool committee, says the *Architect*, were compelled to announce that the lower portion of the new central technical institute was not likely to be completed at the time which was arranged. The explanation offered was that the builders were compelled to wait a long time for steel girders, and the delivery of a steel bridge had not yet been made. Another cause was the scarcity of stone masons. There were, at the time the report was made, only 25 masons working on the building, and there ought to be about 80. The difficulty in getting the requisite number of masons arose from the extraordinary prosperity of the building trade, and the fact that masons could get plenty of work in soft stone, which they preferred to the hard stone which was to be used in the erection of the new institute. Similar delays have occurred in other towns, and they appear to show that in spite of conciliation boards, conferences, agreements, the workmen continue to be masters of the situation, and that an undercurrent of opposition to the contract system exists.

FRAME COTTAGE ERECTED FOR J. C. KOOGLES, AT OAK CREST, BROOKLYN, N. Y.

STANLEY A. DENNIS, ARCHITECT.

MAKING WOOD PATTERNS.—V.

BY CHARLES J. WOODSEND.

IN this issue we take up the consideration of the pattern for a hand wheel, Fig. 39, which is not restricted in any way as regards size. The pattern can very well be made of white pine, but if there are to be many castings taken off it is better to make it from black walnut, mahogany or cherry, as these woods better stand rough usage than white pine. In any case it will be necessary to build up the pattern, because if it were made from a solid block there might possibly be a warped pattern as the result—a thing that would not be at all desirable.

In the first place lay down a plan and cross section of the pattern full size and by the shrinkage rule. It is not necessary to show the core print E, Fig. 40, upon the drawing. After the drawings are completed the first thing to be done is to prepare the web, Fig. 40, which, in its first stages, is a piece of thin wood, a little larger square than the outside diameter of the wheel taken from the drawing. The thickness of it should be the same as the thickness required for the arms. Clean up this piece neatly and have both sides of the thickness perfectly parallel, so that if a pair of calipers were applied to it the gauge would be exactly the same all over.

The rim of the wheel is to be built up in segments one of the segments; plane one side, so as to fit upon the web exactly, and joint the two ends. It is not absolutely necessary that the line of the joints of the segments should strike the center exactly if they were continued. If one has a trimmer in the shop, the ends can be cut with that, but if not the shooting board is the better way to make them. Lay the segment upon the higher part of the board with the side against the stop and the end projecting slightly over the lower part of the board; hold the segment with the left hand and use the plane with the right, working from you. Have the plane set fine and sharp. After one end is jointed turn the segment over and end for end. By thus reversing the vertical part of the joint will fit every time, even if the bit of the plane is not perfectly square across.

After the first segment is planed and jointed place it upon the web, so as to cross the grain as much as possible and secure it in place with two hand screws, or if these are not available the piece may be tacked down with a couple of wire nails, leaving the heads projecting, so that they may easily be withdrawn.

Now fit the second one. Plane the bottom, side and fit the butt joint, so that the side will range with the pencil line drawn upon the web. Tack in place or secure with hand screws, repeating the process until the six pieces are in place. When this operation is completed remove each piece, one at a time; glue and replace. The ends, as well as the bottom, are to be glued, and if a little white chalk is rubbed upon the ends before the glue is put on it will not strike in to the end grain of the wood as much as it would without any chalk. The chalk must not be put on too thick—just enough to help fill the grain.

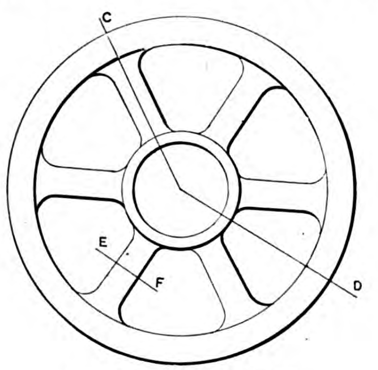


Fig. 39.—Plan of Hand Wheel.

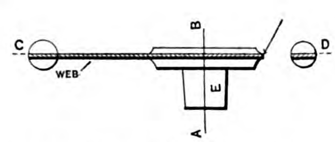


Fig. 40.—Showing Web and Core Print.

Making Wood Patterns.

upon the web, and a mold for marking out these segments must be made. This mold is constructed from any thin piece of stuff, which may be tacked solid to the bench, and upon it strike a portion of the rim of the wheel, taking the diameters from the drawing. On the last line drawn (it makes no difference which, and without altering the span of the compasses) place one leg of the compasses at any point, and with the other leg cut the line. From these two points draw a straight line to the center, which will give the lines for the joints. Six of the segments exactly the same size as the mold will just make the rim of the wheel upon one side of the web.

In sawing out the mold it is necessary to allow for turning up, and if the segments vary a little in their lengths there is no objection; so saw the mold out, leaving a full 1-16 inch all around from the lines, which will be enough for our purpose. In marking the segments let the grain of the wood run lengthwise from end to end. For a small rimmed wheel, such as these hand wheels usually are, one course of segments on each side of the web will be sufficient.

After the segments are all sawn out tack the web upon a piece of board a little larger than the web itself. This board should be perfectly straight and out of wind upon the side on which the web is tacked. The nails may be driven through where the openings will come. Next find the center, and with a pair of compasses having a pencil in one leg strike a circle upon the web the same size as the outer diameter of the mold. Now take

The next will be the small piece to form the hub, which may be in one piece, placed with the grain running crossways to the web. In nailing these pieces after gluing, if there are not any screws available, the nails should be driven through small pieces of wood before being driven through the segments, &c. The nails can then be driven home and will hold the work better. After the glue is dry the small blocks may be split and the nails drawn out. after which the pattern can be removed from the board, and the other side staved up, so as to complete this part of the work. After this is done saw the web to the same circle as the segments and then preparations must be made for putting it into the lathe for turning.

Every pattern maker, of necessity, must be a turner. A pattern maker's lathe should have the cones reversed to those of the usual wood turning lathe. It is very seldom they are so, but there are many reasons why they should be. These reasons, however, will not finish our pattern. The author takes it for granted that the operator has access to a lathe having a face plate. This being the case, take a piece of white pine, any thickness, and not quite as large as the inside diameter of the segments of the pattern and saw this piece round. Then secure it upon the face plate of the lathe, taking care that the screws do not come through. Now this piece of wood upon the face plate of the lathe is by pattern makers called "chuck," and the operation of putting a pattern upon the chuck is called "chucking the pattern." When, as in the present case, the pattern requires to be turned upon both sides, the second operation of chucking is called "rechucking."

Those readers of these articles who are desirous of taking up pattern making as an adjunct of their trade should familiarize themselves with the technical names of things and operations as they are given, so as to use the terms intelligently. The reason for this is that the terms for the same things are radically different in many cases for the trades of a pattern maker or a joiner. Take a fillet, for instance; a joiner would call it a cove, or perhaps a scotia, neither of which would have any meaning to the foundryman. The same with mold and template. They are all patterns to a joiner, while to a pattern maker each means a distinctly separate thing.

A word now about tools for turning. Most of the tools for turning patterns can be made from flat files, by grinding out all the marks upon one side. This will be the face or top side, while the bottom side may be rubbed over the grindstone or emery wheel a few times, so as to permit it to slide easily over the tool rest. If one file is ground square across the end, and the other ground to a round end, but having the basil or bevel on the underside, they will be all the tools needed for turning up the pattern in hand. Pattern makers do all their turning by scraping, not cutting, as is usual with other wood turners, they having in most cases to work to templates, calipers and straight edges. A slip of the tool is easier made in cutting than in scraping, and a slight slip at times would mean the ruin of possibly days of work. Therefore the pattern maker takes no risk but uses the method in which there is the least danger of a mishap.

We will say now that the chuck is screwed upon the face plate. The next step is to screw the face plate upon the mandrel of the lathe; then with the round ended tool turn off the edge of the chuck. This is only done to help balance the parts in the lathe, thus keeping the work steady and also preventing any tendency upon the part of the chuck to tear away from the face plate. True up the face of the chuck to a straight edge, thus making it perfectly straight across the face. Of course it is understood to be running in the lathe. Next turn a depression in the chuck to receive the block of the hub, and sufficiently deep to allow the web of the pattern to rest snugly against the face of the chuck. This being done the pattern must be chucked. Place the pattern upon the chuck, as nearly correctly centering it as one can guess, and drive a few small wire nails through the web, in order to hold it in place. Screw the face plate upon the mandrel and revolve the lathe slowly by hand, holding the fingers or a pencil upon the rest, and noting as the pattern revolves whether it averages up correctly. If it does not run nearly true, move it until it does; then screw fast to the chuck. If all is ready start up the lathe and rough out the pattern, taking off the inequalities, so that the work runs smoothly.

There should have been some small thin templates made before this, but it is not too late to do so now. In the case we have on hand there will require to be four of these templates, and in each case one edge must rest upon the web, that being a fixed point and the correct one from which to work. By referring to Fig. 40, it will be noticed that the web is not quite in the center of the thickness of the wheel. It is this that makes the four templates necessary in the present instance; one on each side of the web for the rim of the wheel, and one on each side for the hub.

GEOMETRY FOR MASONS.

ALTHOUGH the simpler operations in preparing blocks of stone for building purposes may be performed by a careful use of the tools provided, none of the intricate forms required in the details of architectural construction can be successfully worked out or produced with certainty so as to avoid the clumsy wasting of material without application to the elementary rules of geometry. The square, the straight edge, will, indeed, enable the mason to reduce his blocks to level faces and to render these parallel or rectangular, as may be desired, but they will not enable him to strike out correct curves, to determine the alterations produced in regular or irregular figures by their transference to planes at various angles. For these, and indeed nearly all the problems he will be required to solve in working out each portion of the general designs upon the individual block, the mason must refer to the rules of practical geometry; and in proportion to his own practical acquaintance with them will he be able to apply, and, if necessary, combine them, so as to arrive at the particular solution he requires. For measuring and laying down angles, says a writer in one of our English exchanges, the mason uses a bevel, which consists simply of two legs or sticks, jointed in the manner of a 2-foot rule, but so that each leg may pass freely over or within the other, and thus form acute or obtuse angles with it. They should work rather stiffly, or have a clamp screw for fixing the bevel to any desired opening without danger of disturbance. Some bevels are furnished with an arch on which the degrees of the circle are graduated and by which any desired angle may be correctly ascertained. Besides the compasses for describing circles, the trammel is a useful instrument by which the mason describes ellipses for arches, &c. This consists of two pieces of wood fixed together at right angles to and crossing each other. These have slits cut nearly throughout their whole lengths, in which two pins or studs, attached to a separate stick or piece of wood, may be moved along. The studs are capable of adjustment in their relative positions on the piece to which they belong. A pencil or pointer at the other end of this piece will describe true ellipses, the proportion of the axes of which depends on the position of the studs. Besides the square for setting out right angles up to 2 or 3 feet in length of side, the long square or level is used in trying long lines. This is provided with a plumb bob, or weight of lead or brass, &c., suspended by a string, for indicating when the upright part of the level is vertical, and the long frame, which is fixed truly at right angles with the upright part, is consequently truly horizontal or level. This instrument is sometimes furnished with a spirit level, by which a horizontal level may be ascertained independently of the plumb bob. For testing the uprightness of the work a plumb bob is used, which consists only of the bob or weight, suspended by a string from the top of a strip of wood. This strip is of exactly parallel width throughout, and the point of suspense of the bob and the guage mark below are exactly in a line with each other, and equidistant from the edges of the strip. Particular sectional forms, to which many blocks have to be prepared, are the most readily and truly multiplied by using molds or templates. Zinc is a very suitable material from which to cut these templates. An exact correspondence in form of the surfaces which, when combined, are jointed together, and requiring to coincide, is thus secured, the only thing necessary to secure this being that the mason shall mark the outline of his template or pattern correctly upon the leveled surface of the block and direct his chisel accordingly.

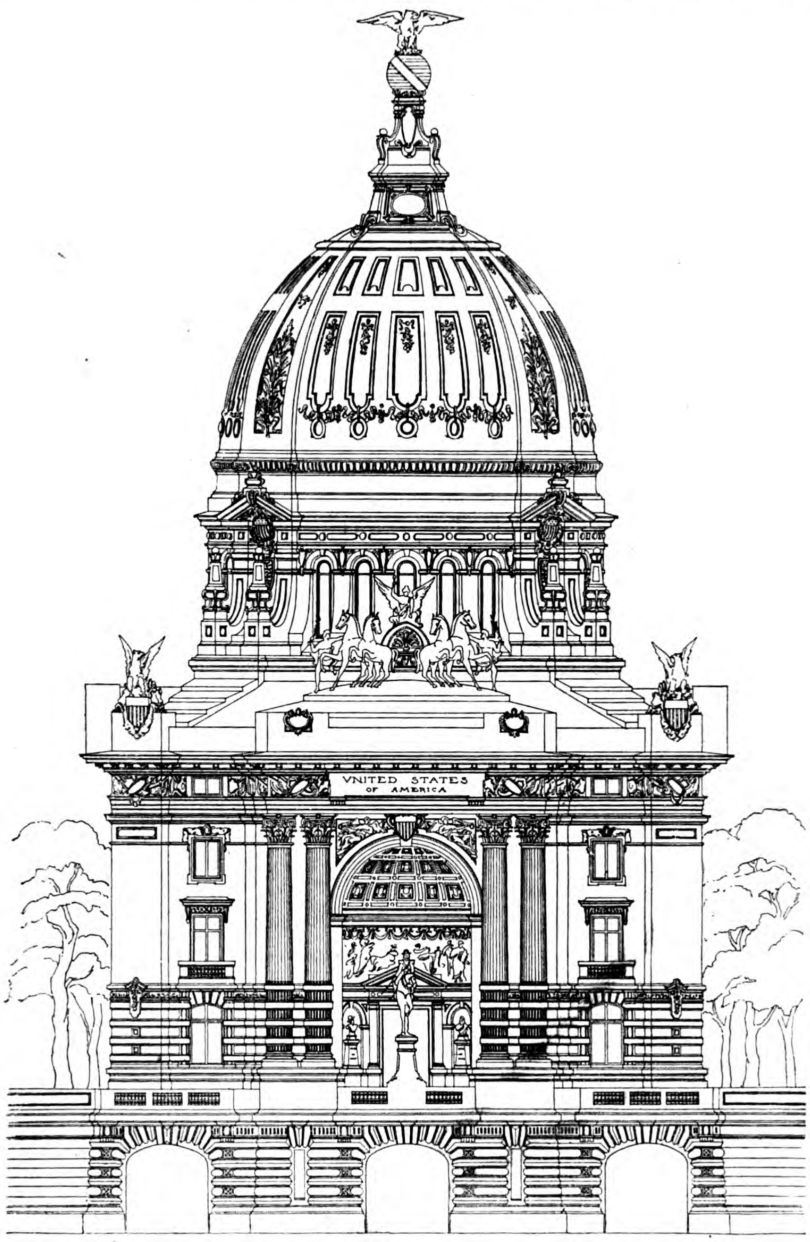
THE plans for a new ten-story factory building, to be erected at Washington and Bank streets, New York City, were recently filed with the Building Department. The building will occupy a plot 105 x 140 feet in area, will be constructed of brick and terra cotta, and according to present estimates will cost $450,000. It has been designed by Architect Cyrus L. W. Eidlitz of New York City, and will be occupied by the Western Electric Company.

The United States Pavilion at Paris.

The United States National Pavilion is situated on Quay d'Orsay, on the left bank of the Seine, among the buildings of the great Powers. Its site is one of the best locations at the exposition. The plan is square, with a large central dome and rotunda which will be used as a general meeting place of Americans during the exposition. Three sides of the rotunda have rooms 13 x 36 opening out of it. That on the left of the main entrance will be used as a lounging room for gentlemen; that on the right for ladies, and that in the middle as a parlor for both ladies and gentlemen. The second story will be given to the States, where people who so desire can rest and register their names. The third story will be reserved for the private offices of the Commissioner-General and staff. The fourth floor will be given to the States and used in a similar manner to the second. The building is 85 x 90 feet and 160 feet high from the lower level. There will be two electric American elevators.

The style of the exterior of the building is classic, and while different in design from any of the buildings at the Chicago Fair, yet the feeling there prevalent has been kept. The main entrance is under a large portico which spans the esplanade, and under this every visitor who walks to the other National buildings will be obliged to pass. In the center arch of this portico, facing the river Seine, will be French's statue of Washington, while a bust of President McKinley will occupy a niche over the door. In the front of the building on the river bank will be a boat landing which will be highly ornamental as a classic barge. All the boats of the American line which connect with the American trolley system at Vincennes will make a landing at this pier.

The interior decorations have been the subject of particular consideration by the Commissioner-General, and an art commission has been appointed which will have entire charge of the mural decorations and artistic treatment of the interior of the building. The architects are C. A. Coolidge and Morin Goustiaux.



The United States Pavilion at the Paris Exposition.—C. A. Coolidge and Morin Goustiaux, Architects.

EVILS OF PRESENT CONTRACT SYSTEMS.

IN one of our recent issues we laid before the readers of the paper some very interesting comments on the subject of contracts and contractors by John L. Faxon, who in the July number of the *Brickbuilder* has also something to say concerning the evils of the present contract systems. While we have not space to give his article in full we present the following extracts which cannot fail to prove interesting:

It sometimes appears as if contractors laid awake nights to exercise an abnormal ingenuity in concocting schemes for extras and omissions; certain it is that many of the schemes or excuses they offer evidence a fertile imagination and utter disregard of contract obligations. This, I have no doubt, is largely due to the practice of cutting down bids to the lowest notch to get the job, and the resultant effect on profit and loss. When contractors bid on work on the basis of honest work at a fair price the vexatious questions of extras and omissions and "let ups" will be reduced to lowest terms and legitimate matters. On the other hand, owners are not without fault in this: the tendency, of late years especially, to get something for nothing, to get as much as possible for the least sum, has so permeated all lines of business that the idea is sometimes carried to extreme lengths, and the contractor, anxious to secure work, is enticed into taking contracts below cost, unmindful of obligations and responsibilities so assumed. Owners are pretty sure to lay blame upon contractors or architects, in case the work does not come up to their expectations.

Basis for "Extras" and "Omissions."

There is a wide difference of opinion as to what constitutes a fair price for extras or omissions. Contractors, as a rule, claim all they think they can get for extras, and allow as little as possible for omissions, and owners *vice versa*. Some contractors ask what it "costs them" to do the extra work, plus 10 to 15 per cent., and offer to allow what they "figured on it," minus the profit, for omissions, and the architect is vexed with such questions to an extent much beyond what he is paid on said accounts.

The only basis which seems to be fair for extras and omissions is the actual reasonable net cost of labor and materials necessary for the work, in either case, plus a fair profit, as may be agreed upon, mutually or otherwise, or by general acceptance. The per cent. of profit to be allowed, over actual cost of extras and omissions, might well be established by the Master Builders' Association, also said association might issue monthly schedules of net market rates, embracing all materials used generally in contract or job work and going wages, the schedule varying according to the variations of market rates, and such schedules would be of much assistance and of value in the making up of bids.

But aside from such established schedules, the cost of work will vary with individual contractors by reason of brains, experience, systems, credit, &c., or the lack of these. And inasmuch as the contractor will not admit that the owner will be right in asking the contractor to do work for nothing or at an excessively low price, because the cost to the contractor is little or nothing, from one cause or another, so the contractor cannot in fairness ask the owner to pay an excessive price, because it cost the contractor a needless and excessive amount from lack of proper system, credit, &c., in the conduct of his business.

Another point which should be carefully observed by contractors, both general and subs, is not to go ahead and do extra work without a definite understanding as to its nature and cost, and a written order for it at time of change as fixed by the architect, while such matters are fresh in mind, and the same applies to omissions. Contractors are apt to neglect this point, either from negligence or from an absurd feeling that the architect will feel offended if his oral directions are questioned, as implied by asking for a written order. Such feeling is a mistake, for I venture to say that architects prefer to have such matters fixed at the time, and thus avoid unnecessary misunderstandings at final settlement. Architects should bear in mind that the fixing of such matters at the time is a duty not only to clients, but to contractors as well; and contractors should bear in mind that "extras," without a written order for the same, are not valid.

Lack of System.

The most potent factor in matters of cost and loss of profit to contractors is a lack of system. I have seen some contractors fritter away the profits on a good job, and more, too, where they might have made good money, with due regard to business methods.

Space does not admit of my going into details. One of the fundamental rules which contractors should keep in mind is, "Spare no expense to economize," and one of the first considerations of economy is to find out just how the architect wants the work done, and with what materials, and then go and do it, and do it right the first time, and save doing it over again. The best workmen at best pay are the cheapest, and a high salaried foreman to lay out and direct the job (and no nothing else), and who can read the plans intelligently and keep ahead of them, is a mighty sight cheaper than a low priced man, who will rattle around the job and "help lay bricks." There should be one foreman on the work to oversee all work, and not a half dozen with conflicting directions.

Keep an accurate account of stock, day by day; don't waste it, and don't let it run short, and don't have stock delivered different from that specified. I have had dealings with a contractor who knew every morning just how much stock he had on each job, of each kind, and he conducted a large business. His men never waited for stock and consequently wasted no time puttering around, and the right kind of stock was always on hand. Keep the job cleaned up; piles of broken bricks, dirt and general debris should not be allowed to accumulate for an hour for men to stumble over or pick their way around. Much time and money are wasted in the careless and negligent manner in this respect which characterizes the majority of work. Three or four laborers to keep the job clean and walks in shape will profitably save the time of 30 to 40 workmen, and especially if the laborers are employed at night, so that the work is free and clear for a start in the morning.

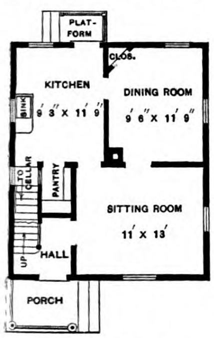
House all stock, especially in cold weather. It takes more time to properly granulate the frost lumps in sand than it does to protect it, and it costs less to neatly pile bricks than it does to chuck them in a heap and have 5 to 10 per cent. of broken stock, and the best stock in the majority of cases (even when not called for) is the cheapest in the end. Flights of rough stairs, from stage to stage, or from story to story, are cheaper than ladders. In Italy, where I have observed much work (and where time does not count as it does here), runs are provided, and the ease and quickness with which laborers swarm over a building is remarkable. Provide for sub-work at the start; don't wait till it is wanted; have it on the job when needed, and have it done right at first. A subcontractor should understand that his work is expected and required at the building at a certain day and hour, and that he is to have it there, with sufficient men to place it in the shortest possible time consistent with the best work. No sub-work should be given out without a written contract, stating time of delivery and finish and forfeit for delay. The usual delay in sub-work is a matter of constant and increasing vexation to contractors and architects, and of material loss to contractors and owners.

COMPETITION IN $750 FRAME HOUSES.

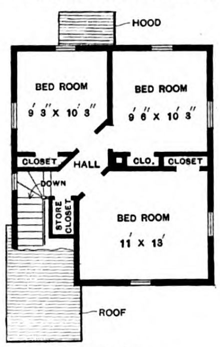
THIRD PRIZE DESIGN.

The winner of the third prize in the competition for $750 frame houses, being the twenty-fifth in the series conducted by *Carpentry and Building*, was Charles E. Sargent of Ware, Mass., and we take pleasure in presenting herewith the design which he submitted. An inspection of the plans shows upon the main floor a sitting room, dining room and kitchen, while on the second floor are three sleeping rooms, with clothes closets. According to the specifications the area under the entire building is to be excavated and the foundation walls are to be laid dry with field or pasture stone. For the underpining common brick laid in mortar are to be used, the same material to be employed for the chimney. The plastering is to be one coat work with a skim coat.

The dimension lumber for the frame and partitions is to be No. 2 spruce, while the outside and rough boarding, as well as the under flooring, is to be of hemlock. The finished floors are to be of a fair quality spruce. The outside finish and the window frames are to be of a good quality of native pine, the clapboards are to be of spruce and the shingles " No. 1 cedar," which the author states means a fair quality. The inside finish is to be of North Carolina pine, very plain. All moldings for the outside and inside finish, as well as all doors and windows, &c., are to be of " stock pattern." The painting is to be two-

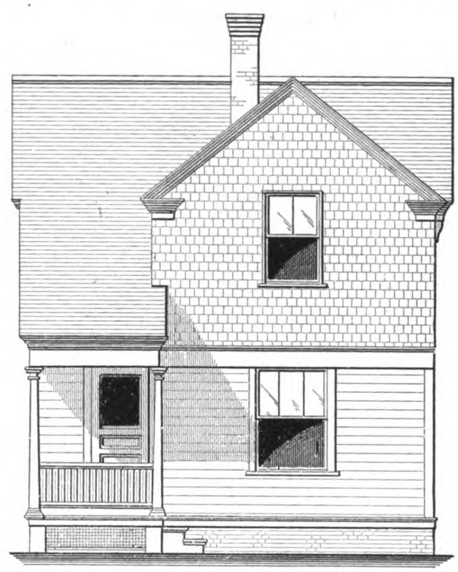


First Floor.



Second Floor.

Scale, 1-16 Inch to the Foot.



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

Competition in $750 Frame Houses.—Third Prize Design.—Charles E. Sargent, Architect, Ware, Mass.

coat work outside and two coats natural finish inside. The glass is to be single thick American. No plumbing is included in the specifications.

The estimate of cost accompanying the design includes under the head of mason work: Excavation $15; foundations, $63; brick work, $31.35; plastering, $70.80. Under the head of carpentry work is included: Dimension lumber, $44.40; rough boarding, $30; outside finish, $31.60; clapboards and shingles, $41.40; finished floors, $24; outside windows and doors, $48; inside finish, $107.45; stairs, $18; hardware, $15, and carpenters' labor, $156. The amount for painting is given as $54.

The builder's certificate is signed by H. P. Cummings of Ware, Mass.

Advantages of Hollow Walls.

A correspondent of one of our English contemporaries recently made inquiry in its columns as to the advantages or disadvantages of allowing a space between the inner and outer walls of a house and applying bond ties instead of having a solid wall 9 inches thick; also if the former plan added materially to the cost of the building. In reply to this a writer in a subsequent issue offered the following: In exposed situations rain is often driven by the wind entirely through a solid wall, more especially if the materials used are porous or poorly laid. Sometimes the dampness of the walls is due to neglect in flushing the joints with mortar or in the external pointing, but in many cases the moisture is actually driven through the bricks or stone. In stone walls the moisture usually follows the headers which extend through the wall, and not unfrequently these can be counted inside a room by the damp patches on the plaster. Of course a solid wall can be made impervious by means of a vertical asphalt layer between two skins of brick or stone, as well as in other ways; but as a rule quite as effective protection from dampness can be obtained at less cost by forming a simple cavity in the wall.

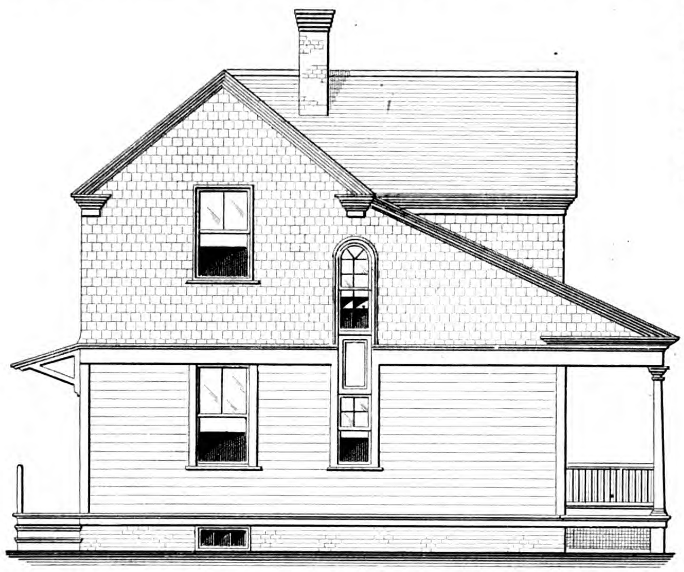
Solid walls, however, have certain advantages. They do not harbor vermin, and for the same quantity of materials are stronger and cheaper. Theoretically a cavity ½ inch wide is to all intents and purposes as effective as one 1 foot wide, but a narrow cavity is so easily bridged by a piece of brick or a chance dropping of mortar that a width of not less than 2 inches should be allowed. Very frequently cavities 2½ or 3 inches wide are adopted.

Thickness of Hollow Walls.

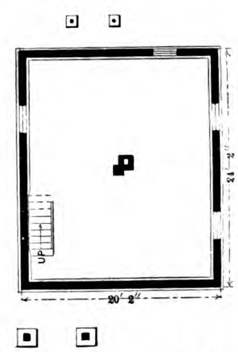
The thickness of hollow walls for small villas is often only 11 inches—that is to say, two half brick skins and a 2-inch cavity—and where cheapness is a primary consideration this is all that can be afforded. At the same time it must be said that a thicker skin on at least one side of the cavity is preferable, and in London, as well as some other places, this is indeed obligatory. Thus the London by-law on hollow walls ordains that " when hollow walls are constructed there shall be a wall on one side of the space of the full thickness prescribed for solid walls." In other words, the total thickness of a hollow wall must exceed that of a solid wall for a similar building by the width of the cavity and the thin skin on one side of it. Clearly, in London, hollow walls are sometimes heavily handicapped, consequently they are not often used. Indeed, it is in exposed situations of country and seaside rather than in the sheltered streets of cities and towns that hollow walls are most needed. Where a wall 11 inches thick is not sufficient, additional strength is usually gained by increasing the thickness of the skin on one side only of the cavity, and the question is often asked, Should the thicker skin form the internal face of the wall or the external? The balance of opinion is in favor of the former alternative, as in this way the greater part of the wall is kept dry and the floors and roofs are more firmly supported. "Set offs" for reducing the thickness of the walls can also be more easily arranged without breaking the continuity of the cavity. Several forms of tubular bricks and concrete blocks have been devised for the purpose of forming hollow walls, but none have met with general acceptance, ordinary bricks being cheap and convenient, and prejudice so strong, that there is little possibility of any patented hollow wall being largely adopted. In the case of stone and brick walls cavities may be formed exactly as in brick walls, an outer skin of stone being substituted for the outer skin of brick, but as ordinary wall stones vary so much on the bed a somewhat wider cavity should be specified. In thicker walls, however, it is customary to build the outer skin of the wall with a lining of brick, the stone and brick being tied together with bond stones, the inner skin being entirely of brick.

Keeping the Space Clear.

In building hollow walls great care must be exercised that the cavity is continuous throughout the circuit and hight of the building. In order to prevent the cavity



Side (Left) Elevation.—Scale, 1/8 Inch to the Foot.



Foundation.—Scale, 1-16 Inch to the Foot.

Competition in $750 Frame Houses.—Third Prize Design.

being bridged with droppings of mortar or brickbats, battens or iron pipes wrapped with haybands, or haybands alone, should be placed in it and lifted out when the wall is ready to receive the iron ties or bonding blocks, the battens or pipes are then laid on the top of these, and the wall carried to the necessary hight for the next row of ties, and so on.

Cavities are sometimes formed in concrete walls by inserting in the required position between the temporary shutters a 2-inch or 3-inch plank, tapering slightly in thickness from the top edge to the bottom; the taper facilitates the removal of the plank. When the concrete has hardened sufficiently the plank is withdrawn and the metal ties are then laid across the cavity. On these ties the plank rests during the formation of the next layer. In order to bind the two skins of a hollow wall together and so strengthen the structure metal wall ties or bonding blocks of brick or stoneware are inserted. Sometimes dense bricks of ordinary shape are used, but as moisture is apt to pass along (if not through) these it is better to adopt special blocks or ties. Iron ties are from 6 to 9 inches long and may be either cast or wrought. They should be of such a shape as to prevent water passing over them to the inner portion of the wall. When the bricks are without "frogs" the projections under the ends of the ties must be omitted. The cast iron ties are sometimes rendered malleable, in order to prevent them snapping.

All metal ties should be galvanized, or dipped in boiling tar and sanded before being used, otherwise they may rust and injure or stain the wall. Bonding bricks are usually of semi-vitrified ware. For the sake of appearances the bonding brick is seldom allowed to show on the face of the wall, as it would not match the color of the ordinary brick work. Where the outer skin is only a half brick in thickness the bond extends into it only 2¼ inches, certainly not an amount calculated to give excessive stability. Any shortcoming in this respect, however, can be counterbalanced by the spacing of the bonds. These, whether of iron or stoneware, are usually placed 3 feet apart horizontally, and 9, 12 or 18 inches apart vertically—that is to say, four, three or two are allowed in each square yard of the wall. The cushion of air in the middle of a hollow wall helps to keep the temperature of the house more equable, but this advantage is lost when the cavity is overventilated, a condition that may be caused by porous materials, bad mortar joints or by excess of air grids. Holes for egress of moisture are often provided at the foot of the cavity, but if the top of the cavity be closed and the wall be well built, little or no circulation of air can take place. Where parapets and lead gutters are adopted an asphalt damp course should be laid on the wall immediately under them.

In order to prevent rain damaging the woodwork of the window or finding an entrance to the room at this point, a strip of 5-pound milled lead, about 6 inches longer than the head of the window frame, should be built into the wall immediately over it. A kind of hollow wall is sometimes formed by fixing upright pieces of wood about 1 foot apart against the internal face of a wall and covering these with laths and plaster. The uprights may be merely grounds about 2½ inches wide and ¾ or 1 inch thick, nailed to plugs in the walls, or may be of larger section (3 x 1¾ inches, 3½ x 2 inches, or more, according to the hight of the room), and fixed quite clear of the wall. The latter is the better method, as there is much less liability of the wood decaying.

A more durable construction consists in the use of small steel uprights of L or T section, to which reticulated or perforated sheets of metal, known as "Metal lathing," are secured with wire, and afterward covered with plaster in the ordinary way. Undoubtedly each of these three devices will hide the dampness of an external wall, but in two there is a great likelihood of decay and in all a cavity is formed for dirt and vermin.

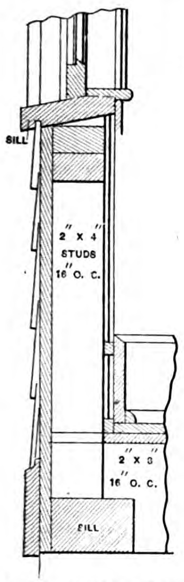
Remodeling Old Buildings.

It is quite a difficult undertaking to remodel and modernize an old building, particularly if it is expected that much of the old building is to be left untouched. Heroic measures are generally the best to adopt in work of this kind and design the new building to a large extent regardless of the old one, keeping just a few things only in view, says a writer in the *Canadian Architect and Builder*. If the old building is large enough on the plan to cover the requirements, the task is generally more difficult, as additions can always be rendered so that defects in the old structure may nearly always be hidden, and windows and doors and gables may be so distributed in the new part as to subordinate a great portion of the old work to it. If the floors and floor timbers are sound, and the building is not to be raised on its foundations, the task will be made much easier than if new floors were required, or if the building had to be raised.

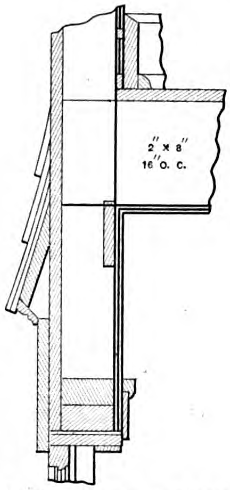
If a new lay out of rooms is necessary, this will be governed largely by the position of the stairways and well holes, and by the position of the partition or partitions that support the inner ends of the floor joists. Moving or distributing the partitions that carry one end of the joists should be avoided if possible, and the new lay out should be so designed that the old well hole remains undisturbed. Where this latter cannot be avoided, there should be new joists inserted, and the short joists and trimmers forming the well should be taken out. This is important, as carrying short joists from trimmer to wall is inadmissable, as it would leave the floor too weak to resist every strain to which it might be subjected.

If the house to be remodeled is of brick, due regard to the new lay out must be had to position of windows and outside doors, as one of the worst features of renovation is the removal of windows or doors and bricking up the openings caused thereby. Windows or doors may be enlarged without disfiguring the brick work if done carefully, but even then if there are stone lintels or gauged niches over them, the enlargement should only be made in their length. In wooden buildings the moving of windows or doors does not matter so much, but when it can be avoided it is always better to do so. Generally the remodeling can be done in the sash, unless, perhaps, it may be desirable to insert a triplet or a twin window where only a single window was before. In a frame building this will be easy enough, but in a brick building it will be necessary to take into consideration the effect the change will have on the wall above.

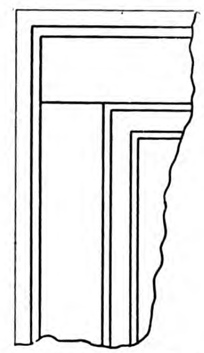
Perhaps the most troublesome part of the whole work will be in dealing with the roof. If the whole is to be new there will not be much trouble, but if additions are to be put to it, or dormers or skylights put in to light up the attic, the practical builder may find some difficulty in arranging them so as to accomplish the practical purpose and at the same time add to the appearance of the building. When a building is to be remodeled, no work should be commenced until everything has been considered, and the scheme for the renovation has been completed in every particular. Of course, no hard and fast rules for this kind of work can be formulated, as each particular building to be remodeled will require a treatment peculiar to itself. Architects generally agree that it taxes their skill and ingenuity much more to remodel a house and give satisfaction than it does to design and build a new house out of whole cloth, so to speak.

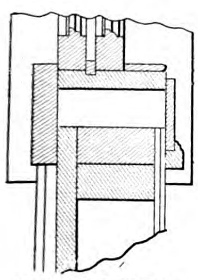


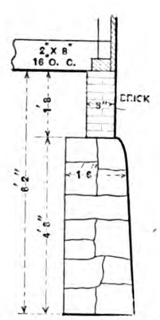
Detail of Water Table and Window Sill.—Scale, 1 Inch to the Foot.



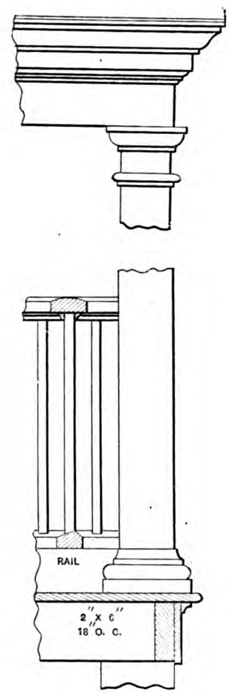
Detail of Belt Course.—Scale, 1 Inch to the Foot.


Detail of Inside Casing for Windows and Doors.—Scale, 1½ Inches to the Foot.

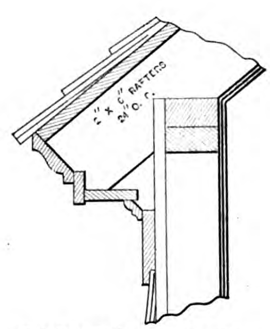

Detail of Window Frame.—Scale, 1½ Inches to the Foot.



Section of Foundation Wall.—Scale, ¼ Inch to the Foot.



Porch Details.—Scale, ¾ Inch to the Foot.

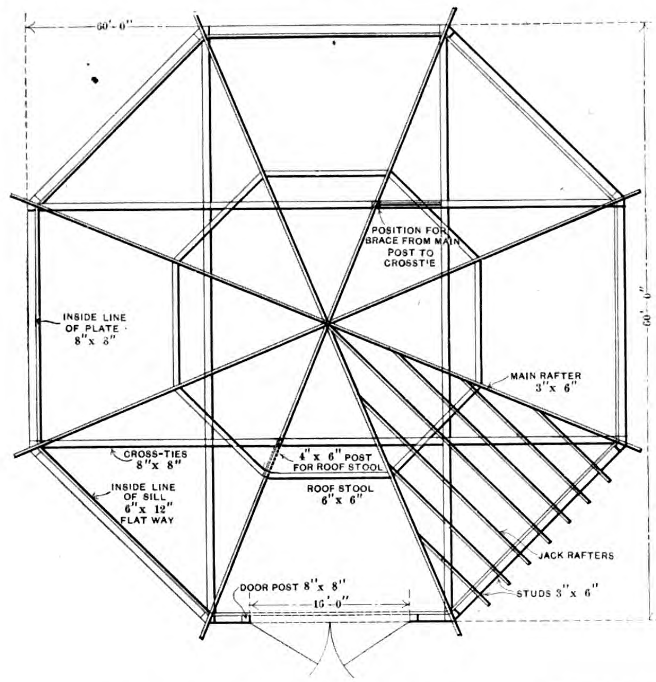

Detail of Main Cornice.—Scale, 1 Inch to the Foot.

Miscellaneous Details of Third Prize Design in Competition for $750 Frame Houses.

CORRESPONDENCE.

Plans for an Octagon Barn.

From F. A. H., *Altoona, Pa.*—A short time ago I noticed in one of the issues of the paper an inquiry with regard to plans for an octagon barn, and as being of possible interest to this correspondent as well as to others, I send drawings herewith. These represent a plan of the barn with an indication of the framing of the roof, a detail of the framing of one of the sections and a detail of one of the corner posts.



Plans of Octagon Barn.—Scale, 1-16 Inch to the Foot

Comments on Prize Designs.

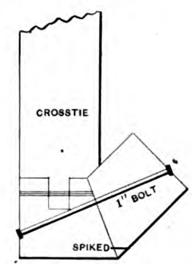
From E. R. RICE, *Denver, Col.*—I noticed in the June number some comments on the prize designs and had intended to give the matter earlier attention, but circumstances have been such as to prevent. Upon investigation I am inclined to agree with "E. G. W." I have been in the habit of figuring 50 cents per square for laying common flooring when making approximate estimates, but am convinced that it is too little. Given the requisite size of biceps and hand axe a man might lay flooring at that price and make wages, but it is just possible, were I superintending the work, he might have to do it all over again, which would cut into his profits. I would state, however, that that price was not intended to include the bridging, which I had figured in with the framing.

I think that any one inclined to be hypercritical could pick flaws in most of the estimates. I noticed one in which a large, husky turned porch column was itemized at 50 cents. If the contractor stole the material and got it turned for nothing he could probably get it hauled to the building for that price.

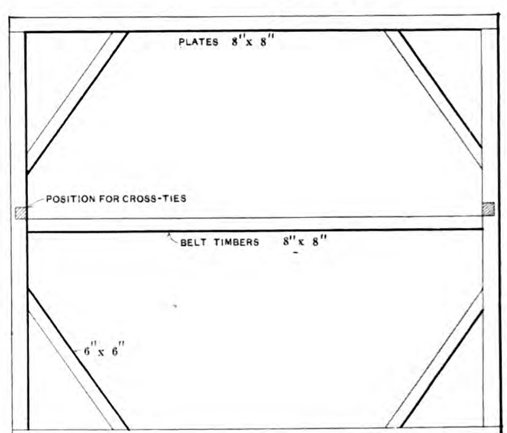
From C. H. M., *Perry, Oklahoma.*—As to the prize designs, I think that the second prize design in the competition for $750 houses is the best; it looks more as if an architect had drawn it. It has the best first floor plan, and would make a very pretty house for $750. As to the $1000 design, I think it was given to the right man, and I think the $1500 prize design was awarded to the right one. In the May number for this year a correspondent says he has no use for potato pit houses. He wishes that you would give to out of date fellows like himself designs for houses in which rooms could be made large enough for a 5 foot 9 inch tall man to go to bed in without crawling on his hands and feet. It is pretty hard to make rooms on second floors that are pleasant to sleep in under 16-foot studding, and they are not fit to be used as living rooms under a 20-foot studding.

Regarding the first prize design in the competition for $1000 houses a correspondent says it is a good design, but a few changes are needed. He fails to state, however, what the changes are. He ought to have given his reasons. Personally I do not think there is porch enough to any of them for this climate.

I wish the Editor would give us the third prize designs in the $750, $1000 and $1500 competitions, and if he will also give the basis on which the committee having the awards in charge founded their decisions the readers can draw their own conclusions.



Detail of Corner Post.—Scale, ¾ Inch to the Foot.



Detail of Framing of One of the Sections.—Scale, ⅛ Inch to the Foot.

Plans for an Octagon Barn.

I think after all the designs have been published that the Editor ought to give the readers the rules under which the committee decided upon the size of building, light and ventilation, as well as waste space. Then if the readers would give their views and tell us how to get the best house out of the smallest amount of money it would be very interesting, for that is just what 85 per cent. try to do in building homes. There are a good many architects all over the country who make a special study of small cost houses, and this is one reason why I ask that the matter be brought before your readers.

I wish the readers would give their views as to the best roof to put on a house, where the second floor is to be used for chambers, with studding; say, 10, 12, 14 and 16 feet. Also as to putting studding on first floor instead of on sills. To take a short studding and get plenty of head room, light and ventilation is quite a task.

Note.—We present in this issue the third prize design in the competition for $750 frame houses, and it is the intention to give in the October issue the design awarded the third prize in the competition for $1000 houses. We would say that in reaching a decision in the various contests, the Committee of Award was governed entirely by the conditions of the competitions as set forth in the original announcement in December, 1898, and repeated in substance in the issues for March and June of the present year in connection with the publication of the first prize designs in the $750 and $1500 competitions. It will readily be seen that under these terms the committee had no other option in the matter than to decide which of the designs submitted best answered the requirements of the contests, and on this basis awards of prizes were made.

We shall be glad to have the readers follow the suggestions of the correspondent above, as it will doubtless lead to a discussion both interesting and profitable. As we have intimated from time to time, our columns are open for a full and free discussion of any and all topics of trade interest, and we trust our readers will improve their opportunities by sending us frequent letters for publication.

Strains on a Crane or Derrick.

From H G. R., *Oakland, Cal.*—Please give me in the columns of the paper a rule or method for finding the strains on a crane or derrick such as that shown in Fig. 1, and oblige a subscriber.

Answer.—In reply to this correspondent F. E. Kidder furnishes the following: There are two methods of finding the strains or stresses in a derrick, one by the use of trigonometry and the other is known as the "graphic method." As the latter is much simpler and just as accurate we will show its application to the derrick in question. Before entering upon the explanation, however, it should be remarked that the stresses in the lines and mast vary with each different position of the boom, becoming greatest when the boom is nearest the horizontal; hence the strains should be determined for the lowest position the boom is likely to assume and for the greatest loads the derrick is intended to handle. The stress in the boom remains practically the same for all positions.

The method of determining the stress for any given position of the boom and guy is as follows: First draw the derrick to a scale say ¼ or ⅛ inch to the foot, with the mast and boom drawn their actual length, to the scale, and the guy at the angle it is to occupy as shown in Fig. 1. Then draw a vertical line, *w*, as shown in Fig. 2, to represent the load. This line should be drawn to a scale of pounds to the inch, using a scale divided into tenths, twentieths or thirtieths of an inch. Having drawn the line *w* of proper length, from the upper end of the line draw another as *l* parallel to L of Fig. 1, and from the lower end a line, *b*, parallel to the boom. These lines will intersect, and the length of the line *l*, measured by the same scale to which *w* is drawn, will give the stress in the top line, while the line *b* will give the stress in the boom.

To find the stresses in the mast and guy proceed as follows: From the outer end of *l* draw a line, *m*, parallel to the mast and from the other end of *l* draw a line, *g*, parallel to the guy until it intersects the line *m*. The length of the line *m*, measured by the scale, will give the stress in the mast, and the line *g* will give the stress in the guy. For the position of the derrick shown a load of 100 pounds at the end of the boom will give stresses of 118 pounds in the boom, 78 pounds in the line L, 81 pounds in the mast and 105 pounds in the guy. A load of 2000 pounds will give stresses 20 times as great. This method applies to derricks of any proportion and to any position of boom or guy.

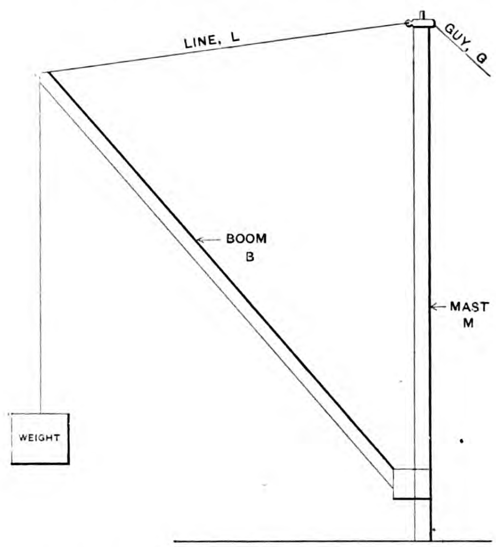


Fig. 1.—Sketch of Derrick Furnished by "H. G. R."

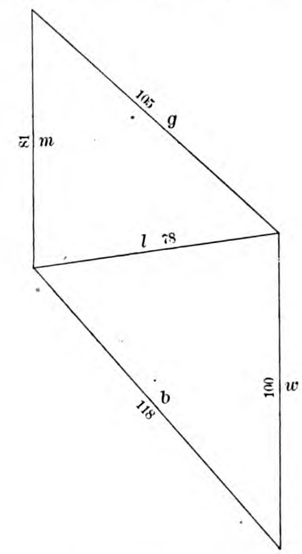


Fig 2.—Diagram of Stresses.

Strains on a Crane or Derrick.

Wedging Doors.

From A. D. C., *Ontario.*—Will some of the readers describe how to wedge doors that are made with blind tenons? I saw an article on this in one of the issues of the paper, but the writer did not say how the work was done.

Value of Articles on Wood Turning.

From J. M. P., *Loyal, Wis.*—In a recent issue the editor asked for the opinion of some of us chips in regard to the papers on "Wood Turning," and I would say that I was very much interested in them so far as they went; at the same time I was very much disappointed when they so suddenly ceased. I would like very much to have the papers continued if the editor feels like conferring the favor, but perhaps it is asking too much, as *Carpentry and Building* already gives more value for the money than any other like publication. What say others ?

Note.—We shall be glad to hear from other readers on this question and desire to say that if the interest in the subject of wood turning is at all general we will endeavor to arrange for a resumption of the articles during the coming winter months.

A Below Ground Ice House.

From F. H., *Clarksburg, Ontario.*—If "J. A. H.," Morotock, Va., has three sides of his ice house covered in with earth, as seems to be the case if he constructs it on the side of a hill, he should have no trouble in its erection. First, he should make the necessary excavation, digging out from the face of the hill to the required size, including thickness of walls. As the foundation will be the rock bottom, the sides and back end walls may be built up to the required hight. These walls should be of stone, but brick or timber will answer, though not so well as stone. The front walls should be double, having an air space of 4 or 5 inches between them. If the walls are of stone or brick, the roof may be arched over with a semi-circular arch and covered with earth, making the ice house neither more nor less than a cellar or vault, with the front exposed. Provision, of course, must be made for carrying the water from the earth covering the structure. If the building is of wood, timbers or joists should be laid over the top, and this should be planked with joints laid close, the whole being covered with earth and protected from the rain.

If the ground is sand, as "J. A. H." seems to intimate, he will not need to carry his drain 300 feet. Sink a couple of barrels, whose sides and bottoms are perforated with holes, into the ground a few yards from the floor of the ice house and drain into them. The water will find its way out of the barrels into the sand and disappear quickly. This, of course, is written under the impression that there is plenty of fall from the rocky bottom of the ice house to the sand beyond. Water from melted ice is readily drained through the sand. An ice house such as "J. A. H." intends constructing will, if properly built, prove efficient and satisfactory in every respect.

Formula for Finding the Size of Stone Caps.

From C. H. T., *Brooklyn, N. Y.*—Will some of the readers please tell me through the Correspondence Department of a simple and comprehensive formula for finding the size of stone caps or templets, both granite and bluestone, on brick piers under columns ?

Durability of Spruce and White Pine Clapboards.

From A. D. C., *Ontario.*—I would like to see a discussion by the readers of *Carpentry and Building* of the lasting qualities of spruce and white pine feather edge clapboards. Which is the better for general house work? Will not some of the readers give their experience and opinions on this subject?

Design for a "Grandfather's Clock."

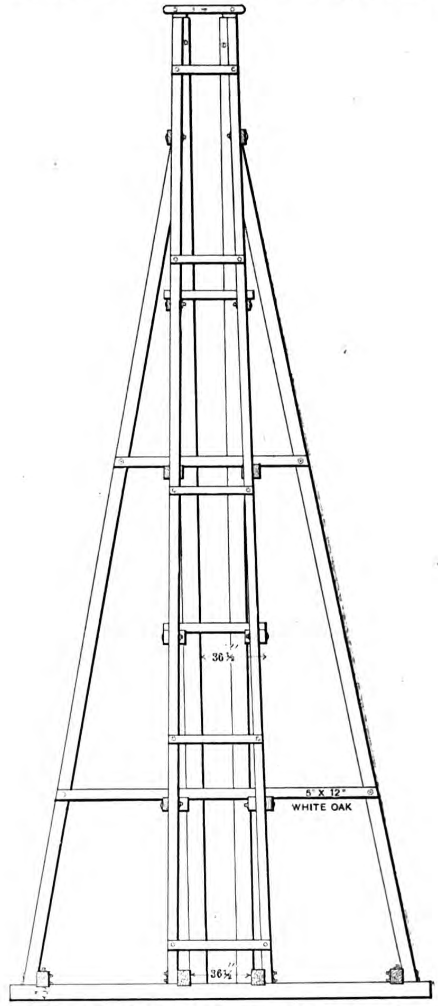
From J. L. W., *Philadelphia, Pa.*—I am a reader of *Carpentry and Building*, and I would like to build and carve a tall hall clock, commonly called a "grandfather's clock." Will some one through the columns of the paper furnish drawings or designs for such an article, and oblige an admirer of the paper?

White Pine vs. Oregon Cedar Shingles.

From OLD BUILDER.—Replying to "E. H. H.," St. Louis, I may say that Oregon cedar shingles wear well if laid on dry boards and nailed with cut nails. Do not use wire nails. They do not wear well in any shingles, and should be tabooed altogether for outside work. It is not tannin, or what "E. H. H." calls tannic acid, that destroys the nails in an Oregon cedar shingle roof. In fact, it is not an acid at all that does the business, but the affinity that Oregon cedar has for atmospheric moisture. It takes up water like a sponge, though in a lesser degree, and thus corrodes and destroys the nails. Dipping the shingles in oil or paint, or better still, in Cabot's shingle stain, protects the shingle from moisture by filling up the pores of the wood and thus preventing damp from reaching the nails. The Oregon cedar shingle is in much demand on the Pacific Coast, where it is sometimes treated to a bath in lime water, and after a thorough drying is nailed on the roof with cut nails.

A Pile Driving Frame.

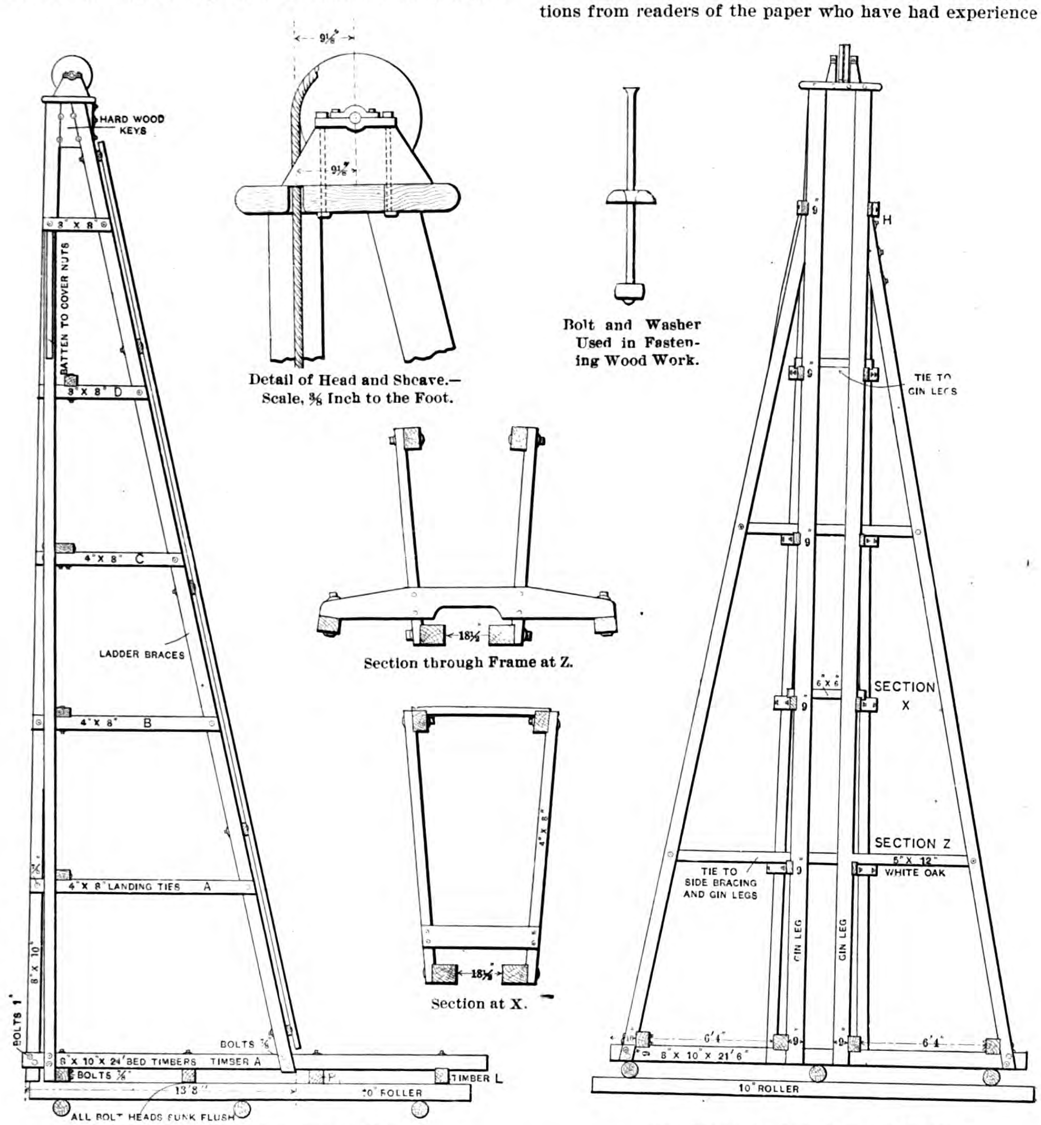
From C. B., *Norfolk, Va.*—Believing that the subject has been but little discussed in *Carpentry and Building*, and thinking that it may prove of interest to readers of the paper, the writer takes the liberty of presenting sketches of a pile driving frame which he constructed some time ago, as the most suitable thing for the work in



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

A Pile Driving Frame.

hand, the situation being such that a good base was required while preventing guying with lines. In constructing a frame of this kind a practical way is to frame and bolt the bed frames together solid and square, and bolt the hammer guides and back braces. These should be framed in such a position that when set on edge the three parts will be in position for connecting. These can be easily set up with a small guyed pole and tackling, after which the braces can be bolted on, thus squaring the frame. In bolting the landing ties the guides should be kept straight and there should be some sag in the back braces, otherwise there will be a tendency to bow the frame when set in position. Let the hammer work freely in the guides with not more than ½ inch play either way, and give it good clearance through all bracing. Securely bolt the guides to the bed frame and cut but little from the guides at this point. The bolts at H of the rear elevation of the frame should be covered in order to prevent chafing the pile fall. The frame here shown is one which will be found useful on small jobs where conditions are such that guys cannot be employed and the piles require to be "snaked" a considerable distance. The double rollers allow the frame to be moved in almost any direction, which will be a convenient feature for driving for bay windows and other small angles.



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

A Pile Driving Frame.—Sketches Submitted by "C. B.," Norfolk, Va.

I think the sketches are sufficiently clear to be readily understood without further description.

Framing Roofs With the Steel Square.

From AN OLD FRAMER.—In the last issue "A. V. E.," Red Lodge, Mon., asks for some simple method for finding the bevels and lengths for hips and jack rafters of a cottage shaped roof. This question has been asked and answered over and over again in the 20 volumes of *Carpentry and Building*, in as many different ways, and I would refer him to any of the back volumes named for an answer, or I would suggest that he purchase a copy of that excellent work, "The Steel Square and Its Uses," where he will find this subject treated in the simplest possible manner, and in such a way that all the "cuts" and "lengths" of hips, valley rafters, common and jack rafters and many other bevels and cuts may be obtained by the aid of the steel square and a pencil, without figuring or making use of any other measurements.

Trouble in Making Blue Prints.

From C. K. S., *Wayland, Iowa.*—I have been having some bother with blue prints, and I would like suggestions from readers of the paper who have had experience in this work. The paper I have been using is two years old, as is also the cloth which I employ. I make use of Higgins' drawing ink. When I take off the glass and tracing cloth I can see the lines very distinctly, but when I put the paper in the water it will not develop just right. The lines turn a sort of a reddish color and never get very white. Can anybody tell me what is the trouble?

Repairing Shingle Roofs.

From YOUNG CHIP, *Montreal, Canada.*—Numerous letters upon the subject of shingling have from time to time appeared in the pages of *Carpentry and Building*, but I do not remember ever having seen anything with regard to repairing of shingle roofs. I would like very much to see a few letters from some of the practical readers of the paper illustrating what they consider to be the best way of doing repair work of this kind.

Laying Out "Nail Ties" for an Ogee Roof.

From W. B., *Bradford, Pa.*—I send a drawing and description which I have prepared in reply to "W. H. M.," Clebourne, Texas, who asked in the June number for an explanation of the method of finding the shape and lengths of girts between rafters with ogee profile over circular plan, the girts standing with upper face perpendicular with tangent at edge of rafters. I have endeavored to make the drawing explain the principle without extended comments, but am not sure that I have been successful. Referring to the drawing, A B C of Fig. 1 represents the plan of part of the ogee roof standing over a circular plan. Fig. 2 shows one of the main rafters, as A D 9 9, with location of girts and the plane of upper face of each girt, as 8 O, 8 O, &c., while Fig. 3 represents a development of the ogee surface indicated in Fig. 1. Now to find the lengths, bevels and curve of each girt, first drop perpendiculars from the points where the girts cut the edge of the rafter A D of Fig. 2 down to the horizontal plate line, extending them to the center line, A D of Fig. 1. Now with A as center produce the arcs 4 to 6, as shown; then parallel to the perpendiculars produce lines extending from 6, 6, 6, &c., of Fig. 1 to 8, 8, 8, &c., of Fig. 2. Trace the curve on the rafter, as shown by E, 8, 8, &c., to A of Fig. 2; then the distance from this last found curve to the face edge of the rafter A D is the amount of curve for each girt taken on the line O 8 and the lengths of chords, as 6 5 on the plan A B C of Fig. 1, are equal to the lengths of the girts.

Now to develop the ogee surface, as shown in Fig. 3, first set off on the line A D equal spaces, as indicated on the edge of the rafter A D of Fig. 2, as for example D, T, T, T, &c., up to the point A. Perpendicular with D A and through T, T, T, &c., produce the lines F F, F F, &c., of indefinite length. Now from 5, 5, 5, &c., of Fig. 1 produce lines parallel to D A of Fig. 3, as 5 F, 5 F, 5 F, &c.; then G H of Fig. 3 will equal B C of Fig. 1, which is the distance between centers of rafters at the plate line, as B C of the last mentioned figure. The other lines represented by F T F will equal the corresponding line 6 5 on the plan, Fig. 1. Then trace through the points of intersection, as H F F A of Fig. 3. The shaded bevels on the line A G equal the angle for the front edge of each girt.

Now to find the joint bevel for the top face of the girt commence with the short girt in Fig. 2 and transfer the distance 8 O from T on F F nearest A to O; then the dotted line F O gives the joint cut toward the center of the roof. Continue this operation until the distance for each line has been transferred to the corresponding girt line in Fig. 3 and from the triangles, as T F O on A D H. After becoming familiar with the principles employed in this example the practical mechanic will readily understand how to find all the lines direct from the full size rafter and without the necessity of a drawing. I believe, however, this is the better way to make clear the principles.

Requisites of an Oil Stone.

From SILAS LAPHAM, *Worcester, Mass.*—I have noted in a recent issue the article on oil stones, and after reading it I asked a gray haired workman who was employed on a house near by as to his opinion of the matter, when he said: "You will make no mistake, sir, if you get an India oil stone made in this city and sold for 75 cents. It is made of corundum." Asking later at the store, I learned that the sales of this stone far exceeded that of any other, and had for years since the corundum stone was introduced. Permit me to suggest that a 25-cent magnifying glass is a very helpful means of examining the edge of any tool and of bringing it to a working condition, and to a beginner it is at least worth a trial. By means of it one can see what is needed and what he is doing to correct it.

Regarding Trusses.

From F. E. KIDDER, *Denver, Col.*—Without wishing to criticise for the sake of criticism, I think it a duty to say a few words in reply to the communication of "R. M. B." in the July issue. I notice that not only he, but many other readers seem to think that because a truss stands it is a safe form to copy. Now there is much risk in going on this supposition, for there are undoubt-

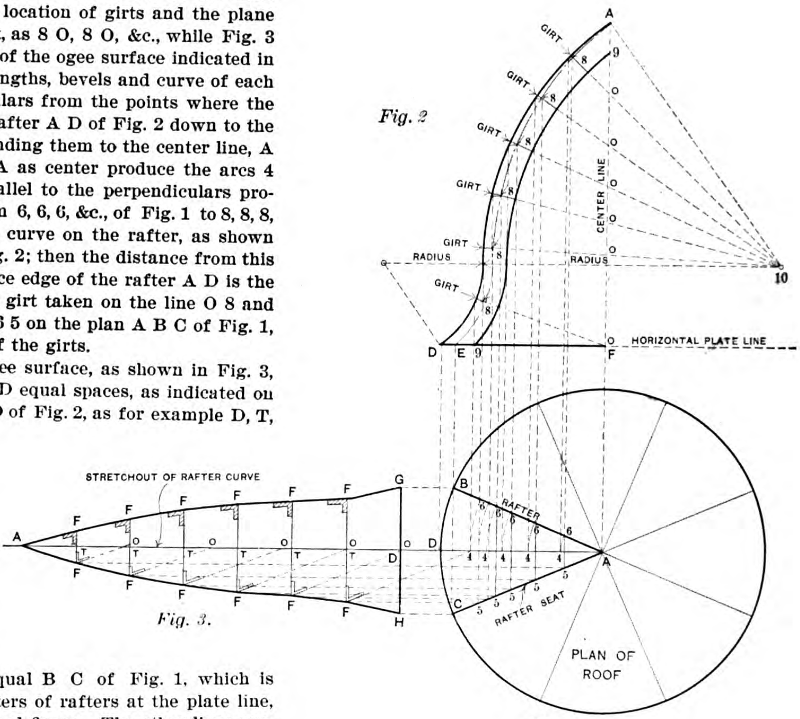


Fig. 1.

Method of Laying Out Nail Ties for an Ogee Roof Suggested by "W. B." of Bradford, Pa.

edly very many unsafe trusses standing to-day, and there are other structures which, while perhaps not actually unsafe, might be a dangerous form to use in another place or under slightly different circumstances. A truss is, or should be, a scientific combination of materials, properly proportioned to the stresses, and I think that no person should undertake to put up a truss, where the safety of life is involved, if he does not understand the principles of the truss, nor how to determine, approximately at least, its safe strength. A great many trusses are standing to-day more from luck than intelligence, but it is a poor way of designing trusses.

Now the truss recommended by "R. M. B.," while in its general form a very safe and common type of truss, is in this particular instance quite unintelligently designed. In the first place, half of the entire load on the truss, including its own weight, is brought as a cross strain on the 8 x 10 inch tie beam, 16 inches inside of the support; second, if it is necessary to use a 1½-inch rod at the center to support the ceiling, then the other rods should be about 1¾ inches, as they have to carry at least one and a half times as much as the center rod. Oftentimes two trusses may look to be just the same, while in reality some slight difference may make one truss perfectly safe while the other may be really unsafe.

SAND FOR MORTAR.

THE quality of the sand has an important effect upon the strength and durability of the mortar, although its importance is generally overlooked, even when the cement is subject to rigid specifications. The chemical nature of the sand appears not to have any important bearing upon its value for mortar, says Ira O. Baker in a recent issue of the *Brickbuilder*. Silicious sand is usually the best. Calcareous sands are usually friable—that is, composed of soft particles, in which case they are less suitable for making mortar. Although calcareous sand is ordinarily inferior to silica sand, nevertheless it is certainly true that crushed limestone makes a stronger mortar, in both tension and compression, than natural sand. and the difference of strength seems to increase with the age of the mortar. Part of the greater strength is unquestionably due to the greater sharpness of the screenings, and the part that increases with the age of the mortar seems to be due to some chemical action between the cement and the limestone.

The dampness of the sand is a matter of some importance. If the sand is very damp when it is mixed with the cement sufficient moisture may be given off to cause the cement to set partially, which may materially decrease its strength. This is particularly noticeable with quick setting cements. Ordinarily for the best results the sand should be practically dry.

The usual specifications for sand for mortar are that it "shall be sharp, clean and coarse." To these requirements should be added a fourth, viz., the proportion of voids should be as small as possible.

Sharpness.

Sharp sand—that is, sand with angular grains—is preferred to that with rounded grains on the assumption, 1, that the angular grains are rougher and therefore the cement will adhere better; and, 2, that the angular grains offer greater resistance to moving one on the other under compression. On the other hand, the sharper the sand the greater the proportion of the interstices between the grains, and, consequently, the greater the amount of cement required to produce a given strength or density. But a high degree of sharpness is more important than a small per cent. of voids. The sharpness of sand can be determined approximately by rubbing a few grains in the hand, or by crushing it near the ear and noting if a grating sound is produced; but an examination through a small lens is better. Sharp sand is often difficult to obtain, and the requirement that "the sand shall be sharp" is practically a dead letter in most specifications.

Cleanness.

Clean sand is necessary for the strongest mortar, since an envelope of loam or organic matter about the sand grains will prevent the adherence of the cement. The cleanness of sand may be judged by pressing it together between the fingers while it is damp; if the sand sticks together when the pressure is removed it is entirely unfit for mortar purposes. The cleanness may also be tested by rubbing a little of the dry sand in the palm of the hand; if the hand is nearly or quite clean after throwing the sand out, it is probably clean enough for mortar. The cleanness of the sand may be tested quantitatively by agitating a quantity of sand with water in a graduated glass flask; after allowing the mixture to settle, the amount of precipitate and of sand may be read from the graduation. Care should be taken that the precipitate has fully settled, since it will condense for a considerable time after its upper surface is clearly marked.

Sand is sometimes washed. This may be done by placing it on a wire screen and playing upon it with a hose, or by placing it in an inclined revolving screen and drenching with water. When only comparatively small quantities of clean sand are required, it can be washed by shoveling into the upper end of an inclined V-shaped trough and playing upon it with a hose, the clay and lighter organic matter floating away and leaving the clean sand in the lower portion of the trough, from which it can be drawn off by removing for a short time plugs in the sides of the trough. Sand can be washed fairly clean by this method at an expense of about 10 cents per cubic yard, exclusive of the cost of the water.

Although it is customary to require that only clean sand shall be used in making mortar, a small quantity of finely powdered clay will not materially decrease the strength of the mortar. In some instances clay to the amount of 10 per cent. of the sand seems not to decrease the strength of the mortar. Mortar containing considerable clay is much more dense, plastic and water tight and is occasionally convenient for plastering surfaces and stopping leaky joints. Such mortar is not affected by the presence of water. Sand employed in actual work frequently has 5 to 8 per cent. of suspended matter. The specifications for the masonry on the Chicago Sanitary Canal limited the suspended matter to one-half of 1 per cent.

Fineness.

Coarse sand is preferable to fine, since, 1, the former has less surface to be covered and hence requires less cement; and, 2, the coarse sand requires less labor to fill the interstices with the cement. The sand should be screened to remove the pebbles, the fineness of the screen depending upon the kind of work in which the mortar is to be used. The coarser the sand the better, even if it may properly be designated fine gravel, provided the diameter of the largest pebble is not too nearly equal to the thickness of the mortar joint.

Voids.

The smaller the proportion of voids—that is, interstices between the grains—the less the cement required, and consequently the more economical the sand.

The proportion of voids may be determined by filling a vessel with sand and then determining the amount of water than can be put into the vessel with the sand. This quantity of water divided by the amount of water alone which the vessel will contain, is the proportion of voids in the sand. The quantities of water as above may be determined by volumes or by weight. The proportion of voids may be determined for the sand loose or rammed. In either case it is more accurate to drop the sand through the water than to pour the water upon the sand, since with the latter method it is difficult to eliminate the air bubbles, particularly if the sand be first rammed. If the sand is dirty and the water is poured upon it, there is liability of the clay's being washed down and puddling a stratum which will prevent the water penetrating to the bottom. If the air bubbles are not excluded, or if the water does not penetrate to the bottom, the result obtained is less than the true proportion of voids. Again, if the sand is dropped through a considerable depth of water, there is liability that the sand may become separated into strata having a single size of grain in each, in which case the voids will be greater than if the several sizes were thoroughly mixed.

The per cent. of voids varies with the moisture of the sand. A small per cent. of moisture has a surprising effect upon the volume and consequently upon the per cent. of voids. For example, fine sand containing 2 per cent. of moisture uniformly distributed has about 20 per cent. greater volume than the same when perfectly dry. This effect of moisture increases with the fineness of the sand and decreases with the amount of water present.

The proportion of voids is independent of the size of the grains, but depends upon the uniformity of the size and varies with the form of the grains and the roughness of the surface. A mass of perfectly smooth spheres of uniform size would have the same proportion of voids, whether the spheres be large or small. A mass of perfectly smooth spheres packed as closely as possible would have 26 per cent. of voids; but if the spheres are packed as loosely as possible the voids would be 48 per cent.

The Best Sand.

The best sand is that which has grains of several sizes, such that the smaller grains fit into the voids of the larger, the proportion of any particular size being only sufficient to fill the voids between the grains of the next larger size. If the grains are spherical and the diameter of the smaller is about one-fifth of the diameter of the larger, the smaller grains will just fit into the interstices between the larger ones. The smaller the voids the greater the economy and the more dense and stronger the mortar. The finer the sand the more uniform the size of the grains, and consequently the less the proportion of voids. On the other hand, the finer the sand the less sharp it is and the greater the surface to be covered. Since it has been conclusively shown that the coarser the sand the better, the argument in favor of fine sand is not as potent as that against it. Further, the advantage of coarse sand over fine increases as the proportion of cement decreases, since with the smaller proportions of cement the voids are not filled.

In conclusion it may be said that very fine sand makes a much weaker mortar than coarse sand, and also that different sands vary considerably in the proportion of voids, and therefore differ in the amount of cement required to produce any particular strength. Therefore, before adopting a sand for a work of any considerable magnitude, all available sands should be carefully examined with reference to, 1, their effects upon the strength of the mortar; 2, their per cent. of voids or the amount of cement required with each; and, 3, their cost. If mortar of any particular strength is desired, the proportion of cement should be adjusted according to the fineness and voids of the best available sand.

New Home of the Cleveland Builders' Exchange.

As recently stated in these columns the members of the Cleveland Builders' Excange have for some little time past been making preparations to dedicate their new quarters in the Chamber of Commerce Building, which they occupied on June 1, but before referring specifically to the dedicatory exercises it may not be without interest to briefly describe the building in which the Exchange is now located. The Chamber of Commerce Building, a general view of which is presented in the first of our engravings, was commenced in August, 1897, and completed in February, 1899, at a cost approximately of $336,000. The structure has a frontage of 100 feet, and rises 117 feet above the level of the curb. It consists essentially of two divisions, the first being the seven storied front structure 100 x 80 feet, while the remaining space, 100 x 127 feet, is taken up by the assembly hall and its approaches and accessories. This hall in the clear is 70 x 96 feet, and has a hight of 40 feet, with a seating capacity of about 1200 persons. A feature of the building is that above the water table line the walls are entirely of brick and terra cotta, another attractive feature of the design being the eight colossal female figures which serve as supporting columns for the projecting balcony on the central front over the main entrance.

The first floor of the main building is fitted up for banking offices, the second floor is devoted to the office of the secretary of the Chamber of Commerce, committee rooms and an assembly hall for general meetings not requiring the use of the main hall, while the third, fourth and fifth floors are fitted up as offices. The third floor is the one occupied by the Builders' Exchange. The sixth floor is devoted to the social features of the organization, embracing a banqueting hall with parlors, &c. The seventh floor is devoted to the kitchen, janitor's apartments, &c.

A good idea of the arrangement of the third floor occupied by the Exchange may be gained from an inspection of the plan presented herewith, the floor space comprising 6205 square feet. The assembly room is located at the front, and is sufficiently large to accommodate the general meetings of the Exchange. There are also smoking and reading rooms, directors' room, four private consultation rooms and a specially arranged plan room, where plans and drawings of proposed new buildings and other work can be displayed and accommodations for "figuring" provided. The cut also shows the spaces occupied by exhibits of materials connected with the building industry. The central idea in providing the exhibition is to bring before the public, as well as the building fraternity, a display of materials and devices on one floor, so that the exam-

The Chamber of Commerce Building.

New Home of the Cleveland Builders' Exchange.

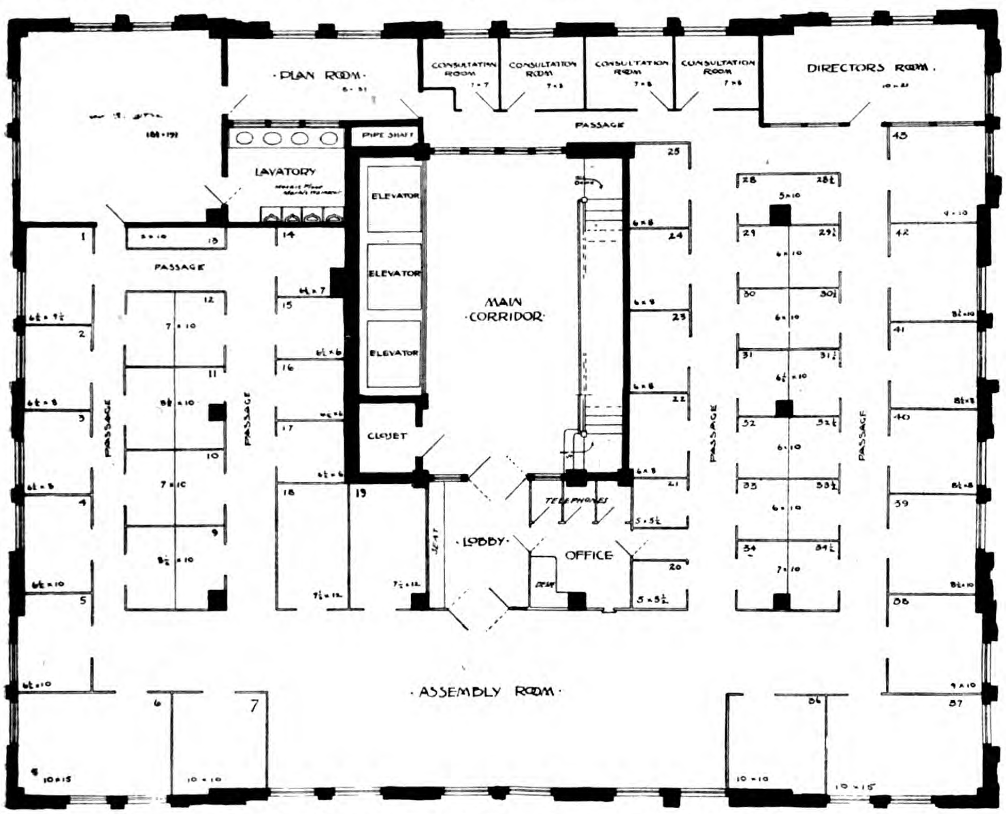
ination of them may be facilitated and comparisons easily made. In the exhibition spaces are shown samples ranging from the cement, stone and brick which enter into the construction of the cellar up to the slate, tile and tin for the roof. There is also on hand for distribution a mass of trade literature exploiting different materials which cannot fail to prove educational and instructive. Many of the displays are elegant and costly, some of the more important of which are those in terra cotta, fancy brick, building hardware, mirrors and glass, mantels, plumbing goods and roofing tile. Beside the exhibition spaces provision is also made for desk room, a list of the firms and individual contractors and material men who have taken spaces for exhibition or desk room including many of the leading concerns of the city connected with the building and allied industries. The room has been arranged for the most advantageous show of the exhibits, the floor space being divided by iron and wire partitions only a few feet high, thus leaving the entire series of exhibits open to view.

The dedicatory exercises were held on the evening of

July 18, when nearly all of the 200 firms in the organization were represented. At eight o'clock the members and their friends assembled on the sixth floor for the purpose of hearing a number of speeches which had been arranged for the occasion. The assembly was called to order by Arthur Bradley, president of the Board of Directors and of the Exchange, who referred to the convenience of the present Exchange, pointed out the objects of the organization and enumerated some of the work which had been accomplished since the Exchange was incorporated in 1892. He stated that for a long time their work was done in modest quarters in the Arcade; that a year and a half ago they began to have "smokers," songs and music, and that soon the builder found his rival was, after all, a good fellow. From that time forward the membership increased from 50 to 200. He stated that the Exchange now has accommodations that cost $4000 a year, and also has the services of E. A. Roberts, its competent and agreeable secretary. He stated that there were three distinct objects that the Exchange should carry out in the future. In the first place, it was hoped to have the "Hour on 'Change" a benefit to all connected with the business of planning and constructing buildings, next that the outside membership be increased, and finally that the Exchange should have a code of understanding between builders and architects such as they now have in Boston.

"The Past of the Builders' Exchange" was a topic upon which E. H. Towson made some interesting remarks, while E. W. Palmer, in an address on "The Future of the Builders' Exchange," presented a very definite statement of the functions of that body and what it means to the business life of Cleveland. After William Downie had told of the advantages of a permanent exhibition, C. W. McCormick, vice-president of the Exchange, read an interesting paper on "The 'Change Hour," the new feature which has been introduced by the Exchange. An address was also made by Architect George Hammond on the subject of "The Builder," which was answered by an address on "The Architect," by Col. C. C. Dewstoe, the new postmaster. At the conclusion of the addresses the members and their guests adjourned to the third floor, where refreshments were served and the evening spent in an examination of the various exhibits.

We understand that the 'Change Hour will be observed from 11 to 12 o'clock every day except Sundays and holidays. The purpose of the hour is to provide a fixed time when notices of interest to builders will be presented, new work announced, and the result of competition for contracts stated. The main business of the hour will, however, be between the contractors and the material men themselves, who will utilize this time each day for the discussion of current matters of mutual interest and importance. The membership of the Exchange is growing rapidly, and the outlook is regarded as most encouraging.



Floor Plan, Showing Arrangement of Rooms Occupied by the Builders' Exchange.

New Home of the Cleveland Builders' Exchange.

Planning High Buildings.

The planning of high buildings is a matter of grave responsibility, and it is to be hoped that those having such work in charge appreciate the great care necessary to be exercised. One of these modern office buildings often houses during the daylight hours as many as 3000 or 4000 persons, whose lives and safe keeping depend upon the careful design and construction of the foundations, the steel framework and the floor systems more especially than upon any of the other features.

It is reputed that the foundations for one enormously tall building (which were made by driving piling, much to the astonishment of many) are very inadequate, some of the piles being only a few feet in length after they were cut off. There is little excuse, says a writer in one of our exchanges, in not having good foundations, as the pneumatic process is frequently used where rock is within reach, and where it is not, piles *can* be properly driven and in sufficient number, or a concrete and steel foundation can be employed. For the steel frame only the best details should be used, and no experiments tried. The steel should have a minimum thickness of not less than ⅜ inch, and for parts under great duty, ½ inch would be better, inasmuch as the question of rusting has never been satisfactorily exploited. Will some of us now living see the sky-scrapers begin to fall from the rusting out of the steel work? Manifestly not if the metal was properly cleaned of rust before being painted and is kept perfectly dry thereafter. But how are we to know that it is always perfectly dry?

The use of cast iron has been to a great extent condemned by engineers, and also to some extent by architects, and it is to be hoped that it will never be used again for columns in an important building. Mind you, we do not say *cast* columns, for it is to be hoped that *cast steel* will be so cheapened and its use so extended that perfect cast columns of great tensile strength may be obtained.

The fire proof floors are so many that there is some excuse for a mistake being made in selecting a type for use, but we believe that some forms of concrete steel will be the ones to survive, as having the requisite strength and the necessary fire resisting qualities. Besides the dead weight to be carried is so much less as to cause a great saving in weight of steel work.

There are many other things to be borne in mind, and which come to mind as one rides up and down in the swiftly moving elevators, not the least of which is the safety of the elevator itself. The engineering skill employed in their design should be of the highest class, the inspection of the materials most careful, the workmanship and erection of the very best order, and, lastly, most careful examination of its safety after erection and from time to time.

These are only a few of the things we think of and mention in the hope that by much repetition they will become engraven on the minds of those engaged on the work.

New Japanese Palace.

Some of the daily papers recently published an interview with Tokuma Katayama, the architect of the Imperial Household, Japan, who is in this country to buy steel to be used in the framework of the new palace for the Crown Prince Yoshihito and in regard to the matter he is reported to have said:

The new palace will be one of the finest, if not the finest structure in Japan. It will cost between $2,000,000 and $3,000,000, and will take six or seven years in building. In no country are buildings thrown up with such astonishing rapidity as in America. In Japan we require more time, but the building of the palace will be unusually slow, because of the intricate work to be put on it. It will be in the Italian Renaissance style, and in the decorations I shall endeavor to combine what is best of Japanese art and of European and American art as well. It is likely that we shall import some carvers from America, but it is too soon to discuss that subject, for the building will not be ready for decoration for several years. I do not know, as yet, the amount of steel I shall have to buy. I notice that the price of steel is steadily rising, and I am afraid that my purchases here may run up as high as $300,000. As soon as the material for the framework arrives, work on the palace will be begun.

Architecture in Japan is in a transitionary stage. The old wooden dwellings are unsatisfactory for many reasons, chiefly because they burn like tinder boxes. The ordinary brick building is even more undesirable, because the first hard earthquake shock will send it tumbling down upon the heads of its occupants. When you consider that Japan has, on an average, about 300 earthquakes, of more or less violence, in a year, this is not an unreasonable objection. The steel frames, however, have solved the problem. Japanese houses in the future will have steel frames, and the walls may then be built of brick or stone with perfect safety. But the hight must be limited. I should say that no building over four stories high, even though it had steel framework, would be safe in Japan. The palace of the Crown Prince will be only two stories. In the matter of architecture Tokio or Yokohama can never be like New York. They may be as wide and as long, but not as thick. There is a tendency in Japan to adopt American architecture as far as possible. It varies so widely that monotony has no chance to creep in.

I think the next class of buildings to undergo a change will be the railroad stations. At present they are almost invariably of the old wooden shanty style. We have none of the fine train sheds, with great steel arches, that you have in America, but I think the time is coming when we will. I predict that the next few years will witness a wonderful revolution in Japanese architecture.

The 'Change Hour.

At the recent dedicatory exercises of the new home of the Cleveland Builders' Exchange in the Chamber of Commerce Building, Cleveland, Ohio, an interesting paper on the "'Change Hour" was read by C. W. McCormick, vice-president, from which we present the following extracts:

What is the "'change hour?" What are its duties? The term, as you all know, is one used by all business organizations having a common place for meeting to transact business, such as stock exchanges, coal exchanges, iron exchanges and numerous other commercial competitive interests, meeting at the same time and place to discuss methods, to correct abuses and to establish uniform practices regulating the transaction of business. The necessity for such meetings increased with the volume of trade, and the demand for prompt action became imperative in order to keep in touch with the rapid march of improvement that continually beckons us on to better and greater things.

Perhaps the most important regulation introduced in coming into our new quarters is the adopting of the 'change hour. Too much importance cannot be attached to this. It is the very essence of the purpose of the exchange, which is to bring the men who have mutual interests together at a convenient time and place, so that they can make known their wishes and wants, get what information they need without waste of time, and, going on, act upon the knowledge there obtained without needless annoyance or delay.

The principal object of the 'change hour is to save time, and as time is money it will be saving money to observe it. Some may say "I cannot go down to the exchange to-day, I am too busy; besides, I have no business with any one there; when I have, I'll go!" Very well! You forget when coming to such a conclusion that perhaps some one else has gone on 'change that very day for the purpose of seeing you, and not finding you there gives his business to some one else in your line, although you were preferred, simply because you were not there and he could not wait until you came or spend the necessary time and money to hunt you up. The next day you want to see some member of the exchange and you decide to be there at the 'change hour. It is important that you see your man, but find when you get there that he has done as you did the previous day, stayed away because he had no business there, or thought he had not. The result in both cases is the loss of time and money, and probably custom, to say nothing of the annoyance and disappointment.

PUTTING UP LIGHTNING CONDUCTORS.—II.

BY W. N.

WE shall now consider the details of fastening and putting up the rod. In Fig. 5 are seen various forms of points, A being one having five points, with an opening at B to receive the rod; C a point with a section through D E indicated at F and with the necessary opening at H; at J is another form of point, having attached four leaves, a section through the leaves being shown at K and the opening at L; while M shows a plain point with inlet at N.

In Fig. 6 is a brace which can be bought ready made, A being the brace with clamps at B and C, these holding the rod F, while at D and E are the arrow and point respectively. In Fig. 7 is shown a home made brace made of 3-16 inch brass wire. It is made in two parts brazed together at the top A, with an eye at the end of each leg to fasten to the ridge pole. The usual hight of the brace or stand is 18 inches.

drawn up to the highest point of the building, as at the ridge, and fastened as shown in Fig. 12, where B is the metal ridge, along the top of which runs the rod C and is fastened by a copper cleat 1 inch wide, being soldered at E and F.

In Fig. 13 are shown front and sectional views of a roof, with the method of fastening wire brace, rod, tubing and point In the section B represents the metal capping and C the brass wire brace, which is fastened by means of brass screws turned into the wood ridge, all as shown. A copper tubing, D, passes through the opening in the top of the brace at E, over which the point F is fastened, as at H. A side view of the ridge is shown at J, in which L is the brace and O the copper tube. The copper rod M passing over the ridge is fastened by the cleat N and extends into the tubing as shown at P, this giving sufficient contact.

Very often a cross, urn or finial is placed on a building which it is desired to protect, in which case the rod can be run on the inside of the object, as in Fig. 14, where

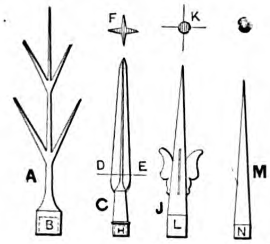


Fig. 5.—A Few Varieties of "Points."

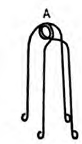


Fig. 7.—Wire Brace.

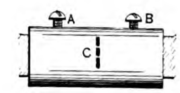


Fig. 8.—Butt Joint Connection.

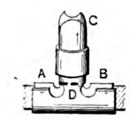


Fig. 9.—A "T" Connection.

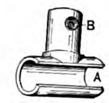
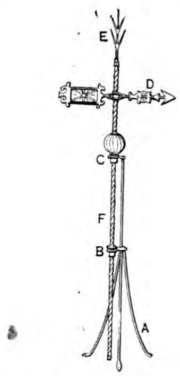


Fig. 10.—Set Screw "T" Connection.

Fig. 11. — Fastener for Cable Rods on Frame Buildings.



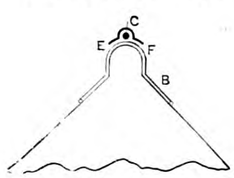


Fig. 12.—Method of Fastening Rod to Ridge.

Fig. 6.—Brace, Arrow and Point Complete.

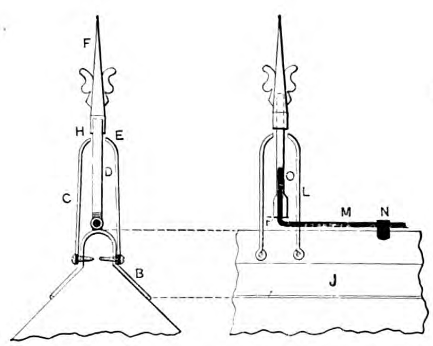


Fig. 13.—Section and Elevation, Showing Method of Fastening Wire Brace, Rod, Tubing and Point.

Putting Up Lightning Conductors.

In Figs. 8, 9, 10 and 11 are shown fixtures which can be obtained from dealers in these supplies. Fig. 8 is a butt joint connection, the rod being placed in the connection from either side, butting together in the middle, then fastened by the set screws A and B. Fig. 9 is a T connection, the rod passing through A and B, the T being obtained by placing the rod in C and meeting or obtaining contact with the rod in A B at D. Then by means of a gas pliers the tubes A, B and C are tightly closed. In Fig. 10 is shown another form of T connection, in which the tube A is closed with the pliers and the rod forming the T being fastened by the set screw, which would be placed at B. In Fig. 11 is shown a fastener one-half full size for cable rods on frame buildings, when the rod should stand free from the structure, the portion A being fastened to the wood work. There are also fasteners made to drive into the joints of brick work, these being made of malleable iron, so that when the rod has passed through B the ring is tightly clasped around it by means of the pliers.

When putting up the rod the coil (which contains about 500 feet) remains on the ground, while one end is

A A represents the ridge capping and B C a section of a cross at its base. In some cases the rod is carried down on the outside of the object, as indicated by the dotted line, but this spoils its beauty and outline. To avoid this a copper tubing can be carried up on the inside of the object, as shown by E E, allowing it to project outside the base, as at F. Into this the rod H is connected as far as J, while at the top K it projects far enough to receive the point. A funnel may be soldered on the top to avoid leakage.

Of course this tubing is all put in place before the object is put up, the connections only being made at the building. It may happen that a brace is to be placed inside of the object to secure it against wind or weather, in which case let the tubing be placed to one side in the base, so as to pass the brace, and let it extend along some straight surface, as at N.

When a rod has to be carried along a parapet wall having a stone coping it is fastened as shown in Fig. 15, where $x\,x$ indicate the holes drilled into the stone work and filled with lead, after which the rod C, resting in position, is fastened by hard brass staples, D, using the staple driver shown in Fig. 18. By means of this device the staple is prevented from spreading. The staple driver in shape and form is made as shown, with a staple opening at B and a groove cut into the center of the tool to admit the staple, as indicated by the dotted lines. A section through the groove is also shown at D.

In Fig. 16 is shown the method of putting a point on a brick chimney with stone coping, where no stand or brace can be used. At C is a hole drilled into the stone work and plugged with lead, a copper tubing being bent to the required shape, as shown by D D, and fastened by means of the brass staples *x x x*. The point E is then placed on top and the rod connected to the tubing in the usual manner.

In Fig. 17 is shown what is known as a hidden rod ; in other words, a rod that is carried down behind the leader. After the copper lightning rod has been brought to the line of the gutter or cornice it is carried over the latter in a graceful curve and down against the walls of the building. If the walls are brick or stone it is accomplished as follows: Let A represent the wall and B the rod fastened by means of the staple and the staple driver, the leader E being supported by the hook D, which projects from the face of the wall.

When running a rod down from a high building where ladders cannot be employed a swinging scaffold or chair is used. When the roof is flat it is fastened in the same manner as an ordinary scaffold, but where the roof is pitched an S hook is employed, as shown in Fig. 19, which represents a section of a cornice, with F the S hook made of 2 inch round bar iron, onto which the pulley H is fastened at the bottom. This hook saves a lot of time in fastening scaffolds to pitched roofs.

In Fig. 20 is represented the method of fastening the rod when brought down against the walls of a building which are of wood. Here A is the wall, B the rod and C a copper strip 1 inch wide which is fastened with copper nails at C[1] C[1] and the edges D D turned over so as to cover the nail heads, as shown at E.

We will now assume that the rod has been carried down ready for ground termination, the different methods of which have already been described. It is sometimes the case that a termination takes place in dry earth, which is a very poor conductor of the electrical current. To overcome this proceed as shown in Fig. 21, which represents a section through the foundation wall of a building. Take a piece of gas or other iron pipe, or better still brass or copper tubing, 2 inches in diameter and place it with a funnel at the top to catch the rain water, as shown at E. This being done, pitch the walk or flagging toward the funnel, so as to catch a good amount of water, then run the rod F through the pipe as at H, allowing the coil to go into the ground at *x*. Care should be taken in all cases to have the discharging rods terminate below the foundation walls, and not run a rod a few feet in the ground—for example, as far as the point J—and then stop. In some cases ground circuits are made of heavy sheet copper about 10 inches wide or of the same kind of rod as that used in rodding the building, well connected in one continuous circuit, and to which the discharging rods should be well secured. These discharging rods can be carried up to the ground line and the rods from the building connected to them afterward.

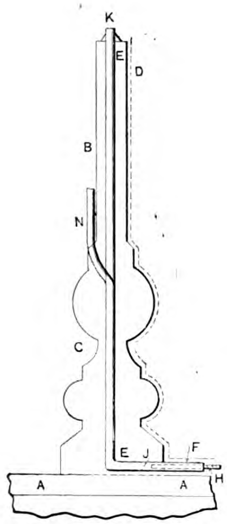


Fig. 14.—Method of Connecting Rod Inside of Cross or Finial.

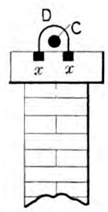


Fig. 15.—Method of Fastening Rod on Stone Coping

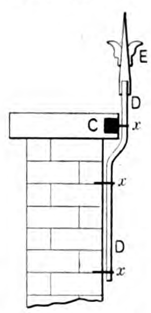


Fig. 16. — Method of Attaching a "Point" to a Chimney.

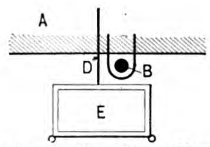


Fig. 17.—Plan View, Showing a Hidden Rod.

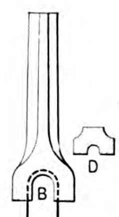


Fig. 18.—Elevation and Section of a Staple Driver.

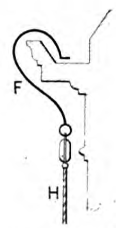


Fig. 19. — Showing Manner of Using an S-Hook.

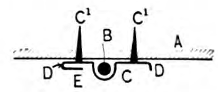


Fig. 20.—Method of Fastening Rod to Frame Building.

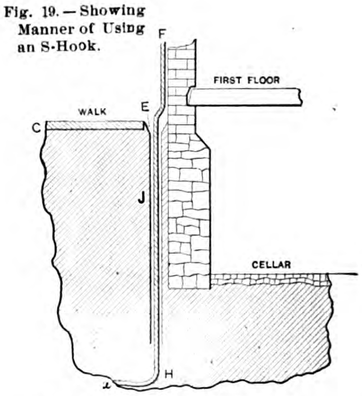


Fig. 21.—Scheme for Obtaining Moist Ground Termination.

Putting Up Lightning Conductors.

Zinc Coating on Iron.

It may not be as generally known as it ought to be, says an electrical exchange, that a coating of zinc on iron acts quite different than when the iron is plated with other metals, such as nickel, silver or copper. Unlike these other metals, zinc protects the iron electrically by virtue of the fact that in the presence of moisture a galvanic couple will be formed between the zinc and any exposed parts of the iron, which will cause hydrogen to be formed on the exposed iron, and this tends not only to keep rust from forming, but will also reduce any rust which may have been formed. To successfully plate iron with zinc is therefore much more important than to nickel plate it, but, unfortunately, it is much more difficult. The following receipt from the *Zeitschrift fur Elektrotechnik* may therefore be of interest: The bath should have a specific gravity of 1.135, or contain about ½ pound of zinc sulphate per quart of water. Its current density should be about 0.1 to 0.2 amperes per square inch, and the solution should be kept stirred. The articles must be very carefully cleaned before plating, and the bath should be replenished with a mixture of zinc dust with about twice its weight of powdered coke, suspended in a bag.

Fastening Metal Ceiling Work.

In the following illustrations are shown some methods of fastening metal coves, ceilings and center pieces, or gas and electric light outlets. As very little skill is required to do this work, the material being furnished by manufacturers in this country, who also in some cases furnish construction drawings and directions for putting up, these diagrams will cover about all the cases that may arise. In Fig. 1 is shown the method of fastening when the beams are of wood. Let A represent the beam, B the plate and C the studding, D the plaster laths and E E E, &c., furring strips, nailed to the studding and beams to receive the metal cove and ceiling. Care should be taken when nailing the furring to have a perfectly straight line, otherwise high and low places will show in the ceiling. To prevent this, drive wooden wedges between the strips and joist until a level line is obtained. The furring being in a level line, apply the cove F, fastening with thin wire nails with small heads at J and H. On the side walls the plaster is then finished against the bottom of the cove, hiding the nails. K K indicate the metal ceiling plates, nailed at J and L, the furring being placed to meet the panels. Fig. 2 shows beams ceiled with ⅝-inch sheathing, A A indicating the sheathing and D B D the metal ceiling nailed at C and C. Under no circumstances drive nails as shown at E E, which only buckles the flat surface of the panels.

In Fig. 3 is shown the method of fastening sheet metal center pieces. A shows the beam, B B the furring strips, onto which the center piece D D is nailed at F and F. An opening is made in the center piece D D to admit the gas pipe E. The plastering is then finished against D D, which hides the flange and nail head F F.

In Fig. 4 is shown the method of fastening sheet metal coves when the side walls and ceiling are plastered. A is the beam, B the plate, C the studding, G the level furring placed around the side walls, E E E, &c., the plaster laths and D D the sheet metal cove fastened to the furring at F and F. When the cove is very large wooden brackets shown at L are fastened every 3 or 4 feet apart, into which a thin wire nail, H, is driven through the cove at intervals, care being taken that no buckles show. The plastering is then finished against the laps of the cove, as shown. When a picture molding is required under the cove, as at J, this can be nailed directly through the metal work into the furring G.

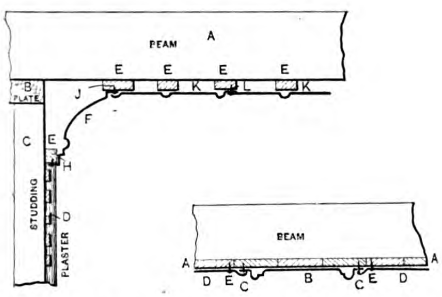


Fig. 1.—Method of Fastening Metal Cove and Ceiling when the Joist are of Wood.

Fig. 2.—Beam Ceiled with Sheathing.

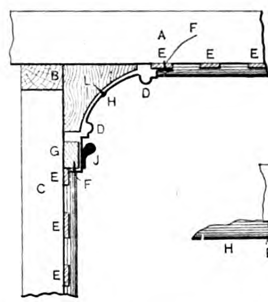


Fig. 4.—Method of Fastening Sheet Metal Coves when Walls and Ceiling are Plastered.

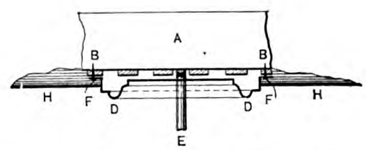


Fig. 3.—Method of Fastening Sheet Metal Center Pieces

Fastening Metal Ceiling Work.

SOME of the big new office buildings in our large cities are perfect hives of humanity, with a daylight population equal to a good sized town. A recent investigation in the Monadnock Building in Chicago showed that nearly 6000 persons were employed in the business offices in that structure. There are 16 elevators, and these carry from 30,000 to 40,000 persons a day. Exclusive of halls and other places used by the general public, the building has nearly eight acres of office floor room.

Moving a Court House by Rail.

House moving by rail is always interesting, but when a railroad loads up a "county seat" and carries it on a train without laying out regular traffic the achievement is worthy of record. This is an instance of responsible work done by the local division authorities of the Burlington & Missouri River Railroad, and the following is quoted from a letter to the *American Engineer and Railroad Journal* from an officer of that road: "The feat was that of transporting by rail the county seat of Hemingford, Box Butte County, Neb., to Alliance, Box Butte County, Neb., a distance of 19 and a fraction miles. By popular vote the county seat was changed some months ago from Hemingford to Alliance. The building was placed on four 60,000-pound capacity trucks. Two loaded coal cars were in front and the same number back of the house. These coal cars served the purpose of anchors to which the building was guyed by ropes. Heavy bridge timbers were secured to the lower part of the court house and supported on the trucks. One difficulty that had to be provided for was that of passing trains. To avoid any inconvenience the first part of the journey was made from Hemingford to Berea, the outfit being allowed to remain for the night on the main track, and the through trains east and west ran around it on yard tracks at that point. The following morning, after the trains had all passed, the court house continued its journey to Alliance, reaching there about noon, June 30. In noting the speed it was observed that country wagons, in order to keep up with the speed of the building, had to move along at a trot, the speed being about 6 miles per hour. Several of the cuts had to be widened in order to let the corners of the building pass. It was through loose earth and not much of a job. The Hon. J. Sterling Morton happened to be in that vicinity when this transfer was made and dryly remarked 'that it was the first time he ever saw a court house going to court.' The building weighed about 70 tons and its dimensions were 34 x 48 feet and 45 feet high."

The Œcus.

The word œcus signifies a room of extraordinary size, though it very frequently means an entrance hall or dining room, says a writer in one of the London architectural papers. Vitruvius mentions four kinds of them in such a way as to vary them into five species; he mentions the Tetrastylon, two Corinthian ones, and adds to these also the Cyzicene and Egyptian. Œcus Tetrastylos is a room where four insulated columns support an upper story. It will be convenient to have the entrance of this construction, for the floor of the hall will thus be made more secure, and by the advantage of the columns the hight of the entrance may be made to agree with the proportion of the other parts.

The Corinthian œcus is a room which, acording to

Vitruvius, has single columns placed either on a poggio or base, or on the ground; that is, columns in a single row and inserted in the wall, either standing upon pedestals, as in the first figure, or standing on the ground, as in the second, and for the sake of distinction it is called Corinthian; each style is excellently adapted to a hall. The entablature may be made either of wainscot or stucco. The ceiling should be either semi-circular or curvature, depressed to the third part of the breadth of the room. The most beautiful length will be that which exceeds the breadth by two-thirds.

The Cyzicene œcus was not of Italian but of Grecian origin, nor does it differ so much from the Corinthian in figure and use as in the situation, the doors and the windows. It looks toward the north and into the gardens, and so capacious are its dimensions that it would contain two triclinia placed opposite each other with their respective circuits. It has folding doors in the middle, and windows made to open like doors to command a view of the gardens.

The Egyptian œcus, far exceeding the others in beauty, contains the hight of two stories, so that it has two orders or rows of columns. The lower ones are insulated, with an architrave only placed upon them, according to Vitruvius, but to which Palladio properly adds a frieze and a cornice. On the corona of this rests an entire wall, in which is inserted a second order of columns, which are either half or three-quarter ones. They are placed directly over the insulated columns, and are a fourth part less, and in their intercolumniations are windows. In the part below the wall stands off from the columns, but is connected by means of the story above; so that round the sides of the hall a walk is formed by the columns, covered with a floor open to the air, and with a balustrade.

New Publication.

MODERN PLUMBING, STEAM AND HOT WATER HEATING. By James J. Lawler. Size, 7¾ x 10 inches. 397 pages. 284 illustrations and four plates. Published by Chiswick Publishing Company. Price, $5.

Treating of both plumbing and heating as it does, there are many who will find this book valuable for reference. The author states that illustrations teach quickly, while many details are shown by cuts that will give the correct idea for arranging the various parts of a house drainage system. The house drainage pipes with the ventilating pipes and traps are dwelt upon at considerable length on account of their important sanitary bearing. Water pressure and its effect, which is found by many a confusing subject, is freely discussed, as are also pumps and hydraulic rams. Questions of interest to plumbers who must take examinations are presented with answers, and this section of the book, occupying 146 pages, concludes with the plumbing regulations of New York City. The remainder of the book is devoted to steam and hot water heating, giving many tables with the much needed explanation for their use, so that the amount of radiation required can be determined, also the size of the mains and branches for all systems of piping. Sectional views show the various traps, pressure valves, pump governors and apparatus used in modern heating plants, accompanied by a brief explanation of their operation, so that the practical man can readily comprehend their use. Exhaust steam heating and blower systems with proportioning of the air ducts are treated in a similar manner, and greenhouse heating is also given attention. The book clearly presents both practical and scientific information, so that the workman, plumber or steam fitter can gain valuable hints as well as learn how to design his work on correct principles.

Foliated Arches.

From the invention of the arch to the middle of the eleventh century no other form of it was used except the semicircular and segmental. About this period license was taken to alter the forms of arches; the pointed arch was introduced, and with it a variety of other forms, as ogees, horseshoes and ellipses. At the same time there came in the practice of foiling arches—that is, of uniting a series of three or more by their bases so as to form one, which is termed a trefoil, quatrefoil, cinquefoil, and so on, according to the number of its component arches or foils, as they may be termed. These foils may be either of the same or different forms, but are generally of an odd number, with one in the center and the rest disposed in similar pairs on each side of it. They are often all circular or all pointed, and sometimes all ogees. An ogee or pointed between two circular foils is a very common arrangement; the lower pair are commonly imperfect semicircles, from their being continued downward to form the sides of the arch, but in some of the earlier examples are made complete semicircles. The pointed arch, from its united strength and convenience, of course assumed the prominent place, and was used in all the larger and essential parts of the fabric, while the other forms were reserved for the decorative arcades, the galleries, doors and windows. These arches when at first introduced were treated in composition exactly in the same manner as the circular arches had been, and were mixed with them. The other characteristics of the pointed style were invented before or after their introduction, and may be traced from their first imperfect germs to their final perfection entirely among European buildings, so that the notion of the pointed style being introduced complete is at any rate erroneous.

CONTENTS.

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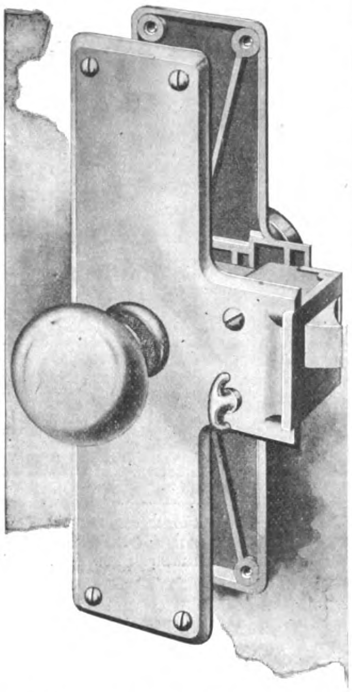
NOVELTIES.

New Corbin Lock.

A new lock set involving some unique principles, both as concerns the construction and method of fitting the door, has just been placed upon the market by P. & F. Corbin of New Britain, Conn. The sets are sent out



Novelties.—New Corbin Lock.—Fig. 1.—Front Door Lock from Inner Side, Showing Locking Collar on Knob, Swing Latch and Dead Bolt with Thumb Knob.

assembled just as they appear in use with knobs and escutcheons attached, each set in an individual box, perfectly adjusted by expert mechanics, and can be used for right or left hand doors. In this way loss of parts either through the dealer or carpenter, with the consequent annoyance and waste of time, is prevented. The lock is made up in three sizes, adjustable to any thickness of doors, one size fitting all doors from $1\frac{3}{8}$ to 2 inches, inclusive, in thickness; one size for doors thinner than $1\frac{3}{8}$ inches, and another size for all thicknesses greater than 2 inches.

To put the lock on it is only necessary to saw from the stile of the door a piece 3 inches deep by $1\frac{1}{2}$ inches wide and slide the set just as received into the cut thus made, tighten the machine screw that clamps the escutcheon against the side of the door and drive home four screws in each escutcheon Fig. 1 shows a door lock, from the inner side, with locking collar on knob, swinging latch and dead bolt with thumb knob, while Fig. 2 represents an office door lock, with jacket removed, looking from above. The two rollbacks in the center perform a double function, operating the latch and locking the door when manipulated by the collar on the inside knob.

From an inspection of Fig. 2 it will be seen that the thumb stop is on, dead locking the lock. If this were off the latch could be operated by turning either knob. To lock the door it is only necessary to give the collar on the inside a quarter turn, throwing the rollback nearest the outside into the slot shown, making the outer knob immovable. The latch can then still be operated by the inside knob and the other rollback, or from the outside by the key, which engages the rollback by means of the locking spindle running through the knob spindles. On front door locks there is a dead bolt under the latch in addition to the latch attached to the thumb knob, instead of the dead locking device shown in Fig. 2. Communicating locks have upon each side a thumb stop like that shown in the illustration, so that each of the occupants of adjoining rooms can lock the door against intruders. Closet locks have simply the latch mechanism, with a knob on the outside only. Ship locks have a key action on each side, without the locking ring, and another pattern is similar, but has a drop handle on the outside for narrow passages. Bedroom locks, hotel locks, &c., show different combinations of the same functions to suit the requirements of the places where they are used, while other patterns embodying variations of the principle employed will be added as required.

The usual thickness of the lock and the fact that its inside face is always the same distance from the outside of the door is referred to as permitting the use of a hinged or swinging latch, a form that for easy action and antifriction qualities is unequaled, but which has been kept out of universal use because ordinary lock cases are too narrow to accommodate it. With this latch the door closes easily and smootbly and the impact of the latch with the strike is not felt. The strike is the same for all locks, one uniform size answering for all thicknesses of doors. The lip at the outer edge is mortised into the stop and the edge of the lock frame rests against it when the door is closed, rendering it impossible to insert anything from the outside or push back the latch. The indented portion of the strike is also protected by a brass backing, the cut in the door frame not showing, thus obtaining a neat and finished appearance not otherwise possible. The distance from the lip of the strike to the top of the latch being the same in all instances it is possible to accurately calculate the space required to accommodate the latch, so that the door is always tightly closed, and the shrinking or swelling of the wood does not affect it.

An important feature to which the manufacturers direct attention is that in a lock so constructed, set up by skilled workmen and sent out with all parts fitted, a very close adjustment of the mechanism is possible. With a solid one frame piece, holding all the parts and keeping them rigidly in the same relative position without possibility of displacement, extreme accuracy can be employed, in this case, for instance, the play of the knobs in the frame being restricted to a maximum of 2 1000 inch. Placing the key work in the knob is also a radical departure and gives additional room for the latch mechanism and greater strength of the frame In the knob is a ball bearing pin tumbler locking cylinder, which can be both master keyed and grand master keyed for any number of locks. Illustrations and price lists covering the line in detail, describing styles and finishes, &c., are in course of preparation, but the company have issued a handsomely printed monograph of 16 pages, which fully illustrates the lock and describes its construction and special features.

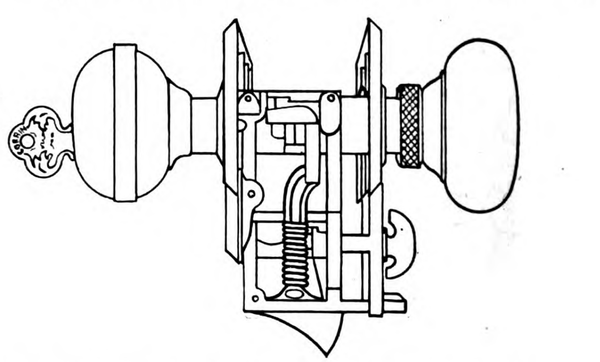


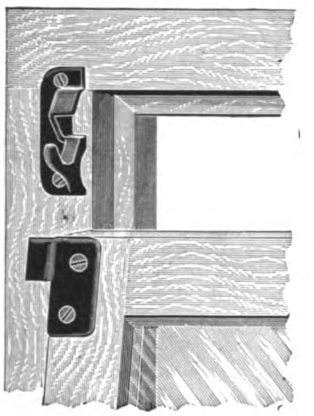
Fig. 2.—Office Door Lock with Jacket Removed, Looking from Above.

Turned Wood and Metal Art Moldings.

The catalogue which has just been issued by George Mertz's Sons of Port Chester, N. Y., is an attractive volume of 48 pages, profusely illustrated with patent turned art moldings, spindles, twisted moldings, machine embossed moldings, &c., which are manufactured in almost endless variety. In offering this publication to the trade the manufacturers state that their object has been "while presenting a larger and more varied line of moldings than any other concern in the world, to eliminate every molding not reasonably needed, to condense rather than to expand the line and to present it in such form under such groupings and with such system as will enable every user of the book to easily obtain every item of information desired." Some of the opening pages are devoted to views of interiors showing the manner in which moldngs may be used to produce rich and tasteful effects. In connection with the engravings are given the numbers of the designs and the sizes in which they are made, thus greatly facilitating ordering and at the same time tending to prevent annoying errors which are likely to occur when this method is not observed. Accompanying the catalogue is a price-list, special notice for ordering twist or turned moldings, and also a discount sheet with a blank order sheet. The catalogue is arranged with a view to meeting the requirements of the trade, and is issued in attractive paper covers.

The Magic Hanger and Fastener.

The Whaley-Dwyer Company, St. Paul, Minn., are manufacturing the Magic storm sash and window screen hanger and fastener, which is herewith illustrated. The device permits the sash or screen to be removed or replaced quickly and easily from the inside of the window. Fig. 3 shows the hanger and Fig 4 the patent fastening or ventilating rod. The sockets have lugs or hinges which prevent the sash falling out of position when inserting or detaching, which is done by simply holding at the proper angle and pushing upward, or the reverse action. They are made of malleable iron, finished in enamel or tinned. The patent



Novelties.—The Magic Hanger and Fastener.—Fig. 3.—View of the Hanger.

fastening or ventilating rods on either side allow the sash to be opened for purposes of airing the room o. washing the window, and when the sash is closed or drawn in they lock securely through the staple on the inside and lie snug against it. They are of nickel plated finish.

Leonard Combination Kitchen Cabinet and Table.

An article which will doubtless interest the enterprising carpenter as well as the housewife is the Leonard kitchen cabinet and table combined, which is being introduced to the trade by the Leonard Mfg. Company of Grand Rapids, Mich., who say it is the first article of the kind which provides a place for the new japanned flour bins with sifter. These can be set up on the bracket just above the table. A place is also provided for a pair of

Fig. 4.—Fastening or Ventilating Rod.

scales or other articles for kitchen use between the flour bins. Being so placed they are entirely out of the way and are claimed to be much more convenient than the old style of tilting flour bins below the table. The molding board is situated just below the table top, and this is made so that it can be used on the reverse side as a cutting board. The drawer below the molding board is intended for kitchen utensils, such as rolling pins, basting spoons, knives, &c. Below this drawer is a cupboard for pots, kettles, stew pans, &c. On the other side of the table is a deep drawer with eight movable boxes for dry groceries, such as sugar, oat meal, tapioca, &c. Another drawer is provided with partitions to hold bottles of flavoring extracts of various sizes and to afford room for salt, pepper and spices. The bottom drawer is for crackers or other groceries. The entire top is designed to be used as a kitchen table. It is constructed of ash with a maple top. The finish is antique and the trimmings are of bronze.

Ott's Wire Nail Hatchet.

The hatchet which is shown in Fig. 5 of the cuts is of special interest to carpenters and is being offered to the trade by Ott's Wire Nail Hatchet Company, 944 Sixth avenue, New York City. The principal feature of the hatchet is the slots for pulling nails. These, it is remarked, are just in the right places to allow of pulling nails from usually difficult places, such as

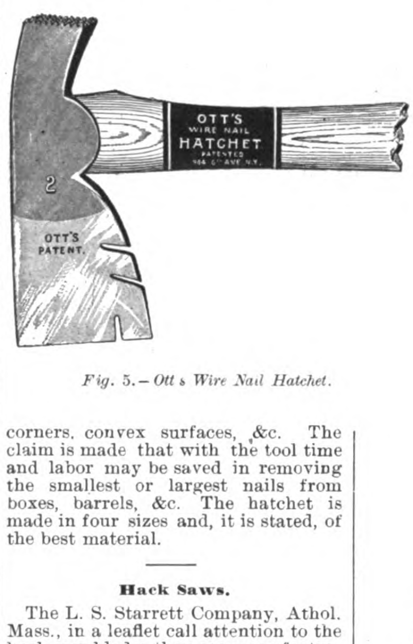


Fig. 5.—Ott's Wire Nail Hatchet.

corners, convex surfaces, &c. The claim is made that with the tool time and labor may be saved in removing the smallest or largest nails from boxes, barrels, &c. The hatchet is made in four sizes and, it is stated, of the best material.

Hack Saws.

The L. S. Starrett Company, Athol. Mass., in a leaflet call attention to the hack saw blades they are manufacturing. Saws for common use have 15 teeth to the inch except the 12, 14 and 16 inch, which have 13 teeth. Saws for tubing and bicycle work have 24 teeth to the inch, made in nine sizes, 6 to 16 inch, inclusive. Saws with extra fine teeth, 30 to the inch, are made in 8 and 9 inch sizes only.

Handsome Sheet Metal Work.

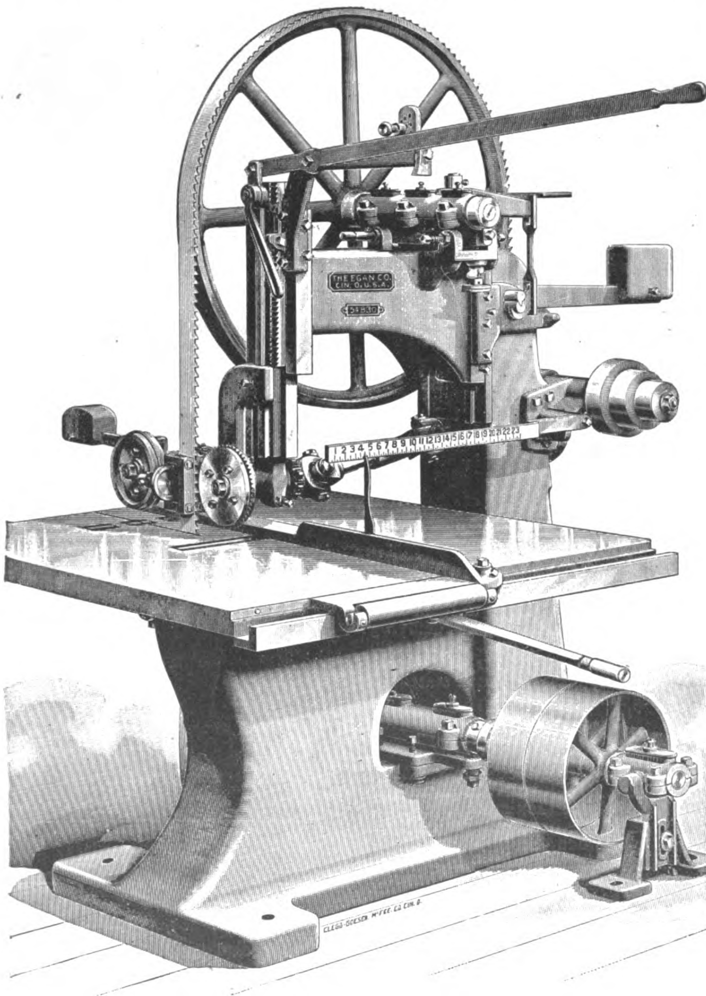
Some beautifully finished specimens of sheet copper work to form a portion of a soldier's monument, erected at Antietam, Md., have recently been furnished by Friedley & Voshardt, 194 and 196 Mather street, Chicago, Ill. An illustration—Fig. 6—presented herewith shows a statue representing the return of peace, modeled by the firm named. It is 6 feet high and made of 32 ounce copper. The firm are prepared to execute any class of work in sheet metal of all descriptions, either from designs furnished them or from their own designs to suit special requirements. They carry in stock a great variety of sheet metal ornaments and have in preparation a 240 page catalogue, showing new designs, which they expect to have ready for distribution about October 1.

New and Improved Automatic Band Rip Saw.

What the manufacturers refer to as an entirely new departure in rip saws is illustrated in Fig. 7 of the engravings. In this machine the column is very heavy, the construction being such

Handsome Sheet Metal Work. Fig. 6.—Statue Representing Return of Peace.

that it is said to be free from vibration. The machine measures 24 inches between the fence and the saw blade, taking material up to 9 inches thick. The wheels are 42 inches in diameter, the upper one being light yet strong and provided with spokes, while the lower one is heavy and with a solid web, thus circulating less dust and giving increased momentum to the lower wheel, so that its speed governs that of the upper, preventing the upper wheel overrunning the lower one. The upper wheel is fitted with the company's new improved straining device, which has a forward, backward and also a side adjustment. It is regulated by an adjustable weight and a compound lever so sensitive that no matter what the vibrations may be the strain takes up the slack in the blade, thus adding materially to the perfect working of the machine and the life of the saw blades. There are three speeds of feed—60, 90 and 135 feet per minute. The arrangement is also such that short stock can be worked to advantage. The manufacturers are the Egan Company, 221-241 West Front street, Cincinnati, Ohio, who claim that they are the first to produce a machine of this kind. The point is made that the machine is safer to operate, a less kerf is removed, wider and thicker material may be ripped, less power is required, the work is accomplished rapidly, the table is always level and at standard hight, the rolls are close together and the adjustments of fence and rolls are quickly accomplished. The claim is made that there is a great saving in time each day in every adjustment made over circular rip saws.



Novelties.—Fig. 7.—New and Improved Automatic Band Rip Saw.

C. E. JENNINGS of C. E. Jennings & Co., 101 Reade street, New York, sailed July 29 on the steamer "Statendam" for Rotterdam, Holland. He goes abroad in the interest of his concern and will spend several months in Europe.

Adjustable Cast Iron Level.

Standard Tool Company, Athol, Mass., are making the iron level illustrated in Fig. 8 and which is offered as possessing many of the advantages of higher cost levels. In many respects it is similar to the ordinary cast iron level, the level glass, however, being inserted in a cast iron shell before being placed in the level, the shell resting on a central point. Two screws pass through the frame of the level and fit on to a projection at each end of the iron bottle receptacle, holding it securely in place, and at the same time making an adjustable level of it, as a right turn of the screws will readily adjust the glass should it by any accident get out of place. If the glass is broken a new one can be inserted and adjusted by any one. The levels can now be supplied in sizes from 6 to 24 inches inclusive.

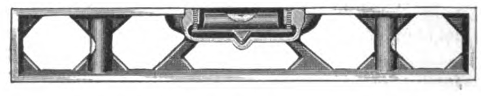


Fig. 8.—Adjustable Cast Iron Level.

TRADE NOTES.

THE metal ceiling trade will learn with regret of the death, which occurred July 18, of Ruluf Lyles, of the well known firm of Lyles & Mills, makers of steel ceilings, 231 William street, New York City. Mr. Lyles was born at Flatlands, Long Island, 78 years ago and from 1861 to 1888 was engaged in the canned goods business under the style of Bogle & Lyles. For the past ten years, however, he was connected with the steel ceiling industry as a member of the firm of Lyles & Mills. The business of the concern will be conducted in the future under the same name as heretofore.

BOMMER BROTHERS, makers of the well known Bommer spring hinges, have recently taken possession of their new quarters at 257 to 271 Classon avenue, Brooklyn, N. Y. The main building, which is 60 x 100 feet in size and four stories in hight, has light on all sides, is of the slow burning mill construction, fitted with automatic sprinklers, and every precaution of tried value has been taken to minimize the fire risk, while at the same time special attention has been given to the question of ventilation, as well as sanitary surroundings for the employees. The building contains fire proof vaults for the storage of designs and special tools, while the engines and boiler rooms, storage for coal, &c., are located outside the main structure. The power plant consists of a battery of Bigelow high pressure boilers, arranged for either forced or natural draft, and a Watts & Campbell 100 horse-power Corliss engine. The manufacturers express the hope that with their largely increased facilities they will be in a position to serve their customers better than ever before.

THE STOVER MFG. COMPANY of Freeport, Ill., have decided to erect a large plant intended for the manufacture of wind mills, grinding mills, &c., of which they make a specialty. It is the present intention to have the new plant ready for active operations by the first of the coming year. The buildings to be erected will be of a substantial character, composed largely of stone, brick and steel and will for the most part be one story high. The plant will cover about 5 acres and will be constructed on plans which will admit of expansion whenever it may be necessary to increase the manufacturing facilities. We understand that this step has been rendered necessary by the large increase in the company's business.

A PAMPHLET just issued by the Alfred Clay Company of Alfred, N. Y., relates to the Regal roof tile, for which many strong claims are made. It is pointed out that a tile roof requires no paint, stain or repairs and that there is an equal temperature space between the tile and the roof sheathing, thus making the upper rooms in a building much cooler in summer than would otherwise be the case. The tile has deep reveals, which, it is pointed out, are not possessed by tin, slate and shingles, while the construction is such that it does not back flow and break from freezing, neither does it disintegrate under the action of salt air or soft coal smudge. Another point made is that water collected from a tile roof is freer from impurities than from any other roof. The illustrations in the pamphlet consist of half-tone engravings of buildings which have been covered with Regal tile.

THE BRIDGEPORT MFG. COMPANY, Bridgeport, Conn., have recently put on the market the B. M. Co. screw drivers in 3, 4, 5 and 6 inch sizes. They have beech wood handles, capped ferrules and flat cast steel blades thoroughly hardened and tempered. The company will be pleased to furnish samples of these goods, and call attention to the prices at which the screw drivers are offered.

THE IRON CITY METAL CEILING COMPANY of Pittsburgh have been granted a charter of incorporation, under the laws of West Virginia, with a nominal capital of $1000, with the privilege of increasing same to $15,000. The shares are $100 each and are held by John C. Graff and M. Walters of Pittsburgh, Chas. L. Atwood and Jos. G. Atwood of Homestead, and Harry L. Graham of Allegheny, Pa. This new concern will take over the business of the Iron City Mfg. Company of Pittsburgh, manufacturers of patent paneled metal ceilings, stamped steel plates, patent cap seam roofing, crimp roofing and siding.

Carpentry and Building

WITH WHICH IS INCORPORATED

The Builders' Exchange

VOL. XXI. No. 10. NEW YORK, OCTOBER 1899. Ten Cents a Copy. One Dollar a Year

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CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

DAVID WILLIAMS COMPANY, - - PUBLISHERS AND PROPRIETORS
232-238 WILLIAM STREET, NEW YORK.

OCTOBER, 1899.

Shortage of Steel Checks Building.

The scarcity of steel is beginning to make itself seriously felt in the building industry. Structural work on some of the big new buildings in New York City is suspended by delays in the delivery of material, and a similar condition prevails in many other quarters. So great is the inconvenience thus caused that in many cases contractors are offering a handsome premium on contract prices in order to secure prompt delivery. In New York the work on a number of new public school buildings, which were intended to be ready for occupancy at the opening of the fall term, is at a standstill, and grave inconvenience and loss is likely to accrue to contractors and to the city in consequence. The advance of $5 a ton made the last week in August in the price of structural steel appears to have no effect in restricting the demand, which continues urgent. Every rolling mill turning out this class of material is working to its fullest capacity, and many orders have to be turned down by reason of inability to fill them within reasonable time. It is likely that this condition of affairs will check a good deal of the projected fall building in all parts of the country, with the necessary consequence of reducing the current demand for all kinds of goods that are used in the construction and equipment of new buildings. It is probable, however, that this will not be found altogether an unmixed evil. In many of these lines the demand of late has outstripped the capacity of production, and a slackening of the current demand will give producers a chance to catch up with their orders. So far as can be judged by the existing condition of business, it is not likely that many of the building operations which are postponed this fall from the lack of material will be abandoned altogether, but merely deferred until spring.

Collapse of the Chicago Coliseum.

Our readers are doubtless more or less familiar with the disaster which occurred a few weeks ago in connection with the construction of the Coliseum in Chicago, resulting in the death of a number of the workmen engaged in the undertaking. The happening has provoked the severest criticism of those responsible for the work which was in progress, and to designate it as an accident pure and simple, liable to take place at any time under similar circumstances, is to express it mildly to say the least. Naturally attempts are being made to evade the responsibility for the destruction of property and the deplorable loss of human life, but some one is undoubtedly culpable in the highest degree for this gross carelessness. Twelve large steel arches had been erected, each of 165 feet span, placed 25 feet apart. Common sense, or the most ordinary prudence, would seem to dictate that as soon as two of these arches had been erected they should have been so braced or tied together that they could have withstood any lateral shock, and every additional arch should have been treated in the same way. The fact that all were erected, and all went down like a row of bricks when the end arch fell against its neighbor, proves that they were braced very imperfectly and that no safe calculation had been made to guard against such an occurrence. Elaborate investigations can be instituted as to what caused the first arch to sway and fall over, and severe blame may be visited on the head of the man who ordered tackle to be fastened to it improperly for the purpose of taking down the erecting crane, but that arch would not have fallen if it also had been sufficiently braced. The excuse has been published that the lack of bracing was caused by the non-delivery of the steel by the mills having the contract for it, but such an excuse can receive little attention from those who mourn for their dead. The building contractors were evidently in such haste to get all the arches in position that apparently they took chances on what seemed to be a remote contingency. Doubtless this accident will be cited by our foreign trade rivals as an argument against the use of American steel or the purchase of American structural work. Some of our own daily newspapers have been inclined to ascribe the fall of the incomplete structure to possible faulty material or bad workmanship in some portion of the arches. But the cause is so obvious that any reflections on the material used should be at once dismissed.

The International Bank Building.

The modern office building which is being erected on the northwest corner of Broadway and Cedar street, this city, will be known as the International Bank Building, and will rise 14 stories above the street level and extend two stories below the curb line. It will be of steel skeleton construction, and, according to the plans of Bruce Price, the architect, will be of modified Florentine style of architecture. The building will have a frontage of 40 feet on Broadway, 153 feet on Cedar street and a trifle over 33 feet on Temple street. We understand that the exterior materials will be of granite for the basement, Bedford limestone for the first two stories, and red and white brick, with terra cotta and limestone trimmings, for the upper stories. The roof will be of the hip type and will be covered with slate tiles. A noticeable feature will be a copper cornice of deep projection. The ornamentation of the front will embrace vermiculated Bedford columns, extending two stories in hight. The main hall will have the floor and walls of marble, while the upper stories will have mosaic floors and iron staircases. There are to be four hydraulic passenger elevators, and in the sub-basement will be boilers, electric lighting plant and general machinery. The cost of the structure is estimated at $700,000. The work of tearing down the old Niagara Building, which for many years has occupied the present site, has recently been completed and operations upon the foundations are in progress. The builders and contractors of the new structure are the George A. Fuller Company, who are also putting up the Andrews Building, at the corner of Broadway and Chambers street, and the Battery Park Building.

Fire Causes in Massachusetts.

Some rather interesting statistics are to be found in the fifth annual report of the State fire marshal of Massachusetts, which shows the total number of fires occurring throughout the State and the causes by which they were brought about. It appears that during the year there were 4513 fires throughout the State, of which 3609 occurred in wooden buildings, 864 in brick buildings and 40 were other than building fires. The loss involved by the conflagrations is placed at $6,150,154. The total number of fires occurring in the city of Boston during the year was 1110, of which 531 were in brick buildings and 577 in wooden buildings, two being other than building fires. The cause of 140 of the fires was the explosion of kerosene lamps, while carelessness with and the upsetting of kerosene lamps caused 489 fires, involving 11 deaths and 27 serious injuries. In commenting upon this fact the fire marshal states that most, if not all, of these casualties might have been avoided by the disuse of glass lamps, and he strongly recommends the general adoption of metal lamps wherever practicable. He also suggests the adoption of a general building law to apply to the smaller cities of the commonwealth and the maintenance, by State or county authorities, of some intelligent supervision and regulation of electric wires in towns.

New York's New Building Code

The new building code of the City of New York, as prepared by the Building Code Commissioners is, at the time of going to press, in the hands of the Municipal Assembly. The commissioners state that they have attempted to cover the entire ground so that no matter need be left in doubt in the minds of contractors, builders or persons desiring to erect buildings in the city. The new code is a very extensive and comprehensive system of laws, and will make a bulky volume. While there have been retained a great many of the old laws these have been rearranged, making of them practically new ones, and besides there has been added in every section a great mass of entirely new matter; new sections have also been introduced treating of subjects upon which there has been up to this no law on the statute books of the city or State.

Interesting among the new provisions are those relating to the reduction of thickness of walls of dwellings and the decreasing of what is technically known as the "floor load." The commissioners seem to have thought it advisable to allow the walls of certain kinds of dwellings to be reduced in thickness by as much as 4 inches and to allow builders to put in floors in dwellings and other houses that will be expected to stand less transverse strain than has hitherto been demanded of them.

The code makes two classifications of buildings, the word "dwellings" being defined to include dwellings, asylums, apartment houses, tenements, convents, club houses, dormitories, hospitals, hotels, lodging houses, parish buildings, schools, laboratories and studios.

The term "warehouse" is made to include warehouses, stores, factories, mills, printing houses, pumping stations, refrigerating houses, slaughter houses, wheelwright shops, cooperage shops, breweries, office buildings, stables, railroad buildings, markets, jails, police stations, court houses, observatories, foundries, machine shops, public assembly buildings, armories, churches, theaters, libraries and museums.

The principal innovations in the building laws will be found in the section of the code devoted to fire proof buildings, floor loads as already mentioned, fire appliances and fire limits in the city. The code provides with respect to floor loads "that every floor shall be of sufficient strength to bear safely the weight to be imposed thereon in addition to the weight of the materials of which the floor is composed." This is the general provision of the old as well as of the new law, but the new code provides that for dwellings as defined above a strength of 60 pounds will be sufficient, 75 pounds for office purposes above the first floor and 150 pounds for the first floor; for school houses or places of instruction, 75 pounds; a public assembly, 90 pounds; stores, 120 pounds, and warehouses or factories, 150 pounds.

The section devoted to fire proof buildings provides that "Every building hereafter erected or altered, to be used as a hotel, lodging house, school, theater, jail, police station, hospital, asylum, institution for the care or treatment of persons, the hight of which exceeds 35 feet, excepting all buildings for which specifications and plans have heretofore been submitted to and approved by the Department of Buildings, and every other building the hight of which exceeds 75 feet, except as herein otherwise provided, shall be built fire proof—that is to say, they shall be constructed with walls of brick, stone, Portland cement, concrete, iron, or steel, in which wood beams or lintels shall not be placed, and in which the floors and roofs shall be of material provided for in this code."

The code also provides three legal kinds of filling between the iron floor beams; first, arches of common brick; second, hollow tile arches of hard worked clay and porous terra cotta, and third, the Roebling system of arching. Provision is also made for other kinds of arching or fillings to be decided upon under conditions prescribed in the same section.

The new code is meeting with some very severe criticism on the part of the architectural profession, and public hearings are to be given, after which the commissioners feel that the new code will be adopted, although it may be in a somewhat amended form.

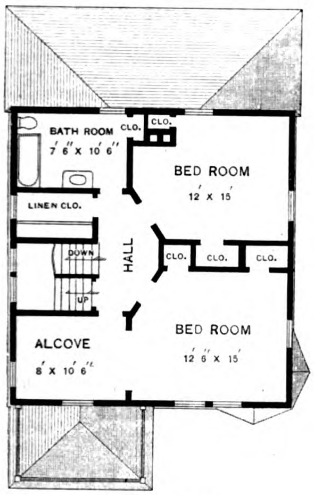
Security Against Fire at the Paris Exposition.

Intending exhibitors and visitors from the United States to the Paris Exposition in 1900 will be interested in knowing what arrangements and regulations will be made by the French authorities against fire. The Paris Exposition administration has taken all the measures possible to afford security to exhibitors and visitors against fire at the exposition. Their regulations are rather voluminous, containing 36 articles distributed in six chapters. These regulations take up the openings and exits and the stairways and doors of all palaces and buildings. They regulate the width of doors and steps. All exterior doors will open in and out. Doors opening only inward must remain open constantly. Emergency doors will bear an inscription stating their purpose, and in all hallways and corridors painted arrows will indicate the direction of the exit. An emergency lighting system for night use will consist of lamps of 1 candle-power, bearing the distinctive red color. All wood of the frame work in the buildings will be covered with an insulating coat of non-inflammable material. All stairways will be of fire proof material. The floors of all buildings, palaces, theater halls, *cafés*, concert rooms, exhibition places, and all railings and balustrades will also be of fire proof material, and before accepted will be thoroughly tested at the expense of the contractors. All decorative canvas, awnings and canvas coverings must be fire proof. All electric installation of cables, lamps, wires and conductors in the interior of the buildings must be put up under the supervision of the director of exploitation. All motive power, other than electric, will be admitted only under rigid conditions. The use of celluloid in lamps, globes, balloons and other fancy apparatus for lighting decoration will be forbidden. The regulations for heating and lighting provide that it can only be done by gas or electricity. The use of hydrocarbures oils and petroleum, acetylene gas and other gases than coal gas is positively forbidden, either for heating, lighting or motive power. The construction of meeting halls, *cafés*, concert halls and theaters must be of fire proof material, and the theater curtains must be of iron or asbestos cloth. The lighting of such places will be exclusively by electricity. A fire service as nearly perfect as possible will be established, with a water piping and pressure sufficient for firemen's service. The administration assume the right to enforce any measures that may be deemed necessary to assure safety.

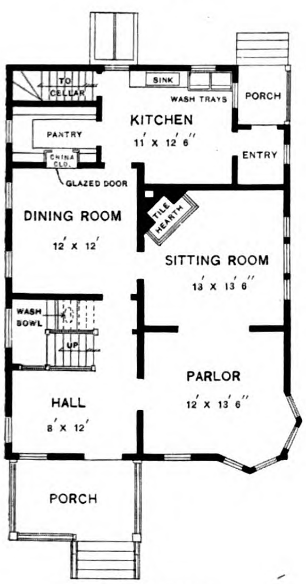
The Tenement House Committee of the New York Charity Organization Society propose to hold an exhibition next winter which will be devoted to improvements in the planning and construction of tenement houses, workmen's cottages, model lodging houses, public baths, laundries, cooking schools, &c. Lectures, conferences and public discussions in relation to these subjects will be held in connection with the exhibition.

HOUSE AT MERIDEN, CONN.

The subject which we have taken for our half-tone supplemental plate this month is a frame residence embodying many points of interest to those seeking a home. Some of the more noticeable features are the gambrel roof, the projecting windows at the right hand corner of the lower story, and the neat and tasteful finish of the front porch. The interior is divided into five large rooms on the first floor, in addition to a stair hall of such dimensions that it may be readily utilized as a reception



Second Floor.



First Floor.

Scale, 1-16 Inch to the Foot.

room. The dining room is just in the rear of the main stairs and communicates directly with the kitchen, which occupies the rear portion of the house. On the second floor are two sleeping rooms, out of one of which is an alcove 8 x 10½ feet in size. The bathroom is at the rear of the house, yet readily accessible from the other rooms. Between the bathroom and the main stairs is a commodious linen closet. In the attic are two sleeping rooms, with ample closets, and two large storerooms.

From the architect's specifications we learn that all the timbers are of spruce, the first floor joist being 2 x 10 inches, the second floor joist 2 x 9 inches, the attic joist 2 x 7 inches and the ceiling joist 2 x 5 inches. The studding used is 3 x 4 and 2 x 4 inches, all placed 16 inches on centers. The rafters for both the upper and lower roofs are 2 x 6 inches, placed 2 feet on centers. The sills, girts and posts are 4 x 6 inches, the lower plates 2 x 4 inches, doubled, and the upper plates 2 x 6 inches, doubled. The house is sheathed with No. 2 matched spruce, on which is laid water proof paper. The first story is covered with No. 1 white pine clapboards, and the second story, gables and roof, as well as the projecting windows at the corner in the first story, are covered with California red wood shingles, these being 18 inches on the roof and 16 inches on the sides. The clapboards and trimmings are painted, while the shingles are treated with one coat of linseed oil.

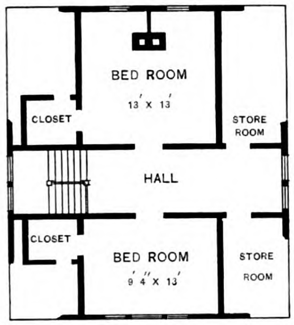
The first and second floors are laid double. The

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

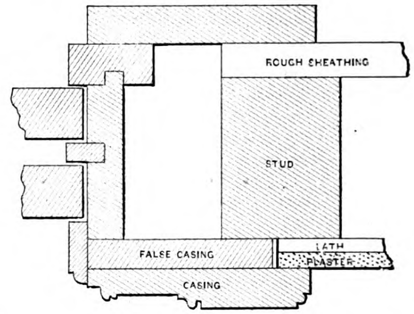
House at Meriden, Conn.—D. Bloomfield, Architect.

kitchen and bathroom floors are straight grained North Carolina pine, while the balance are sound pine 4 inches wide. The entire finish inside of the house is in the natural wood, the kitchen pantry and entry being in North Carolina pine and the balance of the first floor in brown ash. The bathroom is finished in ash, with the balance of the second floor in whitewood, this also being the finish used in the attic. The fire place in the sitting room is laid up with old gold colored brick, the mantel is of pretty design, finished in antique oak, while the hearth is of tile of neat pattern. The plumbing throughout the house is of the exposed type, well ventilated and with nickel plated trimmings. The heating is done by a hot air furnace made by the Dighton Furnace Company of Dighton, Mass.

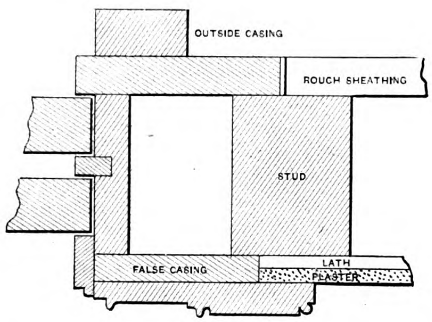
The house is located on Broad street, Meriden, Conn., and was erected a little more than a year ago for J. H. Charlton, at a cost, ready for occupancy, of a trifle less than $3200, in accordance with plans prepared by D. Bloomfield, architect, 129 State street, Meriden, Conn. The builder was A. J. Lyman of the place named.



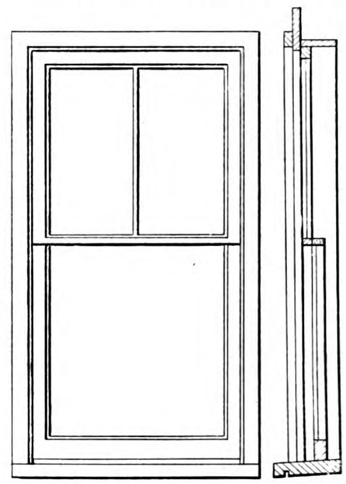
Attic Plan.—Scale, 1-16 Inch to the Foot.



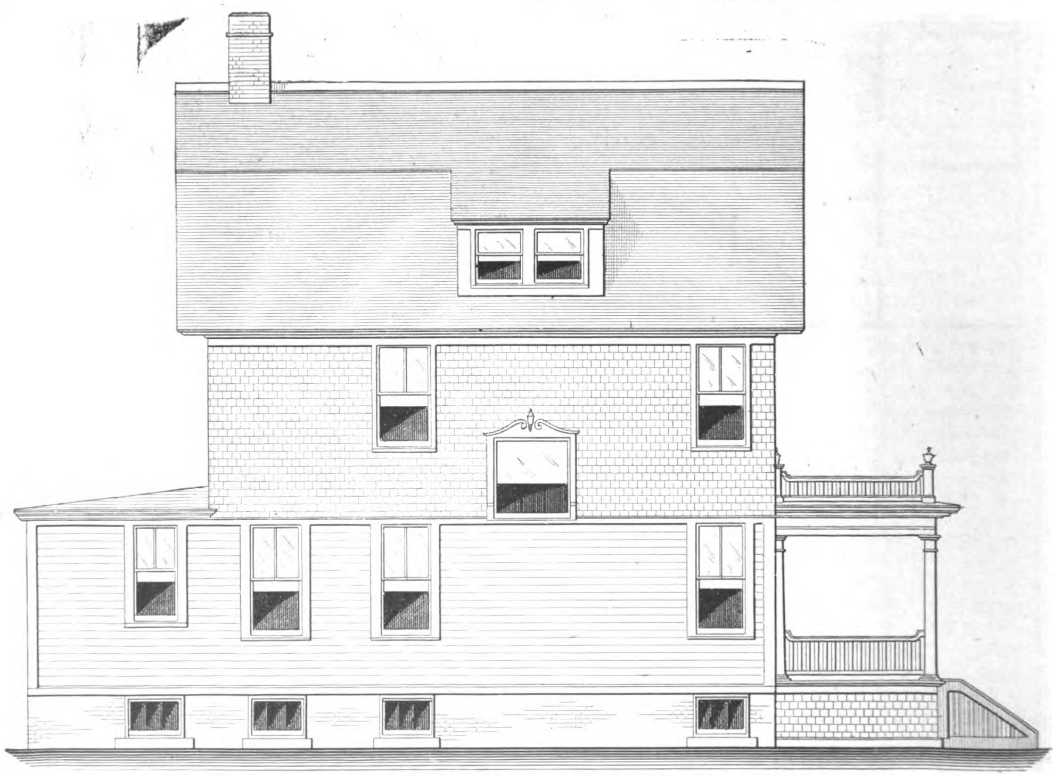
Horizontal Section through First Story Window Frames.—Scale, 3 Inches to the Foot.



Horizontal Section through Second Story Window Frames.—Scale, 3 Inches to the Foot.

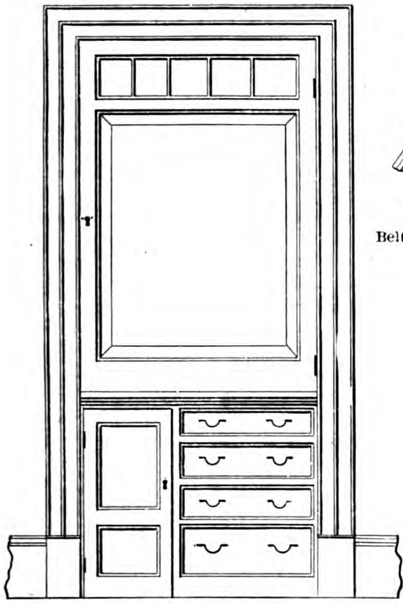


Elevation and Section of Second Story Windows.—Scale, ½ Inch to the Foot.

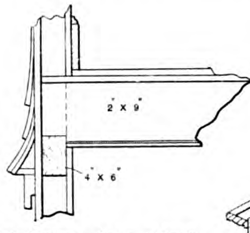


Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.

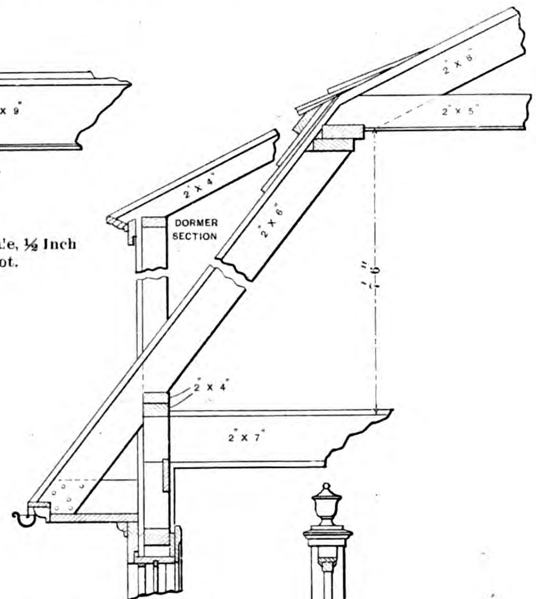
House at Meriden, Conn.—Elevation, Plan and Miscellaneous Details.



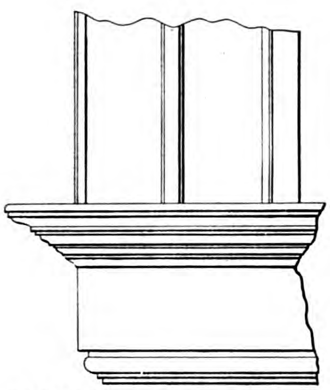
Elevation of China Closet.—Scale, ½ Inch to the Foot.



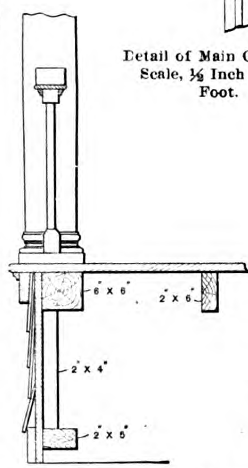
Belt Course.—Scale, ½ Inch to the Foot.



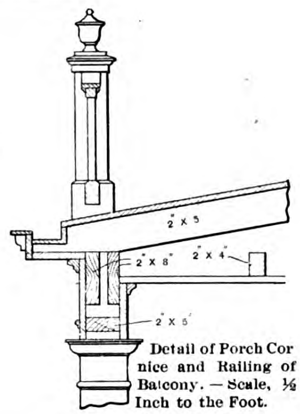
Detail of Main Cornice.—Scale, ½ Inch to the Foot.



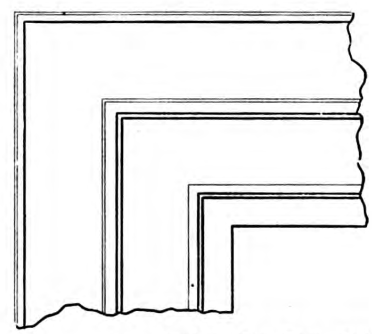
Detail of Window Finish.—Scale, 3 Inches to the Foot.



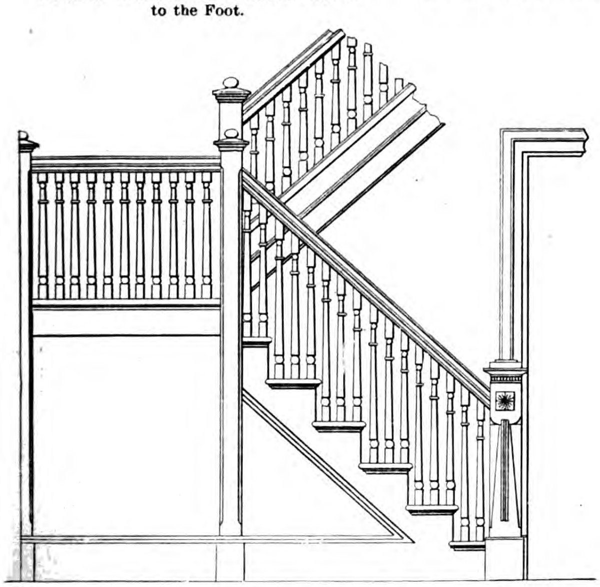
Detail of Porch Construction.—Scale, ½ Inch to the Foot.



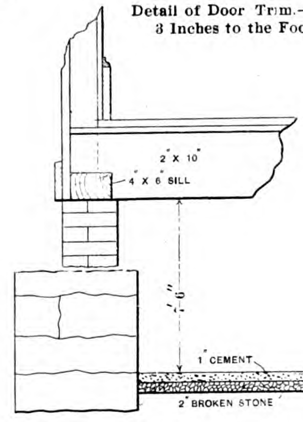
Detail of Porch Cornice and Railing of Balcony.—Scale, ½ Inch to the Foot.



Detail of Door Trim.—Scale 3 Inches to the Foot.



Detail of Main Stairs.—Scale, ⅜ Inch to the Foot.



Detail of Foundation and Water Table—Scale, ½ Inch to the Foot.

Miscellaneous Constructive Details of House at Meriden, Conn.

THE FUTURE OF THE BUILDERS' EXCHANGE.

WE present below some interesting extracts from an address entitled "The Future of the Builders' Exchange," delivered by E. W. Palmer at the dedicatory exercises July 18 of the Cleveland Builders' Exchange, on the occasion of the occupation of their new quarters in the Chamber of Commerce Building, Cleveland, Ohio:

One of our prominent members in a recent conversation remarked, "I am willing at any time to figure in competition with a trained mechanic who is a responsible bidder, but I am not willing to figure against men who either do not understand how to figure or who do not intend to live up to the specifications."

This, it seems to me, is the attitude which should be taken by exchange members, and that it is the province of the exchange to formulate rules of action on which fair competition should be based and disseminate those rules among our own members, and among builders and material men outside of our organization.

While the exchange has a large function to perform in giving builders and material men a common place for meeting and for the transaction of business, it is no doubt true that the more important reason of its existence is along the line of ideas. Business will be done whether there is an exchange or not, but the manner of its doing must depend largely upon our organization and the methods which it advocates.

The position in busines of every contractor and subcontractor in Cleveland is to-day more secure from interruption and interference by reason of the exchange. Ten years ago the standing of a contractor was considered in no way commensurate with that assumed by any other class of business men employing a like number of men or requiring equal skill and responsibility. This was due, first, because his position was associated with no fixed place of business and that much of the work done by him was of a nature performed by cheap labor, and, second, because the contracting business had no fixed principles to act upon save the common rules of ordinary business and such individual practices as the contractor himself might assume.

Impositions without number helped to create this impression. He could be asked to spend an unlimited amount of time figuring without compensation on plans which were perhaps never to go through or which might be let to a preferred contractor even if he were the lowest bidder. He could be asked to sign impossible specifications, to do detail work for which his original plan never called. Material which he put in could be rejected for very insufficient causes, and if he dared to object he was referred to that clause in the specifications declaring the architect sole judge of all questions involved. We have all of us, builders, subcontractors and the material men, felt the injustice of this position many a time. To-day some of it still exists, but, thanks largely to the exchange, much of it has been remedied and much more may be.

We have to-day a more responsible class of contractors with larger capital and facilities. We have uniform contracts. We have, I believe, educated the architects to much fairer practices than formerly obtained, and we have removed from the building business many of the petty jealousies, prejudices, tricks and malicious practices which formerly found no other excuse than to belittle and embarrass a contractor. Fair competition has found free scope in the exchange; any other practice would soon rightly lose us the confidence of the building public.

The failure of the exchange in past years to grow as its founders had expected was due largely to the fact that we had insufficient organization and facilities. The details were for years left to a clerk, whose only duties were to record the minutes and keep the books of the exchange. From the date of the installation of a permanent secretary, employed to give his entire time and energy to the exchange, commenced its present success. With our present room and facilities it will be an extravagance not to become a member.

We can also do much to help the architects and thus, at least indirectly, bring them more closely in touch with our practices and methods. Architects have complained bitterly of competition from members of their own craft who paid no attention to their rates and usages, and who looked for their compensation to methods which few architects would care to pursue. I believe it possible to formulate such rules among our members that any architect guilty of the practice of demanding part of his compensation from the contractors should be duly investigated by the exchange, and, if found guilty, that all members should be requested to abstain from doing business in his office.

The exchange has also a responsibility in the training of mechanics for future years. At present there is no standard fixing the efficiency of a workman and no opportunity to learn any of our departments of business with any systematic thoroughness. As a result the worst factor the contractor has to face to-day is not his competition or the material market, but his own labor. Unskilled foremen and mechanics lead to a waste of material and time which in many cases would afford him a handsome profit.

The remedy prescribed by the National Exchange lies in manual training and trade schools. Organized labor is sometimes supposed to be hostile to this move, but we believe not when properly regulated. Provision must be made to supply the country with capable mechanics and the youth of the country must be educated. In Philadelphia there is a school conducted in connection, we believe, with the exchange, where young men are taught the elements of mechanics and building, and are then apprenticed to go through a practical training before being recognized as journeymen. We can see nothing but good from this move and believe the exchange should take it under early advisement.

Much can be done also to better the condition of the workmen employed by us. We are glad to say that the sentiment in the exchange has always been largely in favor of the best possible remuneration for men that could be afforded, together with shorter hours and such protection as may best guard from accident. Much can be done in this way to create better conditions between employer and employee, and to bring about peacefully what may otherwise cause tedious and expensive struggles.

Upon each member of the exchange lies the responsibility of so supporting it with his time, thought and influence that in every way it may soon be brought to the highest possible usefulness to contractors, material men and to the community.

Boring Holes in Bricks.

Holes may be very quickly drilled in brick or stone walls by making the cutting end of the drill in the form of a cross with four cutting edges, says an exchange. The drill is held in one hand and rotated while being struck with a hammer. When the holes are required to be deep, a projection may be made on the outer end by which it can be knocked out of the hole quickly. The cutting end should be larger than the shank, so as to allow the clearance, and the shank should be sufficiently long to allow a hammer to be used for knocking it out of a deep hole. An old twist-bit, also, makes a good boring tool for the purpose required, also a piece of steel tube, such as bicycles are made with, will, if jagged at the end, answer very well. These tools are only suitable where the bricks are fairly soft.

MAKING WOOD PATTERNS.—VI.

BY CHARLES J. WOODSEND.

THE templates being all ready, we will now proceed with the turning. From the drawing made with the compasses, set for the semi-diameter of the wheel, transfer it to the pattern as it revolves in the lathe, then turn the edge of the pattern up to this line and let it be square with the face. Now take off the sharp corners of the segments forming the rim. Apply the template. Keep on turning off a little and trying the template until the work and it agree, bearing in mind all the while that after the edge of the pattern has been turned off to the line marking the diameter there should be no more reduction in size except just enough to round it up to the template.

The hub will be the next. Turn off the face of the hub until it is the right thickness above the web, and then with the compasses set to the proper distance mark the upper edge of the fillet. Turn out the fillet until the template for this part touches the web in one portion and the line marked with the compasses in the other, taking care in all cases not to cut into the web. When the following is complete, sandpaper the work neatly; then give it two coats of shellac. Let the first coat dry before putting on the second. Then when all is dry, sandpaper smoothly with a piece of worn fine sandpaper until no roughness whatever can be detected. This being done, remove the pattern from the chuck, take the face plate from the lathe and unscrew the chuck. Throw it away and make another one which is turned up in a similar manner to the old one, with this difference: The depression in the chuck for the hub must fit in the diameter of the one turned upon the pattern. This is necessary so as to center the pattern correctly and bring the turning upon both sides of the wheel to a proper junction. Screw the pattern in place and proceed as before. After the pattern is shellacked, and all roughness removed, take it from the lathe and lay out the arms, cutting them with a draft, as indicated in the sectional view, Fig. 41, and in the direction as indicated by the arrow in Fig. 40. Sandpaper these freshly cut edges, and shellac the same as the rest of the work. Always shellac the work as it is finished, as this prevents all liability to check and also keeps the pattern clean while handling.

Instead of the arms shown upon this pattern, round holes may be used, or, if preferred, curved arms may be employed. But under all circumstances, unless, indeed, the pattern be very small, the web must not be left solid, as in the shrinkage of the metal there will be unequal strains and a liability to crack the web.

We will consider that for the case under consideration the hole through the hub is so large that it will pay to core it out, and also that the hub is so thick that a green sand core will not answer. Green sand cores will be explained fully later on, but what we will have to do with at present will be a dry sand core, requiring a print upon the pattern and also a core box in which to make it. In case of the pattern on hand one core print will be sufficient. If the hole is to be round the core and also the core print must be round, but if the hole is to be square the core and print must be square also. In the case of square holes in a casting, it is usual to allow a small margin for finishing by the machinist. One-sixty-fourth of an inch all around will be enough, and it is termed "file finish." In the case of a round hole being through the casting, more finish should be allowed. About 1-16 inch on each side of the hole would be enough in a case of this kind, thus making the core print and core box 1/8 inch less in diameter than would be the finished hole.

The core print for this pattern is indicated in E of Fig. 40. Whatever size the hole is to be this print is to be the same at the lower end toward A, but where it joins the pattern it should be about 1-16 inch larger on each side. This applies the same to both round and square prints. The length of the print should be about the same as the diameter of the hole, round prints being turned in the lathe, and after the print is made it should be treated with black shellac. This is made by putting lampblack into orange shellac and mixing well. Give it two coats and rub down with a piece of worn fine sandpaper. Then nail it securely to the pattern, putty up the nail holes and give the whole pattern one final coat of shellac. Let this dry thoroughly and then rub down with either curled hair or hair cloth.

It will not be necessary to make the core box. Figs. 42, 43 and 44 are part plans and sections of a core box for a round core print. Fig. 42 is a plan of half the box, showing the location of the dowels. Fig. 43 is a longitudinal section of the previous figure upon the line A B, while Fig. 44 is a cross section of the whole box. In making this box, take two pieces of stuff a little longer than the required length of the box, the grain running the same as the hole. Face up the two sides which will come together, and it may be well to state that they must fit each other perfectly. The holes for the dowels come next. Bore right through one piece, then place the two pieces together and bore into the other one. The pieces can be held together while boring either with hand screws or with dogs, shown in Figs. 48 and 49. Pattern makers' dogs can be purchased ready made, or a blacksmith can readily make them. Several sizes are employed ranging from 1 inch up to 3½ inches in length, and from ¼ inch square to ⅜ inch square in cross section. The outside of the prongs should be square, while the inside is tapered. Fig. 48 represents a side view and Fig. 49 an end view of one of these dogs. In use the points are driven into the pieces to be held and may readily be withdrawn by the claws of a hammer. After the dowels are driven into the holes, remove the dogs or the hand screws, as the case may be. Then square up the ends of the box to the exact length of the core print with the thickness of the pattern added. This must be done very carefully, for if the box is too short the hole will not go through the casting, while if too long the core

Fig. 41.—Section of Arm.

Fig. 43.—Section of Box on Line A B.

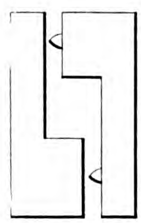


Fig. 45.—Plan of Core Box for Use with Square Core Print.

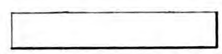


Fig. 46.—Side View of Box Shown in Previous Figure.

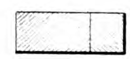


Fig. 47.—End View of Box Shown in Fig. 45.

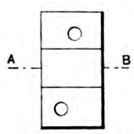


Fig. 42.—Plan of Half of Core Box.

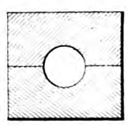


Fig. 44.—Cross Section of Core Box.

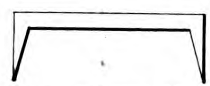


Fig. 48.—Side View of Pattern Makers' "Dog."

Fig. 49.—End View of "Dog."

Making Wood Patterns.

will crush into the sand and possibly spoil the molder's work. After the ends are squared the hole can then be bored out or worked with a gouge. Cut the dowels similar in shape to that shown in connection with Fig. 43. The box must part easily, but when the two parts are in position they must not have any movement sideways or lengthwise. The explanation that was given in regard to this movement in flasks applies equally to all core boxes, as to a certain degree they are flasks themselves. Neatly sandpaper the hole and ends and give two coats of black shellac. Then rub down with worn, fine sandpaper.

In Fig. 45 is presented a plan of a core box for use with the square core print, the parts being shown separated in order to better illustrate the idea. Fig. 46 is a side view and Fig. 47 an end view. In making this box the stuff requires to be the same thickness as it is desired the core to be, and of sufficient width to leave the narrow portions of the box about the same width as the thickness; a little more or less makes no difference whatever. Joint up one edge of each piece. Cut them in the manner shown in Fig. 45. Place the two pieces together so that the hole in the center shall be the same length as the core print with the thickness of the pattern added. Secure the pieces together, and bore for the dowels. Then cut the dowels as previously explained. Put the two pieces together, shellac the opening for the core and the two sides of the box, giving it two coats of black shellac. After this has been done rub down smooth with worn fine sandpaper. It may be as well to mention in this connection that core boxes are left quite rough, excepting just where the parts come together, and where it is nessary they should be smooth for the cores.

HALLS OF THE ANCIENTS.

IT will be remembered that some eight or nine years ago we presented in these columns various half-tone and line engravings illustrating a Pompeian dwelling, known as the "House of Pansa," which was reproduced at Saratoga by Franklin W. Smith, a gentleman well known for his extensive research touching the habitations, manners and customs of the ancients, as well as for his reproductions of antique architecture. One of the later developments of his enterprise in this direction is a scheme for a series of gardens and buildings, to be located along the banks of the Potomac, illustrating the art and architecture of all history.

One of these buildings, known as the "Halls of the Ancients," has already been thrown open to the public. In an interview in regard to the scheme Mr. Smith has said: "These gardens and buildings are to be known as the National Galleries of Art and History, and shall not be surpassed by anything in the world. If my scheme can be carried out, and I sincerely hope that it will be some day, then the capital of this nation would become the world's centre of art, literature and learning.

"The design exhibits eight courts and galleries, showing in succession the styles of architecture of the Egyptian, Assyrian, Roman, Greek, Byzantine, Mediæval, Saracenic and East Indian people. It is my idea also to have a temple for the presidents of the United States and for the Sons and Daughters of the American Revolution. While the design in combined perspective equals in grandeur the national Capitol building, it is in fact composed of the most simple construction possible for the purpose—that is, of ranges of galleries of one story terraced upon the hillside. I shall devote all my energies in the future to seeing that this magnificent scheme is brought to a fulfillment, and in case I do not live to see it, I shall leave behind me a most eloquent argument in the shape of the Halls of the Ancients."

The Main Story.

Inside the building the first room is called the Egyptian throne room, and has 12 immense Egyptian columns rising to the roof. Inside the vestibule is the atrium, which is probably the finest room in the house. It corresponds to a reception room, and Mr. Smith has fitted it up regardless of cost. The room is a very large one, with a high ceiling, and in the outer center of the roof is seen the compluvium, with a sacrificial cornice of festoons and skulls of bulls.

Toward this slopes the roof, in order to throw rain water into the impluvium, marble pool in the floor, where the fountain throws a cool spray into the air; at the corners are lions' heads, through which spouts carry the water into the pool. Three Muses are upon pedestals around the fountain—Terpsichore, Euterpe and Clio. Tables, chairs, couches, musical instruments and other furniture have been reproduced from the originals preserved in the Naples Museum or from wall pictures found in Pompeii and Herculaneum.

The lamps are also modeled from one of the richest patterns in the great work on the antiquities of Herculaneum. On the south wall of the atrium is reproduced one of the richest mural decorations of Pompeii. There are two floating Bacchantes in a central panel from Herculaneum. On the north wall are four splendid panels, a figure of History from the Pompeiian forum, a floating Bacchante and two Centaurs from Herculaneum. Beneath the four panels are copies of four miniature allegorical scenes from the House of Vettius. The ceiling is composed of fragmentary specimens from Pompeii. Wall spaces at intervals are hung with the patterns of the selections.

The ceiling of the peristyle is copied from the baths of Titus. There is also a garden adjoining the peristylium, which Mr. Smith has equipped so well that it seems almost like the stage setting of a Shakespearian play. In the interior of the peristyle are a number of handsome paintings by Sig. Pascal.

The winter triclinium, or dining room, is in the rear. It is so named from the couches surrounding the table, as the Romans always reclined during meals. The size of the couches was in accordance with the rule that the number at dinner should never be less than three (the number of the Graces), nor more than nine (the number of the Muses). The principal ornament of this room is a large painting by Zurcher of Boulanger's "Feast of Lucullus," the table service has been carefully selected in classic forms, and in general the dining room is fitted up superbly, with great attention to details.

The Second Story.

The main part of the second story of the building is occupied by the lecture room. The seats are raised in tiers, and behind the speaker's stand there is placed in the form of a semicircle a copy of the great painting, "The Grandeur of Rome in the Time of Constantine."

In the rear of the lecture room there is what is known as the Moorish room, fitted up in an exact reproduction of the Moorish style of architecture. Adjoining this Moorish or Saracenic hall of Benzaquin is what is described as the Persian hall. This has not yet been fitted up, but the decorations will all be of Persian patterns. In front of the lecture room there is the Assyrian throne room, which will probably be the most interesting historical room in the entire building. In this throne room, at great expense, Mr. Smith intends to erect an exact reproduction of the celebrated throne of Xerxes, which will be nearly 16 feet high.

There is an upper gallery of the throne room, and by standing on the north side of this gallery and speaking in an ordinary tone of voice it is possible to address 5000 people.

On the third floor the main room in front is known as the hall of the Egyptian Arts and Crafts. The decorations are of the rich and intricate designs used by the Egyptians. There are three pictures in this gallery which are striking pieces of work. The first one is a large painting, 10 x 7 feet, "The Egyptian Feast." There is also a copy of Richter's "Building of the Pyramids." The third painting is the restoration of the palace of Sennacherib, but this painting will be placed later in the Assyrian throne room.

COMPETITION IN $1000 FRAME HOUSES.

THIRD PRIZE DESIGN.

IN this issue we conclude the presentation of the designs awarded prizes in the recent competitions in low cost frame houses. The prize designs have attracted a great deal of attention on the part of our readers and have brought out some rather interesting points in the way of criticism. The field for comment has been rendered somewhat more pronounced by reason of the marked advance in building materials of all kinds which have occurred since the competitions closed in January and February of the present year, and in considering estimates of cost at this time this fact should be borne in mind. The design which we illustrate on this and the following pages was awarded the third prize in the "Competition for $1000 Frame Houses," the author being Frank J. Grodavent, residing at Helena, Mont., at the time the competitions were announced, but at present located at Fort Stevens, Ore. In laying this design before our readers we take pleasure in stating that the drawings were exceptionally neat and attractive in their execution, while the specifications and detailed estimate of cost were more than ordinarily full and explicit, as may be gathered from what follows below.

Specifications.

This house to be 22 x 26 feet, with posts 12 feet high, and to rest upon a brick foundation and to have cellar under the rear half of the building. The construction to be balloon framing.

Mason Work.

Excavation.—Excavate for cellar at rear for footings and for porch piers and fill in around the building with a slope of 1 foot in 20.

Brick Work.—Build foundation and cellar walls with a good quality of hard burned common brick, laid in lime mortar, and walls bound by headers every fifth course. Footings to be 13 inches wide and two courses high. Walls 9 inches thick. Dwarf wall at cellar to be 4 feet high. Exterior face walls above grade faced with select common brick of uniform color, with joints not exceeding ¼ inch thick. Chimney built as shown, with double flues, plastered on the inside and 5 inch stove thimbles set for use in the different apartments. Six-inch thimble with cover, set at bottom of chimney, for clean out. Flues of chimney to start at dwarf wall. Level foundation walls and bed sills in mortar and point up around sills. Joints smooth, struck on outside.

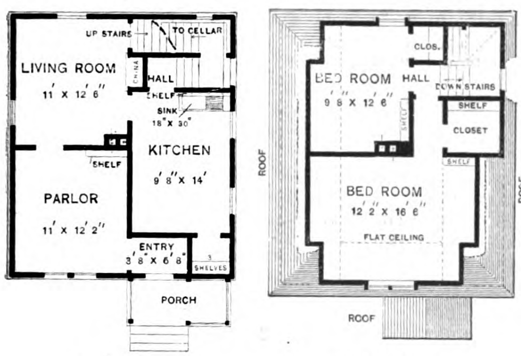
Plastering.—All apartments in first and second stories to be lathed with native pine lath, put on with joints broken at every six courses. Cellarway included, and all walls and ceilings plastered with two coats of drawn work, brought out to the line of all grounds, troweled smooth and angles left plumb. Mortar made of fresh burned quick lime, clean, sharp sand and long, clean cattle hair.

Carpentry.

Timbers.—Sills, 2 x 8; joists, 2 x 8-16 inches on centers; corner post, 3-2 x 4; studs, 2 x 4-16 inches on centers; plates, 2-2 x 4, spiked together; rafters, 2 x 4-16 inches on centers; ceiling joists, 2 x 4, spiked to rafters; hips, 2 x 6. Frame set plumb and thoroughly spiked together at all bearings; bridging, 1 x 3, double nailed. All native timber.

Side Walls.—Covered with ⅞ inch matched Novelty siding, with center false joints, cut close at windows and doors, lumber to be well seasoned No. 2 native stock.

Exterior Finish.—Cornices, corner boards, water table, window and door frames and porch finish to be of well seasoned No. 2 mill dressed native pine, worked in accordance with the detail drawings.



First Floor. Second Floor.

Scale, 1-16 Inch to the Foot.

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

Competition in $1000 Frame Houses.—Third Prize Design.—Frank J. Grodavent, Architect, Fort Stevens, Oregon.

Roofs.—Covered with 1 x 6 pine fencing, spaced for shingles and nailed at every bearing and covered with Oregon cedar shingles with clear butts, laid 4½ inches to the weather. Shingles at the eaves to be doubled and hips shingled with 4-inch shingles with tin flashings, laid in with each course. Lay flashings of tin with each course of shingles at chimneys and side walls and over flash where necessary.

Porch.—Build porch as shown, with 2 x 6 joists, 4 x 4 posts, dressed and chamfered, roofed and shingled as before specified, ceiled overhead. Floored with ⅞ x 4 inch matched flooring, finished at ends with nosing and scotia and fascia, build the lattice and steps; steps, 1¼ inches; risers, ⅞ inch; strings, 2 x 10 inch railings, constructed with posts, rails and square balusters.

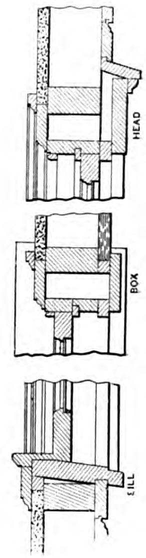
Windows.—Cellar window to have rebated 1¾ inch jambs, head and sill, and 1⅜-inch sash, hung on hinges at the top and secured with button when closed, and with hook when open. The main windows to have box frames, with ⅞-inch jambs and heads, and 1¾-inch sills; sash, 1⅜ inch thick, hung upon pulleys, iron weights and No. 6 braided cords. Windows to have meeting rail sash locks. Casement window on stair platform hung on 2½ x 2½ wrought hinges and secured with spring cupboard catch.

Doors.—Outside doors to have frames with 1⅜-inch jambs and heads and 1¾-inch sills. Doors, 1⅜ inch thick with ogee stiles, and rails and raised panels. Doors hung upon 4 x 4 loose pin butts and trimmed with mortise locks with brass face bolts and keeper and with black porcelain knobs and japanned rose and escutcheons. When required, put down cherry base knobs with rubber buffers.

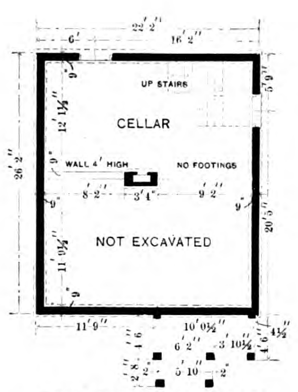
white pine apron, 1⅛ inches, top sloped for drip, and finished with nosing and scotia. Build an inclosed cupboard at one end with material same as wainscoting, and construct and hang on wrought hinges a batten door, secured with spring supboard catch.

Closets.—Kitchen closet to have three pine shelves, smooth dressed, ⅞ x 14 inches, supported on wood cleats. Front bedroom closet to have one shelf 14 inches

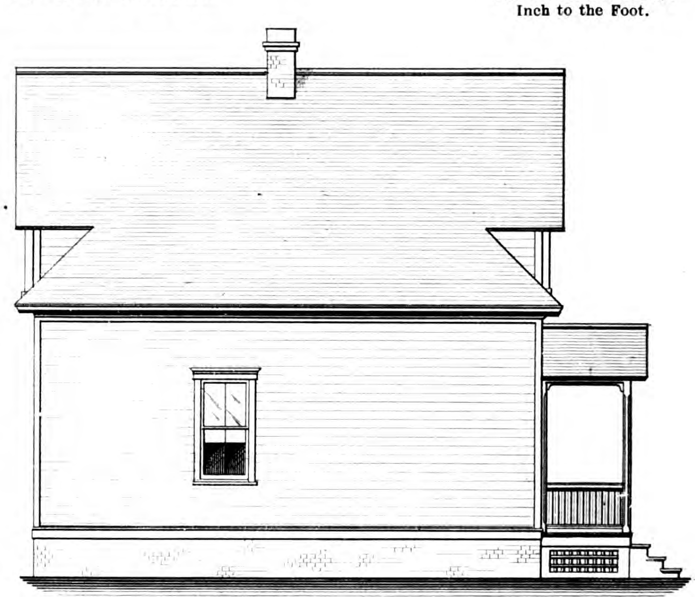
Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.



Window Details.—Scale, 1 Inch to the Foot.



Foundation.—Scale, 1 16 Inch to the Foot.



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

Competition in $1000 Frame Houses.—Third Prize Design.—Elevations, Plan and Details.

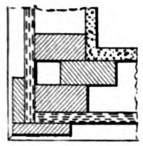
Base.—⅞ x 8 inch base with shoe at floor, put down in all the finished rooms; 6-inch base put down in closets.

Floors.—First and second stories and stair platforms to have 5-inch matched pine flooring, well seasoned native lumber, ⅞ inch thick cut and blind nailed at all bearings.

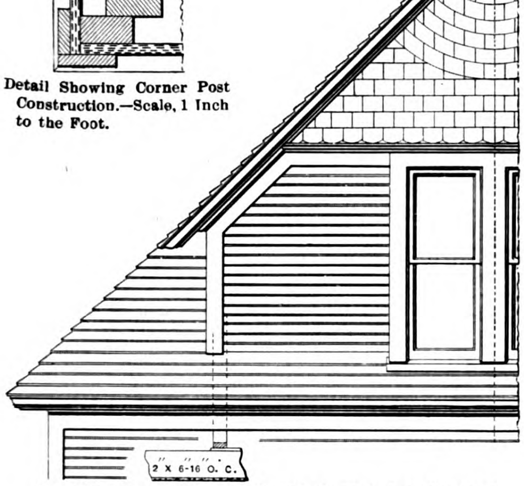
Wainscoting and Chair Rail.—There will be wainscoting at back and end of kitchen sink, 5 feet high, with 6-inch shelf at top, supported upon wood brackets, strips to be matched and beaded, ¾ x 3 inch native pine.

Kitchen Sink.—Case kitchen sink with ⅞ x 6 inch wide, and 3-inch hook strip put up on one side and end. Closet for back bedroom to be stepped up as shown on sheet 9, to give head room at stairs. These steps and risers, made of matched flooring, put up 3-inch hook strips on two sides. Closets to have double pronged wire hooks, put up 9 inches apart.

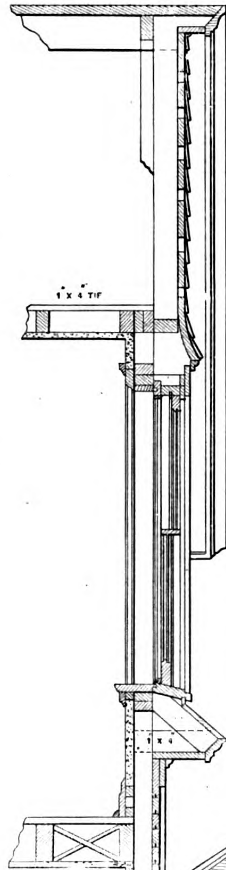
China Closet.—Built as shown, with cased front with drawers below. Drawers smooth dressed, dovetailed and glued. The cupboard lined inside with matched, narrow beaded ceiling and provided with three smooth dressed shelves, supported upon cleats secured with



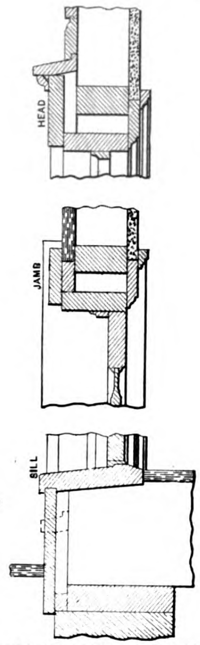
Detail Showing Corner Post Construction.—Scale, 1 Inch to the Foot.



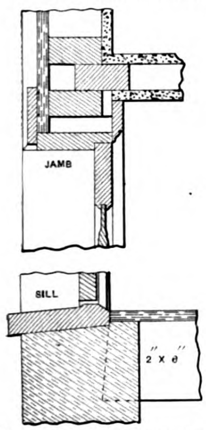
Half Elevation of Front Gable.—Scale, ¼ Inch to the Foot.



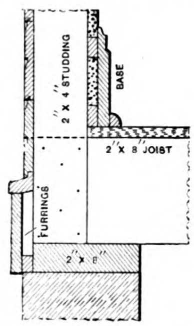
Section through Front Gable.—Scale, ¾ Inch to the Foot.



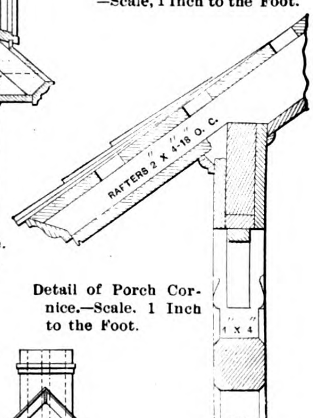
Sections through Front Door.—Scale, 1 Inch to the Foot.



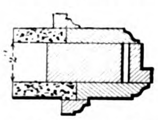
Details of Side Door to Cellar.—Scale 1 Inch to the Foot



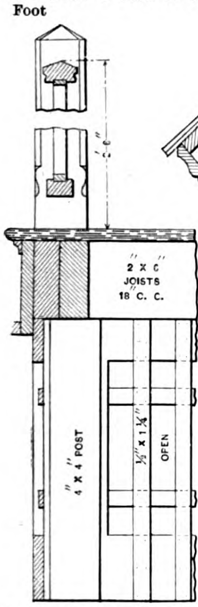
Detail of Water Table.—Scale, 1 Inch to the Foot.



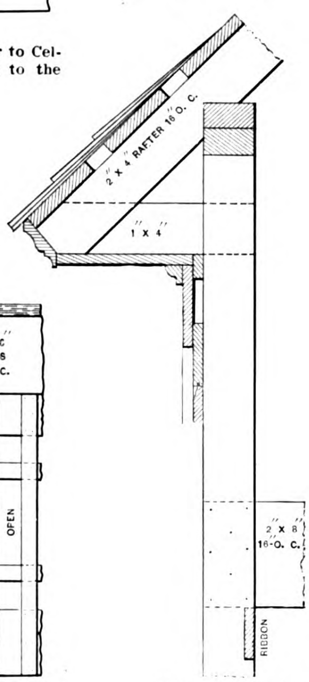
Detail of Porch Cornice.—Scale. 1 Inch to the Foot.



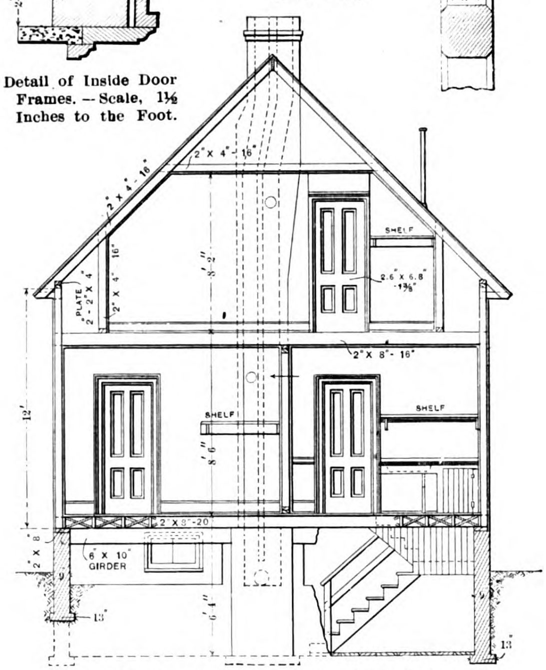
Detail of Inside Door Frames. —Scale, 1½ Inches to the Foot.



Details of Porch and Railing.—Scale, 1 Inch to the Foot.



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



Vertical Cross Section Looking Toward the Rear.—Scale, ⅛ Inch to the Foot.

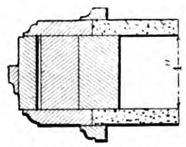
Competition in $1000 Frame Houses.—Third Prize Design.—Miscellaneous Constructive Details.

screws. Doors to be 1⅛ inch thick, put together with mortise and tenon and glazed with single strength glass secured with stops. Doors hung upon 2½ x 2½ inch wrought butts and trimmed with spring catch and elbow catch.

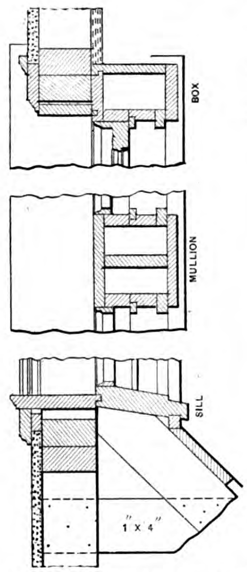
Trim.—Doors and windows cased as per details. The casings to be set for plastering and at completion of plastering joint covered with band molding.

Grounds.—Put up grounds at doors, windows and base as required, to receive plastering.

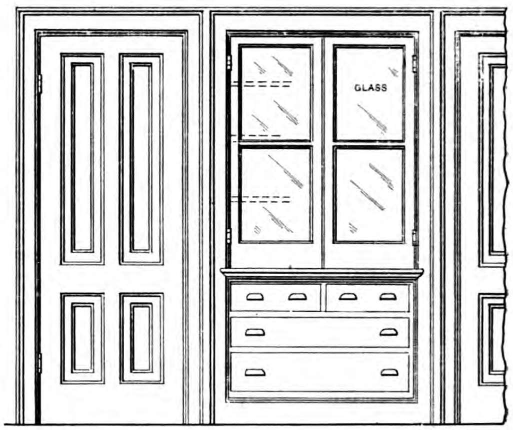
Cellar Floor.—Cellar to have floor laid with 2 x 12 plank in full length, smooth dressed on top and supported



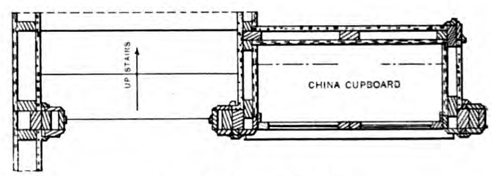
Detail of Inside Door Frames.—Scale, 1½ Inches to the Foot.



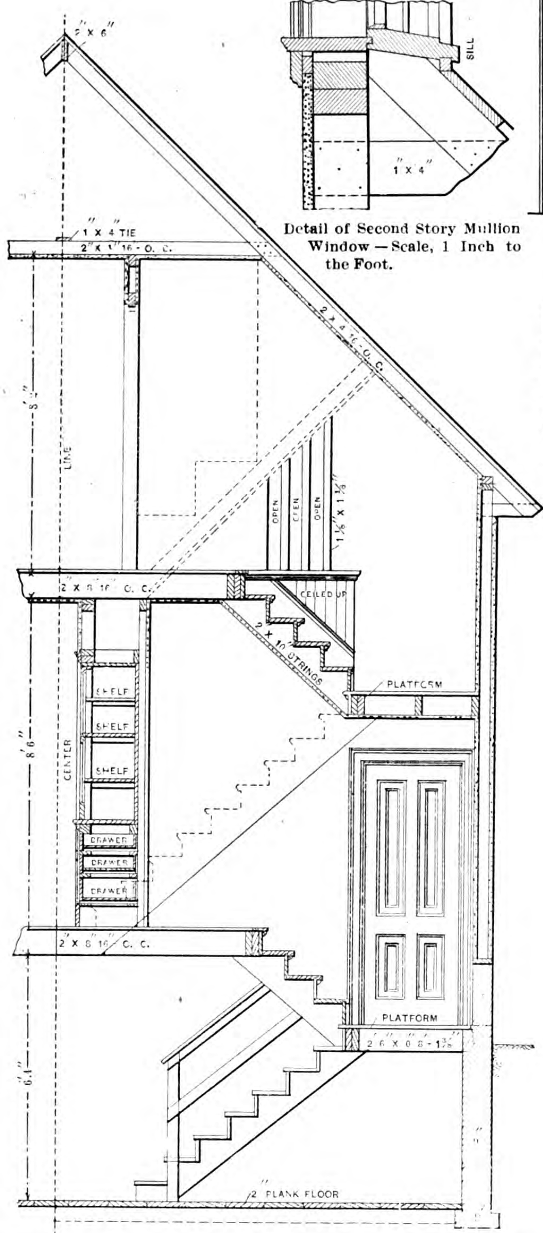
Detail of Second Story Mullion Window—Scale, 1 Inch to the Foot.



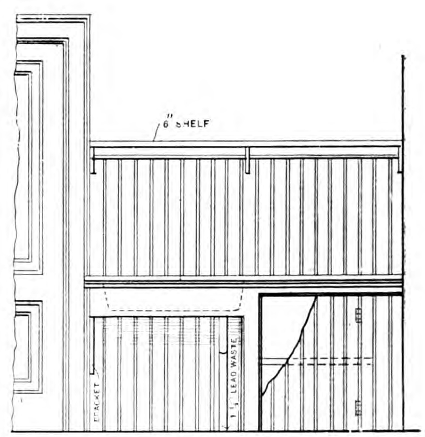
Elevation of China Cupboard.



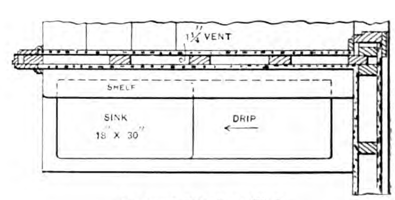
Plan of China Cupboard.



Partial Transverse Section, Showing Stairs.—Scale, ¼ Inch to the Foot.



Elevation of Kitchen Sink.



Plan of Kitchen Sink.

Scale, ⅜ Inch to the Foot.

Competition in $1000 Frame Houses.—Third Prize Design.—Miscellaneous Constructive Details.

upon 3 x 3 sleepers, set 18 inches on centers, and thoroughly spiked at all bearings.

Stairs.—Build cellar stairs with 1⅛-inth treads and ⅞-inch risers, set upon two 2 x 10 strings, slat railing of pine, built as shown. The stairs from first floor to platform and flight from first to second floor to have 1⅛-inch treads and ⅞-inch risers, grooved together and finished with nosing and scotia. The treads and risers scribed closely to the strings and supported upon three 2 x 10 strings.

Shelves.—Furnish and place, where shown, in the parlor and two bedrooms, white pine shelves, supported upon wood brackets put up with screws.

Entry.—Put up in the entry 3-inch hook strip and ½ dozen wire coat hooks.

Painting and Glazing.

All exterior and interior finished wood work to have two coats of pure white lead and pure linseed oil, properly toned and colored in two shades, as directed. Nail holes and imperfections filled with putty. Knots to have a coat of shellac sizing. Prime all finished wood work before it is set if exposed to the weather and other parts as soon as the progress of work will permit. Inside casings set for plastering to be primed before plastering is done. Inside finish smoothed with sand paper after it is primed.

Glass for all windows and outside doors to be first quality, single strength. That in windows secured with glaziers' points and putty. Glass in doors bedded in putty and secured with wood stops.

Plumbing.

Water will be furnished at the kitchen. It is expected that the house is to be built near a city water supply and near a sewage system.

Furnish one galvanized pressed steel sink, 18 x 30, set on wood frame, put up by the carpenter. Sink to have 1¼-inch lead trap, with cleanout screw connected by means of 1¼-inch lead pipe in cellar with 1¼-inch wrought iron pipe leading to sewer. Trap vented to 1¼-inch iron vent pipe extended above roof and made water tight, with lead flashing at roof. Sink supplied with water from water main by ¾-inch galvanized iron pipe and polished brass compression cock. Trenches for pipes beyond building excavated and filled. Waste graded to sewer.

Detailed Estimate of Cost.

The detailed estimate of cost for the $1000 frame house here shown is as follows:

52	cubic yards excavation at 18 cents	$9.36	
15,280	bricks, wall measure, at $12	183.36	
420	square yards plastering, two coats, at 20 cents	84.00	
6	thimbles for flues at 10 cents	.60	
			$277.32
5,200	feet dimension timber at $20	$104.00	
1,150	feet 1 x 6 roof boards at $20	23.00	
1,410	feet novelty siding at $25	35 25	
9,000	shingles at $5	45.00	
	I. C. tin flashings	5.00	
104	lineal feet main cornice at 20 cents	20.80	
64	lineal feet gable cornice at 20 cents	12 80	
96	lineal feet water table at 10 cents	9 60	
60	lineal feet cornice boards at 8 cents	4 80	
26	lineal feet roof ridge at 8 cents	2.08	
1,250	feet flooring at $35	43 75	
340	lineal feet base at 8 cents	27.20	
46	square feet wainscoting at 5 cents	2.30	
88	lineal feet chair rail at 6 cents	5.28	
	Closet shelving and hooks	5 00	
1	cellar window	4 00	
10	windows, first and second stories, at $7.50	75.00	
1	casement window, stairs	5.50	
12	doors, complete, at $8	96.00	
1	cased opening	3.00	
	China closet	15.00	
	Cellar stairs	12.50	
	Main stairs	20.75	
	Casing sink	8.50	
3	shelves on wood brackets at 50 cents	1.50	
326	square yards, two coats, painting at 18 cents.	58.68	
	Front porch timber and shingles in other bill previously estimated	26.45	
	Cost of building		$950.06
	Plumbing—		
1	sink	$3.50	
1	faucet	1.00	
1	1¼-inch lead trap	1 50	
3	feet 1¼-inch lead pipe waste	.80	
1	1¼-inch lead roof flashing	1.50	
60	feet 1¼-inch iron waste and vent	6 00	
45	feet ¾-inch iron supply	3.60	
	Fittings	2.50	
	Tapping for supply	2.50	
	Tapping for waste	1.00	
	Excavating and filling 80 feet trench work for pipes	12 00	
	Plumber, &c	13.00	
			48.90
	Total cost		$998.96

The builder's certificate is signed by H. Fowler, contractor and builder, Helena, Mont.

LAYING A PARQUET FLOOR.

By T. H. F.

In order to properly lay a parquet floor everything depends on commencing aright. If a wrong beginning is made no amount of tinkering or expedients will make the work as it ought to be, and the manufacturers often get blamed for defects that rightly belong to the persons who put down the floor. If the room in which the floor is to be laid is occupied, every piece of movable furniture should be taken away and the old floor be well cleaned and dried. If it is at all worn the defective parts should be taken up and new flooring substituted. Where it can be done a second floor should be laid over the old one, if the latter is worn, or else take up the old floor altogether and lay a new one in its place. In any case if a new floor is put down the material should be as dry as a kiln will make it, and it should be kept dry until the parquet floor is laid over it. It is not always possible to lay a new floor over an old one because of the doors, hearths and other things, as it would raise the floor too high and necessitate cutting an inch or so off the bottoms of the doors to admit of their swinging clear.

The floor designed to be covered with parquet must be made true on its face, so that a straight edge will touch at all points. If there is a carpet strip or quarter round planted at the junction of the base and floor it should be carefully taken up and laid aside, to be put down again after the parquet floor is laid. Having trued the floor properly and removed every speck of dirt and shaving, lay down good felting paper, fitting the joints closely—not lapping them—and tacking it down with cut tacks until the whole is smooth and even. This being done, measure the width of the room at both ends, and if it is found to be exactly parallel well and good, but if not then take the width of the border and measure off the same distance on both sides of the room at the widest end. That is to say, if the border is 18 inches then measure out from the base on each side 18 inches and mark the points. We will suppose the room to be, say, 3 inches narrower at the other end—a not uncommon case in old buildings—then we must make allowance for this 3 inches, so as to get our field within the border exactly parallel; so we measure off from the base, on both sides of the narrow end, 16½ inches instead of 18. Now strike chalk lines along the sides of the room, holding one end of the line on the 18-inch mark and the other on the 16½-inch mark, snap the line and this gives us the inside edge of the border. Do the same on the other side of the room, and the two lines will be parallel to each other. Lay off the ends of the room in a similar manner, and a perfect rectangle for the field will be the result. Here there are 1½ inches to be removed from each of the borders at the narrow end of the room, while they are to be left the whole width at the wide end of the room. In this case it will be best to cut a part of this from off each edge if the outside stile of the border will allow of its being so done without spoiling the appearance of the work; if not, it is always better to let the taper stile join the base board. If there are base plinths or other projections to be fitted to they may be utilized in assisting to give the wall stile of the border a parallel appearance, if the workman manages the matter properly.

Border and Corner Pieces.

It is always best to lay the border and the corner pieces first, all round the room, and continue it round the hearth, if specified to have a border around same; then the field may be laid out in full accordance with the furnished design, keeping all the lines parallel with the inside border lines. If, however, the design calls for diagonal work, the angles must be drawn from the lines produced on the floor. If there is a center pattern, or more than one, to be worked in, they may be laid out on the felt paper, cut roughly, and tacked in place; then one side and both ends of the room up to the centers may be finished, then follow up with the other side, making all connections as perfect as good tools and good workmanship can make them. The centers can then be fitted to a nicety, if care and skill are exercised.

After this the nailing can be done over the whole floor. There should be not less than 20 nails used to each square foot of flooring. If the under floor is formed of pine or other soft wood the wire nails should not be less than 1¼ inches long, but if the floor is of hardwood then 1 inch will be long enough for the nails. All the nails must be finishing nails and must have very small heads. A little judgment must be used in distributing the nails, for where there are narrow strips it will not do to nail along their center; they should be nailed on the edges in a zigzag fashion, as this will give the best results. All nails must be set with a small pointed nail set and have their heads sunk below the surface about 1-16 inch. After the nailing is done and every nail set it will be necessary to go over the work with a fine set smoothing plane and scraper, for, no matter how perfect the flooring may be when it leaves the factory, it will be found impossible to lay it so that all the joints will be on the same plane; some of them will stand up above others, though good and careful workmanship will materially reduce the inequalities. If the surface can be brought to a smooth, flat face by use of a scraper and sandpaper it will look, when finished, very much better than if dressed to a face with a smoothing plane, as when the latter is used—no matter how fine it may be set—there will be marks show through the polish when finished. A good scraper, well sharpened and skillfully used, will do nearly as good service as a smoothing plane.

In my practice I have found it the better way to fill up over the nail heads with some good wood filler than to fill over them with putty. The latter does not hold the shellac varnish nearly so well as the wood filler, and after a time the floor gets to look speckled and spotted as the varnish leaves the putty. This never occurs where the nail holes are filled with good wood filler.

Use of Wood Filler.

After the floor is scraped and sandpapered with No. 0 sandpaper and all defects—if any—made good, the whole floor should receive a heavy coat of wood filler which has been thinned down with spirits of turpentine to the consistency of thick cream. It should be spread evenly over the whole surface and let remain so for an hour or so until the filler begins to set, when all the superfluous filler must be rubbed off with a wad of excelsior. The whole should be rubbed until the surface appears dry and smooth. If well done this process will fill up all the nail holes and every possible crack and joint in the floor. After the rubbing has been done and all the surplus filler and other stuff removed from the floor, the room should be closed and left untouched for about 48 hours, when the shellac finish may be applied.

If the floor is to be stained, or darkened, some of the coloring matter may be put in the wood filler before it is applied. This will carry the color into the pores of the wood and fill the nail holes with the colored filler. The shellac varnish may be colored and thinned down with spirits to suit, and should be applied with a flat, wide brush. The softer and finer the brush the evener and smoother will be the finish. After being varnished the floor should remain untrodden upon for a period of three or four days, which time will allow it to get hard and thoroughly dry, after which it may be waxed and finally finished.

It is not necessary here to describe the method of waxing a floor, further than to say that no extra skill is required to perform the work. There are heavy brushes with long handles made for the purpose and which may be obtained from any dealer who keeps floor wax in stock.

The foregoing directions apply more particularly to parquet flooring that is prepared at the factory in slabs 5-16 inch in thickness. The designs and patterns for flooring this thickness may be very elaborate and yet not very costly, as special machinery and facilities are employed in its manufacture, the strips and blocks being fashioned after regular patterns by the machines. The pieces are glued together and backed with cotton cloth by special methods, so that a very handsome floor composed of four or five different shades of hardwood may be obtained from the manufacturer at a cost not exceeding 25 cents per square foot. A good parquet floor in the thickness named may be got for 16 cents per square foot, but this, of course, will be plain and consisting only of two or three kinds of wood.

Thickness of Flooring.

The thickest parquet flooring made in this country is ⅞ inch, and this is generally quite costly because of the manner in which it is often put together. In thin parquetry square and plain glue joints are employed, but the thicker kind is generally tongued and grooved both on the edge of the grain and at the butt joints. This necessarily makes the work very expensive. Another method of making thick parquetry is to glue the hardwood pattern on to a base of pine or hardwood. This plank base is made ⅝ inch thick, and the parquet pieces are made ¼ inch thick and are glued solid to the base and to the edges of each other. The latter method is some cheaper than the former and answers the purpose nearly as well.

The thick flooring is usually made up in blocks from 12 to 18 inches square or in slabs from 12 to 18 inches wide, and 4 feet long or longer, according to the custom of the manufacturer. The thin flooring is made in slabs from 3 to 6 feet long for the field of the floor and from 6 to 24 inches wide and 12 feet long for borders.

While the first cost of a parquet floor may exceed that of carpet from 25 to 50 per cent., yet in the end it will prove more economical, inasmuch as one floor will last as long as the house in which it is laid, with very little care; will always look fresh and clean, and be just as it appears, whereas the life of a first-class carpet under ordinary wear is not more than 15 years, and, whatever may be said to the contrary, a carpet is never as clean and free from dust as a clean parquet floor.

There are some workmen who try and lay a parquet floor by gluing it to the under floor. This method is not to be commended, as it very seldom proves to be a success, and I have known of a number of instances where the floors that have been treated this way have had to be taken up and relaid and nailed, at much expense and annoyance to the owner.

The quarter round or carpet strip that may be taken up when about to lay a parquet floor on an old floor may be used again if desired, and if so the workman may not be so exact in fitting his border to the base board, as the carpet strip when in place will cover any little want. It is more workmanlike to build the floor tight and snug to the base board and to leave off the quarter round altogether.

CORRESPONDENCE.

Truss for Flat Roof.

From E. R., *Stouffville, Ontario.*—Will you or some of the readers tell me what they think of the form of truss for flat roof shown in the sketch sent herewith? I have a job to put up a block and hall, the latter being 50 x 62 feet. There are three of these supports or trusses, and the ceiling is to be sheathed with ½-inch basswood. The dimensions of the various timbers are indicated on the drawings. All the timbers are hemlock, the top ones being 2 x 8 inches and 16 feet long, bolted together 2 feet apart. The rafters and joist are 2 x 8 inches, placed 18 inches on centers.

Answer.—From our correspondent's sketch we have prepared the engraving shown in Fig. 1, and would say that the general design of the truss is safe and well adapted for the purpose intended. The tie rod, however, is much too small and would barely support the dead weight of the roof with no snow load. The rod should be 1⅜ inches in diameter, with upset ends, or if our correspondent prefers to use a rod without upset ends, it should be 1⅝ inches in diameter. The rod should also be supported at least once in its length in order to prevent excessive sagging. The timbers in the truss proper are of sufficient size, but the purlins are too small. Each purlin has to support 252 square feet of roof, and the latter, including the weight of the truss and ceiling, will weigh about 20½ pounds per square foot if for tar and gravel, and 19½ pounds is none too much to allow for snow. Assuming then a roof load of 40 pounds per square foot, each purlin has to support 10,080 pounds, with a span of 15 feet, which will require an 8 x 14 inch hemlock beam. The rafters should not be spaced more than 16 inches on centers over the center span.

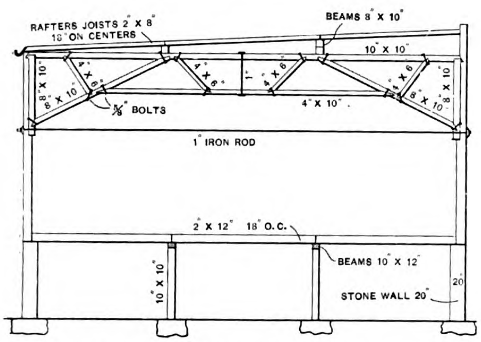


Fig. 1.—Sketch Submitted by "E. R."

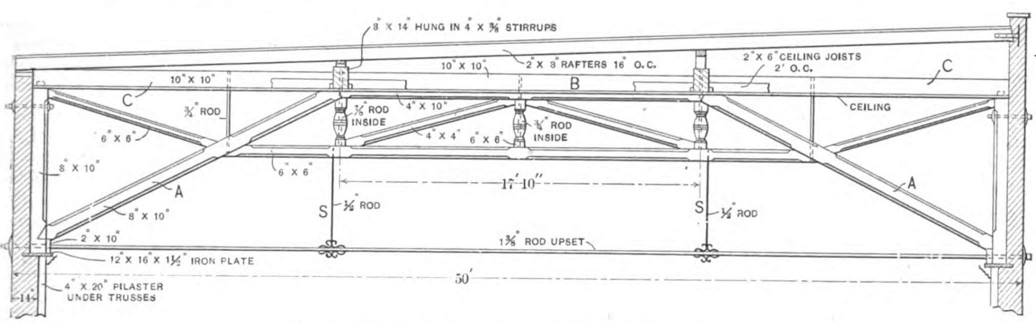


Fig. 2.—Form of Truss Recommended by F. E. Kidder.

Truss for Flat Roof.

In Fig. 2 of the engravings is shown a form of truss recommended for this case by F. E. Kidder, and indicates a little better arrangement of the timbers than in Fig. 1. The purlins are held in stirrup irons, so as to receive the ceiling joists. The latter can be run from truss to truss, however, if such an arrangement is preferred. In this truss the main pieces are the struts A A, the top chord B and the tie rod. The other members have no strain from a vertical load, but are required to stiffen the truss and walls. It is assumed that all except the top chord of the truss will be exposed. The small rods S S are merely inserted for the purpose of supporting the tie rod. The trusses should be placed 15 feet on centers, and the basswood ceiling should be of ⅝-inch material.

Obtaining Lengths and Bevels of Round Timbers by the Steel Square.

From YOUNG CHIP, *Montreal, Canada.*—Can any of the numerous readers inform me if it is possible to obtain the lengths and bevels of round timbers in temporary trestle work by means of the steel square? The timbers are spruce, tapering from 15 or 16 inches to about 9 inches. I should be glad to have the readers answer this inquiry, showing by means of sketches how the work is done.

Interpretation of Specifications.

From B. F. Z., *Baltimore, Md.*—In a recent case a cottage was built near here, the drawings showing that there were to be granite slabs on the tops of the chimneys, but there was nothing said about them in the specifications. The builder signed an agreement before erecting the house that he would construct it according to drawings and specifications, but when the house was almost finished he said he was not compelled to furnish the slabs, because nothing had been said of them in the specifications. I would be pleased to have the opinions of some of the readers of the paper on this subject and hope my request will bring an answer.

Note.—In current practice it is generally understood that whatever is shown upon the drawings, even though not mentioned in the specifications, is included in the work which the builder or contractor is called upon to do. The specifications covering this point often read, in effect, that "The plans and specifications are considered to be co-operative, and all works necessary to the completion of the design drawn on the plans and not described in the specifications, as well as all works described in them and not drawn on the plans, are to be considered a portion of the contract and must be executed in a thorough manner, the same as if fully specified."

The common method of procedure in cases of this kind, when a contractor or builder finds something upon the drawings not called for in the specifications, is to immediately consult the architect with a view to ascertaining what is intended. We lay the communication of our correspondent before the readers of the paper in order that they may express their views touching the question raised.

Articles on Wood Turning.

From G. N. J., *Arapahoe Agency, Wyo.*—I agree with "Young Chip," Montreal, Canada, that the articles on "The Art of Wood Turning" were cut off too short.

With the aid of the blacksmith here we have built a lathe in the Government shop according to the drafts and instruction presented in *Carpentry and Building*, and the device works all right. I hope the articles will be continued.

From J. F. W., *Danville, Pa.*—I notice in a recent issue that "J. M. P.," Loyal, Wis., was disappointed by reason of the articles on wood turning ceasing so suddenly. I can say the same thing myself. I would like to see a resumption of the articles, and would like to know how to turn large rollers, say 24 x 24 inches. I would like to see illustrated and described the kind of tools necessary to use in turning work of this kind, also to know the shapes of all kinds of augers that will bore lengthwise of sticks. Again, I would be glad to see published a design of an automatic turning lathe.

Comment on Prize Design.

From G. J. S., *Litchfield, Conn.*—While not desiring to be hypercritical, but as a contractor and builder of some experience, I have been greatly interested in the prize designs published in the last three issues of *Carpentry and Building*, and have asked myself at different times of what practical benefit are they, especially the lists of prices. For instance, I notice on page 208 of the August issue brick laid at $6 per 1000, and on page 200 of the same issue bricks laid at $18.25 for 2000, or over $9 per 1000, while in the July issue there is an allowance of over $19 per 1000. Of course the location of the work and the cost of material make some difference, but hardly as much as that. Of what use would estimates be in a town like this, where we cannot have the pleasure of a look at good brick on the works for less than $10 per 1000?

Looking over the list of items in connection with the second prize design in the July issue, I fail to find any allowance for windows or even blinds, but presume they are fortunate enough in Indiana not to need any. Perhaps, however, the author expects to fill the openings with old rags, &c., which would make quite a contrast with those pretty veneered oak doors, called for in his specifications. But where are those oak and pine doors allowed for in the lists? The author might have gone a little further and left out a few more of the items and probably he would have won first prize in the $750 class with his design.

Requisites of an Oil Stone.

From H. T. F., *Ontario.*—Your correspondent from Worcester, Mass., "Silas Lapham," is no doubt sincere in his recommendation of the so-called "India stone" by implication, but he certainly cannot have had a varied experience in the use of oil stones or he would not have been satisfied with the assertion made by his "gray haired friend." The "corundum stone" is well enough and serves its purpose in a way, but it is no such stone as the White Washita, the pure Turkey stone, or the Welsh slate. For quick work, and fairly good work, the Washita "takes the cake," but its great fault is that if not kept clean it is apt to become clogged with the grindings from the tools sharpened and the oil used, and when once its pores get filled up it glazes and cuts slowly. The Turkey stone, from its peculiar formation, while it does not cut as rapidly as the Washita, never clogs or fills up, no matter how dirty it may be left after using. It also has an oily texture, something like lithographic stone (which it resembles somewhat in color), therefore does not require as much oil as most other stones. The Turkey stone is a popular one with European wood engravers and carvers of fine wood work. Welsh slate, so called, is not exactly a slate. I am inclined to think it is a sort of petrified wood, similar to the oil stones taken from the Irish lakes. It has a very fine grit, puts on a beautiful edge, wears but little and does not require much oil. The best has a dark green color, is very heavy, is slightly laminated—hence its name of slate—and cuts fairly well. It is much used for sharpening surgical instruments in some countries, and is employed by cutlers to put the finishing touches on fine pen knives, razors, &c. For general purposes there is no stone, in my opinion, that beats the Washita, but a finished workman will carry some other fine stone as well, and then add, for a roughing stone, a good old Missouri oil stone. This last, if a good one and does not get filled up with oil and dirt, will grind away a plane iron or a chisel almost as rapidly as a small grindstone.

The Value of "Carpentry and Building."

From FRANK J. GRODAVENT, *Fort Stevens, Ore.*—In the issue of *Carpentry and Building* for February, 1895, there was published a design and description of a water tank and trestle erected some years previous at Fort Logan, Col., from designs prepared by me. Since coming here I had need for reference to these particular drawings, but not having my original notes or copies at hand, the thought occurred to me that possibly I could secure a copy of that issue of the paper, which would serve my purpose. I therefore sent for the February number, which has since been received in good order, and I desire to say that I now see new benefits to be derived from having designs published in *Carpentry and Building.* While saying this, however, it does not fully express the good which this particular issue of the paper may do me. I trust that others may derive like benefits.

Repairing Shingle Roofs.

From AN OLD BUILDER.—If "Young Chip," Montreal, has an old roof that leaks, his best way to repair it is to reshingle it entirely. It is the greatest of follies to tinker and putter with an old roof, and a rotten or worn out shingle roof is like an old shoe that has been worn down to the insole—beyond renovation. If, however, "Young Chip" has reference to a comparatively new roof that leaks, he should first discover where the leaks are and then prepare pieces of tin or galvanized iron to insert under the shingles at the point of leakage. These pieces of tin or iron may be of any suitable width, but should not be longer than to reach the nails holding the shingles down. If the shingles are laid, say, 5½ inches to the weather, then the tin may be cut 7½ inches long, for, as a rule, the nails are driven in the shingle about midway of its length, so if it is an 18-inch shingle the tin or iron may be driven in to its full length without its touching the nails. If the work is nicely done the metal will not be seen nor will the roof be injured, and the leaks will be effectively stopped. There will be no need to nail through the metal to hold it in place, as the pressure of the shingles will prevent its moving. The old way of driving shingles under the laid one to stop leaks is a source of more evil than good, as the thickness of the shingle when driven under will cause one of three things—it will start the nails in the shingle, or it will cause the top shingle to split in a line with the nailing, or the shingle being driven will strike a nail and will start a split that in a few days will travel down to the butt end, and the roof will leak more than ever; besides, it gives the roof a botchy look.

Small Wood Working Shops.

From C. H., *Bowmanville, Ont.*—I note with interest the request of "W. P. B.," in the July number, with reference to small wood working shops, and I hope he may meet with better results than I did a few months ago when I requested about the same thing and have not had any response as yet. Now, I think this is something of interest to a great many and there must be many small shops in the country using more or less machinery, and I hope some one will furnish the plans showing arrangement of same and discuss the machinery and power, as "W. P. B." suggests. Personally, I would like to see a plan of a small wood working plant, to contain planer, sticker, shaper, mortiser, tenoner, jointer, boring machine, circular, band, scroll and swing saws, and to have a small dry kiln, also some information about size of engine and boiler and piping. I should think that perhaps some of the makers of wood working machines might be in a position to do something in this line.

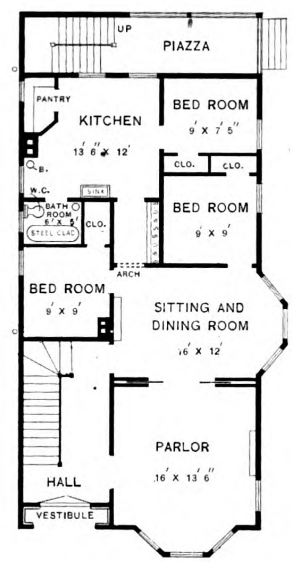
I have to thank Mr. Mumma for his many practical plans of schools, elevators, &c., and I might say in passing that plans of such things as these are far more acceptable than so many house plans. We are never at a loss for a house plan, but do not know where to look sometimes for things of this kind. A plan of skating and two curling rinks for a lot 132 x 165 would be very useful to me just now.

Mr. Woodsend's articles on pattern making "fill a long felt want," as did Mr. Hodgson's on turning, and I think a series of articles on the theory and practical construction of trussed roofs by Mr. Kidder would prove of much interest to many, and I hope *Carpentry and Building* may see its way to secure them, these to be written from the standpoint of the practical builder rather than the architect or engineer.

Design for a Two-Family House.

From JOHN F. LAPE, *Rensselaer, N. Y.*—Thinking that possibly the subject may prove of interest to some of the readers of the paper, I send drawings of front elevation and first and second floor plans of a two family house, which has recently been erected in this place. It will be noted from an inspection of the drawings that on each floor there are parlor, dining room, kitchen, three bedrooms and a bathroom. The design may offer suggestions to some of those about to erect buildings of this character, and I trust that those who feel so inclined will criticize the arrangement or any features to which their attention may be drawn.

Front Elevation.



Plan of First and Second Floors.

Scale, 1-16 Inch to the Foot.

Design for a Two-Family House.—John F. Lape, Architect.

Trimmings and Fixtures for Tool Chests.

From R. C., *Carroll, Iowa.*—In answer to the subscriber from Virder, Ill., in a former issue, as to where he can "secure" trimmings for a tool chest, I would say that they could be taken from another fellow's chest late at night by the skillful manipulation of a crowbar and a screwdriver; but should he be willing to purchase them he can do so at a hardware store, a place where they keep for sale ten-penny nails, gimlets and gasoline stoves. Such an establishment can be found on the front street of any well regulated town, the entrance to which—the store not the town—is generally designated by a washing machine and a scoop shovel. Or any school boy can locate the place for a nickel. I would advise him to use iron handles, as crickets and grasshoppers often eat a rope handle. The hinges, which should also be of iron in preference to leather, as the contraction and expansion of the leather during dry and wet weather might seriously affect the working of the lock, should be placed on the opposite side of the lock, which ought to be a combination. As the correspondent failed to sign his name to his letter of inquiry, he is evidently absent minded, in which case it would be well to have the combination in large letters on the top of the chest, then wrap the whole thing well with a clothes line, securing both ends of the line—not the chest—in a Marquis of Queensberry knot sealed with green wax. Any further information desired by the subscriber will be cheerfully furnished. If other subscribers wish information of any kind, I hope they will make their wants known.

Rule for Figuring Joist and Studding in a Building.

From A. P. G., *Newport News, Va.*—I notice in the issue of *Carpentry and Building* for August, page 202, a rule for figuring joist, studding, &c., required in a building. I have been using this rule for floor joist for 12 years and find it all right, but for the benefit of the beginner attention should be called to a few points. It is necessary to consider the extra lumber where hearths, stairways, &c., have openings framed into the floor space, also where specifications require joist to be doubled on each side of headers and under partitions. I do not consider the rule in question at all correct for stud walls on 16-inch centers, taking the average residence where studs are doubled each side of openings and angles and properly framed under and over the openings. It is a safe rule only when they are counted on 12-inch centers, or one to each lineal foot of wall, and even this does not include the foot and top plates.

Drawing Lessons by Mail.

From W. C., *Ware, Mass.*—In answer to "J. C.," Sheepshead Bay, N. Y., whose inquiry appeared in the August issue, I would say that the results of a course of lessons in connection with the International Correspondence Schools of Scranton, Pa., are in every way satisfactory, so long as the student wants to study. If "J. C." will get the "Mechanic Arts Magazine" for July or August, he will find therein pictures of a few of the many successful students with names and addresses. As for myself, I do not care to state here what I have learned since I enrolled in the complete architectural course of the schools named, and what a lot more I am going to try to learn. If the correspondent is curious to know how much of an education I had when I began and how far I progressed, I will give him all the information needed if he will write me personally in the care of the Editor.

Prizes for Essays and Designs.

From F. S., *Bowmanville, Ont.*—I wish to say that I fully concur in what "Young Chip" says in the July issue about offering prizes for the more practical essays, dealing with the methods and principles of building construction in wood, brick and iron. I believe also that some information along the lines of estimating might be imparted if time required was given and the statement made as to just what facilities are employed to accomplish a stated result.

In regard to the publication of house designs for prizes or otherwise, I would like to see more attention given and prizes offered for designs and plans of stores with details of fittings, &c., for a special line of business; manufacturing buildings, stock barns and other agricultural structures, schools, churches, hotels, town halls, skating rinks, stations for trolley lines and the many buildings used for special purposes too numerous to mention. What do other readers of the paper think of this? By the way, how would it do to offer a prize for the best suggestions for the improvement of *Carpentry and Building*, hoping, of course, that the Editor will accept this in the spirit in which it is intended.

What Are the Best Nails for Slate Roofing?

From E. H., *Leetonia, Ohio.*—I wish to ask the readers for a little information regarding the best kind of nails to use for nailing on slate for roofing. A foundry is being erected, and it is intended to cover the roof with slate. I have been referred to an instance where copper nails are said to have rusted off in three years. Can this be correct? Any information which may be given by the readers will be greatly appreciated.

Note.—We have always been under the impression that copper nails were considered the best for fastening slate when used as a roofing material, although galvanized nails are employed to a very large extent. The durability of the nails would seem to depend largely upon local conditions, the uses to which the foundry was to be devoted, the severity of the chemical action of gases and vapors which might be generated as well as upon climatic conditions. We, however, lay the inquiry of our correspondent before the readers of the paper, and trust they will discuss it in the light of their own experience.

Glass for Large Printing Frame.

From W. C., *Ware, Mass.*—I would like to ask through the Correspondence Department of the paper if "F. R." of West Point, N. Y., who contributed to the July number the interesting article about blue prints, will tell what kind of glass and of what thickness should be used in a printing frame 46 x 36 inches in size? Any one who can give the desired information will confer a favor.

Note.—In order to start the discussion, we would suggest that our correspondent use polished plate glass about ¼ inch thick. Possibly there are readers who have made use of some other quality and thickness, and we trust they will give the correspondent making the inquiry the benefit of their experience.

Principles of Bending Moments.

From D. J., *Sandon, British Columbia.*—I have noticed with interest the articles by F. E. Kidder which have appeared in past issues of the paper on the method of determining the size of beams, and to any one who is interested in this subject I would like to offer a few suggestions. I would say, learn the principles of moments from some elementary work, which will be found an interesting and simple subject. The student will then be able to calculate the bending moment due to any system of loads upon a beam, and by using the simple formula for the moment of resistance of a rectangular section (which must equal the bending moment) he will be able by a simple arithmetical exercise to select the required beam. By this means he will also be relieved from memorizing a lot of formulas which he must always take on faith. If he will go a little further and learn the principles involved in determining the resistance due to bending of a beam he will know the why and wherefore of every step he has taken and can apply his knowledge readily in any particular case. He will be in line with modern practice, and in using wood, if he knows its compressive value, he will be always able to know its value in cross bending.

The formula for the resistance of a rectangular beam as given in the structural handbooks is:

$$f\,\frac{b\,d^2}{6}$$

where f equals the working stress on the extreme fiber, b the breadth of the beam and d its depth.

Finding the Number of Bricks in Piers of Given Dimensions.

From INTERESTED SUBSCRIBER, *New York.*—Will you kindly answer the following questions in *Carpentry and Building:* How many bricks are there in a pier 12 x 12 inches and 8 feet high? Also how many bricks are there in a pier 2 feet square and 8 feet high? In the pier are five 4-inch bluestone binders, and I desire to know how these are figured.

Answer.—In regard to the first question we would say that it is the practice in some localities to allow 22 bricks to the cubic foot of wall, and, as there are 8 cubic feet in the pier first mentioned, it would require 8 × 22, or 176 bricks. In the case of the pier 2 feet square, the cubical contents are found to be 32 cubic feet. This, multiplied by 22, the number of bricks in a cubic foot, gives 704 as the requisite number of bricks.

Another method is to consider the outside superficial area of the pier as a wall surface, which in this case might be regarded as a 12-inch wall 4 feet in length and 8 feet in hight. According to "Kidders' Building Construction and Superintendence," a 12-inch wall requires 22½ bricks to the foot, so that it would take 90 bricks for 1 foot of the wall. As the wall or pier, however, is 8 feet high, there would be necessary 8 × 90, or 720 bricks. The discrepancy in the two methods is probably due to the amount of mortar, for which allowance is made for the work of construction.

It is possible that our mason friends have other methods of figuring the amount of brick required in piers, and we shall be glad to have them come forward and tell the correspondent how to ascertain what he requires, and especially describe the method prevailing in their locality of figuring the bluestone binders, as practice differs largely in this respect.

Blue Prints and Blue Print Paper.

From SEYON, *Portsmouth, Va.*—Blue print paper all prepared can be had of any dealer in drawing materials in 10 or 50 yard rolls, and in widths of 24, 30, 36 and 42 inches, and from 75 cents to $1.50 per 10-yard roll, according to the width and thickness of paper, which in my estimation is far superior to any that can be prepared at home. I specially object to the statement near the top of the second column on page 185 of the July issue of *Carpentry and Building*, that such paper "does not keep for any length of time." I have recently made good prints from prepared paper which I have had in my possession for over three years, and I see no reason why it should not be good for a year or two longer, the only difference being that it prints rather slower than fresh paper. It is simply necessary to keep it from light and dampness, and the best way to do this is to have made a tin cylinder about 3½ inches in diameter and 1 or 2 inches longer than the paper it is desired to keep, and with a tight cover to fit over the outside at one end.

I would also mention that in making tracings for blue print work a firm line, not too fine, is desirable, as a much better print can be had when the lines are not too fine. The washing should also be more thorough than is recommended, if the prints are to be kept permanently, or if the paper is somewhat old. Five to ten minutes is none too long.

Designs for a Grandfathers' Clock.

From P. L., *Elizabeth, N. J.*—I send a design, roughly sketched, for a grandfathers' clock, in reply to the inquiry of "J. L. W.," Philadelphia, Pa., which appeared in the September issue of the paper.

From A. D. L., *St. Charles, Ill.*—In response to "J. L. W.," in the September number, I take the liberty of sending drawings of a design which I trust will meet his requirements. It would be my idea to construct the clock of quarter sawed white oak, chemically treated, or darkened and filled with a paste filler until nearly black with age.

Sill and Sub-Sill.

From L. J., *Valleyfield, Canada.*—Will you kindly give in your next issue an explanation of the difference between "sill" and sub-sill," as used on brick buildings?

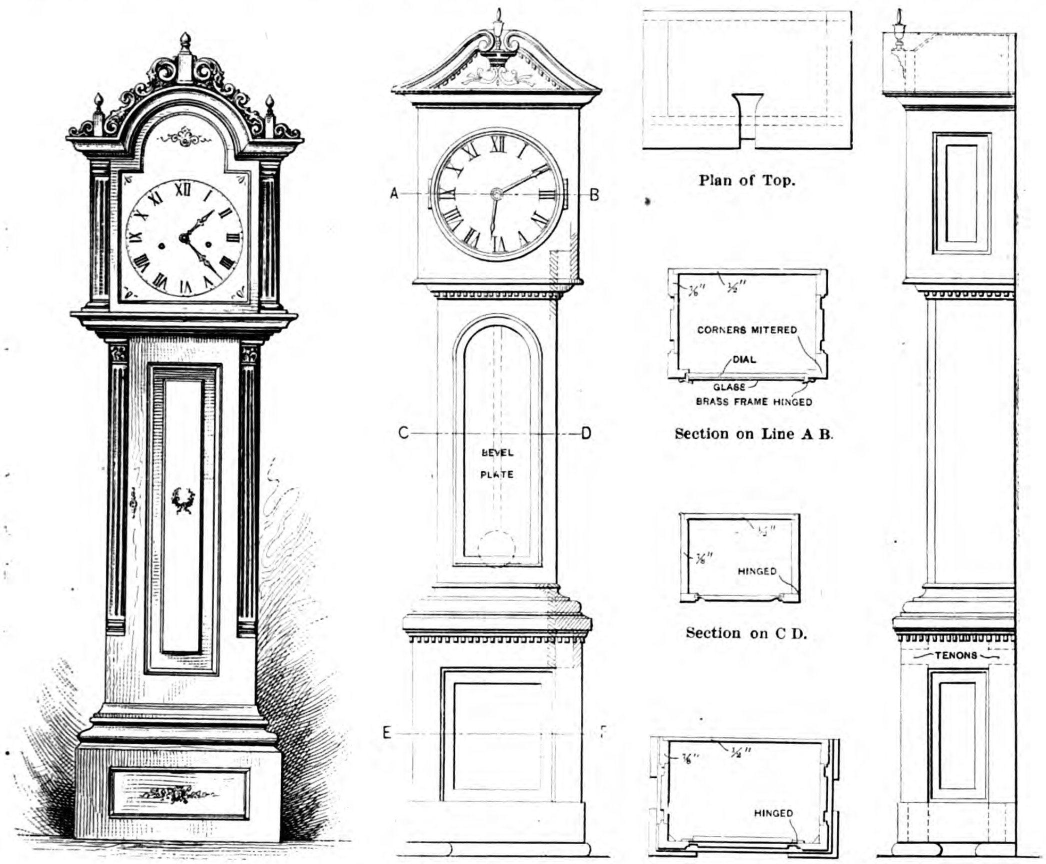
Answer.—The "sill" is the lowest member of a window frame or that part upon which the bottom sash rests when the window is closed. In the case of brick or stone buildings the "sub-sill" is the bottom of the window opening and usually consists of a slab of stone a little longer than the opening is wide and which, partially supporting the window frame, projects slightly beyond the face of the wall. In some localities the two parts are distinguished from each other by designating one as "sill" and the other as "stone sill" or "sub-sill." In frame buildings, however, a wooden substitute for the "stone sill" would be termed the "sub-sill." This practice, we would state, is not universal, as many are prone to use the terms in the reverse order of meaning to that described above. Such use, however, is not in strict accordance with the definitions of the words and therefore lacks the sanction of the best authorities. We shall be glad to have our readers describe the custom as regards the use of these terms in the localities in which they reside.

Trouble with a Smoky Chimney.

From D. C. P., *Norwich, N. Y.*—With regard to the chamney about which "W. B. B." makes inquiry in the May number, I would suggest that he tear it down and build one with a larger flue, say 8 x 8 inches, or even greater than this. A flue 4 x 8 will never do good work, especially in the position in which he has it.

From H. M., *St. Louis, Mo.*—A cure for the smoky chimney about which "W. B. B.," Ansonia, Conn., inquires would be to try a turntop. There are several patterns on the market, among the number being the Peerless, supplied by J. Eckhardt's Sons of this city. The best are of copper, but galvanized iron ones will last a good while, probably five years. There should be at least a distance of 15 feet from the fire to the top of the chimney. When such a device as that indicated above is applied it is not necessary to run the stack higher than the ridge of the roof.

From C. B., *Charlottetown, P. E. I.*—In answer to "W. B. B.," Ansonia, Conn., who asked in the May number of the paper in regard to a smoky chimney, I would



Plan of Top.

Section on Line A B.

Section on C D.

Design Submitted by "P. L.," Elizabeth, N. J.

Front Elevation of Design Contributed by "A. D. L.," St. Charles, Ill.

Section on E F.

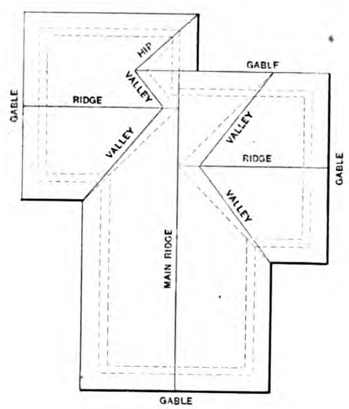
End Elevation.

Designs for a Grandfathers' Clock.—Scale, ¾ Inch to the Foot.

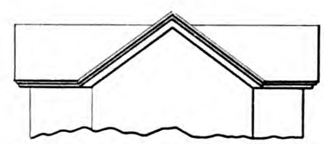
say that flues should never be built in such places as he describes. I would advise him to waste no more money on patent ventilator tops, as none of them are of much use in such cases. Better for him to pull down the chimney and build it in the main house to such a hight as will insure a steady draft. This he will find in the end the only secure and permanent remedy.

Plan for Roof of One-Third Pitch.

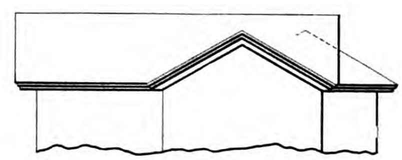
From C. B. C., *Charlottetown, P. E. I.*—I have been much interested, and in some cases amused, at the many varied designs for a roof plan for "A. S.," contributed in reply to the request in the February number of your excellent and interesting paper. In designing a roof, and for that matter, constructing a building, efforts should be made to have the roof lines as plain and simple as possible, avoiding in all cases level valleys or pockets, as some of the contributors have shown on their plans. Figs. 2 and 5 in the April issue I consider the best, although Fig. 5 is not quite complete at the rear end. This same fault applies to Fig. 3 in the same issue and Fig. 1 in the May number. I inclose a plan showing the main part of roof a steeper pitch than the wings, which would make a better appearance than if all the ridges were carried up even, as is suggested by the dotted lines.



Plan.



Front Elevation of Roof.



Right Side Elevation.

Plan for Roof of One-Third Pitch.—Scale, 1-16 Inch to the Foot.

Paint for Zinc.

F om W. N, *New York.*—Replying to your correspondent, "J. A. N." of New Hampshire, would say his trouble is probably due to a number of causes. In the first place he may have put on the prime coat when the galvanized iron was yet clean and glossy. The galvanized iron should be allowed to become affected by the weather, so that the paint obtains a better hold. 2. The zinc trimmings may have been still greasy (as grease is used at the factory when stamping to allow the dies to slip well), and the prime coat over the grease would obtain no hold and would naturally peel. 3. If any large surface, as cornice, gutter, roof, &c., is of sheet zinc, the expansion and contraction of the metal may be the cause. It is well known that zinc expands very much from the heat of the sun, and it may be for this reason that the north side of the house is all right, because the metal has an even temperature. The zinc expanding by day and contracting at night would cause the paint to crack and peel. I would suggest to "J. A. N." to use a wire brush and thoroughly remove all peeled paint, then give all the metal work a good coat of metallic paint which has been ground in boiled linseed oil, and over this metallic coat the desired color mixed in pure boiled linseed oil.

Trouble in Making Blue Prints.

From H. K., *Columbus, Ohio.*—I am a reader of *Carpentry and Building*, and in looking through the Correspondence columns recently I noticed an article from "C. K. S.," Wayland, Iowa, recounting some trouble he had experienced in making blue prints. I think I can tell him in a few words what the trouble is. In the first place the blue print paper which he uses is too old. He should start out with fresh paper, and the best place of which I know to obtain it is the Chicago Blue Print Paper Company. When new paper is used and the prints are cloudy after washing, I would suggest sending the paper back, as it is void, although this rarely happens. I would suggest to the correspondent that he keep his paper when not in use in a dark, tight place. If the tracing cloth is not exposed to dust or rolled loosely and is wrapped when not in use it is all right.

It is also well to have the cloth powdered with pumice stone or magnesia, and afterward brushed off, as this will make the ink run smoothly and the prints clear. It is also necessary to have a printing frame with pad in order to do good work. It may be that the correspondent does not place his drawing properly in the frame. If the print does not show up plain after immersing in water for a few times let it soak. It may be the prints are over printed. When a print is made with new paper do not let it be exposed to the light more than six minutes on a bright day, and on a cloudy day the time varies from 20 to 30 minutes. If the correspondent will follow these directions I think he will have no trouble, as I speak as one having had experience.

Framing Roofs.

From G. L. M., *Tacoma, Wash.*—In the August issue of the paper I notice a couple of inquiries as to methods of finding lengths and cuts for hip, valley and jack rafters. I submit the following as an easy method of doing the work. Lay off the length of the common rafter on the blade of the square and half the width of the building on the tongue. The distance between the two points will be the length of the hip. For instance, for a building 24 feet wide and with a half pitch roof take 17 inches on the blade and 12 inches on the tongue and the distance measured across between the two points will give the length of the hip or valley. The figures 14 5-16 and 12 will give the same for a roof of one-third pitch, and in a similar way the length of any hip or valley may be found. The cross bevel for jacks is the same bevel—12 and 17. Mark by the blade of the square for one-half pitch. This gives the following rule for cross bevels for all pitches. The length of the common rafter and half the width of the building will give the cross bevel. The plumb cut for jacks is always the same as the plumb cut for the common rafters. Jack rafters increase or diminish in length for one-half pitch roof 17 inches for each foot between centers, for one-third pitch, 14 5-16 for each foot between centers, and for any pitch as many inches per foot between centers as there are inches in the common rafter per foot run.

RESIDENCE OF MR. J. H. CHARLTON, ON BROAD ST., MERIDEN, CONN.

D. BLOOMFIELD, ARCHITECT.

SUPPLEMENT CARPENTRY AND BUILDING.

WHAT BUILDERS ARE DOING

THE reports which come to hand this month indicate a very gratifying degree of activity in the building industry in all parts of the country. While the rapid advance in the cost of materials entering into the construction of buildings has tended to interfere in some instances with operations, the percentage as regards the total work under way has been small and of no particular significance.

While the labor situation is generally favorable, there are mutterings of discontent in some quarters, and strikes have occurred. The outlook as a whole, however, is favorable for an early adjustment of differences existing between employers and workmen.

Birmingham, Ala

The Builders and Traders' Exchange of Birmingham was formally organized the first of August, with a membership which included nearly all the more prominent builders and material men of the city. A constitution and by-laws were adopted and the following officers elected:

President, A. J. Krebs, Secretary, Norman Kerr,
Treasurer, A. Stockmar.

The objects of the organization, as set forth in the constitution, are, among others, 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 adjust differences and settle disputes between members, or between members and others, and to make membership in the exchange a reasonable assurance to the public of the skill, integrity and responsibility of its members.

On the first of September the new schedule of the carpenters and joiners went into effect, the minimum rate now being $2 per day and nine hours to constitute a day's work.

Chicago, Ill.

The amount of building in Chicago during the month of August, as gauged by the permits which are issued by the Building Department, shows a slight falling off as compared with the preceding month, and also with the corresponding month of last year. In the opinion of builders this condition of things has been brought about by strikes seriously interfering with their operations. This view is partially borne out by the fact that during the latter part of the month the number of permits largely increased. During the month of August permits were issued for the construction of 314 new buildings, extending over a frontage of 10,398 feet and involving an expenditure of $1,789,060, these figures comparing with 375 new buildings for which permits were issued in August, 1898, estimated to cost $2,133,550.

At the regular meeting of the Building Trades Council, early in September, the question came up in regard to annulling the agreement between the Hod Carriers' Union and the Master Masons, and on a trade vote it was carried by 22½ to 8¼. It is said that the reason that the building trades took this action was on account of the late controversy between the Bricklayers', Master Masons' and the Hod Carriers' Union. It is regarded as practically the first step in the long-looked-for battle between the master masons and the Building Trades Council.

In the investigation by Coroner Berz of the Coliseum disaster, by which a number of workmen lost their lives, the Coroner discovered that when the first iron truss fell it was being used to support pulleys for hoisting heavy timbers.

Cleveland, Ohio.

The city of Cleveland is enjoying a season of unusual activity just at present, all branches of the building industry being exceptionally busy for this time of the year. Many large buildings are in process of erection, as well as numerous shops, factories, apartment houses and residences. Some of the leading contractors are loath to figure new work, having all they can handle with comfort for the season.

Great success attended the annual outing of the Builders' Exchange in August at London, Can. The Cleveland builders occupied a large excursion boat, and first visited Pt. Stanley, going from there by special train to St. Thomas and then to London. In each place the city officials, United States consuls, and officers and members of the municipal bodies, as well as members of the exchanges, joined in extended hospitalities. There was a friendly interchange of greetings which smacked of good feeling between the two countries. As a result of the visit Arthur Bradley, president of the Cleveland Exchange, has been made an honorary member of the exchange of London, Canada.

Secretary Roberts has just returned from a tour of inspection through the East, having visited Washington, Baltimore, Philadelphia, New York and Boston and examined the methods of work there in vogue. While the Eastern exchanges bear evidence of stability and a high development of the "exchange idea," Mr. Roberts declares that for life, progress and adaptation to the uses for which it is organized the Cleveland exchange is equal to any of them, excepting, perhaps, Boston.

The 'Change Hour was inaugurated on September 11 with satisfactory results. Formal exercises were held in honor of the event and a number of addresses were made, the members manifesting much enthusiasm over the innovation. Hereafter exchange hour will be observed every day, excepting Sundays and holidays, between 11 and 12 o'clock.

The exhibition feature of the exchange is meeting with great favor. All the spaces are rented and applications are in hand for the first vacancy that may occur.

Columbus, Ohio.

The Builders' Exchange is enjoying a decided wave of prosperity and the membership is constantly growing in numbers. Secretary Gardner has just completed an official directory of the building trades, and it will probably be issued from the press in a short time. He has also prepared a novel form of blank for the special use of architects, to invite bids on work and material of all kinds needed in the construction of buildings. It is expected that this will be a great convenience to the contractors and dealers as well as to the architects.

Detroit, Mich.

In spite of the high prices which prevail for all kinds of building materials, local contractors and builders have their hands full of work. The month of August compared very favorably with the corresponding month of last year as regards the amount of building, while July was far ahead of the record for 1898. We understand that nearly 33 1-3 per cent more work was consummated in July than was the case in the corresponding month of any of the three preceding years. In a few instances the high prices of materials have caused some of the small contractors to abandon their work rather than to continue at a loss, but the great majority of the builders of the city are completing their work, even though the margin of profit is extremely small.

Hartford, Conn.

The master builders of the city held a meeting early in August, when they completed the organization of the Hartford Builders' Association, the signers of the agreement including the names of the leading builders of the city. The organization is said to be due to the fact that the master builders of the city had become somewhat alarmed at the rise in the price of building materials, which threatened to interfere with building operations, and after a conference among themselves they decided to form an association for mutual protection, and to bring builders and contractors in closer touch with each other. It is intimated that the step was also largely due to the position taken by the master plumbers in the matter of securing contracts from builders. There has been a controversy going on for some time between builders and master plumbers, the builders taking the ground that the present figures for plumbing work are largely in excess of the rates of six months or a year ago, while on the other hand the master plumbers claimed that the increase in the price of iron, pipe and other materials is largely responsible for the higher figures given on contracts. At the present writing an effort is being made to have a better understanding with the Master Plumbers' Association, the details of which are in the hands of a committee appointed to confer with the plumbers with that end in view.

At the meeting in August the following officers were elected:

President, Halsey B. Philbrick. Secretary, Burt L. Newton.
Vice-President, Charles B. Andrus. Treasurer, William H. Scoville.

BOARD OF DIRECTORS.

C. C. Cook, S. D. Stoddard, John R. Hills,
Theodore Newton, Fred J. Bliss.

The association has rooms in the *Times* Building, and on the evening of September 4 their new quarters were dedicated with appropriate ceremonies.

Newark, N. J.

The scarcity and high price of structural iron have seriously affected building operations in Newark, the erection of a number of large buildings which were to have been put up this year having been postponed to next year because of the high price of iron. A member of the Newark Builders and Traders' Exchange recently expressed the opinion that it was fortunate for Newark builders that they have no large structural frame buildings contracted for within the last month, for the rolling mills cannot fill their orders, and cannot begin to take new orders. In many cases the large foundation iron pillars can be had, for they are kept in stock for buildings of certain dimensions, but all the upper frame material must be made to order.

New Orleans, La.

In the annual comparative reports of the Mechanics', Dealers' and Lumbermen's Exchange, Secretary C. E. Dirmeyer states that the building outlook for the past year indicates an improvement of about 10 per cent over that of a year ago, and that the prospect for the coming season is very encouraging. The comparative statement of building improvements and repairs for 1898-99 shows 1466 buildings, additions and improvements as having been made at a cost of $1,667,504, as compared with 1367 buildings costing $1,321,583 for the corresponding period in 1897-98. Secretary Dirmeyer states that all the lumber mills throughout the city and vicinity are busy, many of them with orders ahead, while the sash, door and blind factories are in many cases fitting out work for export.

New York City.

The scarcity of certain forms of structural material has had the effect of checking building operations in many quarters in the Greater New York, and in some instances projects have been indefinitely postponed. In and about the suburbs, however, there is a great deal of activity in the way of dwellings and flat houses, and above the Harlem River there has been a large increase in operations as compared with a year ago. An idea of what is being done in the Boroughs of Manhattan and Bronx may be gathered from the statement that up to the middle of September permits had been issued by the Building Department for 3311 buildings, estimated to cost $88,119,442, as compared with 2374 buildings involving an expenditure of $49,178,635 for the same period in 1898.

In the latter part of August several thousand plasterers belonging to the Plain, Operative and Ornamental Plasterers' Association were granted an advance of 50 cents per day in wages. A week or two previous the plasterers' laborers received an increase of 25 cents a day. Early in September the carpenters of the city made a demand for an increase in wages from $3.50 to $4 a day and an eight-hour work day, to take effect on September 18, and a Saturday half holiday to go into effect on September 16. The master carpenters in many instances refused to accede to this demand, although it is probable that those connected with the work at Madison Square for the Dewey celebration may grant the increase, as they are under bonds to complete their work within a certain time.

Pittsburgh, Pa.

The amount of building which is in progress or contemplated in and about the city of Pittsburgh leads real estate men to believe that they are on the eve of the greatest period of building activity in the history of the city. New buildings intended for dwelling purposes, business offices and manufactures are springing up on every side, and the outlook is very encouraging. Superintendent J. A. A. Brown reports that for the month of August permits were issued for 177 new buildings, estimated to cost $527,245, while there were 54 for additions and 48 for alterations and repairs. These figures show an increase as compared with the same month of last year, as well as with the preceding month of the present year.

The rapid advance in the cost of materials has been to some extent a drawback to improvements, and some of the contractors are feeling that there is great risk in building at the present time. Numerous building projects have been postponed by the rapid rise in prices, and especially is this the case in connection with speculative building. Every one, however, is busy, and where buildings are needed they are being put up. Some of the architects state that their business is the largest they have ever known, and the difficulty is in getting material. Activity in manufacturing circles causes a great demand for homes in the many suburbs of which Pittsburgh can boast, the activity being especially noticeable in Homestead, Bellevue, McKee's Rocks, East Pittsburgh, Wilkinsburgh, Hawkins, Copeland, Rankin, Swissville, Avalon, Esplen, Braddock and towns along the Turtle Creek Valley.

St. Louis, Mo.

The Building Contractors' and Material Dealers' Association, comprising over 1000 different contracting firms in the city, was organized a short time ago and now have offices in the Turner Building. The idea of the Association is to further the interests of the reliable contractors who are engaged in the various branches of the building business and bring them into closer relationship one with another. It is the object also of the association to deal with those who do not comply with just laws and who deal unfairly with one another; to formulate a more systematic method of carrying on their business and to compel those who are engaged in the business to deal honestly in the matter of giving and taking bids.

The officers are Daniel Evans, president; John Hill, first vice-president; John B. Hughes, second vice-president; L. B. McFarland, Secretary, and Hugh C. Gillick, treasurer.

Spokane, Wash.

The Spokane Society of Architects was organized at Spokane on the evening of September 7, with 11 charter members. Its objects, as expressed in the by-laws, are to promote the artistic, scientific and practical efficiency of the professoin.

The officers elected were: President, Alfred Held; vice-president, J. A. Zittel; secretary, John K. Dow, and treasurer, C. Ferris White.

The Executive Committee consists of K. G. Malmgren and A. E. Permain.

The city ordinance provides specifically that a record of building operations shall be kept, but the law seems to be ignored, and it is said that a great many houses are now going up without permits having been issued. A movement is on foot to require those who build within the fire limits of the city to take out a permit, so that the Board of Public Works may be assured that the buildings will conform with the legal requirements.

Springfield, Mass.

The city has been experiencing somewhat of a boom in building operations during the past Summer, and it seems likely to continue until the cold weather. Up to the middle of September the number of building permits issued were double the record of last year, this applying more particularly to buildings intended for dwelling purposes. The number of business blocks which have been and will be put up may not be quite as large as a year ago, when many of the structures now completed or nearing completion were commenced.

Worcester, Mass.

The members of the Builders' Exchange, accompanied by their friends, to the number of 100 or more, participated in an outing and picnic at Quinsigamond Park, one day early in August. The event of the day was a clambake prepared by Daniel Moulton, whose name is renowned all over the county for the excellence of his dinners. After dinner there was a game of baseball between teams captained by E. W. Hayden and Arthur W. Kimball, resulting in a victory for the former nine by a score of 21 to 7. A second game was played by teams captained by the same men, but this resulted in a victory for Captain Kimball's nine. The afternoon was pleasantly passed by the members of the exchange and their friends, and in the evening they returned home well pleased with their outing. The success of the affair was due, in a great measure, to the work of the Committee of Arrangements, consisting of George W. Carr, Thomas J. Smith and Joseph G. Vaudreuil.

Notes.

About 25 members of the Builders' Exchange of Portland, Me., had an outing early in September at Underwood Park, where at 5 o'clock in the afternoon they partook of a clambake. The Committee of Arrangements consisted of Josiah C. Ward, president of the association; Nathan E. Redlawn and Sylvanus B. Bourne.

Quite a building boom is in progress in Easton, Md., where dwellings, factories and storehouses are in process of erection. The contractors are employing considerable outside labor in the work.

It is stated that building operations are seriously handicapped at Millville, Pa., by reason of the scarcity of workmen. All the local bricklayers, masons and carpenters are engaged, but it is stated that two or three score more could be kept busy if they were forthcoming. Some of the buildings that were intended to be erected this fall will have to wait until spring, owing to the scarcity of workmen.

The builders and contractors of Utica, N. Y., held a meeting the first of September to consider the matter of letting local contracts go to outside parties. Some of the contractors state that on several large pieces of work now in the hands of out of town men they were entirely shut out from the bidding.

The builders and contractors of Waterbury, Conn., are experiencing considerable difficulty in rushing work, owing to the scarcity of men. All of the larger contractors are said to be short-handed, and in neighboring towns labor is at a premium. This is also said to be the condition of affairs at Naugatuck.

Raleigh, N. C., is the scene of a great deal of building activity, but here, as in many other parts of the country, the demand for labor in the building trades is greater than ever before.

Considerable building is being planned for the autumn and winter in Camden, Me., where a large summer hotel is to be erected and summer cottages put up.

Contractors in Hazelton, Pa., are finding difficulty in securing carpenters to do the work which they have in hand, the scarcity being due in a large measure to the fact that many carpenters left the city for other places early in the spring.

Beverly, Mass., is experiencing a genuine building boom just at present, and new houses are going up in all the suburbs. New tracts of land are being cut up into building lots and placed on the market, and the outlook is for a very active period.

The annual banquet and election of officers of the Colorado chapter of the American Institute of Architects was held September 11, at the University Club. Short speeches were made and the following officers elected: President, Robert S. Roeschlaub; vice-president, Thomas F. Walsh; secretary, F. E. Kidder; treasurer, William Cowe.

A WRITER in one of our exchanges states in a recent issue that he was witness a short time ago to a rather interesting test of the strength of a brick arch. A building was in process of demolition which had stood in place ever since 1858. The floors were constructed of brick arches turned between cast iron beams; steel was not known in those days. The arches were 4 inches thick at the crown, spanning about 4 feet 6 inches, and the haunches were filled up level with concrete. The mortar in which the bricks were set appeared to have very little cement in it. In taking down the upper portion of the building a heavy stone weighing in the vicinity of 1 ton dropped from a hight of about 30 feet. It struck fairly in the center of one of the arches and broke a hole clean through the brick work slightly larger than the stone, without, however, dislodging any of the remainder of the brick work. The masonry about the gap was perfectly secure and did not seem to be damaged at all by the shock. This is the result which it is usually claimed will follow an accident, though I have no doubt that considerable of the strength of this particular arch was due to the mortar, which had been slowly hardening during the last 40 years.

A LOCK OUT of employees in the building trades, which had been in force in Denmark for several months, was ended early in September, a satisfactory agreement having been reached. Thirty-five thousand persons were involved in the trouble.

NOVEL FACTORY CONSTRUCTION.

FROM an architectural point of view the new factory just erected by the Weston Electrical Instrument Company, at Waverly, N. J., embodies many features of striking originality and which mark a wide departure from usual construction. The structure is one story in hight, with a basement. The latter is lighted by windows on three sides, but the former is inclosed by masonry walls without any openings whatever, all the illumination being obtained through the saw toothed roof, so arranged that all the light is from the north. This provides ample light, since the glass area of the roof is three-eighths that of the floor space. In addition to this unique arrangements are provided for leading away the roof water and the water of condensation of the roof, use being made of the hollow supporting columns as leaders. As both dust and moisture are extremely dangerous to the fine instruments made by the company, it is of the utmost importance that both be entirely eliminated. It is expected that this construction will perfectly accomplish the result.

The new factory is located at the southeast corner of Frelinghuysen avenue and the road leading to the Waverly station of the Pennsylvania Railroad. The office building runs parallel with the main factory and faces this road. The main building is 241 feet 8 inches long on the avenue, by 193 feet 8 inches wide, being connected by a gangway 18 feet long and 17 feet wide, outside, with the main office building, which is 41 feet 8 inches by 105 feet 8 inches. The whole covers an area with the annexes for water closets, &c., of 53,000 square feet, or 1½ acres.

The level of the main floor is 4 feet above the ground, and its hight is 11 feet between the floor level and the lower chord of the roof trusses. Underneath this floor is the basement, 9 feet from the underline of the main girders to the asphalt floor. The iron construction forming the main floor consists of a frame work of steel girders carrying a cement flooring, made up of ribbed steel bars with concrete above and between them, to which is directly nailed the double wooden flooring, consisting of one layer of 3 x 6 inch spruce, and a top layer of 1¼ x 3 inch factory maple. The main girders of the frame work are 20 feet high, 20 feet from center to center, and weigh 32 pounds per foot. This frame work is carried on cast iron columns spaced 20 feet apart from north to south and 16 feet from east to west. Each column connects vertically with a lighter cast iron column, Fig. 3, which supports the roof trusses. Through each of these columns the water from the roof is discharged into the lower columns and from there into the sewer pipes running under the basement flooring, as shown in Fig. 6.

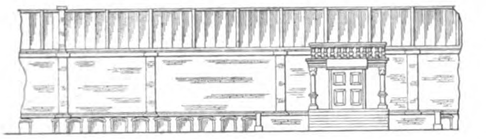


Fig. 1.—Partial Side Elevation.

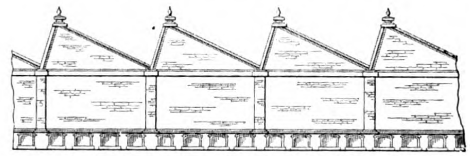


Fig. 2.—Partial End Elevation.

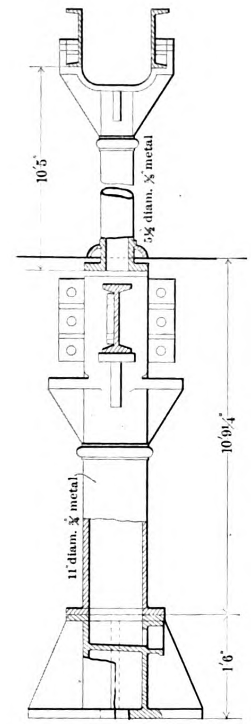


Fig. 3.—Detail of Columns.

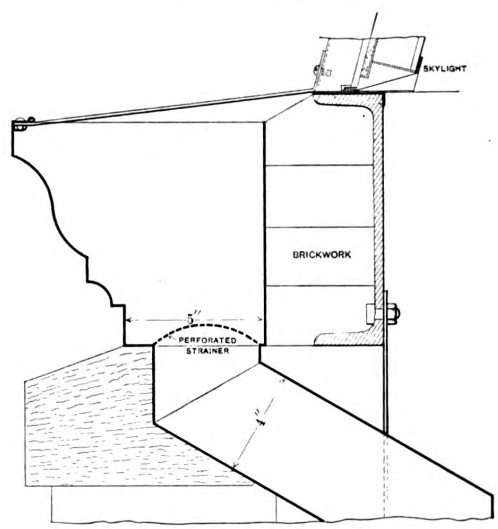


Fig. 4.—Detail Outside Gutter.

Novel Factory Construction.

The entire roof of the factory consists of a number of shed roofs of the saw tooth type, Fig. 2, the shorter side of the triangle of which is placed at an angle of 72 degrees and is furnished with ribbed glass. The roof is composed of 12 bays, each running the whole width of the building, 193 feet 8 inches, and consisting of 22 trusses 8 feet apart, made of double angle iron. The glass plates are 2 feet wide, 8 feet high, ¼ inch thick and rest in a copper frame with steel supports. The other or long side of each section of the roof is covered with 2-inch pine planking, to which is fastened asbestos roofing composed of strong canvas and asbestos felt and connected together and compressed into a flexible roofing sheet without coal tar or shoddy.

Between each two sections are gutters made of copper and fastened to the channel iron carrying the roof, as indicated in Fig. 5. This gutter, as will be seen from the engraving, is composed of three separate and distinct troughs; the upper one takes care of all storm water, the middle one immediately beneath it is arranged to lead away all water of condensation, while the third one takes care of any leakage and prevents drip due to condensation.

The basement has, in the direction from east to west, on the northern side, 17 4-foot windows, arched on top, and all being 3¼ feet high. On the southern side, on account of an additional bay without any basement, there are no windows. The east and west sides are also fully provided with windows. The east, west and south sides have annexes for water closets and bathrooms, which are 21 x 24 feet 2 inches. The annex on the south side, by reason of the additional bay without any basement, connects with the basement through a gangway. The annexes have windows in the basement and on the main floor. Both the east and west sides are provided with extensions 7 x 12 feet, closed by trap doors, and which are to be used for the delivery of heavy machinery into the basement. Since the basement is naturally lighted by windows only from three sides the center space will be illuminated artificially, and will be used for the storage of raw material and finished instruments.

The office building contains on one side the commercial, and on the other the technical department. Its design of flooring and roofing is the same as that of the factory building, light coming only through the roof. The main entrance consists of a porch with a balustrade on top and six steps leading to the porch. On both sides of the porch and extending beneath it are staircases for the entrance of the men and girls employed in the works. These entrances lead to the basement, where the lavatories and clothing closets are arranged, one washbowl and cabinet being provided for each employee. From here the latter pass on separate staircases to the main factory floor.

Sufficient water closets and urinals are provided on three sides of the building, also sufficient drinking pumps. This disposition was made in order that there might be as little time as possible lost by the employees in traveling to and from them. In the basement are bathrooms for the girls and shower baths for the men, also large dining halls for all where meals may be obtained from a specially arranged kitchen situated between the men's and girls' dining rooms. The water supply of the building is obtained from a well and stored in a tank of 30,000 gallons capacity, placed outside of the building on a special structure, and at a hight adequate to give sufficient pressure. The office of the superintendent is placed near one side of the main floor, and being elevated 4 feet above the floor, commands a general view of the entire interior. The different departments are divided from each other by glass or screen partitions but 4 feet high. The motive power is derived from the power house placed outside of the building, and containing boiler, steam engine, dynamos and so on. From the generators wires run to the several motors in the factory which drive groups of small tools by means of shafting, or which are coupled directly to the larger machines. Besides the electric current compressed air will be largely used, partly for the transmission of power and partly for direct mechanical manipulation and also for cleaning.

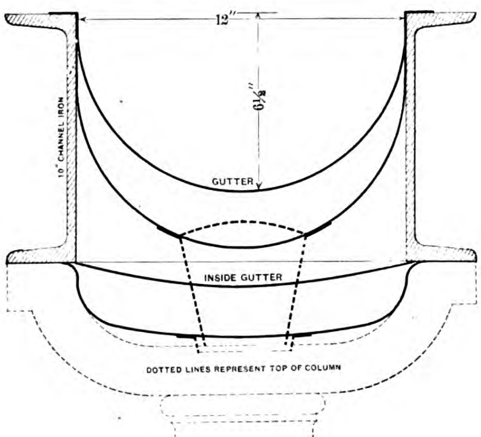


Fig. 5.—Detail Saw Tooth Gutter.

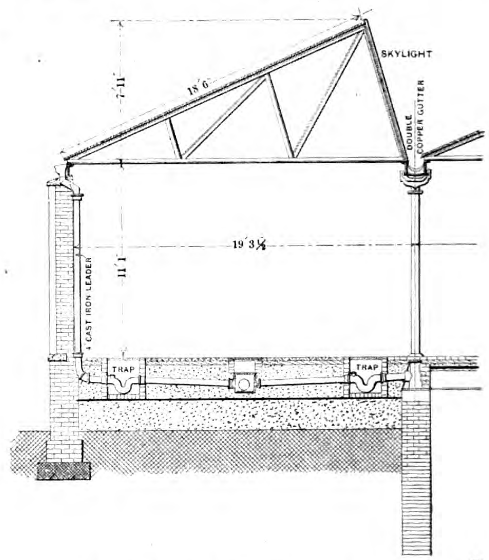


Fig. 6.—Detail of Roof, Showing Drainage.

Novel Factory Construction.

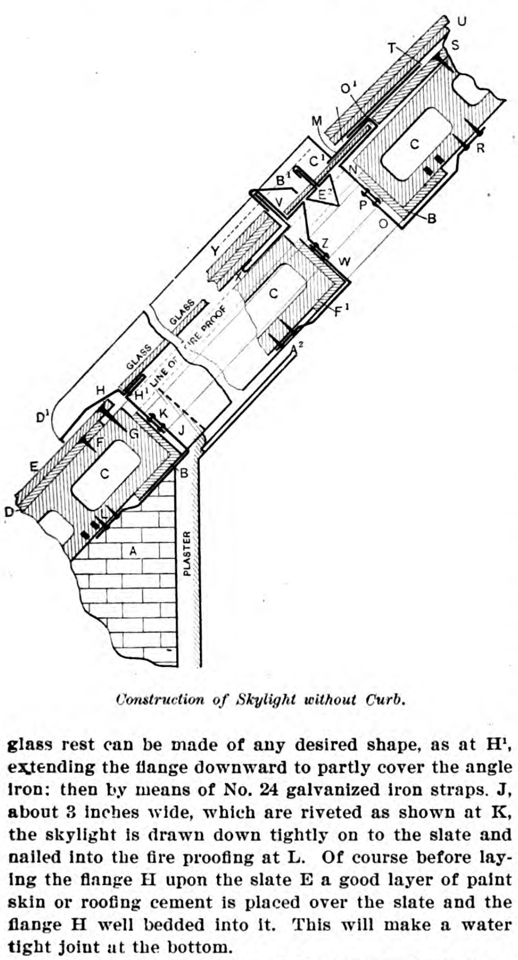
Greek Masonry.

The ancient Greeks were as empirical in their rules upon the proportions of each stone they employed as upon the proportions of the whole design, says a writer in an English exchange. Thus it may be observed, for example, that the size of the stones in the Erechtheum and in the Parthenon differ in about the same ratio as the one differs from the other. For the actual proportion of the stone itself no direct rule can be given, nevertheless it is found that the geometrical ratio of 1, 2, 4 is by no means unfrequently employed. Symmetry also was considered as necessary in the position of their joints as in the composition of the plan, or the position of their triglyphs and mutules, and these may be observed as occupying the same place in nearly every similar construction. The Greek joint, whether it be executed in marble or in stone, is a thing really to marvel at. It is, indeed, scarcely visible. Its perfection arises from the amount of skill and labor bestowed upon it, and from the peculiar method of working the two surfaces. There are grounds for believing that there was a universal method adopted in all ages by that nation, nor was it confined to the Greeks alone, it having been handed down to and practiced by the Romans also, as can be observed in the Coliseum and Arch of Septimius Severus. It, however, at length became either lost or disused.

THE jury composed of American and foreign architects having in charge the final decision in the competition resulting from Mrs. Phœbe Hearst's offer of prizes for the best plans for new buildings for the University of California, have awarded first prize to Architect M. Bernard of Paris, France.

Construction of Skylight Without Curb.

One of the readers of *The Metal Worker* sends to that journal a drawing showing a section of a skylight on a slate roof and asks how to construct a water tight joint between the glass and slate, the skylight having no curb. The accompanying sketch shows all that is required to indicate the construction of the sheet metal work and flashing. In the engraving let A represent the brick wall built to the line of the fire proofing and B B the angle irons forming the opening for the skylight in the roof. Porous terra cotta blocks are laid into the angle irons, as shown by C C C, and on these the skylight is to rest. If the size warrants the skylight is finished complete in the shop and made water tight with the slate as follows: Let D represent the second course of slate, nailed at F, and E the last course of slate, nailed at G. The base of the skylight is then bent, as shown, at H, leaving the flange bent over so as to cover the nail of the second slate. The



Construction of Skylight without Curb.

glass rest can be made of any desired shape, as at H^1, extending the flange downward to partly cover the angle iron; then by means of No. 24 galvanized iron straps, J, about 3 inches wide, which are riveted as shown at K, the skylight is drawn down tightly on to the slate and nailed into the fire proofing at L. Of course before laying the flange H upon the slate E a good layer of paint skin or roofing cement is placed over the slate and the flange H well bedded into it. This will make a water tight joint at the bottom.

For a water tight joint at the top bend the sheet metal as indicated at M N, making the thickness of the groove O^1 equal to a little more than the thickness of the glass used. Then, by means of the strap O, which is riveted at P, the upper frome is drawn tightly on to the terra cotta by nailing the strap at R.

Place a good layer of roofing cement on the terra cotta blocks in the back of the metal frame M N and bed the slate S well into the cement. Take the strip of metal or flashing T T and place it over the joint between the metal frame and slate, nailing it at intervals between the slates; then over this flashing lay the second and third courses of slate in the usual manner, keeping a distance of 1 inch or so away from the edge of the upper frame, as shown at M, so as to allow space for soldering the caps of the skylight bars. This will make a tight joint at the top.

When putting in the glass it is laid in putty against the glass stop at the bottom at H^1 and laid in putty at the top into the groove O^1.

For a tight joint along the sides of the skylight proceed as follows: Let F^1 show the angle iron forming the opening, on to which the terra cotta C is placed; bend the side metal frame as indicated by X V Z, being careful that the glass rest at the bottom H^1, at the top O^1 and at the side V is in line, as shown. Then form the side V about 4 inches high, which forms a side flashing, and make the flashing on the roof about 6 inches wide, with a water lock at X. By means of the metal band W, which is riveted to the skylight at Z, the latter is drawn down on to the roof by means of nailing the band at A^1. If the lock X does not lay on well to suit the slating fasten it down to the terra cotta by means of cleats, but do not under any circumstances nail through the lock, for that would cause a leak which would be hard to find. Now put a layer of cement over the flange X and lay the slates in the usual manner.

Where the side of the frame V meets the base H a finish is made by cutting the side round, as at D^1, while at the top it is cut square, meeting the flange M, as at C^1.

When the glass is in position and puttied a cap is placed over the side bar, as shown at B^1, with a head soldered in at the top C^1 to prevent the water running in. E^1 shows the center bar, which can be made in any desired shape, having a cap and head at the top, as before explained. If a condensation gutter is required at the bottom with tubes to convey the water to the outside, the construction at the sides and top is the same, but the bottom would be raised high enough to allow the tubes to pass over the slates or flange H, and the bottom of the side frame would be as high at that point.

Rendering Frame Houses Warm.

In those sections of the country where the winters are severe, too much attention cannot be given in building frame houses to render the walls and floors practically frost proof, and this may be done in any one of three ways, all of which are simple and comparatively inexpensive. In the first place the floors should be laid by nailing strips 1 x 2 inches along the sides of the joists, about 2 or 3 inches from the top edge. On these strips lay a false floor and nail well; then fill in with lime or cement mortar to the level of the joists. When dry, lay over this two thicknesses of heavy felt or building paper, and lay the finished floor over all. An alternative plan is to cover the joists by a solid matched floor, well nailed, then lay two thicknesses of felt, and lay the finished floor over all. A third method is to strip the joists as mentioned above, then lay false floor, on this lay tarred felt paper, seeing that the paper runs up the sides of the joists and laps over their edges, and that all the joints of paper are well broken. Fill in with lime mortar to top of joists and over this lay the finished floor. The first method is the better one, but either of the others will answer very well. For the walls, in which the studding is assumed to be 2 x 4 or 2 x 6, cover inside and out with surface boards and then cover with felt or other good paper well lapped over and nailed. The outside may be sided or it may be roughcast, and the inside may be "furred," and have 1 x 2 inch strips nailed vertically 26 inches from centers, and be lathed and plastered in the usual manner.

The second method of protecting the floors and walls is to build solid brickwork between the studs 3 feet high from the sills, or fill it up that high with concrete. Strip the studs vertically on the sides with 1 x 2 inch strips, lath on the strips and plaster in between the studs. Board inside and out, and cover with paper, and finish same as in previous method.

For a third method, sheath the studs inside and out with 1-inch boards; cover outside with heavy dark canvas, painted one heavy coat of lead and linseed oil. Before inside sheathing is put on, cover the sides of the studding and the back of the outside sheathing with tarred felt paper, starting on face of stud, then on side of stud along the sheathing, out on side of stud around the face, and so on, in and out, forming a perfect air chamber; put a lath on all joints, which must be vertical and close. Prepare the first floor and ceiling joists in any of the methods described for preparing the floors, and if the work is well done the building will be as warm as the best brick house in winter, and as cool as any stone building in summer.

In the construction of the roofs, well tarred paper under the shingles, and lath and plaster between the rafters, right up to the ridge, then rough board under the rafters, nail on paper, then lath and plaster as usual. Do not bring windows close to the floor, and see that all the joints around window and door frames are made close and tight. When using felt paper see that the laps are perfect around all frames and openings and that all joints are well nailed close. The warmth of a house, says a well-known writer in the *Canadian Architect and Builder*, depends very much upon the care taken in fitting everything about window and door frames close and tight, and having the paper carefully "tucked" into and around all angles.

Law in the Building Trades.

WHEN CONTRACTOR ABANDONS WORK.

A party contracted to erect a building within a specified time, and on failure to complete the building within such time he was to pay a specified sum *per diem* as liquidated damages. He partially completed the building and then abandoned it. At the time of abandoning he had received more than the value of the completed portion. It was held that the measure of damages against him was the difference between the value of the building completed and the contract price, the amount paid in excess of the value and the stipulated damages for delay.—Watson *vs.* Dewitt, Texas, 46 S. W. Rep., 1061.

A building contract provided that if the contractor should fail to supply sufficient skilled workmen, or materials of proper quality, or to prosecute the work with diligence, the owner might, upon securing a certificate from the architect to this fact and after giving notice, enter upon the premises and finish the work. The court held that such provision contemplated a case where the contractor claimed to be complying with his obligation, and not one where, before doing any substantial part of the work, he absolutely abandoned it, and voluntarily surrendered the premises to the owner for its completion, and that neither the failure to secure the certificate of the architect or to give the notice to the contractor, nor the waiver of them by the contractor, under such circumstances, would release the surety on the contractor's bond.—George A. Fuller Company *vs.* Doyle, U. S. Cir. Ct., 87 Fed. Rep., 688.

WHEN THE PLANS ARE CHANGED DURING PROGRESS OF WORK

Where after part performance of a contract to build a house, such material departures from the plans and specifications are made, at the instance of the owner, as will result in a different undertaking, and no agreement is made as to the price of such departures, the builder may recover for the reasonable value of the material and labor furnished in accordance with such new undertaking, and will not be limited to the price agreed upon in the original contract.—Rhodes *vs.* Clute, Utah, 53 Pac. Rep., 990.

WHEN CONTRACTOR IS NOT LIABLE FOR INJURY.

A contractor is not liable for injury caused by brick falling from a properly constructed wall, which, although not permanently, is temporarily completed, through the intentional or negligent act of an employee not acting within the scope of his employment, though proper scaffolding or guards to prevent brick from falling have not been erected.—Mayer *vs.* Thompson-Hutchinson Building Company, Alabama, 22 So. Rep., 859.

WINDOWS IN CONTINUATION OF PARTY WALL

The adjoining houses of two parties were supported for a distance of 48 feet by a party wall, which from that point continued 37 feet further, and in it were 18 windows overlooking the other premises. The parties acquired their respective lots from a common grantor, and when the one whose lot was overlooked by the windows bought the windows were there. The court held that he could not compel the other to close them up.—De Baun *vs.* Moore, 48 N. Y. Supp. Rep., 16.

EXTENT OF LIABILITY OF CONTRACTOR'S SURETY.

Where a building contract provides that a certain amount be retained until the building is completed and accepted, a surety on the contractor's bond is not liable unless such amount has been paid.—School Dist. of Moreland *vs.* Parker, Pennsylvania, 13 M. C. L. R. Rep., 210.

EVIDENCE OF LIABILITY.

In an action for the price of material shipped to a party to be used in the construction of his house, evidence that the contractor building the house took the material from the depot is admissible to show that the owner of the house got such material.—Watson *vs.* Winston, Texas, 43 S. W. Rep., 852.

LIABILITY OF OWNER TO SUBCONTRACTOR FOR BALANCE.

Where a building contract provides for the owner's completion on the default of the contractor, a subcontractor's lien attaches to any balance in the owner's hands, over the contract price, after deducting the price of completion.—Schmohl *vs.* O'Brien, 55 N. Y. Supp. Rep., 629.

NO EXCUSE FOR NOT COMPLETING IN AGREED TIME

Where one contracted to finish a house by a certain time, delay is not excused by the failure of the owner to furnish certain fixtures, the contractor not having called for them until the day on which the house was to be completed. And agreed changes in the specifications, not of such a nature as to render further time necessary, do not excuse failure to perform in time.—Goldnick *vs.* Toelberg, 55 N. Y. Supp. Rep., 954.

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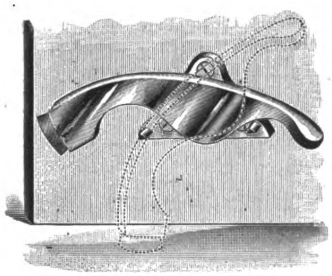
NOVELTIES.

The Empire Door Holder.

A door holder which has been placed upon the market by the Caldwell Mfg. Company, Rochester, N. Y., is shown in Fig. 1 of the engravings It is designed to hold the door open at any angle, a light pressure of the foot throwing the presser either way. A spring which is inclosed holds the presser up when not in use and forces it down when the door is held open. The holder is suitable for use on carpeted or polished floors the rubber tip preventing the marring of the floor in the latter case. The holders are made in iron or bronze metal in all finishes. They are referred to as simple in construction, attractive in appearance, easily attached to the door and moderate in price.

Stamped Steel Ceilings.

The Canton Steel Roofing Company of Canton, Ohio, have just issued from the press "Catalogue D," consistig of 68 pages of highly finished paper profusely illustrated with half-tone engravings and devoted to stamped steel ceilings that should meet the approval of architects and builders who desire to produce a handsome effect. After giving the terms, enumerating the advantages and presenting instruc-



Novelties.—Fig 1.—Empire Door Holder.

tions for putting up ceilings, patterns are shown adapted for continuous work on ceilings and side walls, followed by ceiling panels, friezes, moldings, cornices, border plates, fillers, girder covers, corner leaves and center plates. The center plates vary in size from 12 x 12 inches to 4 feet square, some solid and others open for ventilating; these are of elaborate design and very handsome. Side wall designs and wainscoting for stairs are also shown in variety. The last 30 pages are devoted to ceiling designs, some of small pattern with center pieces, and others in heavy relief of rich ornamental design with moldings, cornices, borders and field plates. An interior view is given of a large room with the walls and ceiling finished in elaborate style with the company's art metal work. Broken and sectional views are presented to show the material used and the method of applying their continuous metal ceilings. One page calls attention to skylights and roofing materials.

The Equator and Gulf Stream House Heaters.

The Nason Mfg. Company of 71 Beekman street, New York City, point out in an interesting pamphlet which they have issued that the Equator and Gulf Stream hot water house heaters, which they manufacture, are the result of long and careful study on the part of C. W. Nason, a steam engineer of experience and ability, and are introduced to the trade as free from recognized defects, while embodying the best points which have been made by him and other inventors. In offering these goods to the trade the manufacturers point out that the fire surface is large as compared with

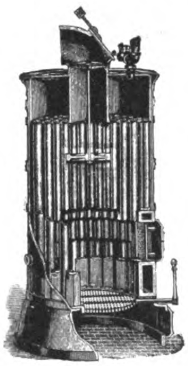


Fig 2.—Broken View of House Heater, Showing Internal Construction.

the areas of their grates, thus insuring a rapid heater of great efficiency: that the surface is practically all exposed to the direct radiaton of the fire; that it is of the drop tube type and is self cleansing; that the fire box is deep and roomy and that the grate used is of special design. The heaters are equipped with modern self controlling devices and are entirely automatic in the control of their draft and fire. A broken view showing the internal construction is presented in Fig. 2. These heaters are illustrated and described in detail in the little pamphlet previously referred to, which also contains a treatise on steam and water warming and the selection of an apparatus. It has been written with great care by a practical man, and as it is based upon experience covering considerably more than half a century it is likely to be found of unusual value to those interested in the science of steam and water heating. We understand that a copy of this little work will be furnished free on application to the address named.

Hildenbrandt's Double Acting Hinge.

The Hildenbrandt Automatic Hinge Company, Cincinnati, Ohio, manufacturers of self closing door and gate hinges, have just brought out a new style automatic double acting door hinge, which is illustrated in Fig. 3. The principal feature of construction is an automatic table operating with a wheel pressing against a spring in the center forward of the pintle to prevent any tendency to violent closing of the door, and providing an easy swing to the latter, its action being such, it is said, that no perceptible jar is apparent, yet closing the door in much less time than with an ordinary double acting hinge. It can be readily attached by any one with the aid of a screw driver in a very short time. The hinges are made in all the usual sizes styles and finishes, from 1 inch upward. The company also manufacture a complete line of these goods, with or without springs complete descriptive circulars of which will be mailed upon application.

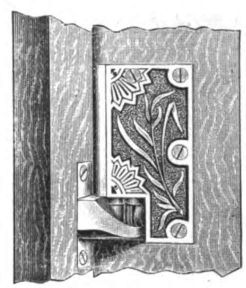


Fig. 3—Hildenbrandt's Double Acting Hinge.

Oefinger's Automatic and Burglar Proof Sash Lock.

An illustration is given in Fig. 4 of a sash lock which has just been put on the market by J. L. Oefinger, 7 South Jefferson street, Chicago, Ill. The construction of the device is such that the lock secures both upper and lower sash at the same time. When the upper sash is lowered for ventilation the lock holds both sash together at any point. Absolute security is thus assured, as the top sash cannot be lowered or the bottom sash raised except from the inside.

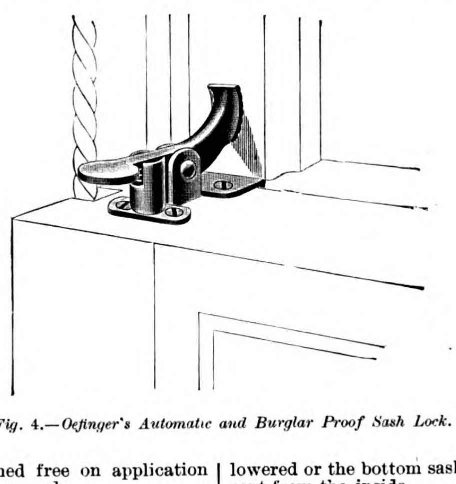
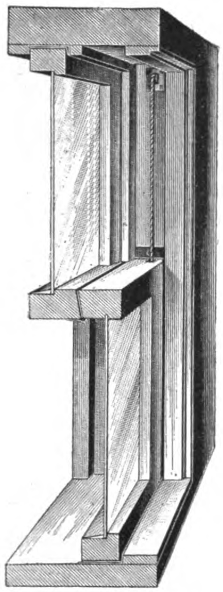


Fig. 4.—Oefinger's Automatic and Burglar Proof Sash Lock.

The Carpenter Metal Sash Guard.

Architects, builders and house owners generally are likely to be interested in the metal sash guard which we illustrate herewith, as it has been designed to remedy the defects in the present method of sash fitting and to insure to its users the perfect working of windows. The device consists simply of flanged bearing plates of galvanized steel set in the frame and attached to the edges of the sash and running one within the other so that



Novelties.—The Carpenter Metal Sash Guard.—Fig. 5.—Sectional Perspective View, Showing Window with Guard Applied.

there is a bearing of metal to metal entirely independent of the wood work. Fig. 5 of the illustrations represents a sectional perspective view, showing the window with the guard applied; Fig. 6 is a view of a corner of the sash, indicating the method of slotting for the reception of cord or chain, while Fig. 7 is a horizontal section through a window with the guard applied. It will be seen from an inspection of the engravings that the

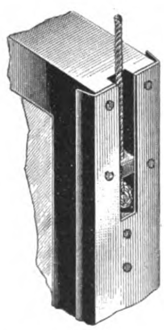


Fig. 6.—View of Corner of Sash, Showing Method of Slotting for Cord or Chain.

bearing plates are fastened to the frame or sash in a straight line in the center, and that small space is always left between the flanges of the plates and the wood work to which they are secured, thus preventing the swelling or shrinking of the window from having any effect whatever on the metal bearings. The flanges of the plates attached to the sides of the sash are bent at right angles and the flanges of the plates set in the frame are bent at an acute angle, thus always maintaining a perfectly tight joint irrespective of the shrinking or swelling of the sash. The outer flanges of the plates at the top of the window are omitted as unnecessary, as are also the outer flanges at the bottom, all as shown in Fig. 5 of the engravings, this being done to prevent the accumulation of water when washing windows or when the window is left open in stormy weather. For the purpose of insuring a tight joint between the upper and lower sash a strip of metal having a single flanged edge is attached to the under side of the meeting rail of the upper sash projecting far enough to cover the joint and make it perfectly tight when the window is closed, as may be seen from an inspection of the engraving just referred to. This device is being placed upon the market by the Carpenter Metal Sash Guard Company of 105 Park place, New York City, who refer to its great durability and to the fact that a window properly fitted with it always remains absolutely dust and wind proof. It is also pointed out that it will always work easily, will never rattle and can never be stuck fast by painting or varnishing. It is out of the way of screens, does away with the necessity of double windows, is claimed to cost no more than ordinary weather strips and it can be readily applied to old as well as new windows.

New Improved Combination Saw Bench.

In placing on the market the combination saw illustrated in Fig. 8 of the engravings S. S Miles & Co., 526-528 Livingstone street, Cincinnati, Ohio, state that they have endeavored to meet the demand of carpenters, builders and wood workers generally for "the best rip saw, the best cross cut saw and the best machine for cutting grooves, rabbeting and edging ever introduced to the trade." The nature of the device is such that a scroll saw attachment can be readily added if required and at comparatively small cost. A change of mandrel, which can be almost instantly made, gives a machine capable of cutting gains, dados, rabbeting, &c., while by the use of special knives sash molding can be cut. In constructing the machine the manufacturers state that they have been careful not to add in their combinations any device which will not be as satisfactory in operation as if

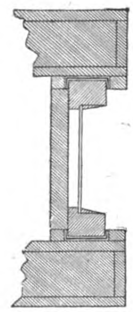


Fig. 7.—Horizontal Section through Window with Guard Applied.

made to do that work alone. They have therefore excluded boring machines, fluting and molding attachments, &c., as, in their estimation, these are detrimental to the main object—namely, rip, cross cut and scroll sawing. The frame of the machine here shown is heavy and well braced. The table, which is of wood or iron as preferred, is planed perfectly true and is hinged at the back. The saw is run either by hand or foot power, or both may be employed should circumstances require. The foot power is run by means of sprocket chain running loose. The manufacturers have done

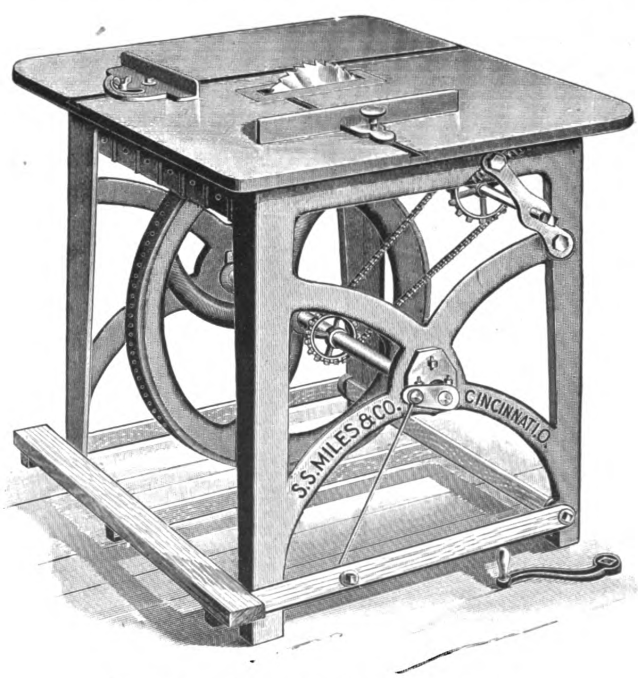
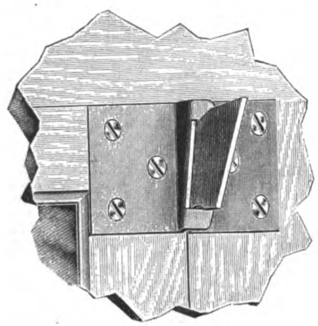


Fig. 8.—New Improved Combination Saw Bench

away with all gears, which are apt to clog with sawdust, while at the same time producing a great amount of unnecessary friction. The company also refer especially to the manner in which they apply the power and to the fact that bearings are adjustable and dust proof. The changes from one class of work to another are quickly made and all unnecessary friction and noise are avoided. The construction of the device here illustrated is such that four machines are contained in one to which can be added scroll saws and cutters if desired.

Acme Storm and Screen Sash Hangers.

The Heath-Quimby Company, 102 Hennepin avenue, Minneapolis, Minn.,



Novelties.—Acme Storm and Screen Sash Hangers.—Fig. 9.—Acme Hanger, Style No. 1.

are just putting on the market storm and screen sash hangers, shown in Figs. 9 and 10 of the accompanying cuts. Style No. 1, or visible, is designed to be screwed on the outside of both frame and sash. It is most quickly applied, it is explained, and where there is ample room on the frame and appearance is not considered this position is usually preferred. Sash fitted with this style can also be hung on frames that have been fitted with the frame leaf of the invisible or style No. 2 hanger, the latter being intended for use on thin frames, and where it is desirable that as little hardware as possible should appear on the outside of the frame and sash. The interchangeable features of the hangers may be used with thin frames or thin sash or both, or in such manner as

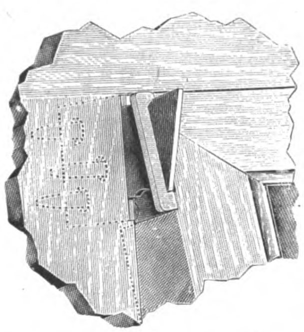


Fig. 10.—Acme Hanger, Style No. 2.

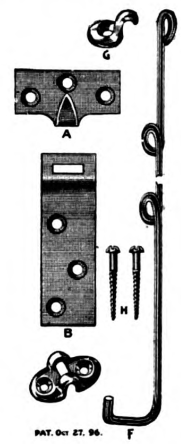
house owners may choose. At present the hangers are marketed only in styles No. 1 and 2, the dealer or user making up his own combination if anything different is desired. The points of excellence claimed by the manufacturers are that the sash hangs at the bottom of a V, centering it perfectly whether open or closed, and absolutely preventing rattling in either case; that the point of support is just a little below the face of the window frame, so that when window opens the loop piece swings freely in the V, and no resistance is offered by the loop moving up the outside slope of the V; that when open, as shown in Fig. 10, the hanger is locked at the bottom of loop or sash piece against upward motion, absolutely preventing rattling; that provision is made for allowing sash to slip over any deposit of ice that may accumulate on the outside of the sill, without binding the hanger; that the hangers are made from bright, smooth finished cold rolled steel, with dies made from the finest special annealed tool steel, insuring in the hangers absolute accuracy and perfect interchangeability; insuring a degree of accuracy and smoothness of finish not obtainable in cast hangers.

The Yankee Reciprocating Drill No. 50.

A drill which it is claimed differs very materially in design and work-

Fig. 11.—The Yankee Reciprocating Drill No 50.

manship from any having a similar appearance is that illustrated in Fig. 11 of the engravings, and which is being introduced to the trade by North Brothers Mfg. Company of Philadelphia, Pa., and for which John H. Graham & Co. of 113 Chambers street, New York City, are general selling agents. It is known as the Yankee reciprocating drill No. 50 and is intended for use in drilling in all varieties of woods, as well as in iron, steel, brass and other metals. It is so constructed that the drill runs continuously to the right during both the forward and backward movement of the driver. The pressure to feed the drill is obtained by the pressure against the head of the tool, which is provided with ball bearings in order to reduce friction. The chuck is of new design, has three jaws, is referred to as being accurate, stronger and more durable than similar chucks, while at the same time it will not get out of order. The chuck will



Phenix Hanger and Fastener No. 2.—Fig 12.—View of Parts Constituting a Right Hand Half Set.

hold any drills with shanks 3-16 inch in diameter or less. The movement or traverse of the driver is 8½ inches, the entire length of tool without drill being 16 inches. The workmanship and materials are referred to as of the very best and each tool is guaranteed by the manufacturers.

Phenix Hanger and Fastener No. 2.

The Phenix Mfg. Company, with office and works at 614-616 Hubbard street, Milwaukee, Wis., have just added to their extensive assortment of specialties a new locking device known as the Phenix Hanger and Fastener No. 2, this being brought out to meet the demand for a somewhat cheaper device possessing the same

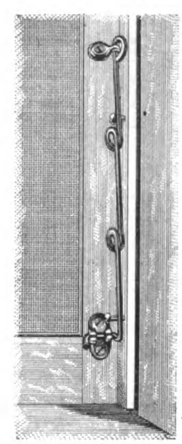


Fig. 13.—Appearance of Fixtures When in Position.

features as their No. 1—namely, that of drawing the sash to the window frame firmly at the top, middle and bottom by means of pressure or leverage. The device is intended for use in connection with storm windows and entire screens and is made of steel wire with curled loops, which give it strength and stiffness when fastened over the screws or pins on the blind stops, while at the same time drawing the sash up closely to the frame. In Fig. 12 of the illustrations is shown a right hand half set, the parts A and B being of wrought steel, the part F of wrought steel wire 18 inches long for windows 4½ feet in hight and above and 12 inches long for windows less than 4½ feet high. In Fig. 13 is shown a right hand half set of fastener No. 2 as it appears when applied to the sash. The company state that both fastener No. 2 as well as No. 1 are applied very nearly to the center of the sash, where pressure is wanted in order to keep the sash from bulging out or warping. Both fasteners serve as a locking and ventilating device, or for the purpose of extending the sash outward far enough to allow sitting in the window for the purpose of cleaning the outside of it. The company have issued a little pamphlet illustrating and describing this and other devices which they are manufacturing, and a copy will be forwarded by the company to any one who may apply for it.

TRADE NOTES.

THERE are many of our readers who will learn with deep regret of the sudden death of Charles L. Mead, president and treasurer of the Stanley Rule & Level Company, which occurred on August 19 at Norfolk, Conn. Mr. Mead was born in Chesterfield, N. H., January 31, 1833, and early in life engaged in the manufacture of levels and pocket rules in Brattleboro. When the Civil War broke out he sold his interest to the Stanley Rule & Level Company of New Britain, Conn., in whose service he engaged after the war had ceased. He was at that time chosen a director and made president of the company, positions he since held continuously. On the death of the former president, Henry Stanley, 15 years ago, Mr. Mead was elected president. Mr. Mead had a rare faculty for making and keeping friends and a wonderful memory for recalling people he had met. He was highly esteemed by all with whom he came in contact in a business way or socially, and at a meeting of the employees of the Stanley Rule & Level Company resolutions were passed expressing their sorrow at the death of their friend and the high esteem in which he was held by them.

THE AMERICAN STEEL ROOFING COMPANY of Cincinnati, Ohio, are introducing to the trade a peculiar spiral construction of conductor pipe, which is manufactured under Weitzel's patent. This form of construction is obtained by twisting, which with its polygon scalloped form produces a very strong and durable pipe. It is said that ice forming in it will not burst the joints and seams, as it will descend gradually without injury to the pipe. The article is regarded with favor by architects who have specified it and by builders who have made use of it. The point is made that a handsome, artistic effect is secured and that it costs no more than ordinary pipe.

WE have received advance sheets of a catalogue which is being brought out by the Central Fire Proofing Company, 874 Broadway, New York City. It will relate to the use of terra cotta fire proofing as made by the company named, a special feature being the newly designed arch known as the Model arch. A great deal of interesting and valuable information will be found within the covers of the work and the illustrations will be extensive, embracing among other things a complete presentation of the girder covering sections made for all kinds of floor arches, together with approved methods of application.

SENECA M. RICHARDSON, of the firm of Witherby, Rugg & Richardson, manufacturers of wood working machinery, Worcester, Mass., died from pneumonia on August 15, at his residence in that city, aged 69 years. He was born in Corinth, Vt., and learned the trade of a machinist, removing in 1860 to Worcester, where he worked in various machine shops. In 1864, with D. B. Witherby and Gilbert J. Rugg, Mr. Richardson formed a patrnership for the manufacture of wood working machinery, taking charge of the mechanical part of the concern. He was actively connected with the business up to the time of his death, leaving it one of the most important industrial establishments of Worcester.

THE CALDWELL MFG COMPANY, 3 and 5 Frank street, Rochester, N. Y., are introducing to the trade the Empire Door Holder, a view of which is presented in their advertising space this month. It is operated by a light pressure of the toe and the rubber tip and spring action render it particularly desirable for use on carpet, polished wood or tile floors.

A PARTICULARLY fine bit of art work is presented on the first cover of a catalogue devoted to Dixon's graphite productions, issued by the Joseph Dixon Crucible Company, Jersey City, N. J. It is in the natural colors of the goods represented, including crucibles, lead pencils, barrels of paint, packages of pipe joint compound, stove polish and other specialties, with labels. The catalogue contains 62 pages, and gives a great deal of interesting information on graphite and its uses, which will make it valuable to the trade handling the goods manufactured from it for mechanical and electrical purposes.

A FEATURE of the National Export Exposition at Philadelphia, Pa., will be an exhibit by the International Correspondence Schools, Scranton, Pa., illustrating their method of teaching by mail. The bound volumes of their instruction and question papers, as well as work done by students, including numerous drawing plates, may be inspected by visitors and a representative will be in charge to give full particulars.

OEFINGER'S automatic and burglar proof sash lock is the subject of an announcement made in our advertising columns this month by J. L. Oefinger of 7 and 9 South Jefferson street, Chicago, Ill. The claim is made that this lock is of such construction that it will securely fasten the window when left partially open, thus permitting of free ventilation. Some of its other advantages are pointed out in the illustrated notice appearing in our novelties department.

THE B. F. STURTEVANT COMPANY of Boston, Mass., have issued the second edition of what is known as Catalogue No. 103, relating to the Sturtevant engines, intended especially for electric lighting plants and general high grade work. Accompanying the catalogue, which is neatly printed and attractively bound in paper covers, are circulars known as Bulletins H and I, the former relating to the Sturtevant electric fans and the latter to the Sturtevant eight-pole motors and generators for direct current.

A VERY NEAT catalogue and price list is the 48-page publication relating to drafting room furniture and accessories just issued by the F. W. Emerson Mfg. Company of Rochester, N. Y. The volume is especially interesting to architects, builders and draftsmen, covering as it does drafting tables of all sizes, blue print frames and apparatus for exposing them, filing cabinets and other appliances for simplifying and facilitating the work of those persons requiring articles of this kind. The make-up is exceedingly neat and attractive, the printing is on good paper and the binding is in colored paper covers.

THE latest advertising novelty sent out by the William Connors Mfg. Company, Troy, N. Y., calling attention to their paints and cements of all sorts, is a most useful article of desk equipment. It is a blotting pad of three sheets of small size, such as is used in letter writing, and with a top cover of celluloid, which gives a smooth surface and at the same time calls attention to the American Seal paints.

INDIANAPOLIS STEEL ROOFING & CORRUGATING COMPANY, Indianapolis, Ind., call the attention of the trade to recent improvements and additions they have made to their plant. In order to adequately serve the demands made upon them for their productions and to insure prompt shipment and low freight rates 6000 feet additional floor space has been provided, in which has been installed the latest and best machinery for the manufacture of steel and iron roofing, siding, ceilings, eave trough, conductor pipe, &c., and galvanized iron cornices.

THE JOHNSON BENCH TOOL COMPANY of Escanaba, Mich., state in their advertising space this month that a carpenter is wanted in every town in the United States to act as local agent for the introduction of John's Universal work holder for carpenters. The company refer to the description of the device which was presented in these columns in the August issue, and state that a working sample will be sent prepaid to any address east of the Rocky Mountains upon receipt of $3.50 and to any point west of the Rocky Mountains for $3.75.

THE FOX MACHINE COMPANY of Grand Rapids, Mich., have just issued from the press a very neat little catalogue of 16 pages, relating to the Fox All Steel sash pulleys, post boring machines, three and four hole bits, Universal trimmers, &c. The printing is in colors, giving to the catalogue a very rich and attractive appearance. The various lines of goods are illustrated by means of sectional and general views and the matter has been arranged with a great deal of care. We understand that a copy of the publication will be sent to any one sufficiently interested in goods of this character to make application for it.

OVER five thousand letter carriers visited Scranton, Pa., on Labor Day and took part in the parade which preceded the business sessions of the tenth annual convention of the National Association of Letter Carriers. In honor of the occasion the business houses of the city were handsomely decorated and electrical devices were freely used. The International Correspondence Schools had a large monogram, I. C. S., with letters composed of red, white and blue incandescent lamps, in front of their building, making a very fine display. This institution has many thousand students, and as its mail is handled by carriers in all parts of the country they were much interested in inspecting the home office at Scranton. A constant stream of visitors went through the building and on Friday evening an informal reception was given the letter carriers.

ARTIFICIAL GAS is now so extensively used in the household for cooking as well as lighting purposes that house owners and builders will be interested in the announcement made in another part of this issue by the Standard Lighting Company of Cleveland, Ohio, relative to their New Process gas ranges. These are offered in 250 styles and sizes and are referred to as handsome, most efficient and economical in the consumption of fuel. The company have issued a catalogue showing the leading lines and will be glad to send a copy upon application.

"PURE ASPHALT" is the title of a dainty brochure issued by J. L. Perkins & Co., 211 Lake street, Chicago, Ill., general agents for the Samson brand of pure asphalt roofing. Directions are given for laying this roof, which, it is claimed, will then last as long as the building. Illustrations are shown of large buildings roofed with this material, and much information is furnished on the general subject. In their advertising space this month the company call attention to this brand of roofing and also to the fact that they are in a position to supply building papers, roofing cements, paints, &c., as well as ornamental steel ceiling.

W. J. BURTON & CO., "the quick shippers," Detroit, Mich., have issued their stock sheet and price-list No. 79, which will be found interesting by buyers of eave trough, conductor pipe, elbows, painted and galvanized roofing and siding, metallic shingles, paper and felt and asphalt roofing, tin plate, &c. They call special attention to the fact that although there is a scarcity of goods in their line they very fortunately have been able to arrange so that they now have an exceptionally large stock, which they are prepared to ship in large or small quantities by first freight. Having contracted for these goods before the recent advances, they are quoting prices on them which are advantageous to the buyer. In the stock sheet is published a sworn statement that their sales for the first seven months of 1899 were nearly three and one-half times as large as in the corresponding period of 1897, proving that the trade have found their dealings with this house satisfactory. The company have also issued a card entitled "We protected your interests," which is to the effect that they have secured a supply of materials sufficiently large to enable them to fill all orders promptly.

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We have just received direct from the West Coast of Mexico the finest cargo we have ever handled of this most Popular Wood, it being far above the average in lengths, widths, color and texture, and we are now prepared to furnish it in quantities and thicknesses to suit the trade. Architects and builders are invited to correspond with us in regard to it, and also in regard to all other woods used for Interior Finish and Decoration.

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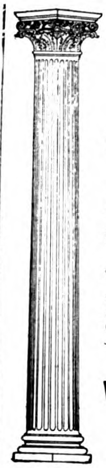
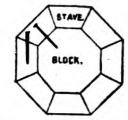
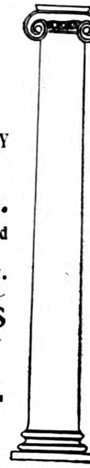
Over 1000 designs illustrated in our new catalogue and price-list, just out. Mailed for 8 cents in stamps.







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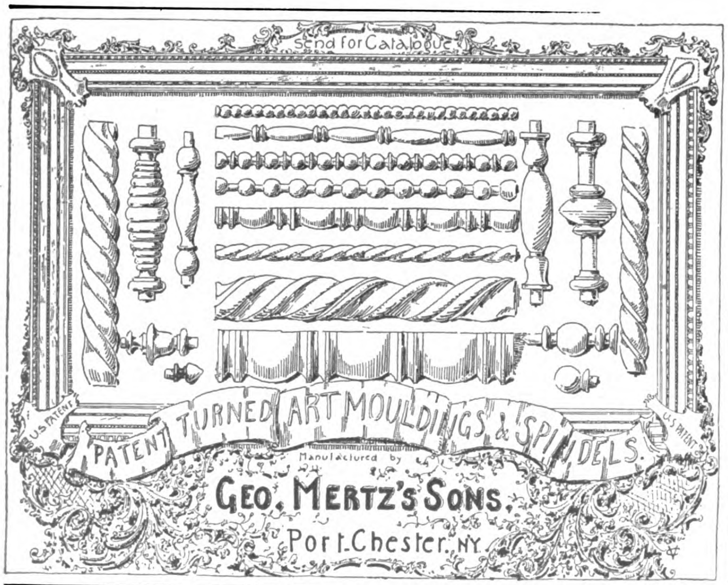

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VOL. XXI. No. 12. NEW YORK, DECEMBER 1899. Ten Cents a Copy. One Dollar a Year.

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Oefinger, J. L.

Sash Pulleys
Empire Forge Co.
Fox Machine Co.
Grand Rapids Hardware Co.
Palmer Hardware Mfg. Co.

Sash Weights
Barney & Reed Mfg. Co.
Raymond Lead Co.

Sashes, Doors and Blinds
Foster-Munger Co.

Saws
Jennings, C. E. Co.
National Saw Co.

Saw Guide
Thomson Bros. & Co.

Saw Jointer
Pike Mfg. Co.

Saw Sets
Taintor Mfg. Co.

Schools
Academy of Architecture and Building.

Screw Drivers
North Bros. Mfg. Co.
Russell & Erwin Mfg. Co
Sawyer Tool Co.

Sheet Metal Fronts
Mesker & Bro.

Shingles and Tiles, Metallic
Berger Mfg. Co.
Burton, W. J. & Co.
Cortright Metal Roofing Co.
Garry Iron & Steel Roofing Co.
Merchant & Co., Inc.
Montross Metal Shingle Co.
Thorn Shingle & Ornament Co.
Van Noorden, E. Co.

Shingle Stains
Cabot, Samuel.

Shutters (See Blinds.)

Skylights
Kanneberg Roofing Co.
Van Noorden, E. & Co.

Speaking Tubes
W. R. Ostrander & Co.

Spring Hinges
Bommer Bros.

Squares
Mayhew, H. H. Co.

Stable Fittings
J. L. Mott Iron Works.
Ludlow-Saylor Wire Co.

Stained Glass Windows
Keystone Stained Glass Works.
Wallis, A. H.

Steel Figures and Letters
Sackman, F. A.

Tiling
Star Encaustic Tile Co.

Tools
Gage Tool Co.
Hammacher, Schlemmer & Co.
Jennings, C. E. Co.
Leavitt Mch. Co.
Mayhew, H. H. Co.
Millers Falls Co.
North Bros. Mfg. Co.
Sawyer Tool Co.
Smith, Otis A.
Stanley Rule & Level Co.
Starrett, L. S. Co.
Strelinger, C. A. Co.
Walter's Sons, Wm. P.

Turn'd, Mold'd, Carv'd Wk.
Grand Rapids Carved Moulding Co.
Mertz's, Geo. Sons.
Standard Wood Turning Co.
Waddell Mfg. Co.

Varnish
Devoe, F. W. & Co.

Ventilating Attachment
Ormsby, E. A.

Ventilators
Doerge, H.
Globe Ventilator Co.

Wax, Floor
Butcher Polish Co.

Weather Strips
Church, E. I. & Co.
Hammacher, Schlemmer & Co.

Weather Vanes
Jones, Thos. W.
Mott, J. L. Iron Works.

Window Fasteners
Stanley Works.

Wood Ornaments
Waddell Mfg. Co.

Wood Working Machinery
American Wood Working Machine Co.
Barnes Tool Co.
Barnes, W. F. & John.
Cincinnati Ball Bearing Machinery Co.
Cordesman, Meyer & Co.
Crescent Machine Co.
Fay, J. A & Co.
Fox Machine Co.
Marston, J. M. & Co.
Seneca Falls Mfg. Co.
Seymour & Whitlock.
Towsley, J. T. Mfg. Co.
Yerkes & Finan Wood Working Mch. Co.
Witherby, Rugg & Richardson.

Woods, Ornamental
Albro, E. D. & Co.

Work Holder
Johnson Bench Tool Co.

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CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED

THE BUILDERS' EXCHANGE.

DAVID WILLIAMS COMPANY, - - PUBLISHERS AND PROPRIETORS

232-238 WILLIAM STREET, NEW YORK.

DECEMBER, 1899.

Carpentry and Building for 1900.

The present issue brings to a close the twenty-first annual volume of *Carpentry and Building*, and while standing on the threshold of a new year it might not be out of place to indulge in a little retrospection, yet we are inclined to believe that we can direct the attention of our readers to what we have in store for them in the near future to much better advantage than dwelling upon what has past. The announcement which will be found in another part of this issue gives an outline of the programme we have arranged for *Carpentry and Building* for 1900. In it we have described some of the work we hope to accomplish during the ensuing twelve months, and at the same time have called attention to plans which have been formulated for supplying our readers with interesting articles on topics of a practical nature. During the past year we have received many requests for competitions dealing with a variety of subjects, and with a view to meeting some of the expressed wishes of our friends we have prepared the programme referred to. It will be seen that the competitions deal with matters of a highly interesting and practical nature, and we trust the responses will be upon a liberal scale. The subject of small wood working shops is one which appeals to a very large class and offers an excellent opportunity for widespread discussion. A great deal of interest has been manifested in the past in stables and carriage houses, and the rather novel plan of competition which we announce in connection with buildings of this character should attract large numbers. Those who prefer articles on practical subjects as the basis for a contest will find in the programme for the new year an excellent field for their efforts.

Nine Months' Building Operations

Unusual activity has been a conspicuous feature of practically every line of business during the past year, but it is probably safe to say that never before have building operations in this city been conducted upon such a scale of magnitude as the figures show for the first nine months of 1899. It is reasonable to suppose that the enormous expenditure is in some measure due to the rise in prices of iron, steel and other building materials, but leaving these aside the showing is certainly a remarkable one. It is also a significant fact that, notwithstanding the rise in prices and the prospects of a further advance, plans on a very liberal scale are constantly being filed with the Department of Buildings. Nearly two-thirds of the total operations for the first nine months of the present year were made up of new flats and tenements, which have sprung into existence all over the city, and particularly above Fifty-ninth street, west of Central Park and as far north as the Harlem River. According to the figures available, 3494 buildings were projected the first nine months of this year, estimated to cost $89,325,906, as against 2814 buildings, costing $57,018,231, for the corresponding period of 1898. It will be seen from these figures that the improvement over last year is marked, both as regards the number of buildings projected and the amount of capital involved. Out of the enormous total for the period under review, 2016 permits were issued for flats and tenements, estimated to cost $55,779,899, while for the same time last year 1384 permits were taken out for the same class of buildings, involving an expenditure of $33,505,600. The next important classification embraces office buildings, hotels, stores, churches, &c., for which 158 permits were granted for structures costing $20,225,744, these figures comparing with 150 buildings, costing $13,950,650, for the first nine months of last year. In regard to private dwellings there is little change to be noted as regards the number of permits issued, but the structures were evidently of a little better character, as the aggregate of cost exceeds that of a year ago by practically a million dollars. A great deal of building has been going on above the Harlem River, in what is known as the Borough of Bronx, where for the first nine months of the year 1627 buildings were projected, costing, it is estimated, $15,284,358; of which 773 were for flats and tenements involving an estimated expenditure of $10,637,700, while 611 were for private dwellings costing $2,328,485. The greatest number of permits were issued in the second quarter of the year, although March leads for individual months. In Brooklyn, for the first nine months of the present year, 3439 buildings were projected, of which 1441 were brick and 1998 were frame, all estimated to cost $16,660,642. These figures compare with 2669 buildings in the corresponding period of last year, of which 1033 were brick and 1636 were frame, involving an expenditure of $11,059,629. With these figures in mind it is highly probable that the total cost of the buildings projected in this city and Brooklyn during the year 1899 will aggregate something over $120,000,000.

Labor and Wages in England.

The Labor Department of the British Board of Trade has issued its sixth annual report on changes in rates of wages and hours of labor in the United Kingdom, covering the calendar year 1898. The report reveals very healthy industrial conditions. The past year is shown to have been a period of active employment, the proportion of unemployed workers being lower than it has been for several years, while the extent and magnitude of the advances in wages far surpassed those recorded for any of the previous five years. No fewer than 1,105,169 work people were reported as affected by changes of wages in 1898, compared with 597,444 in the previous year. Of this number 1,003,290 received increases. Even this large total is exclusive of agricultural laborers, seamen and railway employees, with regard to whom the numbers affected cannot be exactly stated, though the statistics obtained show that wages in these employments shared in the general advance of the year. The result of all changes was an aggregate rise of over $460,000 per week. During the previous year the net increase was $216,000 per week. It is interesting to observe from the preliminary figures relating to the changes of the first half of the present year, which are also given, that so far the upward tendency of wages showed no sign of diminishing. Up to the end of June, 1899, nearly a million persons had had their wages changed, the net effect of all the changes during the six months being not less than $240,000 per week in the wages of those affected. The bulk of the increase recorded both in 1898 and in the present year is accounted for by the general upward movement of miners' wages in the principal coal fields, though there was also a marked advance in the building, engineering and shipbuilding trades. While the year 1898 shows so marked an advance of wages the changes in the hours of labor have been comparatively insignificant. Less than 40,000 persons are reported as having had their hours altered, the aggregate reduction being computed at about 82,000 hours per week, compared with over 285,000 in the previous year. It is also shown that in the vast majority of cases the readjustment of wages took place without stoppage of work, and the changes were amicably arranged directly between the parties. During the first half of the present year only about 2 per cent. of the aggregate rise in wages resulted from strikes.

Future Supplies of Timber for Building Purposes.

The condition of the lumber market is such at the present time as to turn the attention of the seriously inclined to a consideration of the question of future supplies of timber for building operations. Like many other materials lumber has scored a notable advance in price since the beginning of the recent improvement in industry and trade in this country, coincident with a greater degree of activity throughout the world. But unlike some other materials the advance in lumber has been attended by conditions which indicate a continued higher level of prices than has prevailed in the past. It is plain that the most extensive forest must become exhausted in time if cut into constantly while no provision is made for replacing the felled trees. This is just what has been happening in this country for 250 years, but the disappearance of one forest after another has caused little concern, because of the forests which still remained. The situation to-day, however, is that the more accessible forests in most parts of the country have become exhausted, together with the greater part of the total supplies of some important varieties of woods, and a further heavy demand can be met only on a higher level of prices. It is not meant that a lumber famine has begun, but the exhaustion of the accessible forests is near enough to suggest its possibility and the wisdom of efforts to avert it.

The United States Government has begun none too soon to manifest an interest in this object by appointing forestry officials and trying to protect such forests as remain from ruthless destruction. The authorities in certain of the States likewise have taken measures both to protect existing forests and to stimulate the planting of trees to replace such as may be cut down. The treatment of the forestry question in some of the old world countries may well be adopted in our own land without any suggestion that we have lost our independence thereby, for this has become a thoroughly practical science, and science knows no geographical nor political boundaries. "It is clearly as much a duty of the public," some one has written, "to prevent forest fires as to prevent and extinguish fires in cities," and the prevention of fires is only one of the means necessary to forest protection, though it is a very important feature. The persons who think our forests inexhaustible should reflect upon the disappearance of the bison from our Western prairies, of many kinds of fish from certain waters and of various other things of which we once seemed to have too great a plenty. Even the forests have disappeared from some States, and at a rate which would leave all our States without a tree at the end of another century.

It is true that the disappearance of wood as a building material and for use for other constructive purposes would open a wider field for the iron and steel trades. Already we have seen the substitution of iron for wood in shipbuilding, bridge work, railway cars, the fencing of large farms and various details of architectural work. For some of these purposese iron or steel serves better than any other material, and would be used in any event, but there are other cases where timber construction will be preferred so long as the price does not render it uneconomical.

But this is not the only consideration which makes forest conservancy desirable. In older countries than ours the belief prevails that the removal of the forests has affected the rainfall and brought an alternation of droughts and freshets, instead of the former continuous flow of streams which afforded reliable water power—such as proves so desirable for manufacturing and in the generation of electricity. France alone, within a few years, has expended $10,000,000 on the afforestation of the upper reaches of the mountainous and submountainous streams, with a view to getting back to the old time conditions of volume and regularity of the water supply. There are still other considerations in behalf of intelligent forest control which ought to apply as well to the United States as to France or Switzerland, Germany or Austria, or even India. It may occur to some persons that a still greater exhaustion of timber in this country need occasion no anxiety, on account of the great forests, practically untouched, still to be found in certain parts of the world. Granting the quality of such woods to be suitable for our purposes, their remoteness alone would be a great obstacle to our making use of them. Of what value to us would be the forests of Bolivia, for example—a country larger than any European State, except Russia, but without a seaport or a navigable river to the sea ?

The question of forestry merely as a science may be left to those whose tastes incline them to study it, but reasons will occur to every one interested why it would not be desirable to have our native wood supplies disappear, and these reasons should lead to the support of all legitimate effort for preventing any unnecessary destruction of the forests.

Interior Decoration of the House.

Whether a house is to be plain or adorned the treatment of its interior is important, and should be planned from the outset, says Russell Sturgis, in an article contributed to a recent issue of *Harper's Magazine.* The virtue of a scheme of adornment that arises directly from the purpose of the room may, he adds, be best illustrated in the case of the library, and the decoration of the dining room also may be made something more important than the mere choice of a pretty wall paper and a suitable color for the dado and for the ceiling. The attention of our architects should be given above all things, it is pointed out, to the problem of carrying out decoration of a natural, architectural, permanent and safe character, at a price not wholly prohibitory.

With regard to the staircase there are two ways of treatment: First, it may be shut up between brick walls, with doors opening into the halls, but a more impressive plan is to treat each flight of stairs frankly as necessary to the plan of the house. The stairway may occupy all one end of the hall, no matter how large that hall may be, and the main flight may start in the middle of the hall and branch on either side above; or it may start on the left hand side as you face it, and, breaking at a platform, pass across the end of the hall and return overhead on the right, so that we touch the second story on the same line with that occupied by the first step upward from the floor below, that is fine and stately. The palaces and the palazzi, the houses of legations, and the museums of Europe and America, contain examples of this kind of staircase, and their plans are of great variety, from the simple, square platformed arrangement to the complex concentrically curved plan of the Naples museum or the fantastic scheme of those which lead up to the Laurentian Library.

THE Supervising Architect of the Pan-American Exposition, to be held at Buffalo in 1901, is Henry S. Kissam of New York City, who for some years past has been associated and general manager with Ernest Flagg of this city.

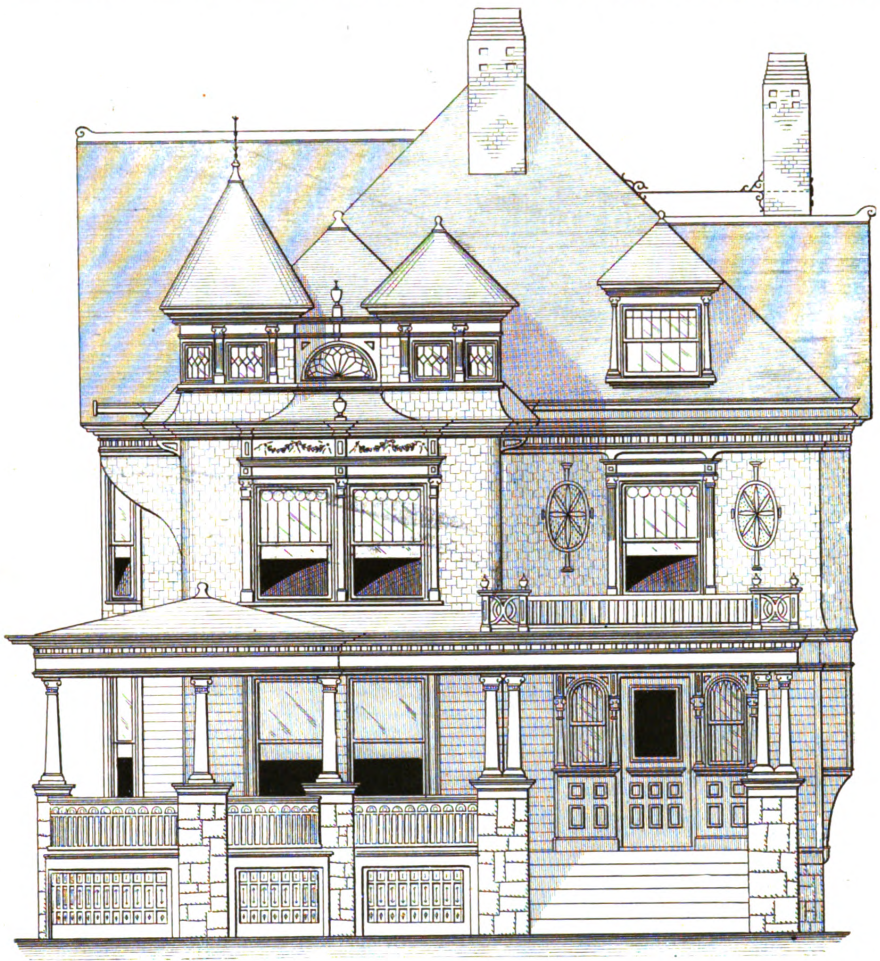
RESIDENCE AT CRANFORD, N. J.

A FRAME residence possessing a number of unique features, both as regards its external treatment and the arrangement of the interior, forms the subject of our colored supplemental plate this month. Particularly noticeable features of the design are the broad veranda extending entirely across the front of the house, the double tower effects above the first story, the projecting gables, combined with the clever architectural treatment of the design as a whole. The plans presented herewith indicate the general arrangement of the rooms on the various floors, while the details which appear upon the following pages afford a good idea of the construction employed. The residence here shown is pleasantly located on Holly street in Cranford, N. J., and was erected in accordance with plans prepared by J. A. Oakley, Jr., & Son, architects, of Elizabeth, N. J.

The foundation walls above grade, also the veranda piers, are of light colored gray stone with pointed joints. The girders of the frame are 6 x 10 inch yellow pine, with a 2 x 3 nailed on bottom edge, the beams being framed level and spiked to the girders. The sills, posts and ties are 4 x 6 inches; the plates 2 x 4 inches, double, and spiked together; the ribbon strips 1¼ x 6 inch hard pine for the support of the third tier of beams; the first and second floor joist, 2 x 10 inches; third-floor joist, 2 x 8 inches; outside studs and braces and those for supporting partitions, 2 x 4 inches, and for other partitions, 2 x 3 inches, all placed 16 inches on centers. The veranda beams are 2 x 8 inches, placed 20 inches on centers; the veranda sills 4 x 8 inches and veranda rafters and ceiling beams 2 x 6 inches, also placed 20 inches on centers. The main rafters are 2 x 6 inches, placed 20 inches on centers, and the hip and valley rafters 2 x 8 inches.

The frame of the house is covered with ⅞ x 10 inch matched hemlock boards, on which is laid two-ply rosin sized paper, well lapped and nailed, the paper passing behind all outside casings, cornices, water tables, panelling, &c., so as to give an air tight job. From the sill to the belt course, and wherever shown on the elevations, the outside walls are covered with 5-inch white pine bevel clapboards, laid with 1-inch lap. The second story, as well as the front and side bays, from the belt course up, are covered with 18-inch white cedar shingles laid 5 inches to the weather. The roofs are also shingled. The floors of the veranda and porch are of 1¼ x 2½ inch tongued and grooved white pine, with the joints white leaded, driven close up and blind nailed. The flooring runs at right angles to the building, the grade of the floor being ⅛ inch to the foot. The turned columns of the veranda are 10 inches in diameter, of Washington red cedar, with composition carved capitals.

The cellar bottom has a covering of 3 inches of concrete, composed of coarse gravel or cinders and Atlas cement, and is finished with a coat of sand and cement

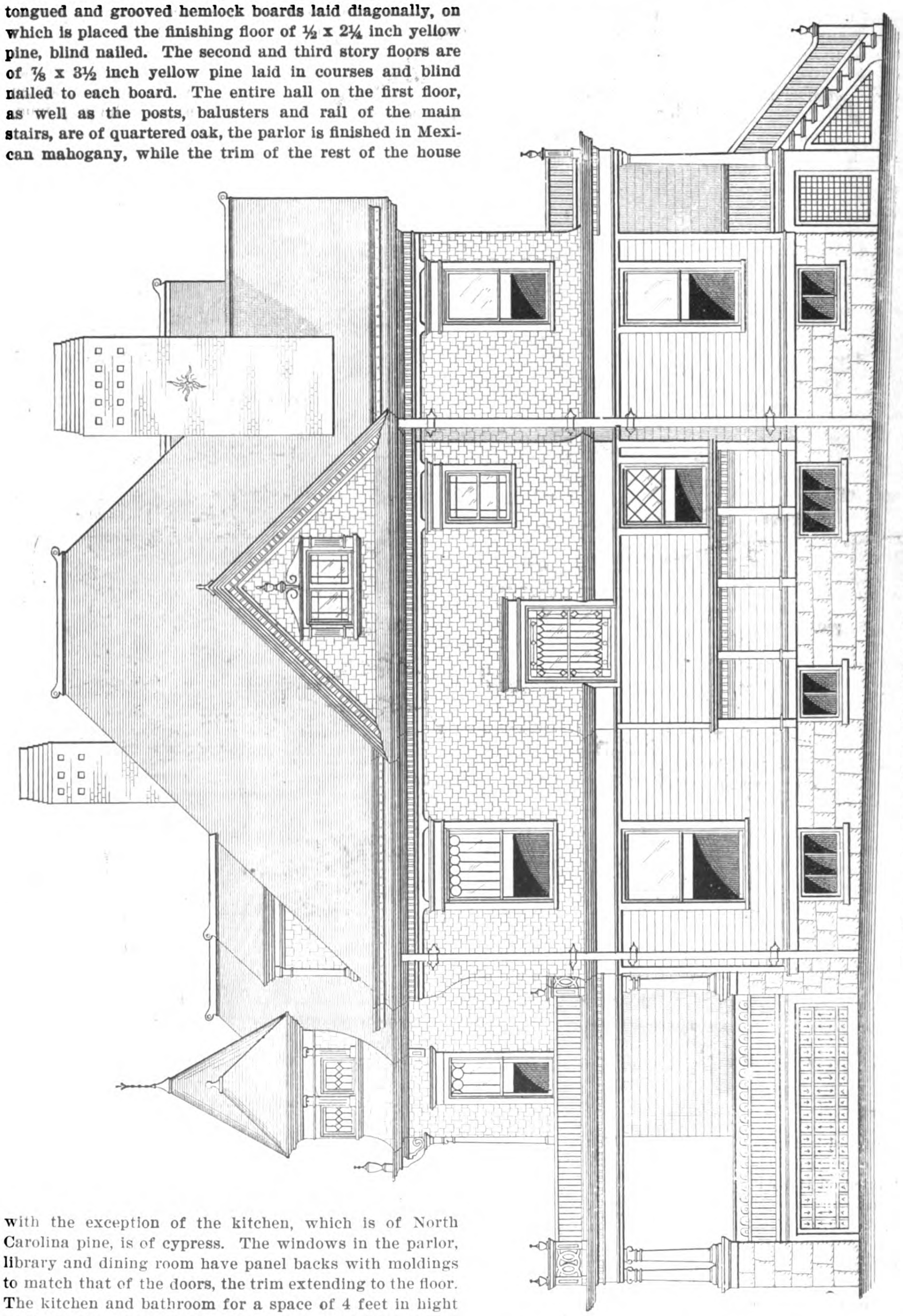


Front Elevation.—Scale, ⅛ Inch to the Foot.

Residence at Cranford, N. J.—J. A. Oakley, Jr., & Son, Architects.

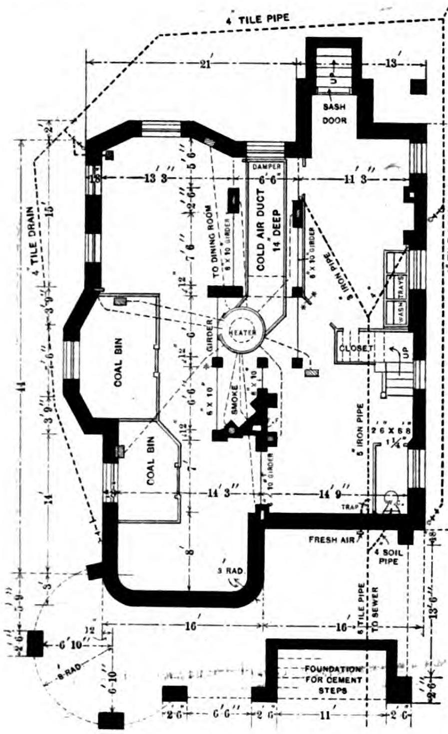
1 inch thick. All inside walls of the house are covered with Adamant plaster, over which is a coat of hard finish, composed of No. 3 Adamant finishing and lime putty well mixed together.

The first story has a rough floor of ⅞ x 10 inch tongued and grooved hemlock boards laid diagonally, on which is placed the finishing floor of ½ x 2¼ inch yellow pine, blind nailed. The second and third story floors are of ⅞ x 3½ inch yellow pine laid in courses and blind nailed to each board. The entire hall on the first floor, as well as the posts, balusters and rail of the main stairs, are of quartered oak, the parlor is finished in Mexican mahogany, while the trim of the rest of the house with the exception of the kitchen, which is of North Carolina pine, is of cypress. The windows in the parlor, library and dining room have panel backs with moldings to match that of the doors, the trim extending to the floor. The kitchen and bathroom for a space of 4 feet in hight are laid off in imitation tile, showing bonded joints. The bathroom has a tiled floor and is fitted with Standard porcelain lined roll rim tub, together with a 15 x 19 oval wash bowl set in countersunk marble top and 18-inch marble back and sides, all connections being nickel plated. The water closet, which it will be observed from an inspection of the floor plan is located a short distance away from the bathroom, is a Vigilant siphon jet having natural oak paneled tank, seat, back and cover. The entire plumbing is of the exposed type with nickel plated fixtures. The heating is by means of a No. 44 Thatcher tubular hot air furnace, made by the Thatcher Furnace Company, while the kitchen range is a No. 11 Perfect, made by the Richardson & Boynton Company, all of New York City. All pipes running through wood partitions are well protected with metal lath, and the hot air pipes are wrapped with asbestos felt secured with wire. All registers on the first floor are 10 x 14 inches, and on the second floor 10 x 12 inches. The building is

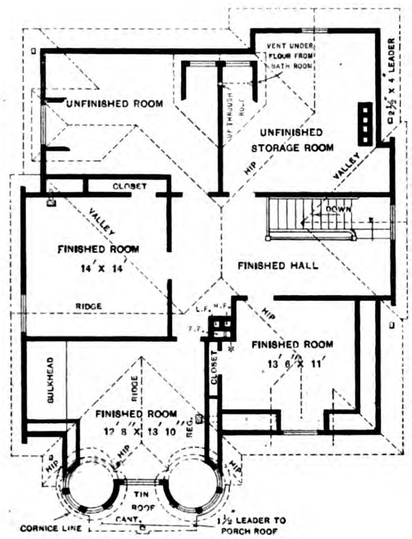


Residence at Cranford, N. J.—Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.

wired for electric lighting, and the kitchen is connected with the various parts of the house by means of speaking tubes.



Foundation.



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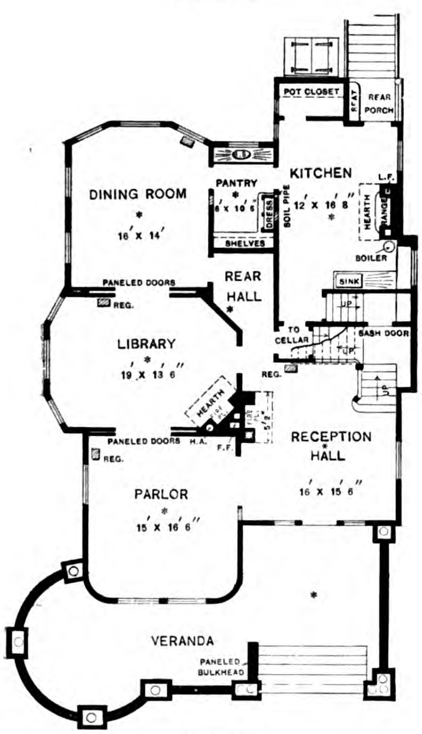
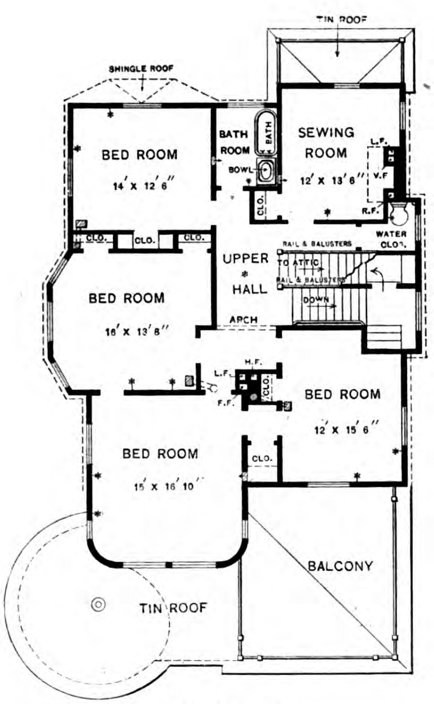


First Floor.



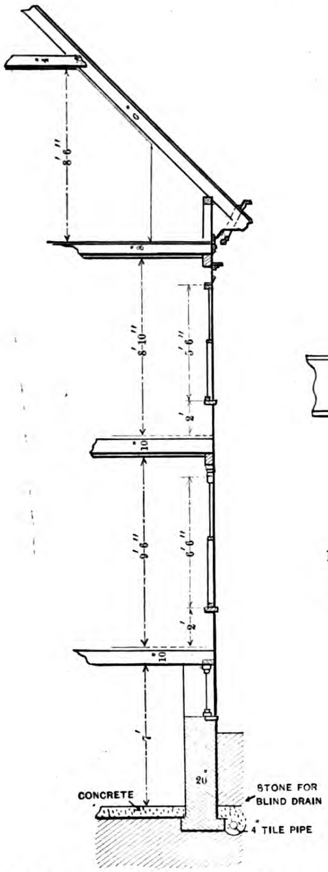
Second Floor.

Residence at Cranford, N. J.—Floor Plans.—Scale, 1-16 Inch to the Foot.

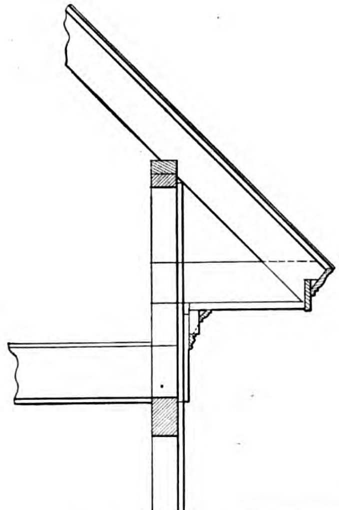
The general contractor for the entire work of construction was Michael Byrns, carpenter and builder, of Elizabeth, N. J.

An English View on Hanging Sash.

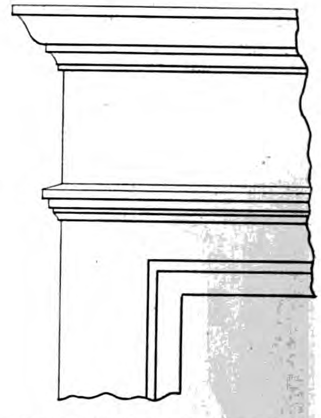
There is no reason why a sash should not be so hung that the slightest touch of the hand will move it to the desired position, and yet have it fitted so close that it will not rattle or allow a gale to enter the room, says a writer in one of the London architectural journals. One of the reasons why sash do not work well is that when the frames are made sufficient care is not taken to make the pulley stile straight and true on the face. Often these are left hollow in the center; then the sash must be made wider at the meeting rail than it is at the bottom or the top rail, if it is to fit snug. This being the case, it is impossible for the sash to slide either up or



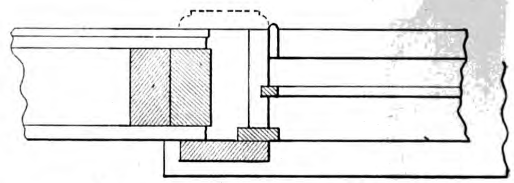
Section through Frame of Building. Scale, ⅛ Inch to the Foot.



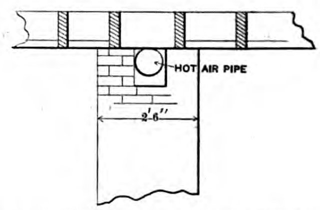
Detail of Main Cornice. —Scale, ½ Inch to the Foot.



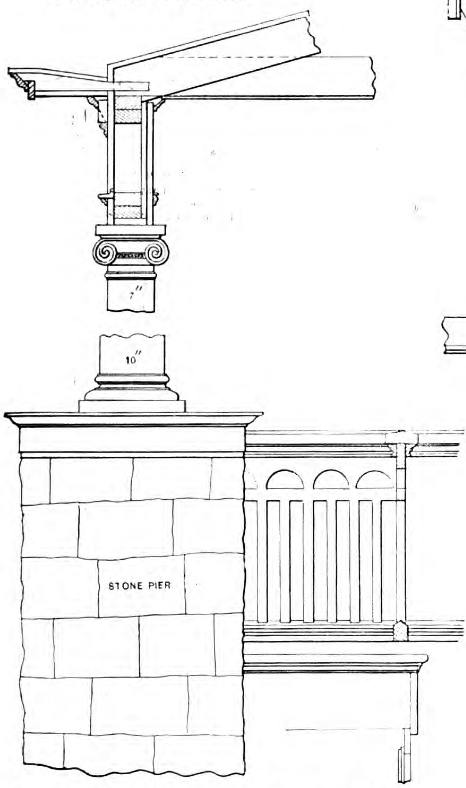
Detail of Outside Window Cap.—Scale, 1½ Inches to the Foot.



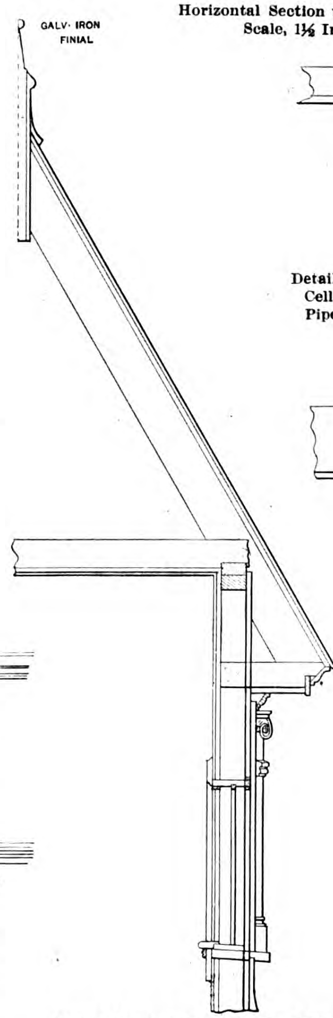
Horizontal Section through Window Frame.—Scale, 1½ Inches to the Foot.



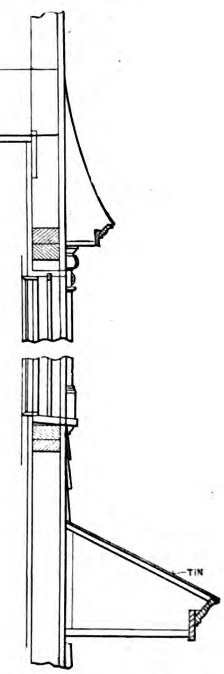
Detail of Girder and Supporting Pier in Cellar, Showing Position of Hot Air Pipe.—Scale, ¼ Inch to the Foot.



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



Section through Tower, Showing Detail of Cornice.—Scale, ½ Inch to the Foot.



Section through Side Gable.—Scale, ½ Inch to the Foot.

Miscellaneous Constructive Details of Residence at Cranford, N. J.

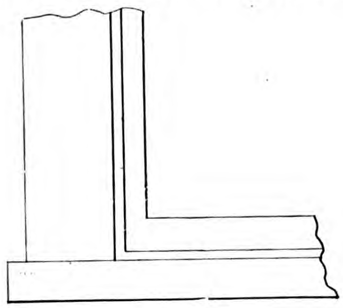
RESIDENCE OF MR. SANTIAGO PORCELLA ON HOLLEY STREET, CRANFORD, N. J.

J. A. OAKLEY & SONS, Architects.

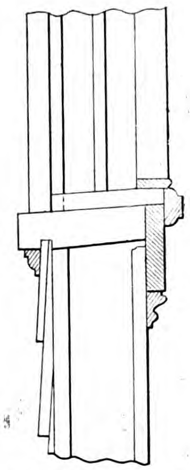
down, so the workman is compelled to narrow the sash at the meeting rail in order to allow them to move easily, and the consequence is that a certain amount of play-room obtains between the sash and the jamb at the meeting rails, which is sure to cause rattling at that point when the wind blows on that side of the house.

To make a good tight window, and one in which the sash move easily, the pulley stiles should be straight and parallel to each other. Another condition that must be complied with to insure satisfactory results is that there must be as little "play" as possible between the sash and the stops. One-sixteenth inch space between side of stile of sash and stop is ample, and more, to allow for paint.

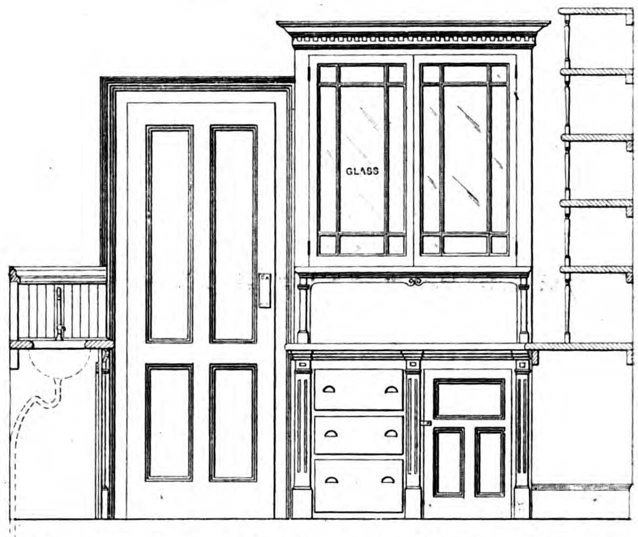
Sometimes window frames are forced out of shape after they have been set in the walls. If the building is a frame one, the siding or other covering is cut in too tight against the casings, and this is apt to force the



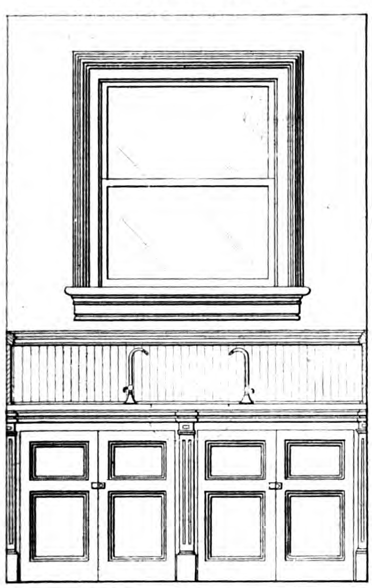
Dtail of Window Sill.—Scale, 1½ Inches to the Foot.



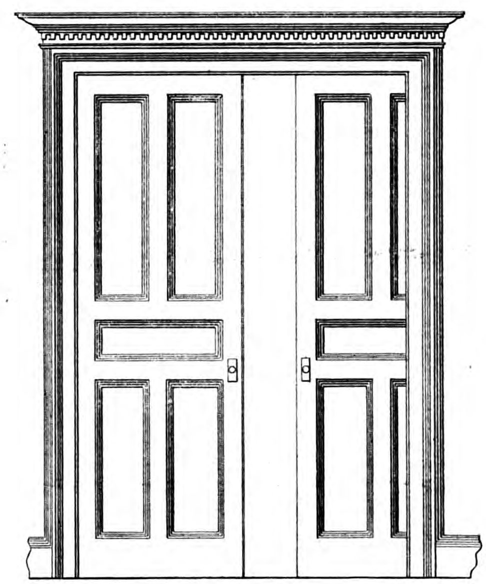
Vertical Section through Window Frame.—Scale, 1½ Inches to the Foot.



Sectional View in Butler's Pantry Looking toward the Kitchen.—Scale, ⅜ Inch to the Foot.



Elevation of Sink in Butler's Pantry.—Scale, ⅜ Inch to the Foot.



Elevation of Sliding Doors, Showing Trim, which is the Same for the Windows.

Horizontal Section through Sliding Doors and Frames. Scale, ⅜ Inch to the Foot.

Miscellaneous Constructive Details of Residence at Cranford, N. J.

middle of the frame inward, making the pulley stile convex or winding on the sash side. When this occurs it becomes next to impossible to make the sash slide easily in their frames, for the lower part of the lower sash will be wider than at the meeting rail if it fits snug, and it would be impossible to raise it. This necessitates planing off the lower part of the stiles until the sash is the same width at the bottom as at the meeting rails, a condition that is sure to cause a rattling window. The top sash, of course, will have to be treated the same as the bottom, which gives both sash an opportunity, whenever the wind blows, to play a "rat-a-tat-tat" while the storm lasts, much to the inconvenience of those occupying the room where the window is situated.

When sash have been properly fitted and hung, the weights and sash lines tested and properly secured, the "pocket" cover should be nicely screwed in place and left with a smooth face, so that the sliding sash will not make any abrasion, or have more friction at the joint than elsewhere. The pulley axles should be lubricated with graphite (blacklead), or, if this is not available, a little hard mutton tallow should be placed in the axle bearings. This should make them run smooth, or at least smoother than if left altogether without some sort of lubricating matter. The common sash pulleys are poor things at best and should never be used in good buildings, as they make as much noise when in use as a locomotive running at full speed. The best pulleys in the market are not any too good, as they are made as cheap as they can be turned out, and are rough and untruthful. The best axle is of fine steel, turned true in a lathe, and it runs in brass bearings, and there is a small hole in the stile plate where a drop of oil may be inserted on the bearings when necessary.

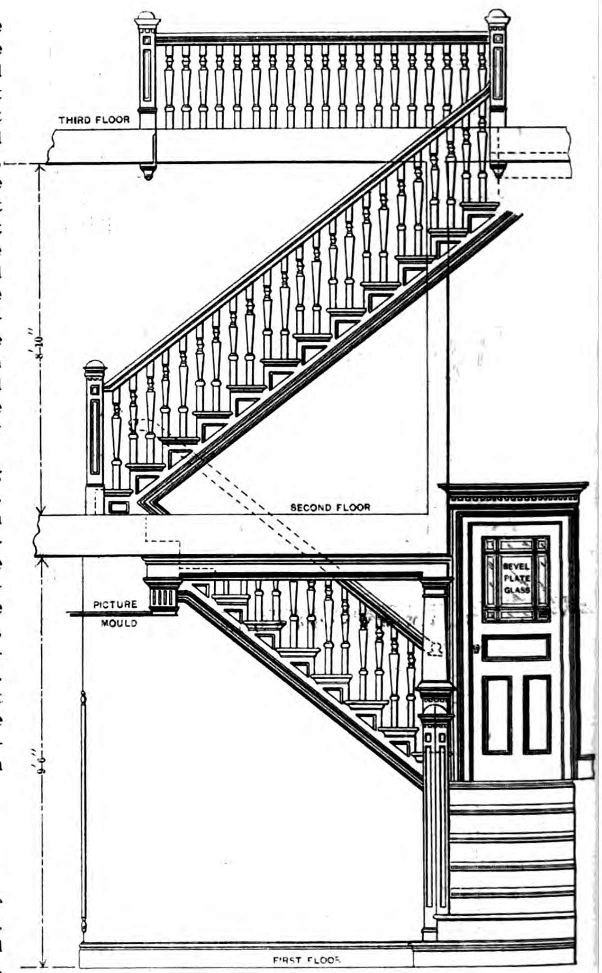
When a sash sticks in the frame because of swelling or of having too much paint smeared on it or the frame, the trouble may often be cured by rubbing that portion of the frame in which the sash slides with a little moistened soap. Ordinary toilet soap answers the purpose fairly well and has no disagreeable following, but common yellow soap is much better. Fuller's earth may be used, but it is apt to dissolve the paint, and, besides, leaves dust and dirt behind. All sash should have window locks, whether they be situated up or down stairs. While the main object of a window lock is to keep out interlopers, it has a secondary importance; it should be so arranged as to bring the two meeting rails snug together and hold them in that position, to the exclusion of wind and weather.

Annex to the Carnegie Office Building.

An office building which will be very similar to the Carnegie Building, and will be used as an annex to it, is about to be erected on the block bounded by Diamond street, Cherry, Scrip and Relief alleys, Pittsburgh, Pa. The property has a frontage of 120 feet on Diamond street and the uniform depth is 95 feet to the rear of the Carnegie Office Building. The latter structure has been taxed to its utmost capacity for several years, and the office requirements of the Carnegie Steel Company have expanded so fast that they now occupy almost the entire building, which is 15 stories high, and is among the most imposing and complete office structures in the city of Pittsburgh. It is thought that the new building will be put up by A. W. & R. B. Mellon, who are largely interested in the Union Steel Company, and under an agreement similar to that under which the present Carnegie Building was erected by Mrs. Thomas M. Carnegie. It is expected that work will be commenced on the new structure in a very short time. When the present Carnegie Building was erected the excavations for the foundations were unusually deep, owing to the fact that a number of springs were found and quicksands were encountered. The tunnel of the Panhandle Railroad also passes close to the building and made the work of securing a solid foundation very difficult. Piles were driven to a depth of 30 or 40 feet, and on these the foundations rest. It is probable that the same plan will be pursued in the erection of the new building.

The Concrete Building.

Concrete building are not altogether a novelty, yet the instances in which concrete has been exclusively employed are sufficiently limited to render interesting a brief reference to a structure of this kind now in process of erection at the corner of Provost and Seventh streets, Jersey City, N. J. The work of construction proceeded as follows:



Front Elevation of Main Stairs.—Scale, ¼ Inch to the Foot.

Residence at Cranford, N J.

After the foundation of the building had been laid large wooden cores were built 10 feet high. A large elevator to which the concrete mixer, a large hollow wheel about 5 feet wide, is attached, was erected in front of the building. After the concrete had been thoroughly mixed it was drawn up the elevator and poured into the cores. After it had hardened sufficiently the cores were removed and built up on what had already been pressed. Then the operation was repeated until at last a two-story structure had been erected. The front of the building has the appearance of limestone.

DETERMINING THE STRENGTH OR SAFE LOAD OF WOODEN FLOORS.*

BY F. E. KIDDER, CONSULTING ARCHITECT.

THE first step in this problem will be to decide what load per square foot the floor should be calculated to support. The following values are believed by the writer to be a proper allowance for the different classes of buildings they cover—certainly they are large enough, yet on the other hand it would not, in most cases, be safe to reduce them:

Proper Allowance for Floor Loads per Square Foot.

	Pounds.
For dwellings, sleeping and lodging rooms	40
For schoolrooms with fixed desks	50
For offices, upper stories	60
For stables and carriage houses	65
For banking rooms, churches and theaters	80
For assembly halls and the corridors of all public buildings, including hotels	120
For drillrooms	150

Floors for ordinary stores, light manufacturing and light storage should be computed for a load of not less than 120 pounds per square foot. For warehouses and heavy mercantile buildings the maximum load should be computed for each individual building.

The span and arrangement of the timbers will, of course, be determined by the plans. To the floor load should be added the weight per square foot of the floor itself, which may be found from the data given in the article in the November issue. The sum of the load and weight of the floor will herein be designated as the *total floor load*, always in pounds per square foot.

In determining the size of floor beams it is, perhaps, more common to use the formula for strength of beams, but when the ceiling below is plastered the writer recommends that the common beams be calculated by the rule for *stiffness*, as floor joists proportioned by the rule for strength will often sag so as to crack a plastered ceiling, although they will not break under the load for which they have been calculated.

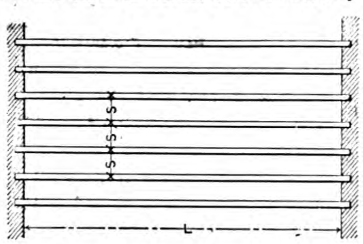


Fig. 5.—Plan of Simplest Form of Floor Construction.

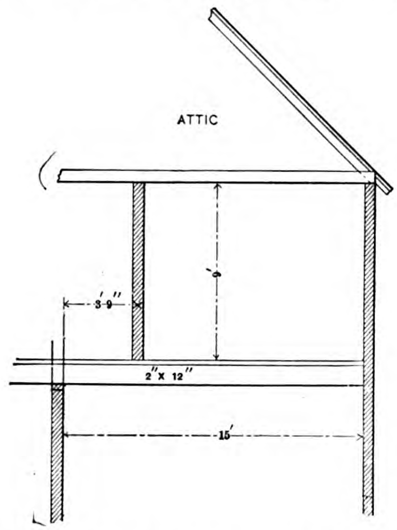


Fig. 6.—Section Showing Second Floor of a Dwelling where the Joists Carry a Plastered Partition.

Determining the Strength or "Safe Load" of Wooden Floors.

Common joists supported at each end, as in Fig. 5, may be computed by either of the following rules, the *depth* of the joists being first assumed:

Rule for Strength. (A.)

To find the breadth or thickness multiply the total load per square foot by the square of the span, and this by the distance between centers of joists, in feet, and divide the product by two times the square of the depth multiplied by *A*. Put in the shape of a formula this becomes:

$$\text{Breadth in inches} = \frac{W \times L^2 \times S}{2 \times D^2 \times A}$$

in which *W* denotes the total load per square foot, *L* the span in feet, *S* the spacing on centers, also in feet; *D* the depth of the beam in inches and *A* the strength of the wood, values for which were given in the November issue.

Rule for Stiffness. (B.)

To find the breadth of the beam multiply five times the total load by the cube of the span, and this product by the distance apart on centers in feet, and divide the product by eight times the cube of the depth multipled by *E*, or

$$\text{breadth in inches} = \frac{5 \times W \times L^3 \times S}{8 \times D^3 \times E}$$

in which *E* denotes the values given below for the elasticity of the wood, and the other letters have the same meaning as in Formula A.

Values of E, to be Used in Rules B and D.

Kind of wood.	E, in pounds.	Kind of wood.	E, in pounds.
Chestnut	72	Pine, Texas yellow	120
Hemlock	80	Pine, common white	82
Oak, white	95	Redwood	60
Pine, long leaf yellow	137	Spruce	100
Pine, Norway	100	Whitewood (poplar)	95
Pine, Oregon	110		

Rules for Spacing of Floor Joists.

It is often desirable to use a certain size of joists and space them whatever distance apart may be necessary to obtain the desired strength or stiffness. In such cases one of the following rules may be used:

Rule (C.) Strength.

To determine the distance from center to center of joists, in feet, multiply twice the breadth by the square of the depth and the product by *A*, and divide by the total load multiplied by the square of the span, or

$$S \text{ (in feet)} = \frac{2 \times B \times D^2 \times A}{W \times L^2}.$$

Rule (D.) Stiffness.

To determine the distance from center to center of joists, in feet, multiply eight times the breadth by the cube of the depth and the product by *E*, and divide by five times the total load multipled by the cube of the span, or

$$S \text{ (in feet)} = \frac{8 \times B \times D^3 \times E}{5 \times W \times L^3}.$$

Example V.—What should be the size of floor joists for a dwelling or lodging room, the joists to be spaced 16 inches (1 1-3 feet) on centers, with a clear span of 16 feet, double flooring to be used and the ceiling below plastered ? The joists to be common white pine.

Answer.—For such a building we should allow 40 pounds per square foot for the floor load, and the floor

* Continued from page 283, November issue.

itself will weigh about 20 pounds, making the total load 60 pounds per square foot.

We will assume 10 inches for the depth of the beams. Then by Rule A, we multiply 60 by the square of 16, and this by 1 1-3, which gives 20,480, and divide by two times the square of 10 multiplied by 60 (*A*), or 12,000. Making the division, we have 1.7 inches for the breadth of the beam.

Applying Rule B, we multiply five times 60 by the cube of 16 and then by 1 1-3, which gives 1,638,400, and divide by eight times the cube of 10 multiplied by 82, or 656,000. Making the division, we have 2½ inches for the breadth of the beam, showing that while a 2 x 10 inch beam will be ample for strength, it will sag more than is desirable.

Example VI.—Instead of finding the size of joists for the floor, described in Example V, we wish to use 2 x 10 inch joists, and will space them whatever may be neces-

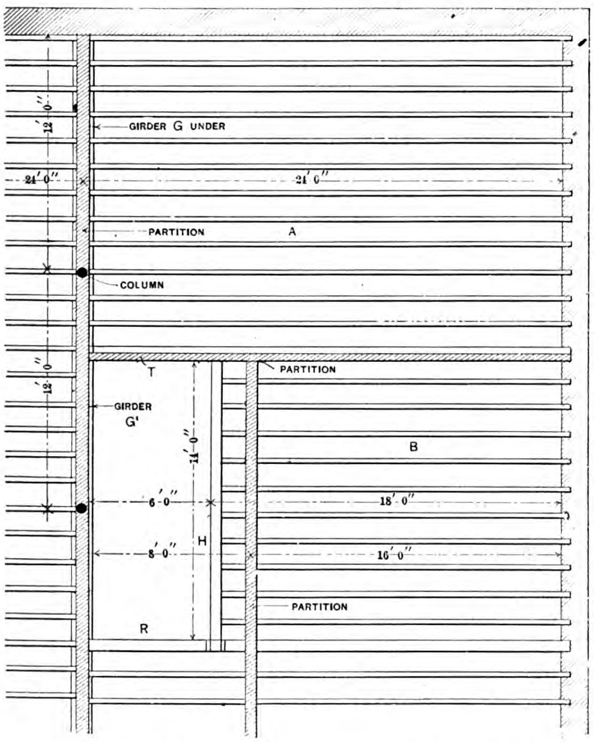


Fig. 7.—Plan of Floor of which Sizes of Girder and Timbers are to be Determined.

Determining the Strength or "Safe Load" of Wooden Floors.

sary to obtain the desired strength or stiffness. What distance from centers should they be spaced ?

Answer.—Following Rule C, we multiply twice the breadth (4) by the square of 10 and then by 60, which gives us 24,000, and divide by 60 multiplied by the square of 16, or 15,360. Making the division we have 1.5 feet, or 18 inches, for the distance between centers of beams. If we use Rule D, we multiply eight times 2 by the cube of 10, and the product by 82, which gives us 1,312,000, and divide by five times 60 multiplied by the cube of 16, or 1,228,800. Making the division, we have 1.06 feet, or 12¾ inches, for the distance from center to center. If we wish a good stiff floor we should not space the joists more than 13 inches on centers, but if we think our allowance for floor load is large, and are not particular if the beams sag some, we may increase the spacing to 16 inches.

When the *span* of the joists *in feet* is about equal to the *depth* in inches, the rules for strength and stiffness will agree very closely, but as the span increases the rule for stiffness requires more lumber than the rule for strength.

Example VII.—Fig. 6 shows the second floor joists of a dwelling, carrying a plastered partition 9 feet high and supporting the attic joists. The weight of the attic floor and its load will be 400 pounds per lineal foot. The joists are to be 2 x 12 inches, *spruce*, with a single floor and plastered ceiling. What distance on centers should the joists be spaced to give ample strength ?

Answer.—The first step will be to determine the total load per square foot for which the joists must be computed.

The floor joists, flooring and plastering will weigh 19 pounds per square foot if the joists are spaced 12 inches on centers, and 17½ pounds if spaced 16 inches on centers. We had better allow for 19 pounds and 40 pounds for the load per square foot on the second floor. Next we must reduce the weight of the partition and its load to an equivalent distributed load. The partition itself will weigh about 20 pounds per square foot, and as it is 9 feet high, the weight per lineal foot will be 180 pounds, which added to the load on the partition makes 580 pounds per lineal foot. This load is concentrated one-fourth of the span from one support, and from the foot note* below we see that the equivalent distributed load will be obtained by multiplying the concentrated load by 1.5, which gives us 870 pounds. This distributed over a span of 15 feet is equivalent to 58 pounds per square foot. For our total distributed load on the floor beams we then have,

19 + 40 + 58, or 117 pounds per square foot.

Next we apply Rule C. Multiplying twice the breadth by the square of the depth and the product by 70 (the value of *A*), we have 40,320. Dividing this by the total load multiplied by the square of the span (26,325), we have 1.5 feet, or 18 inches, as the safe spacing of the floor joists. If the beams were 2 x 10 inches we would obtain a spacing of 12 inches.

As the effect of a concentrated load in producing deflection, compared with a distributed load, is not as great as the comparative breaking effects, whenever beams have a considerable concentrated load they may be *calculated by the rule for strength only*, as in the above example.

Girders, headers and trimmers, also, need only be calculated by the rules for strength, as they are usually shorter in proportion to their size and seldom receive the full loads for which they are proportioned.

Example VIII.—To determine the size of girder and floor timbers in the floor shown in Fig. 7, all of the timbers being of Texas yellow pine, and the floor above being supported by posts and girders in the same way. The building is for lodging purposes, and the hight of the story is 10 feet. There is to be a double floor, and the ceilings and partitions are plastered.

Answer.—We will first determine the size and spacing of the floor joists at A, calling the span 24 feet. As Texas pine is a pretty strong wood, we will try 2 x 12 inch joists, and see how far apart they can be spaced, using the rule for stiffness (Rule D.) The weight of the floor and ceiling will be about 24 pounds per square foot, and we allow 40 pounds for the load, making the total load 64 pounds. Eight times the breadth multiplied by the cube of the depth, and then by 120 (the value of *E*), equals 3,317,760. Five times the total load multiplied by the cube of the span equals 4,423,680. Dividing the former by the latter, we have 0.75 foot, or 9 inches, for the spacing. As this is too close for economy, we will try 2 x 14 inch joists. Making the necessary multiplications and divisions, we obtain a spacing of 1.2 feet, or 14⅓

* *To Reduce a Concentrated Load to Equivalent Distributed Load (Formulas for Strength).*

When load is concentrated at center, multiply by..............	2
When load is concentrated at one-third the span, multiply by..	1.78
When load is concentrated at one-quarter the span, multiply by	1.5
When load is concentrated at one-fifth the span, multiply by...	1.28
When load is concentrated at one-sixth the span, multiply by..	1⅓
When load is concentrated at one-eighth the span, multiply by	⅞

inches. If we apply the rule for strength (Rule C), we obtain 1.9 feet for the safe spacing of the 2 x 14 inch joists. As 40 pounds is a good allowance for the load on the floor, we will be perfectly safe in using 2 x 14 inch joists and spacing them 16 inches on centers.

The joists at B have to support a partition, but as the span is much less, and the partition is quite near the end of the joists, it will be safe to use the same size joists at B and space them the same distance apart.

Header.—We will next consider the header H, which must be of the same depth as the floor joists. The header is 14 feet long and must support the floor half way to the wall, or a floor area of 14 x 9, or 126 square feet. As the total load per square foot is 64 pounds, this will make a floor load to be supported of 8064 pounds. Next we have the weight from the partition. The portion of the partition supported by the header is 12 feet 8 inches long, 10 feet high, and weighs 20 pounds per square foot, or 2532 pounds. Now as the partition is one-ninth of the span from the header, eight-ninths of its weight will be supported by the header and one-ninth by the wall; eight-ninths of 2532 is 2251 pounds, which added to the floor load makes a total load on the header of 10,315 pounds. Now we must determine the breadth of beam, 14 inches deep, 14-foot span, to support 10,315 pounds. This we do by Rule III (March issue.) Following the rule, we obtain 4.1 inches for the breadth of the beam. As we should allow about 1 inch for weakening by framing the tail beams, we will make the header 5 x 14 inches.

Trimmers.—We will next consider the trimmer T. This beam has four loads: A distributed floor load; a distributed load from the partition above; one-half of the load on H, and a small load from the longitudinal partition.

The strip of floor supported by the trimmer will be about 12 inches wide and 24 feet long, and the load will amount to 1536 pounds. The partition above will weigh 10 × 24 × 20, or 4800 pounds.

One-half the load on H is 5276 pounds. As this is concentrated one-fourth of the span from the support, we must multiply it by 1.5 to obtain the equivalent distributed load, which gives 7914 pounds. About 8 inches of the longitudinal partition must be supported by the trimmer, and this will weigh 133 pounds. It is concentrated one-third of the span from the support, and we multiply by 1.78, which gives 236 pounds equivalent distributed load.

The total load for which the trimmer must be computed will therefore be:

	Pounds.
From the floor	1,536
From the partition above	4,800
From the header	7,914
From the longitudinal partition	236
Total	14,486

Applying Rule III (March issue), we obtain 9.8 inches for the breadth, hence the trimmer T should be 10 x 14 inches, and the header should be hung in a stirrup.

The load on the trimmer R will be the same as on trimmer T, except for the cross partition. Deducting the weight of this partition, we have 9686 pounds for the load on the beam, and following Rule III, we find that the breadth of the beam must be 6½ inches.

Girders.—The floor area supported by girder G is equal to 12 x 24 feet, or 288 square feet. For computing the girder we can cut down our superimposed floor load to 30 pounds, which will make the total load per square foot 54 pounds and the total floor load on the girder 15,552 pounds. The girder, however, also supports a partition directly over it, which will weigh 2400 pounds, making the total load on the girder 17,952 pounds. We will assume 12 inches for the depth of the girder and compute the breadth by Rule III. Following the rule, we obtain 8.3 inches for the breadth.

The girder G' supports a floor area at the left of 12 x 12 = 144 square feet, which represents a load of 7776 pounds. The partition over it weighs 2400 pounds, and we also have the weight from the end of the trimmer T. This load will be equal to three-fourths of the actual concentrated load from the header, two-thirds of the actual weight of the longitudinal partition and one-half of the distributed load.

One-half of the distributed load = 3168 pounds, three-fourths of the actual load from the header = 3957 and two-thirds of the weight of the longitudinal partition = 88 pounds, making the total load coming from trimmer onto the girder 7213 pounds. This load is applied one-third of the span from the support, hence it must be multiplied by 1.78 to obtain the equivalent distributed load. Making the multiplication, we have 12,839 pounds.

There is also a floor area on the right of the girder, 3 x 12 feet to be added. This will weigh 1944 pounds, and may be considered as a concentrated load acting 18 inches from the support, or one-eighth of the span. We should therefore multiply it by ⅞ to obtain the equivalent distributed load, which gives 1701 pounds.

The girder must then be calculated for a distributed load of 7776 + 2400 + 12,839 + 1701 = 24,716 pounds, which will require a beam 12 inches deep and 11½ inches wide, but as the trimmer load was figured for a superimposed load of 40 pounds per square foot, and it is not probable that all of the floor space will be loaded at the same time, we may safely make the girder 10 x 12 inches, and it will be best to continue it the whole length of the building.

From this example it will be seen that the computations for special beams and girders consist in determining the loads which they are required to support, reducing them to an equivalent distributed load, and then computing the size of the beam by means of Rule III, given in the March issue. It is also very important that every specially loaded timber be computed, unless it is clearly obvious that the load on it is less than that on similar beams of same size.

Architectural League of America.

The report of the National Convention of Architectural Societies, held in Cleveland, Ohio, early in June last, has just been issued by N. Max Dunning, secretary of the convention. The volume, of 104 pages, appears in attractive form, while the contents are of a character to interest members of the profession generally. The papers read before the convention are given in full, together with discussions thereon. One of the more interesting of these is that on "The Operation of the Illinois License Law," by Peter B. Wight, secretary of the Illinois State Board of Examining Architects.

One of the direct results of the convention was the formation of the Architectural League of America and the establishment of a national circuit of architectural exhibitions for the coming year. These exhibitions will be held in various cities, the first being by the T-Square Club of Philadelphia, extending from December 15 of the present year to January 6, 1900; the second, by the Architectural League of New York City, from February 10 to March 3; the third, by the Chicago Architectural Club, from March 20 to April 2; the fourth, by the St. Louis Architectural Club, from April 7 to 21; the fifth, by the Detroit Architectural Club, from April 28 to May 12; the sixth, by the Cleveland Architectural Club, from May 19 to June 7, and the seventh, by the Pittsburgh Architectural Club, from June 9 to June 30, 1900.

Arrangements have been made for securing many foreign drawings, and we are informed by Henry W. Tomlinson, the secretary of the Architectural League of America, that exhibits may be entered for the entire circuit or for any part of it. Special attention is called to the code governing competitions, already adopted by several prominent societies, and strongly indorsed by the convention as presenting a means whereby competitions can be conducted in a fair and businesslike way whenever desired.

The next convention of the Architectural League of America will be held in Chicago June 7, 8 and 9 of the coming year.

NOVEL METHOD OF HEATING BY HOT AIR.

THIS is the season of the year when a discussion of the question of heating is not without interest to many readers of the paper, and some reference to a rather novel method of distributing hot air for heating purposes may not be out of place. It will doubtless be recalled by many that the heating of entire buildings from a single heating apparatus was, on its introduction, regarded as a marked departure from the method of using several stoves or grates in different apartments. Air taken fresh and pure from out of doors, warmed by passing through a furnace and then distributed to the various rooms, is one of the early methods that still retains its popularity and is in most general use. This is due partly to the simplicity of the method of heating and to the beneficial effect of the change of air which it provides. Bad judgment in arrangement or bad workmanship in application, together with the obstacles presented in the building, have all worked against success in every instance by this method of heating. Sharp competition among furnace contractors and builders, who paid more attention to pleasing the eye of their clients than to providing the essentials for their comfort, has also had much to do with hindering advance in furnace heating.

It has long been known that the heating of a building can be more successfully accomplished when the system of heating is considered in the planning of the building than when the contrary is the case. The opportunity of carrying out this idea has been embraced by F. L. Olds, an architect of Wilkes-Barre, Pa., who has adopted a system of furnace heating which is a considerable departure from the customs almost invariably followed by furnacemen. Mr. Olds has kindly furnished us blue prints from which the accompanying engravings have been made, and showing the system, which has been employed with entire success, we are informed, in a number of houses in the city of Wilkes-Barre. In a letter accompanying the plans Mr. Olds points out that all of the heating pipes are round in shape from the furnace to the register, and are made ample in size so that the house is heated perfectly with warm instead of hot air.

This system of heating is shown in Fig. 1, which is an elevation with three risers with outlets for 12 registers, or an arrangement of flues by which a house with 12 rooms is heated with but three pipes taken from the furnace. Another important feature of the heating system, which has been found very effective, is the large register, which should be located in some inconspicuous place on the first floor, so that at bed time, when the furnace fire has been fixed for the night, the damper controlling the supply of fresh air from out of doors can be closed and this return air register opened. The furnace by this means will be supplied with warm air taken from the halls, library, parlor, sitting room and dining room at a temperature of 66 to 70 degrees, instead of at the outside temperature, which may be very low, and which would result in the whole house being disagreeably cool, while with the return air system the whole house is warm and comfortable.

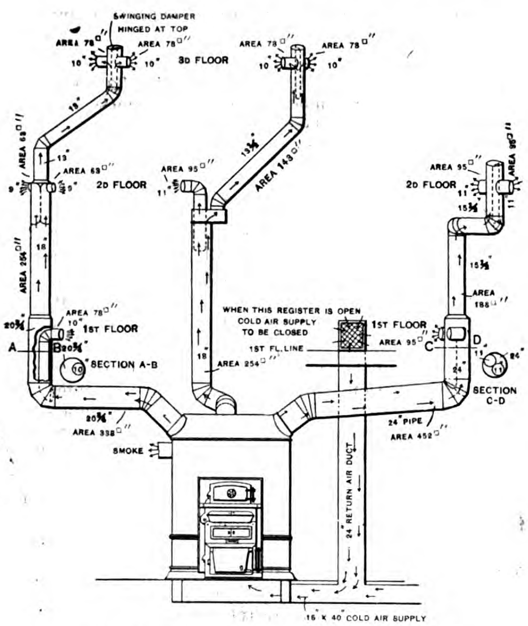


Fig. 1.—Elevation of Furnace and Pipe System.

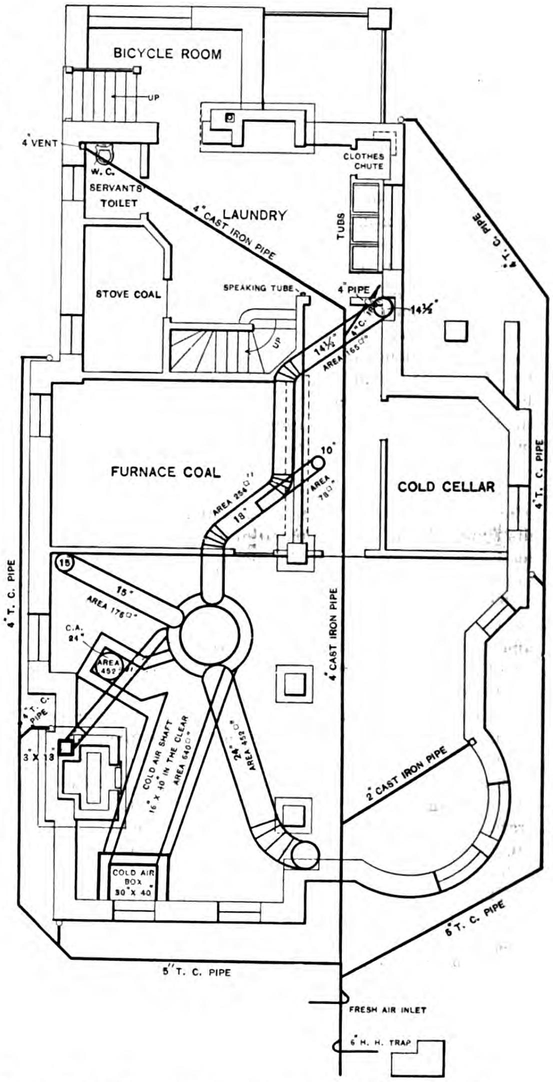


Fig. 2.—Plan of Basement, Showing Air Supply and Distribution.

Novel Method of Heating by Hot Air.

The application of this method of heating may be followed in Figs. 2, 3 and 4, which are plans of the basement, first and second floors of the building, heated by a modification of the system shown in elevation in Fig. 1. It will be noticed in Fig. 2 that the furnace is located centrally, and is supplied with cold air from out of doors by means of a duct 16 x 40 inches in size, having an area of 640 square inches. The brick cold air duct leading into a chamber beneath the furnace also receives a 24-inch round cold air duct, which leads from a large register beneath the seat in the reception hall on the first floor. It will be seen also that there are three hot air pipes leading from the furnace, 15, 18 and 24 inches

air to the apartments to be heated. After the registers on this floor are fed the riser is reduced to 15½ inches in diameter, and this riser is carried over to a point between the den and the chamber on the second floor, where it rises and feeds registers in each of these rooms, a division plate being so placed as to provide the area of a 12-inch pipe for heating the chamber with an alcove and the area of a 10-inch pipe for heating the den.

A 15-inch pipe is carried from the furnace to the left side of the building, where a 12-inch pipe is arranged

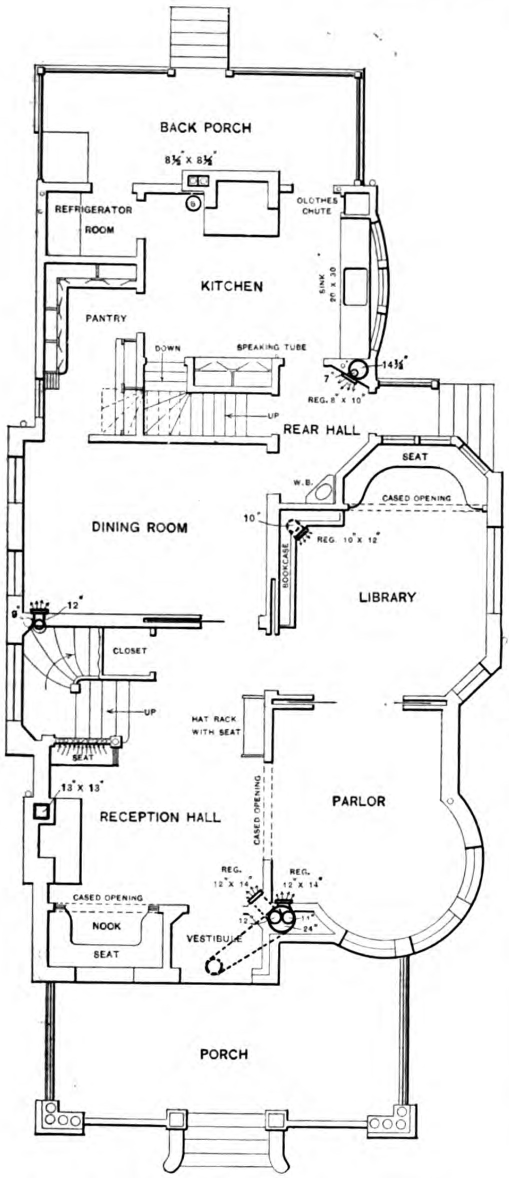


Fig. 3.—Plan of First Floor, Showing Disposition of Risers.

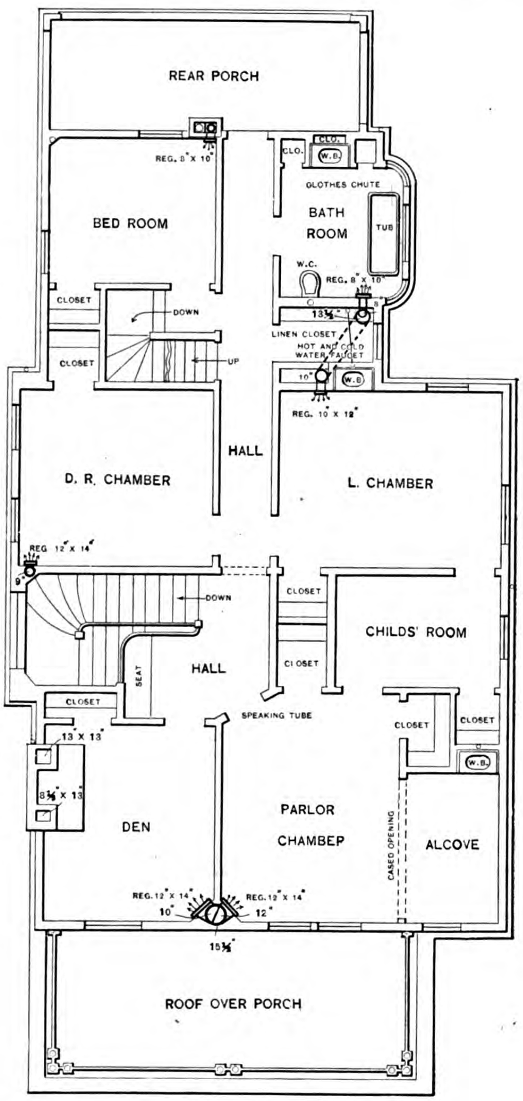


Fig 2.—Plan of Second Floor, Showing Registers and Piping.

Novel Method of Heating by Hot Air.

in diameter, having a combined area of 882 square inches. It will be noticed that the area for the supply of cold air from out of doors is about three-quarters of the hot air outlet, while that of the return current in the house is one-half. The 24-inch pipe leading from the top of the furnace is connected to a 24-inch riser at the front of the house. Within this 24-inch pipe are an 11 and a 12-inch pipe for heating the parlor and the reception hall. It will be seen from the elevation presented in Fig. 1 that these pipes extend down within the 24-inch pipe so as to insure their securing an adequate flow of

after the manner shown at the left of Fig. 1, for heating the dining room. This riser is then reduced to 9 inches in diameter and continued upward for heating the dining room chamber. An 18-inch pipe is taken from the furnace and carried toward the back of the building, a 10-inch pipe being inserted in this pipe, as shown in Fig. 2, and carried up for heating the dining room. The 18-inch pipe, after the 10-inch connection is made, is reduced to 14½ inches in diameter and carried to a point in the wall of the rear hall, where a 7-inch pipe is taken off for heating the rear hall. The riser continues, reduced 13½ inches in diameter, to the second floor, where an 8-inch pipe for heating the bathroom is carried down within the riser for a few feet to insure a good flow of air. The riser is then carried horizontally across for heating the library chamber, the horizontal pipe being 10 inches in diameter.

A table is presented herewith giving the dimensions of the different apartments heated, the cubic space they contain, the area of the hot air pipe connection, and the proportion of the pipe area to the space heated. A study of this table will show that a square inch of area in the hot air pipes is expected to heat much less space than is

Table of Dimensions and Proportions.

	Size.	Space heated. Cubic feet.	Area heat pipe. Square inches.	Proportion of pipe area to space heated.
Reception hall........	17 x 9 x 9 15 x 24 x 10	4,977	113	1 sq. in. to 44 cu. ft.
Parlor........	12 x 17 x 10	2,040	95	1 sq. in. to 22 cu. ft.
Library	15 x 14–6 x 10	2,175	78	1 sq. in. to 28 cu. ft.
Dining room.	12 x 17 x 10	2,040	113	1 sq. in. to 18 cu. ft.
Rear hall.....	3 x 26 x 9 9 x 5 x 10	1,152	40	1 sq. in. to 28 cu. ft.
Den	12 x 14 x 9	1,512	78	1 sq. in. to 19 cu. ft.
Parlor chamber...	12 x 16 x 9 7 x 11 x 9	2,421	113	1 sq. in. to 21 cu. ft.
Library chamber....	12 x 16 x 9	1,728	78	1 sq. in. to 22 cu. ft.
Dining room chamber....	12 x 13 x 9	1,404	63	1 sq. in. to 22 cu. ft.
Bathroom...	9 x 11 x 9	891	50	1 sq. in. to 15 cu. ft.

gererally customary in furnace heating. This is due to the fact that it is the intention with this system to provide a large quantity of warm air at a low temperature to do the heating. This has been considered more healthful than to supply a smaller quantity of air at a higher temperature that would be necessary to perform the same work. An important factor contributing materially to the success of this system is the use of large round pipes, greatly reducing the friction, so that a slight increase in the temperature will produce a positive flow from the registers of warm air, which has no scorched or scorching effect.

In Fig. 1 the areas of the various pipes are presented, in addition to their diameter, so that those who desire can follow this system and see that ample provision is made in all the piping to secure a system that will be filled with a good flow of air and not restricted at any point. The left riser, shown in Fig. 1, is provided with a swing damper, hinged at the top so that an increased quantity of air can be caused to flow into either of the rooms by the manipulation of this damper. In referring to Fig. 1 Mr. Olds says that the 20¾-inch riser with five outlets has been used in eight different houses; the 18-inch riser has been used in two other houses, and the 24-inch riser has been used in one house. These risers have been selected as best showing the system, and it is pointed out that the building is not always so arranged that four or five outlets can be taken from one riser.

The adaptability of this system to the various makes of hot air furnaces on the market is shown in the success attending the use of heaters made by four different manufacturing houses. Mr. Olds says that with almost any good furnace and with the work done by competent men the system should give entire satisfaction in operation.

Fire Resisting Mortar.

The discovery is reported that serpentine rock, when powdered and mixed with good lime, forms a mortar that will successfully withstand heat to 1100 degrees F., and will not crack if subjected when at this heat to contact with cold water. The new material, besides being in the highest degree fire resisting, is also declared to be so elastic as not to crack when the building settles and permits of nails being driven into it. It is said to be one-third lighter than ordinary mortar, easy to handle and capable of receiving decoration.

Builders' Exchanges and Labor Troubles.

The value and importance of a Builders' Exchange in a community has been proven time and again through its instrumentality in the settlement of labor troubles, in the protection of the interests of builders and in the promotion of more friendly relations between employer and employed. This evidently is also the view which a Canadian writer takes of the subject, for in a recent article in the *Architect and Builder* he says: It is gratifying to learn that through the efforts of several builders' exchanges a number of strikes and labor disturbances have been prevented, and in other cases, by the combined efforts of labor leaders and exchanges, serious differences have been adjusted, and the workmen who had been on strike, returned to work satisfied with the mutual arrangements. These achievements by the exchages are only small beginnings of what may be accomplished—for the good of all concerned—if their influence covered a larger area, and a stronger bond of unity obtained among the exchanges. If it were possible that dissatisfied workmen, through the agency of their leaders, could appeal to the heads of some national organization of employers, and there discuss their grievances, and become acquainted with the conditions controlling the particular class of labor disturbed, there would be a less number of strikes and much more harmony between employer and employed than now exists. Speaking for the workmen employed in the construction of buildings—from the man who does the excavating, to the man who lays out and constructs the stairs and hand railing—no more intelligent or more reasonable class of workmen can be found in any other trade; and an impartial discussion of their troubles, when properly submitted to the heads of some sort of a national exchange, would engender kindly feelings all round and be a powerful factor in the prevention of strikes or other labor troubles. It is manifestly in the interest of building contractors that they establish exchanges in every town and city having 5000 or more inhabitants. It is not necessary that expensive rooms for the purpose should be rented; in fact, in the smaller towns it may not be necessary to rent rooms at all, as the board might meet in the offices of its members as occasion might require. A small sum paid to a secretary, and a few dollars for stationery, might compose the whole expenditure for a very long time, and the amount required could easily be raised by a membership fee and a small yearly due. Meetings might be held monthly or bi-monthly, or they might only be held at the call of the chairman, or as occasion demanded. The benefits derived by an organization such as a builders' exchange, even in a small town, can scarcely be measured; and if the builders and contractors will only pause for a moment and think over the subject they cannot fail to see how their own interests, the interests of their workmen, and, greater than all, the public interests, can be bettered; they will seriously think that it is about time to organize a builders' exchange in their town.

Putty for Repairing Broken Stone.

Reduce the following ingredients to powder: Mix all together in a mortar and make into a thick putty with water just before using: Ten parts of clay, 4 parts of fine iron filings, 2 parts of peroxide of manganese, 1 part of common salt (sodic chloride), and 1 part of borax. The heat will harden this cement. A cement for a similar purpose that will resist a very high temperature is prepared by making into a paste with solution of silicate of potash and borax 1 part of sulphate of barium and 2 parts of clay.

CORRESPONDENCE.

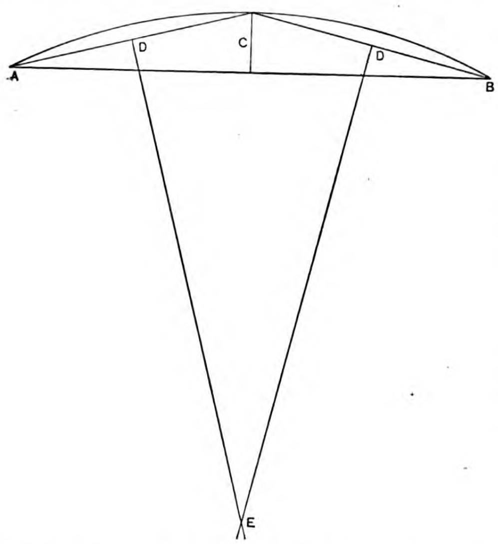
Raw or Boiled Linseed Oil for Wood Shingle Roofs.

From J. B. McM., *Jackson, Miss.*—Which is the better for wood shingle roofs, raw or boiled linseed oil? I wish to mix it with red oxide of iron.

Answer.—We think our correspondent will secure entirely satisfactory results by using half raw linseed oil and half turpentine.

Finding the Radius of an Arc When the Span and Rise are Given.

From HEE H. SEE, *Montreal, Canada.*—The answer to "X. Y. Z.," Cuyahoga Falls, Ohio, in the November issue of *Carpentry and Building* is the one for which he asked,



Finding Radius of an Arc when Span and Rise are Given.

being the method of obtaining the length of a radius rod by figuring. I find, however, that the average chip has at the same time so many other figures and numbers to remember that by the time he comes to need them he finds he has forgotten them. The system I occasionally employ is one which I think is more easily remembered, and if there are fractions in the figures I believe it is more easily worked. It will also answer for a segment which is more than a half circle as well as less than a half circle. It is the old and well known fact that a circle may be drawn through any three given points not in a straight line. Referring to the accompanying sketch we will take the span A B to be 4 feet and the rise C 6 inches, which, of course, must be erected perpendicularly to the center of A B. Draw a line from A to the top of the rise C, and also one from B to the same point. Square out from these two lines, as shown, until they meet at the point E. Then E A or E B will be the radius required, 51 inches exactly, as our worthy Editor has already stated. Of course, when small enough to be struck by the aid of compasses, the line D E may be produced by setting the compasses at B, with rather more than half the distance B C, and striking intersecting arcs from B C and A C. Through these produce two lines, which meet at E, as already described. This problem does not take half as long to solve as it does me to describe it.

Rule for Figuring Joist and Studding in a Building.

From F. K. T., *Raleigh, N. C.*—I would like to ask "Framer," who writes in the November issue, why not reverse the operation in figuring the number of joists, studs and rafters in a building when spaced 16 inches from centers, and thus save figures and time? Now, instead of multiplying by 3 and dividing by 4, first divide by 4 and then multiply by 3, thus:

$$36 \div 4 = 9 \times 3 = 27 + 1 = 28.$$

This operation gives the same result, and saves figures and time, and time nowadays is money.

In estimating studding where spaced 16 inches on centers a good rule, and one sufficiently accurate for the purpose, is to allow one stud for each foot around the building or running feet in partitions. This will give enough studding for doubling at openings and building corners in ordinary balloon framing. The lineal feet of plates should be figured extra.

Oil, Gas or Kerosene Engines for Light Work.

From E. S., *Ithaca, N. Y.*—I have been a reader of *Carpentry and Building* for several years, and would like to ask through the columns the advice of the readers who have had experience with gas, gasoline or kerosene engines for light work. I want to put in a small plant for my carpenter shop, and expect to use about 7 to 10 horse-power. If gasoline or kerosene engines do the work as well as the makers claim, and do not give any more trouble, I think that is the right power for me to use. I would like, however, to have the opinions of some users, and thought possibly some of my brother readers might be using such power.

Backing Hip Rafters.

From G. L. McM., *Tacoma, Wash.*—A short time ago a correspondent made inquiry as to the method of finding the lengths and cuts for hip, valley and jack rafters, and in connection with that subject I would say that it is hardly ever necessary to "back" a hip. I almost al-

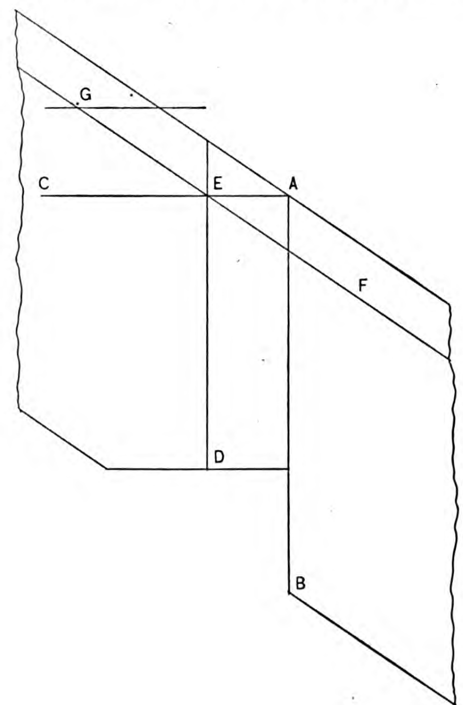


Diagram Showing Backing of Hip Rafter.

ways frame mine so that no backing is needed, as I consider it a waste of both time and labor. However, I submit the following method for the benefit of the correspondent making the inquiry to which I have referred: Having laid off the hip rafter, of which the sketch shows the bottom cut and A B the line of the plumb cut, from A draw A C perpendicular to A B. Lay off A E, making it equal to one-half the thickness of the hip. Through E draw G F parallel to the top of the rafter, and G F is the amount to be taken off in order to make the proper backing, working, of course, to the center of the hip. This is on the supposition that the seat of the hip is at an angle of 45 degrees with the side of the building. For octagonal or other such roofs in place of laying off from A one-half the thickness of the hip, draw D E parallel to A B, letting D be the point where the plate of the building intersects the side of the hip.

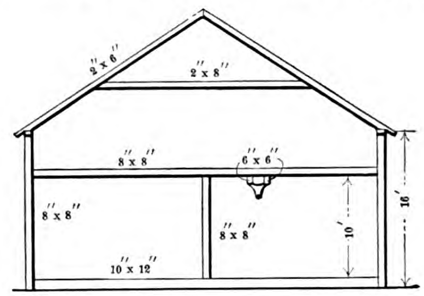
Sharpening Carpenters' Tools With a File.

From ELMER HARROLD, *Leetonia, Ohio.*—It is a fact not generally known or practiced that a good file is better to sharpen a carpenter's chisel or gouge than a grindstone. It is at least worth trying. Screw the tool to be sharpened firmly in a vise, so that the beveled portion comes about level, just a little higher than the jaws of the vise, and then by the use of a good file the chisel can be sharpened as quickly and better than on a grindstone. I find this especially efficient in sharpening turning chisels, but it will also apply for plane irons. Occasionally a tool will be found that is too hard to be sharpened in this way, but it is seldom. The writer often sharpens a pocket knife with a file and finds it much handier than running to the grindstone. I would be very much pleased to see published reports from those who care to try this method of sharpening tools.

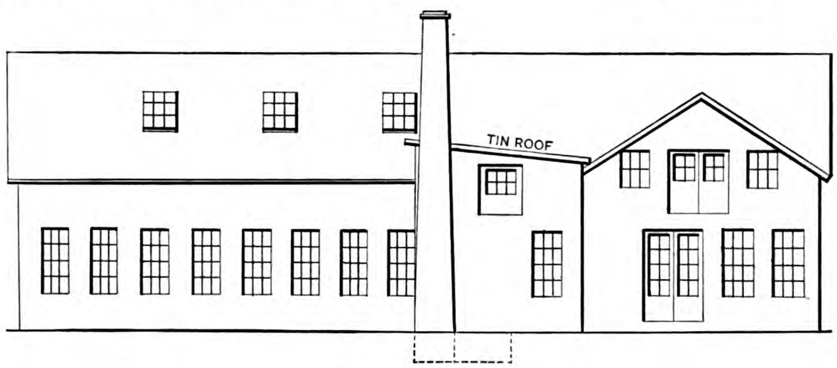
Small Wood Working Shop.

From F. B. E., *Bennington, Vt.*—For the benefit of the correspondent making inquiry in a recent issue of *Carpentry and Building* for plans of small wood working shop, I send pencil sketches of such a building with the power would do, but I think it is better to have more power than less. The smoke stack may be made of brick or iron, as preferred. The building is to be heated by steam, and while it is customary to put the piping overhead, so as to be out of the way, I should prefer where circumstances permitted to place it under the benches and around the sides of the building, as a more uniform heat is secured. The main and planer belts should be of leather, while double belts, that is, belts 6 inches wide or more, should be used under the single belts. I may not have the right amount of space for a passageway between the machines, but that is a matter of judgment to be decided when laying out the plant.

All joist and studding that are exposed should be planed. We do not ceil shops built in this location, but the studding and posts are dressed, and the outside covered with P. & M. paper and clapboards. In this section all studding and joist are sized, and that is why I include



Vertical Cross Section.



Side (Right) Elevation.

Small Wood Working Shop.—Scale, 1-16 *Inch to the Foot.*

relative positions of the machinery clearly indicated. In placing the machinery, however, judgment must be used to set it according to the kind of work to be done. I have arranged the machinery for a job shop such as we have in the East, but it might not answer in localities where they had a different class, or special line, of work to do. I have included an inside molder and matcher in the equipment of the shop because they are less expensive and answer the purpose just as well, but if work is to be done for the market a first-class flooring machine should be provided in order to meet outside competition.

I have provided a complete wood working machinery equipment, but if business in a small way only was to be done some of it could be dispensed with. In the case of a business on a larger scale there should be added two sizes of tenoning and mortising machines.

The boiler room should be sunk about 3 feet and have a cement or stone floor. The fuel room should be lined with tin or sheet iron, and the dry room over the boiler provided with 1¼-inch pipe and a drip returning to the boiler. A 60-horse-power boiler should be provided, and an engine of 50 horse-power. An engine of 40 horse- an endless bed planer in the plant, but if not much lumber or timber is to be planed this machine could be omitted.

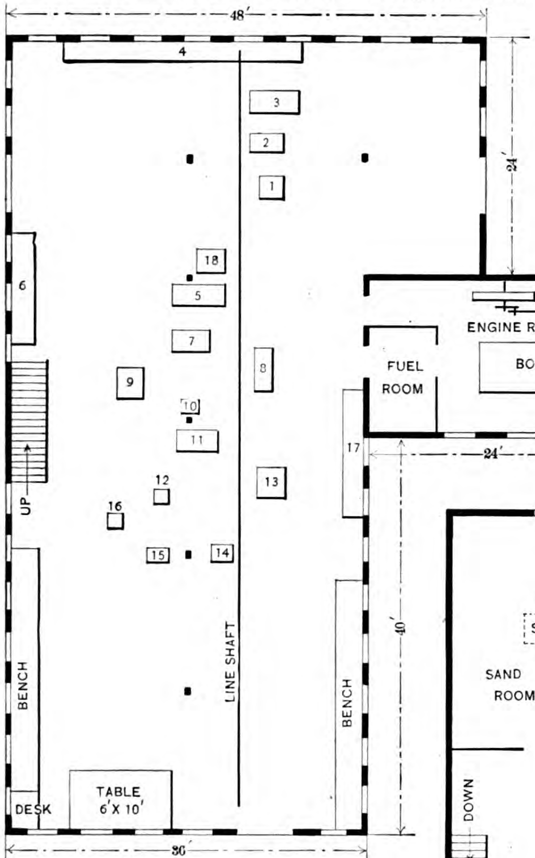
Rule for Determining Size of Eave Trough.

From J. C. B., *Hickory Corners, Mich.*—Will some of the readers of the Correspondence department furnish a rule for determining the size of eave troughs or down spouts and conductors having a given area of roof surface?

Interpretation of Specifications.

From H. K., *Columbus, Ohio.*—In the current (October) issue of *Carpentry and Building*, in the Correspondence columns, I notice an article headed "Interpretation of Specifications." It is from "B. F. Z.," Baltimore, Md., and requests some of the readers to express their opinions on the subject indicated. It must be understood that after the contractor has signed the agreement to erect the structure according to plans and specifications, he is supposed to have perused the specifications and carefully examined the drawings. If there is anything that has been omitted or is not satisfactorily explained in the specifications or on the drawings, the attention of the architect should be called to that fact, and he will gladly make amends and answer all questions that have not been set forth in the specifications or on the drawings. I would therefore say that the builder will be obliged to furnish the slabs mentioned or anything else that has been overlooked by the contractor at the time of figuring and presenting the bid.

From H. M., *St. Louis, Mo.*—In answer to "B. F. Z.," Baltimore, Md., in the October issue, I would say that in my opinion the contractor must furnish the granite chim-



Main Floor.

ney caps if they are not specially excepted in the specifications or even not mentioned therein. The specification is considered to be the sole factor. If everything could be plainly shown and indicated in the designs, as in the chimney cap case for example, they would require no further directions, the contract closing the bargain. I have observed that in small country places for ordinary dwellings the plans and the contract are very often the only instruments for execution, binding the contractor and client.

The clause in the specification I would word as follows: "The plans and specifications are considered to be co-operative, and all work necessary to the completion of the structure shown on the drawings and not described in the specifications, as well as work described in them and not shown on the drawings, also such parts neither drawn nor specified, but absolutely necessary for the completion and immediate use of the structure and not especially excepted, are considered a portion of the contract and must be executed in a thorough manner in quality to agree with the rest of the structure, the same as if fully specified."

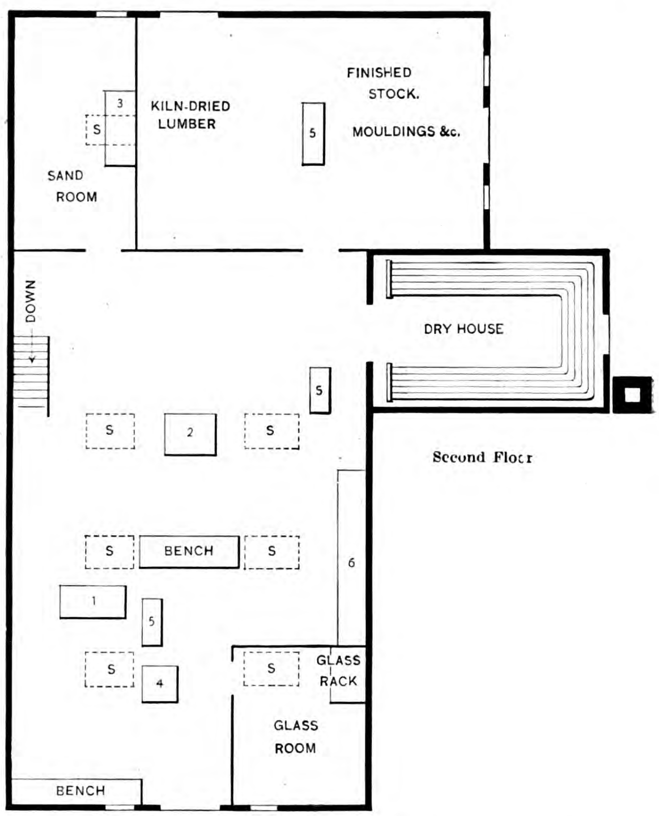
If such a clause is inserted litigation on account of slight omissions is forestalled, while at the same time it is of benefit to contractors who do not aim to take advantage of their clients at the first opportunity, and find it hard to compete with those who do.

Sawing Soft Limestone by Machinery.

From J. A. L., *Nassau, N. P.*—I would like some of my fellow chips to give in the columns of the Correspondence department the results of their experience in sawing soft limestone by machinery.

Qualities of Washita Oil Stones

From THE PIKE MFG. COMPANY, *Pike Station, N. H.*—The discussion which has been in progress in the columns of the paper for a few months past, relative to the requisites of an oil stone, has greatly interested us, and should prove of assistance to both carpenters and dealers. There is one point, with reference to the Washita stone, which it would be greatly to the benefit of both dealers and consumers to bear in mind—namely, that the Washita varies greatly in texture and cutting qualities. Some Washita stones are of very even, sharp grit, fast cutting and free from any tendency to glaze, while others are much more dense, with less abrasive quality, and will glaze very readily. Until the past few years both grades have been sold as No. 1 quality without any label or other mark to enable the purchaser to distinguish between the fast cutting sharp grit stone and the harder, more slow cutting stone. As a consequence, two men, inexperienced in selecting Washita stones and buying from the same box of No. 1, might get two distinctly different stones—one a very fast cutting stone that would give him the best satisfaction, and the other a slow cutting hard stone, which would soon glaze and lead him to



Small Wood Working Shop.—Floor Plans.—Scale, 1-16 Inch to the Foot.

condemn Washita stones in general. This will perhaps explain why there is so great a diversity of opinion among carpenters as to the merits of the Washita stone. When properly selected, however, there is no better stone for "all around" use. The buyer who is not experienced in selecting Washita stone is therefore wiser in buying a labeled brand, like the Lily White, that is selected and fully warranted by the manufacturer.

Framing a Six-Sided Tower.

From A. S. W., *Shawnee, W. Va.*—Will some of my brother chips tell me how to frame a tower with six sides; also an easy rule for laying out polygons with five and six sides. I am very much interested in *Carpentry and Building* and gain more information from it than anything I have ever read. If entirely convenient, I would like to see some more published about the turning lathe. In the country where I work it is a hard matter to obtain any turned work.

Ravages of the "Teredo," or Ship Worm.

From C. J. W., *Berkley, Va.*—Thinking they may prove of interest I send you by mail two pieces of molding taken from the "Reina Mercedes," the Spanish war ship sunk in the entrance to Santiago Harbor during the war between this country and Spain and subsequently raised and repaired. The wood, as near as I can determine, is Spanish or Italian walnut, my doubts arising from the fact that the water has changed the color somewhat. The main interest in the pieces of molding centers in the effects wrought by the "teredo," or ship worm, during the time the vessel was submerged, some of the wood comprising the joiner's work being perfectly free from the ravages of this insect, but most of it is a perfect honeycomb.


Photographic Views of Two Pieces of Molding, Showing Ravages of the "Teredo," or Ship Worm.

Note.—From the pieces of molding we have made the illustrations presented herewith, which are about three-fourths full size. One view shows the face and the other the back of the molding.

Location of Hot Air Registers.

From A. P. A., *Oneonta, N. Y.*—Will you kindly inform me through the columns of the paper of the proper place to locate registers, whether in the exposed or most protected part of the room, supposing the length and elevation of the pipes below are the same in either case?

Note. — Our correspondent has asked a difficult question, for the authorities do not agree as to the proper location of registers. There are those who advocate placing the registers on the outer wall to counteract the descending current of cold air, while many others advise the location on the inner wall as giving the best results and most equable heating of the room. We do not know what a majority of the furnace experts in the country believe, but it is our impression that the best opinion advocates locating the registers in or near the inner walls. The letter from the correspondent below may prove of interest in this connection.

From S. R. B., *Boston, Mass.*—When registers are located near inside walls less pipe is necessary and a sharper pitch may be obtained than when they are placed near outer walls. On the other hand, the loss of heat through the ceiling will be greater. This is of little consequence except on top floors. When possible registers should be located about midway of partition to permit the warm air to reach all points along the exposed walls with nearly equal ease. The rapid circulation caused by the downward currents along the cool outside walls, coupled with the upward current of inflowing air from the register near inner wall, gives an even temperature throughout the room. The current of hot air is flattened on striking the ceiling and passes without perceptible draft over the heads of the occupants to the outer walls. In effect this is similar to that produced by the overhead system of heating mills, where coils of steam pipes are hung from the ceiling a few feet from the exposed walls. Even when there are no machines or belts to stir up the air this system works well.

Following the same theory of circulation, it is the established custom in school houses to place the warm air inlets on inside walls. Those advocating the placing of registers near outer walls may refer to the practice of so locating them in indirect steam and hot water work. This is done, however, chiefly from considerations of economy in piping since when the stacks are placed near the exposed walls both cold and warm air pipes may be made very short. With a furnace system having registers similarly placed the hot air pipes would stretch from one side of the house to the other, their excessive length reducing the pitch and increasing the friction and loss of heat.

When registers are placed below windows the upward current of hot air meets a downward current from the glass, which tends to retard the flow through the pipes. Back drafts through such pipes are more likely to occur (in case the cold air box is insufficiently open) than through short pipes having a sharper pitch.

As bearing on this subject the effect of the location of direct radiators may be cited. They are commonly placed under windows: 1. To counteract down drafts. 2. Because they give off the most heat in that position. 3. Because such location seldom interferes with the arrangement of furniture. The objections to a furnace register location near outer walls have no force when applied to radiators. With evenness of temperature and comfort in rooms of moderate size and glass surface the location of the radiator has little to do. Wherever placed the warm air will seek the cold walls and a continuous circulation will be established.

Some Rafter Questions.

From W. S., *Paterson, N. J.*—I would like to have some one tell me why 17 and the pitch of roof will give the plumb and level cut of valleys or hips, also the lengths, where roofs are all one pitch. Is there a way of finding the proper distance to cut or chop the sides of hips down so that roof lath will lie flat on the hips and come to a center? What I want is a method which will enable me to gauge the hips on the sides before they are cut.

Restoring Overprinted Blue Prints.

From F. A. H., *Moscow, Idaho.*—I have been somewhat interested in the discussion in the columns of the paper regarding blue print making, and I desire to add one item which I think has not been mentioned by any one of the numerous correspondents—that is, how to save and restore an overprinted blue print. After the ordinary water bath to dissolve out the soluble chemicals not changed by the action of light, the density can be reduced by using a weak ammonia bath, prepared and used as follows: Prepare a bath, using about a teaspoonful of strong ammonia to 1 quart of water. Immerse the print, which will immediately change to a purplish color and begin to fade. When partly faded pour off the ammonia solution and immerse the print at once in pure water, to which has been added a few drops of strong sulphuric acid. The print will immediately change again to blue, having a greenish tone. When the proper density is secured wash in clear water. A trial or two will enable one to secure the desired density.

Filing a Rip Saw.

From E. H. A., *Pulaski, N. Y.*—Will some of the readers of *Carpentry and Building* please tell me the proper way to file a rip saw? Is it from one side or both? Also, which is the proper end to begin to file, the point or the head? I should like to see the subject of saw filing discussed in the columns of the paper, as I think it would interest others as well as myself.

Note.—The subject of saw filing has been somewhat extensively discussed in past issues of the paper, and no doubt our correspondent can obtain many valuable suggestions from a perusal of them. In the current volume articles on the subject have appeared in the issues for March and April. The topic, however, has not by any means been exhausted and we lay the request before the practical saw filers for their consideration.

Do 4 or 6 Inch Shingles Make the Better Roof?

From E. H. E., *Canadian, Texas.*—We have a little controversy with regard to shingles for roofing, which we lay before the readers of the paper. All things considered, which would make the better roof, 4 or 6 inch dimension shingles? It seems to the writer that in the case of the 4-inch shingles, should one of them split in the middle the crack would register with the joint in the course below and thus leave an opening right through the roof, while in the case of the 6-inch shingles should one of them split there would still be two shingles beneath to protect the roof.

Note.—With no desire to anticipate the opinions which our readers may express, we should say that the question of first cost aside, the 4-inch shingles would make the better roof. There will be better provision for contraction and expansion due to variations in climatic conditions, the nailing will be more secure and the durability of the roof correspondingly increased. We hope, however, the practical readers of the paper will give their experience in connection with shingle roofs, and thus start a discussion which cannot fail to prove both interesting and instructive.

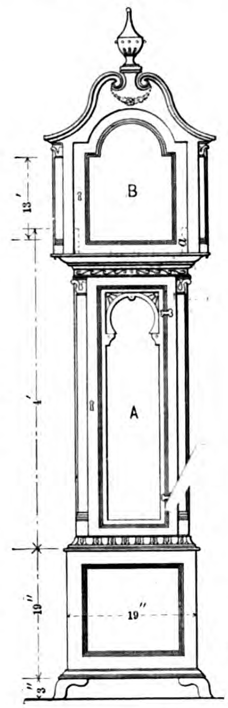
Tar on Tin Roofs.

From W. Q., *Hicksville, N. Y.*—From time to time questions are asked in the columns of the paper regarding tar for painting tin roofs, and there may be different grades of this material with which I am not familiar. To satisfy some "questionist" I have taken the liberty of sending you a sample that I took from a roof. The house was built in 1872 and a tin roof was put on. I do not know whether this roof was ever tight or not; any way, it developed leaks and some one had a hobby for tar. Every time a leak turned up the order was given to put on tar, until finally it has reached the thickness in parts of the sample sent. The present owner of the building has had another roof put on over the old roof, with more pitch and slope given to it. I had the honor of putting on the tin roof and give assurance that it will not be necessary to use tar when I get through with it.

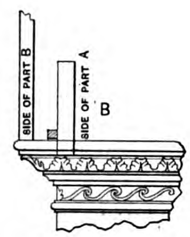
Note.—The sample received is coal tar in the hard form and called by some pitch. In the thicker parts it is ½ inch thick and ⅜ inch thick at the thinnest part. Our correspondent does not state what effect the tar had on the tin. This is a very interesting question. Some contend that the tar will start rust spots and will eventually destroy the tin instead of protecting it. We feel sure that our readers will be glad to hear from him as to the effect of the tar.

Design for a Grandfather's Clock.

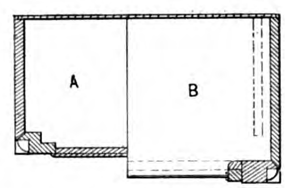
From E. RAW, *Roxbury, Mass.*—In a recent issue of *Carpentry and Building* I noticed an inquiry with regard to designs for a grandfadther's clock case, and as being of possible interest to "J. L. W." of Philadelphia, Pa., as well as others, I inclose drawings of such an article. These represent a front elevation and half plans taken at A and at B of the clock, together with a detail of the construction immediately below the face. The pedestal or base part is 19 inches high, 19 inches wide and 12⅞ inches deep. The middle part is 3 feet 8 inches high to the underside of the bead, the ends being 4 inches longer in order to extend up into the upper portion for the clock to rest on, as shown by the detail marked B. The upper



Front Elevation.—Scale ½ Inch to the Foot.



Detail of Construction.—Scale, 1½ Inches to the Foot.



Half Plans at A and B of the Elevation.—Scale, 1 Inch to the Foot.

Design for a Grandfather's Clock.

part is to have a glass door 13 x 13 inches, and there is to be a rim fixed at the inside of the glass door, as indicated by the dotted lines on plan B. This part is to be built separate from the other work so that it can be slid in from the front. A cleat is screwed on to the ends of the middle part, as shown in the detail B in order to make a groove. The bead is fastened at the bottom edge of the upper part and is just wide enough to run in the groove between the cleat and the cornice molding. The back of the clock case is of one piece of board all the way up. The middle and upper parts have a quarter round turning with square base, and the tops of the turnings can be trimmed with a quarter of a Corinthian or Italian capital, one serving for all four. The ends can be panelled if desired. Now as to the carving I do not care to enter into details, as we all know that carving as a rule is very expensive. I should prefer that only the larger moldings be carved with a leaf, for example, as this will make an attractive case if the work is well executed and polished.

Sizes and Location of Pipes for Heating Houses by Hot Air.

From J. W., *Paterson, N. J.*—Being a reader of the paper and noting the questions and answers presented from month to month, I would be glad to have some one tell me the proper way to frame a house where hot air would be applied to the heating. Is it customary to carry the pipes for the second and third floors up the outside walls or inside partitions, all studding being 2 x 4 inches? What sizes of pipe are used and how high from the floor are registers set in the partitions?

Answer.—There is more or less difference of opinion as to the location of hot air pipes in heating the second and third floors of a building, but the best practice is to run the pipes up inside walls, or partitions, by which means the hot air is delivered in the room at the inner wall, this being considered by many heating experts the position to get the best results.

As to the size of pipe required for heating purposes, we would say that this is largely determined by local conditions, such as location of room, size, &c. One method suggested for determining the size of hot air pipe to be used for a given room is to multiply the square feet of floor surface by 2½, 3, 3½ or 4, according to circumstances; then divide the product by 10 and the result will be the area in square inches of the hot air pipe which should be used. For example, a first-floor room, 15 x 15 feet, with two walls exposed and the usual windows, would have an area of 225 square feet. This multiplied by 3½ would give 787, and divided by 10 would give a fraction over 78, as the number of square inches of area that a hot air pipe should have for this room. If the room had three sides exposed on the cold side of a building the square feet should be multiplied by four. For example, a 14 x 16 foot room would have 224 square feet, and multiplied by 4 and divided by 10 would give 89.6 as the area in square inches of the proper pipe, which would be almost equal to an 11-inch pipe. If the room was to be used only as a sleeping apartment, and over a room that was warmed, either 2½ or 3 should be used as the multiplier, according to the exposure and the amount of heat required. It will be seen that this rule is somewhat elastic and not derived from a scientific base, but simple in application and a fair guide. On computing the cubic contents of the rooms with a 10-foot ceiling it will be found that in the more exposed room 1 square inch of area is provided in the hot air pipe for every 25 cubic feet of space, and in the other room the proportion is about 1 to 30. It corresponds with the method of proportioning the pipe to the cubic space, but the different multipliers have an advantage to beginners, as they do not leave so much to judgment. Multiply by 4 for cold exposed first-floor rooms and by 3½ ordinarily. For exposed second floor multiply by 3, and by 2½ ordinarily for sleeping rooms. These multipliers used for rooms of different sizes will not always give an amount which corresponds with the area of a regular size of pipe, but will sometimes give an amount between two sizes; then the larger or smaller size may be used as the room may seem to need, or according to the number of pipes which are used on the furnace. If there is a large number of pipes on the furnace, taxing its capacity, better results will be secured by using the smaller size of pipe. Small furnaces and small pipes only do their work at the expense of overheating the air, which should always be avoided.

In this connection the rules formulated for guidance in proportioning hot air work and found in a catalogue issued by the Carton Furnace Company may be of interest to our correspondent, these rules being based on the experience derived from the practice of those who have used Carton furnaces under all climatic conditions and varied building constructions. The method of determining the size of hot air pipes is as follows:

While the size of a hot air pipe that will be required to heat a room will largely depend upon the existing conditions, which of course vary in different buildings—proportion of exposed wall and glass surface, length of pipe and construction of building—there must, nevertheless, be some relation to the cubical contents of same, and therefore, as the simplest and most readily comprehended rule of apportioning the size of hot air pipes, we offer the following table, which is based on the building being detached, of average construction and exposure, average length of pipes and the outside temperature zero. In case of extraordinary conditions, such as poor construction of building, location of building, exceptional exposure of wall surface, unusual glass exposure, loose windows and doors and long hot air pipes, allowances must be made, and the ratio of size of hot air pipes to cubical contents must be increased proportionately over that stated in this table:

One square inch of capacity of hot air pipe will heat cubic feet of space as follows:

DWELLINGS.	Each inch will heat—
Living rooms, one side exposed	23 cubic feet.
Living rooms, two sides exposed	20 cubic feet.
*Sleeping rooms, one side exposed	35 cubic feet.
*Sleeping rooms, two sides exposed	25 cubic feet.
Halls	35 cubic feet.
*Bathrooms, size 8 x 12 x 9 feet, or over (smaller sizes 8-inch pipe)	18 cubic feet.
PUBLIC BUILDINGS.	
Stores (where furnace is connected to one pipe directly over same)	50 cubic feet.
Churches (where furnace is connected to one pipe directly over same)	90 cubic feet.

In explanation of the above table we give the following example: To heat a living room, first floor, with two side wall surfaces exposed, size 15 x 15 x 10 feet ceiling, equaling 2250 cubic feet, at a ratio of 1 to 20, the size of the hot air pipe required to heat this room is arrived at by dividing 2250 by 20, equaling 112½, which is the equivalent of a 12-inch pipe of 113 cubic inches.

Formula for a Good Cement Sidewalk.

From FREDERICK REISSMANN, *West Point, N. Y.*—I send herewith a good formula for cement sidewalk, believing that it may be of interest to some of the readers: Excavate 2 feet 6 inches below the surface and fill the interstice with small gravel, leveling off to within 5½ inches of the top of curbstone. Next prepare the concrete bed, taking 20 cubic feet of clean gravel, none more than 1½ inches in diameter, and spread it on plank floor about 5 inches thick. Then take 5 cubic feet of clear, sharp, coarse sand, add to this one barrel of Rosendale cement and mix them thoroughly together in a dry state. Form a ring of this, add water and mix to a paste. After wetting the gravel spread the mixture evenly over the bed of gravel and thoroughly turn the same at least three times over, until well mixed, then put it in the trench and ram well. Let this finish 4 inches thick. The finishing coat is 1½ inches thick.

Before the concrete gets dry prepare and lay the finishing as follows: Take 2 parts of very clear, sharp sand and 1 part of English Portland cement; mix them well together in a dry state, then add as small a quantity of water as possible; in fact, just enough to thoroughly moisten the mixture, as in trowling down the finishing coat the water works through the surface. Have dressed pine strips 1½ inches laid to four blocks of such size as may be desired; lay in the cement and let the mason rod it off with straight edge well to the guide pieces. Take a pine block 6 x 8 x 2 inches with a handle on one side and tamp well, then trowel it hard over, after which with small chalk line lay off in blocks as may be desired, while soft. The coating should be 1½ inches thick. If done in hot weather or to avoid injury from rain, keep covered with canvas until set. This will cost about $2 per square yard for all material, or will cost about $3.75 per square yard for all material and hired labor. If above directions are followed closely a first-class walk will be the result, and one that will last for years.

* If located on the second story the vertical partition pipes or stacks can be about 25 per cent. less in capacity than the round collar connecting pipe to said partition pipe, on account of increased velocity of hot air in the vertical pipe.

MAKING WOOD PATTERNS.—VIII.

BY CHARLES J. WOODSEND.

TEMPLATES may be prepared for the turning up, of which three will be required. In Figs. 55, 56 and 57 these templates are clearly indicated. The center lines are to be marked upon all, these being the only points from which to work. By using only one point all danger of error is avoided. The dotted lines indicate the amount of finish. After the glue upon the pattern is dry secure the face plate upon the back of the chuck, then screw the whole onto the lathe.

The first operation after this is done is to rough down all irregularities of the pattern so that it shall more nearly balance and prevent so far as possible all danger from flying apart. After the roughing down is completed face up the end of the hub to the right thickness and straight across. Next work down the hub to the template shown in Fig. 55, working it down gradually until the center line upon the template and the center of the hub correspond. After this is accomplished work the rim according to the template shown in Fig. 56, working it gradually to the center as before. When this is correctly completed, mark the outer diameter of the sheave from the line upon the template. Cut this down, giving a little draft in the direction of the arrow. Now work the hollow for the rope, according to the template shown in Fig. 57, working to the center and being very careful that it is exact. In turning this out it is possible one may have to cut into the chuck, but there is no objection to this, only see to it that the lower edge of the template and the line of the parting of the pattern (face of chuck), agree.

When the foregoing is completed turn a hole ⅝ inch or ¾ inch in diameter in the center of the hub, and about ¾ inch deep. It is better to turn this hole out than to bore with a bit, there being no danger then of getting out of square with the face of the hub. This course is very necessary to pursue on account of the core print, which must stand square. Now sandpaper the turning, taking great care not to cut away too much of the wood nor to alter any shapes. Give it one coat of shellac, and when dry sandpaper again, as the grain of the wood will rise, especially if the tools are not very sharp. When this is completed remove the chuck from the lathe, then take the pattern from the chuck, after which the nails may be removed by drawing through the wood with either pliers or pincers.

The other half of the pattern can now be built upon the chuck, so as to allow the glue to dry while the first half is being finished. We will proceed to do the work by rounding the arms and rim and cutting the hub, all as shown in Figs. 52 and 53 in the last issue of the paper. Work the second half of the pattern in the same manner as the first, and if the work is correctly done, as of course it should be, the two pieces will be exactly alike. Bore two ⅜-inch holes through the arms of one-half of the pattern, and about 1 inch away from the rim. It is as well not to have these holes located exactly in similar positions, although they should be on opposite arms. Place the two halves of the pattern, one upon the other, so that the arms and rim come exactly together. Hold them in position, either with dogs or hand screws. Then with the two holes already made bore into the other half of the pattern. Do not, however, go entirely through. Prepare two dowels and drive them into these holes, driving them in tight. Let them project 5-16 inch past the face of parting. Work off to shape, as explained before and shown in Fig. 58. Work off all irregularities, sandpaper and give three coats of shellac. Sandpaper between the last two coats and rub down with hair cloth after the final coat.

Next turn the two core prints shown in Figs. 59 and 60. In Fig. 59 is shown what is termed by the trade a "cone" print, on account of its conical shape. The hole through the finished sheave is to be 1⅞ inches in diameter. One-eighth inch cut is required on each side for the machinist to bore out for the finish, so that the size of the hole required in the casting will be 1⅝ inches. The pins upon the core prints require to be the same size as the holes in the hub of the pattern. The length of both prints is to be 1½ inches or 1¾ inches. The diameter of the cone print, Fig. 59, must be 1⅝ inches at its largest part. The diameter at the small or upper end is immaterial, but the angle should be nearly as shown.

The diameter of the print in Fig. 60 should be 1⅝ inches at the upper end and 1¾ inches at the end next to the pin, thus allowing for draft and other things, as will be explained further on. At the shoulder both prints should be cut slightly under so that when they are in place upon the hub they will fit tight upon the outsides. Sandpaper them smoothly. Then give them two coats of black shellac, made by the addition of lamp black to the orange shellac. Sandpaper again, remove from the lathe, trim the ends smooth, shellac the ends twice and sandpaper, after which give the print one final coat of the black shellac.

After this is dry glue them onto the hub, putting the cone print, Fig. 59, upon the hub which has the pins in the arms. The other print, Fig. 60, is to be placed on the hub which has the holes in the arms. It is very essential that great care should be exercised in doing this part of the work. The reason the prints should be placed in the manner described is that the half of the pattern with the core print, Fig. 60, upon it, will be placed in the sand first and will be molded in the drag—an even surface free from imperfections, pins, &c., making it easier for the molder. This fact should be borne in mind, that the

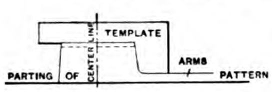


Fig. 55.—Template for Hub.

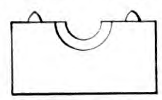
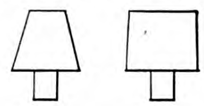


Fig. 58.—End View of One-Half of Core Box.



Figs. 59 and 60.—Core Prints Enlarged.

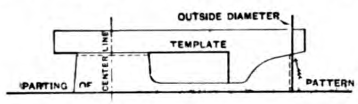


Fig. 56.—Template for Rim.

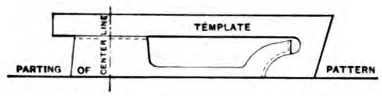


Fig. 57.—Template for Hollow for Rope.

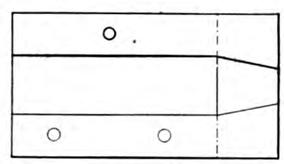


Fig. 61.—Plan View of One-Half of Core Box.

Making Wood Patterns.

cone print, Fig. 59, goes into the cope, and the reason for making it conical in shape is so that the mold will not be crushed by the core in case it is not placed perpendicular when the flask is closed, the taper allowing considerable latitude in this respect.

The core box will require to be made next. One-half of this is shown in Figs. 61 and 58, the former being a plan view and the latter an end view of one-half of the box. In making this box take two pieces of nice soft white pine of sufficient length to take in one core print and the whole of the thickness of the hub of the pattern, allowing a little for squaring up. The width and thickness of these pieces should be such as to allow a similar proportion of wood, as is shown. True up one side and one edge of each piece. Run a fine gauge mark down the center of each piece upon the face sides. Square them off to the exact length, smooth the ends either with the plane or with a trimmer, placing the two faces together so that the gauge marks exactly coincide, and secure the two pieces together, either with dogs or hand screws. Now from the centers formed by the faces of the two pieces and the gauge marks describe a circle upon each end the same size as the required core. The compasses require to be very sharp in order to make neat work. Bore holes for the dowels, the holes being bored through one piece, it is immaterial which, into the other. Drive in the dowels, remove the pieces apart, dri.e the dowels back from the face and run gauge marks along each face, connecting the semicircles formed upon the ends of each piece.

THE COST OF STEEL STRUCTURES.

As a preliminary to a visit to the Homestead Steel Works by the members of the American Institute of Architects, who held their convention in Pittsburgh November 14-16, F. W. Kindl of the Carnegie Steel Company, Limited, read a paper on the "Manufacture of Steel for Building Construction." We quote from it the concluding portion, which deals with the question of cost:

The total cost of the structural steel erected in a building of course depends upon the weight required and the current quotations for the plain material, as well as upon the workmanship thereon, its hauling to and erection at the building site. The weight of structural steel in a building is very difficult to estimate, unless plans and specifications are first drawn up, as this will depend upon the design, the number of stories, the dead and live load to be carried per square foot of floor, the weight of brick or stone work resting on the outside girders, and the allowable unit stresses on the steel. While the allowable stresses per square inch are pretty well determined by our building laws, which are almost identical with each other, yet the former factors are of so wide range as to make each individual case different. However, for the weight of the steel skeleton of the average office building, whose walls are carried by the steel work, we have found by careful records of the weight of steel required that the following formula can be used with sufficient accuracy for preliminary estimates:

$W = N\ F$ (15 plus 7/10 N), in which W is equal to the total weight in pounds of the structural material required: N is equal to the number of floors, including the roof as a floor, and F is the number of square feet in each floor. The first number inside of the parentheses when multiplied by the factor $N\ F$ will give the weight of the beams and fittings required in the floors, while the second member multiplied by the same factor represents the weight of the columns. Thus we have for the weight of the skeleton steel for such a building, having a floor area of 10,000 square feet and 15 stories high, 2,400,000 pounds of beam work and 1,792,000 pounds of column work, or a total of 4,192,000 pounds of steel work.

As regards the cost, while this will vary somewhat, due to design, we might safely assume that unless the construction is complicated, owing to an irregular lot line or unusual construction such as is found in theatres, music halls, &c., the average cost for fitting beams will seldom exceed ½ cent per pound above the price of plain material, including the painting, while for column work, 1¼ cents per pound above the price of plain material. We have, therefore, for our building noted above, assuming the price of plain material will average 2 cents per pound, the cost of the beams would be 2½ cents per pound, and that of the columns 3¼ cents per pound, or a total cost of the beams, $60,000, columns, $58,240, making a total amount of $118,240 for the steel work, f.o.b. cars Pittsburgh, painted. To this must be added the cost of freight, hauling and erection. The hauling can generally be done for 50 cents per ton, while the erection will seldom exceed $6.50 per ton, thus making the hauling and erection $7 per ton. The hauling and erection of the steel for our building would therefore be $14,672, making a total cost of $132,912 for the steel work, erected in Pittsburgh, as per your plans and specifications. These figures are kept somewhat on the safe side, and appear high to-day, owing to having used a base price of 2 cents per pound for the plain steel, which, as you know, is almost double the market price of one year ago.

Since writing this paper the price of steel has again advanced and the cost of our building would now be very nearly $15,000 more.

Conduits for Electric Wires in Buildings.

The question of providing in large office buildings a means of taking care of the electric wires in their passage from floor to floor and from room to room has come to be an important one. Wiring for electric lights can be done practically in a permanent manner, being laid out by the architects before the building is constructed, and a studied plan adhered to. Such wires are now running in some form of conduit. The iron pipe system is perhaps preferable, being entirely fire proof, easy of application and flexible enough for all ordinary purposes.

Telephone, telegraph, ticker, bell wires, &c., cannot, however, be laid out in advance, as the requirements of future occupants of offices in respect to such service cannot be foreseen, and each occupant is liable to want something different from that which his predecessor had. To reach all parts of a room with invisible wiring, and at the same time avoid tearing up floors whenever an installation or change is desired, small wooden troughs have been used, these being placed immediately under the floors every 4 or 5 feet and running entirely across the room. At the ends of these troughs means are provided for bringing up the wires, which can also be reached at any point out in the room by boring a hole into the floor.

Connecting with the ends of these troughs molding is provided around the base of the walls in which the wires can be carried, and which can readily be removed, thus uncovering the entrances to the wire ducts. To take the vertical wire runs, a conduit is placed in a shaft of the building and the openings arranged on each floor. The course of a circuit, then, is through this conduit to the desired floor, thence through the floor molding to the proper room, and on through the molding and floor conduit to the desired location in the room.

This provides an accessible conduit which will enable wiremen to reach a desk at any point in the room in a ready manner, and when placed before the floors are laid is, perhaps, the cheapest form of conduit which can be used.

In the new Marshall Field Building, in Chicago, where tile floors are to be laid, tin pipes are to be imbedded in the cement filling every 4 feet across each room. An outlet will be provided at each end of these pipes along the walls, and if necessary they can be reached at any point in the room by drilling through a tile under any desk which the occupant may desire to reach with electric service.

A NINE-ROOM CITY HOUSE.

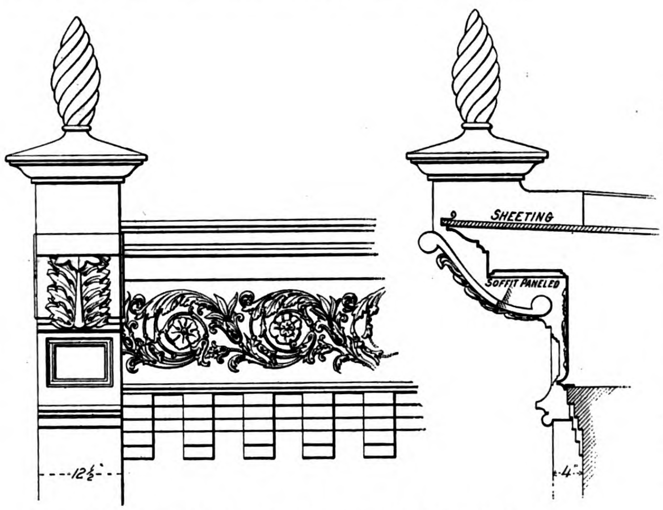
A GREAT deal of building in the way of private dwellings adapted to meet the requirements of small families and those in moderate circumstances has been done in and about the suburbs of Philadelphia, and in the accompanying illustrations we show *fac-simile* plans of one of a number of houses erected not long since at Thirty-third street, Ridge avenue, Cumberland and York streets, for Otto A. Guenthoer. The house here shown has a frontage of 15 feet 6 inches, and a depth of 48 feet, exclusive of the front porch, which is 6 feet deep. The cellar is excavated so as to be 7 feet in the clear, and the walls are built of Conshohocken stone, 18 inches thick, while the floor is of cement 4 inches thick. The walls of the house are of brick, 9 inches thick, and the front is faced with Philadelphia press brick with heads and sills of Indiana limestone. The porch is of wood, roofed with slate. The front has a galvanized cornice painted in colors. The hight of the first story is 9 feet 11 inches in the clear, the second story 9 feet, 4 inches, and the third story 9 feet.

The timbers employed are of hemlock, the first floor joist being 3 x 9 inches, and the second and third story joist 3 x 8 inches, placed 16 inches on centers. The rafters are 3 x 6 inches, placed 2 feet on centers, and the ceiling joist are 2 x 3 inches. All partitions are built of 2 x 3 inch stuff, placed 16 inches on centers, with 3 x 4 hemlock used at all corners and openings. The roof is laid with 1-inch hemlock boards 12 inches wide, which, in turn, is covered with tin. All windows have box frames with double hung sash, front or reveal frames being used on the front and with inside folding blinds, while at the rear are plank front frames with outside shutters on the first story, and outside blinds on the second and third stories.

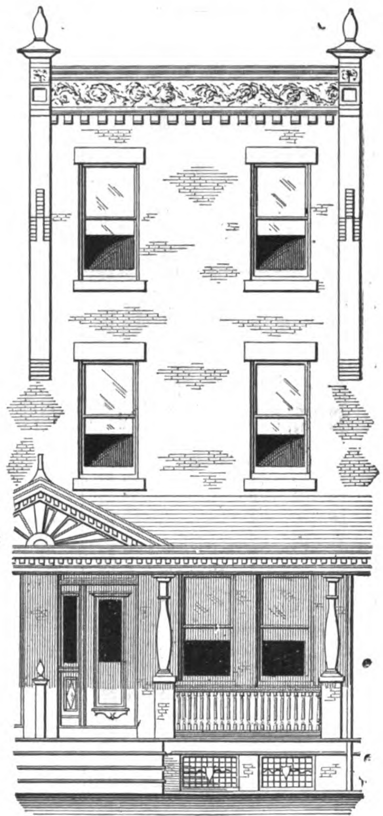
According to the specifications of the architect, E. Allen Wilson of 401 Bourse Building, Philadelphia, Pa., the features of the house here illustrated include among others the skylight over the dining room. This apartment is made larger by using the space that otherwise would be in the area way, this being done by placing a channel beam in the partition and carrying steel beams over the room to support the brick wall above. A hammered glass skylight is placed on the roof, and a sash with leaded glass reposes flush with the ceiling, thus making the dining room a large well lighted apartment.

The floors are laid with matched yellow pine, and the rooms are plastered throughout with three coats, finished for papering. Plaster cornices are run in the parlor, hall, dining and sitting rooms, and plaster centers are used in vestibule, parlor, dining and sitting rooms. The doorways are cased with plain jambs ⅞ inch thick, with rabbet strip, and all passage doors are five panel 1½ inches thick, while closet doors are 1¼ inches thick. All doors are molded and have raised panels, the front door and frame being of special design. The wash boards are 7 inches with 1¼-inch washboard molding and 2½-inch sub on first and second floors, and 5-inch washboard through the balance of the house. A 4½-inch architrave with 1¼-inch band is used for all doors and windows in the first and second story, and 3-inch single edge architrave through the balance of the house. The kitchen is wainscoted with ⅝-inch beaded yellow pine boards with molded cap. The vestibule and sitting room doors have leaded glass of neat design in the top panels, and the doors from the hall to the dining room have embossed glass. The main stairs have 5-inch newel and landing posts, and 2½ x 3 inch hand rail supported by 1¼-inch turned balusters. There are wood mantels in the parlor, sitting and dining rooms, with tile fire boards. The interior finish of the first and second story is natural chestnut with the exception of the kitchen, which with the third floor, are finished in natural pine. The main sleeping room is provided with a double wardrobe built stationary.

The house is piped for gas and wired for electric lighting. The plumbing is first-class in all respects. The kitchen is provided with a range, circulating boiler, water back, &c., together with a galvanized iron sink with hot and cold water connections. The bathroom has exposed plumbing, porcelain tub and water closet, together with washstand with marble top and nickel plated trimmings. It has a tile floor, and is wainscoted with tile



Details of Galvanized Iron Cornice.—Scale, ½ Inch to the Foot.



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

A Nine-Room City House.—E. Allen Wilson, Architect, Philadelphia, Pa.

4 feet high. The vestibule also has a similar floor and sides. The house is provided with a hot air heater, and is piped for heating every room, as indicated on the floor plans. The rooms are papered in gilt and felt, with varnished tile paper in the kitchen and bathroom and attractively frescoed.

Crisis in the Chicago Building Trade.

The following article from the Chicago *Tribune* for the 8th of November sets forth the possibilities which threaten the building trade of that city:

Chicago's building operations may end with this year. The next may see stagnation in that line of trade. This was made known at the meeting of contractors, architects and realty men yesterday at Schiller Hall, 103 Randolph street. The meeting was called by the architects to devise a plan of resisting the demands of organized labor, which it was declared threatened the life of the business.

Several suggestions were made, but that which aroused the most interest was the statement of Samuel Smith, secretary of the Master Plumbers' Association. He said that if the Building Trades Council and other labor union organizations "did not agree to the terms of the building contractors" the building trade in Chicago would be stopped indefinitely on January 1. For the last three months, Mr. Smith said, the general contractors had been holding secret meetings, at which they had decided to fight the labor unions by creating stagnation in the building interests. The limitations as to the amount of a day's work and the advanced scale of wages recently fixed by the labor unions, he said, practically made it impossible for contractors to bid on acceptable terms, or for owners of property to build with profit. Mr. Smith said that as the labor unions had shown no disposition to yield the probability was that for an indefinite time after January 1 no buildings would be erected in the city and no structural work would be done on partly completed buildings.

The meeting was attended by 300 business men. The following resolutions, introduced by C. W. Nothnagel, were adopted with cheers:

Whereas, During the last few years the cost of erecting buildings in Chicago has increased so much as to seriously retard building work by owners and investors;

Whereas, This advance in cost is due mainly to the higher price of building material, the increase of wages paid workmen, the limitations fixed by the unions on the amount of work a man shall do in a day, and the arbitrary exactions of the union business agents;

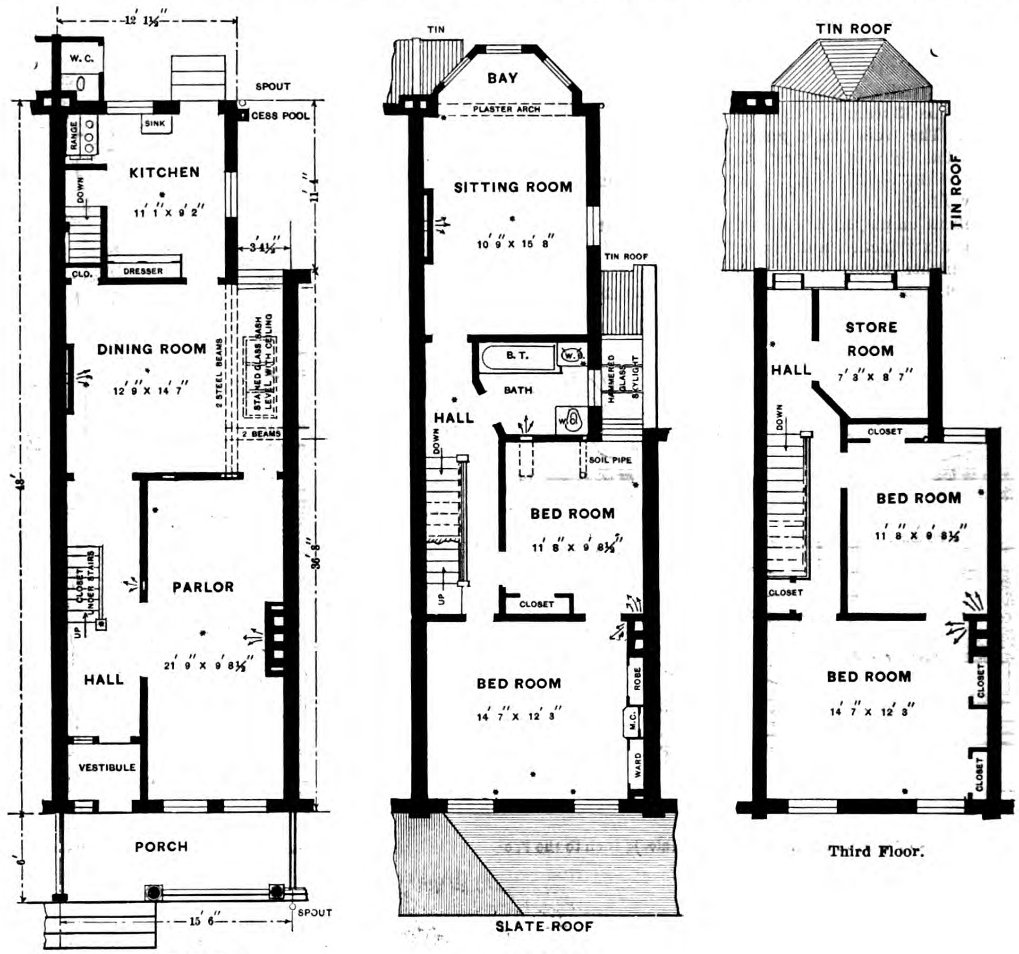
Whereas, In other cities where there are no restrictions as to what shall constitute a day's work the building trades and allied interests are in a flourishing condition;

Whereas, The Building Contractors' Council is endeavoring to have these limitations removed to bring about a more natural and healthy condition in building trades;

Resolved, That this meeting extend to the Building Contractors' Council the assurance of its moral support in its efforts to this end

In speaking of the contractors' plan to stop all work till the laboring men were forced to make terms with their employers Mr. Smith said:

"Although I have not been authorized to make the announcement I can assert positively that the contractors



First Floor. Second Floor. Third Floor.

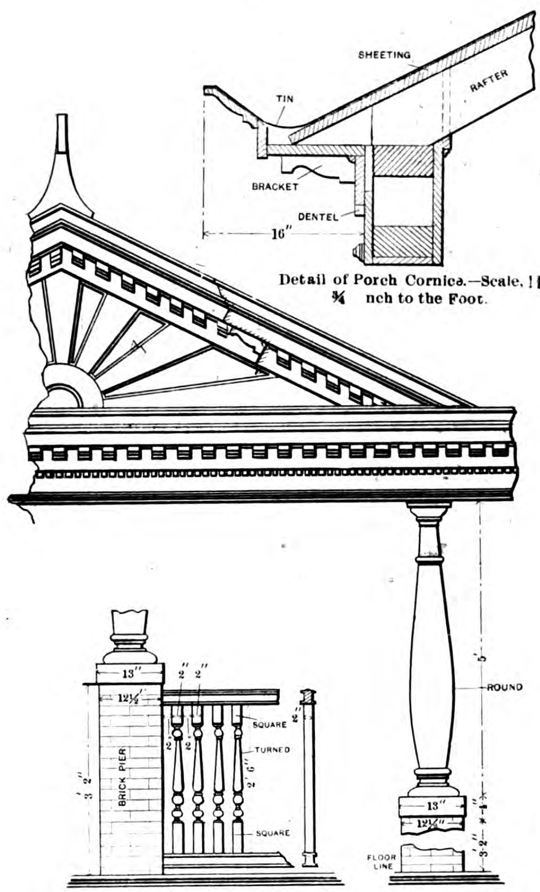
A Nine-Room City House.—Floor Plans.—Scale, 3-32 Inch to the Foot.

have decided that the only way to deal with the labor unions is by throwing them out of work, and that after January 1 no contracts for buildings will be filled unless the unions agree to quit their outrageous exactions. The builders have decided that arbitration and reasoning with the labor men is futile. We have decided to temporize no more. During the last few months we have been holding secret meetings and have made our plans."

The proposition of Normand S Patton that contractors, architects and realty men form a "corporation" for mutual protection against labor unions met with favor. This "corporation," explained Mr. Patton, "would start a movement for the ultimate extirpation of labor unions. The first principle of the organization would be to fight union labor. George M. Moulton denounced the unions as "blackmailing organizations." W. F. Beal of the Central Council of Contractors said that builders were prevented by the uncertainty of labor conditions from making bids for next spring's work, while George L. Pfeiffer said "the mandates of the Building Trades' Council were observed as superior to the law and that Mayor Harrison continually acknowledged that fact."

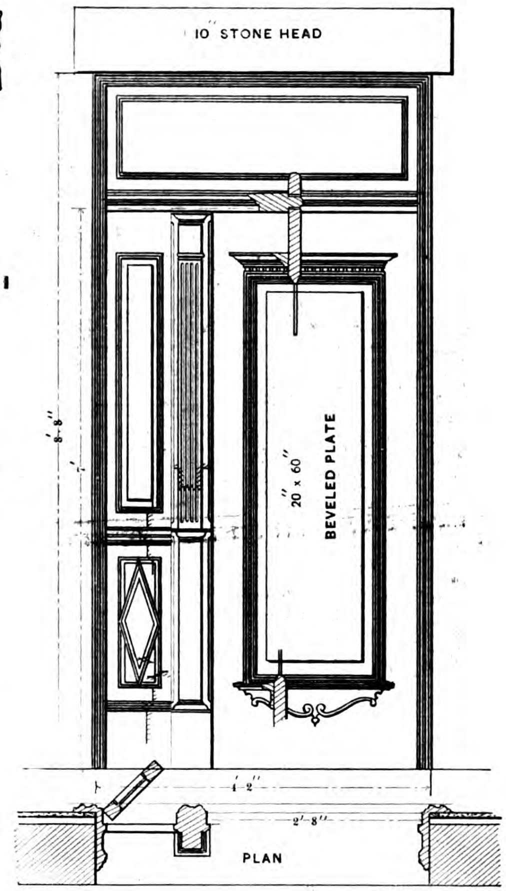
"The tendency of the unions," said Dankmar Adler, "is to bring workmanship to a mediocre average and then to lower that average as speedily as possible."

Other speakers were T. E. Courtney, E. Coleman, H. Dawson, Edward Bauman and George Beaumont, president of the Architects' Association, who presided.



Detail of Porch Cornice.—Scale, ¾ Inch to the Foot.

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



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

A Nine-Room City House.—Miscellaneous Constructive Details.

organized labor as it is organized to-day," he said. "The plan of fighting it would be simply to disregard the rules of the unions by refusing to observe the hours fixed and to pay what we please without regard to fixed scales." It was decided, however, to leave the plans for the completion of the organization to a future meeting to be called by the Architects' Association.

W. L. B. Jenney said that the labor unions demanded more wages for less than half the work given in return four years ago.

"I would suggest two solutions of the situation," he said. "Give the unions all they demand until they become so obnoxious and corrupt that they will disintegrate, or make them subservient to the law. It is preposterous that labor unions can exist while the anti-trust law is being enforced elsewhere. The State's attorney should be made to get after the laboring trust."

Other speakers were equally severe in their attacks on

The *Tribune* in another issue printed the following interviews on the same subject:

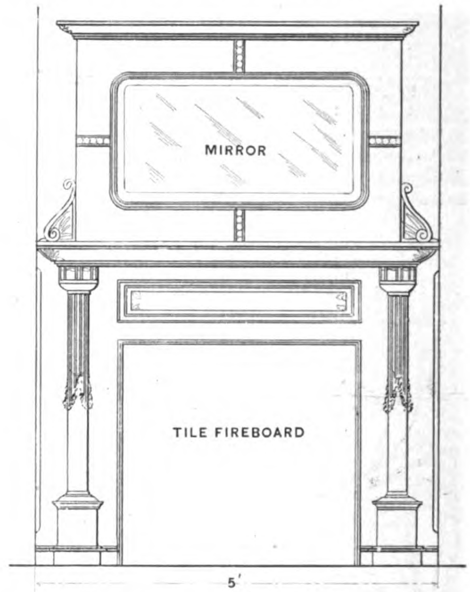
"My firm," said Col. George M. Moulton of the Moulton-Starrett Company, "finished their last contract in Chicago some time ago. We prefer to take work outside of the city, where strikes will not tie us up and where we can keep faith with our patrons. The union rules decreasing hours and specifying the amount of work each man may perform are arbitrary. The remedy, I think, is in a union of contractors."

"The result of arbitrary actions such as limiting the amount of work that any one man shall do, is an immense loss to the city of Chicago," said W. L. B. Jenney of Jenney & Mundie. "If the arbitrary and absurd actions of the trades unions were eliminated there would be a great deal of building. Unions have stopped the use of machinery in the manufacture of cut stone and I have been told they are considering the stopping of the use of machinery in erection, forcing contractors to do the work by hand. Contractors are going out of business or making no contracts, not knowing how much work will cost nor when it will be finished."

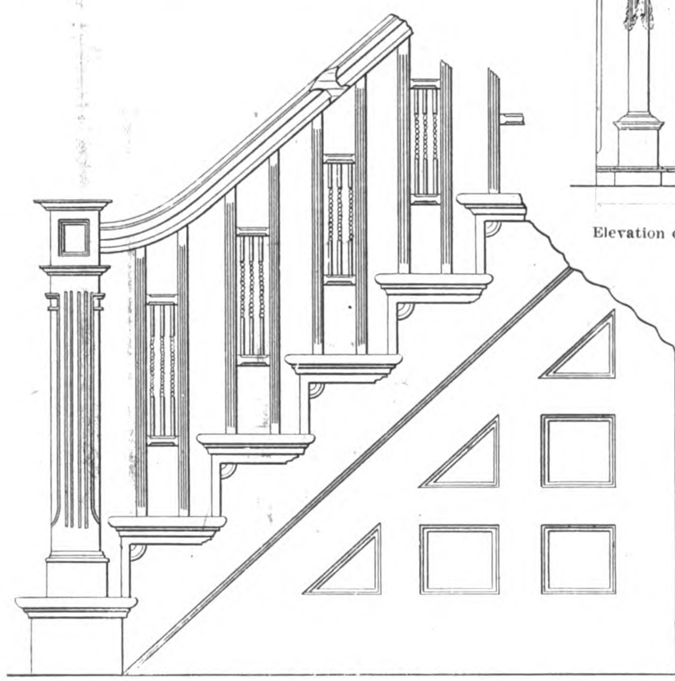
A. D. Pond said that the recent additions to Hull House had been delayed by repeated strikes, and W. B. Mundie, architect for the Board of Education, said their buildings had been delayed by the same cause.

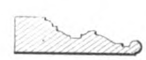
James E. Baggott, president of the plumbing company of E. Baggott & Co., said: "Building is facing a hard problem in Chicago. Plumbers, for instance, are allowed to do only one-quarter as much work as they once did. If they break the union rule they are fined. Contractors under bonds are often unable to finish a job because they cannot hurry the work."

President George Beaumont of the Architects' Association said: "The building interests of this city are now so harassed it is almost impossible for architects to advise clients as to the probable cost of proposed buildings, nor can it be determined when any work once commenced will be completed. Matters have come to such a pass we decided to call a meeting to find relief. As an illustration of methods, a lather who formerly used 60 bundles of lath in a day's work is now limited to 25 by his union."



Elevation of Parlor Mantel.—Scale, ½ Inch to the Foot.


Detail of Main Stairs.—Scale, ¾ Inch to the Foot.


Section of Architrave for Third Floor.

Section of Trim for First and Second Floors.

Section of Base.

Scale, 3 Inches to the Foot.

A Nine-Room City House.—Miscellaneous Constructive Details.

THE Franklin Fund, left to the city of Boston in 1791 by Benjamin Franklin to be used for the benefit of young tradesmen and mechanics, at the end of 100 years, is at last to be expended. The original bequest of £1000 sterling now amounts to about $400,000 and its disposition rests with the city aldermen. Many proposals for its utilization have been made since the fund matured eight years ago, but it seemed to be impossible to agree as to what object it should be devoted. At one time it was urged that the building, equipment and endowment of a first class trade school would be most in keeping with the ideas of the famous testator and an elaborate scheme on that line was laid out, but the proposal did not meet with the approval of the city fathers. It is now announced that one half the sum will be used for the erection of a public building in the South End to be known as the Franklin Building, which will have a hall to be used for public meetings and various lecture rooms in which a course of lectures on trade subjects will be carried on. The other half of the fund will be spent for the extension of public baths and gymnasiums in accordance with a scheme advocated by Mayor Quincy.

WHAT is said to be one of the most remarkable pieces of stone ever taken from the ground was recently cut from a quarry near Vinalhaven, Maine. It measured in the rough state 64 feet in length by 8 feet 6 inches thick by 7 feet in width, the total weight being 310 tons. The stone will be turned into cylindrical form and will be one of eight columns which are destined to support the great dome of the Cathedral of St. John the Divine, now in process of erection on Cathedral Heights, New York City. The column will be 54 feet in length by 6 feet 3 inches in diameter in its finished state. There will be two columns of this size, while the other six are to be of the same diameter, but 2 feet less in length. In order to turn this gigantic piece of stone into shape a special lathe was built at a cost approximating $15,000. It is said that the largest stone previously quarried at Vinalhaven was the monolith for a monument, the shaft weighing 175 tons.

WHAT BUILDERS ARE DOING.

THE advices which have reached us since the last issue of the paper indicate the prevalence of widespread activity in all branches of the building business. In many sections new records have been made as regards the amount of building projected and the aggregate of capital involved, while at the same time the general situation is of such a nature as to warrant the belief in continued activity next year. It is true that in some localities the remarkable advance in the prices of iron, steel, and, in fact, nearly every material entering into the construction of a building has been such as to postpone for a time the carrying out of contemplated improvements; but, on the other hand, a vast amount of new work is under way. The labor situation is not all that could be desired, matters being somewhat uncertain in Chicago with minor disturbances in important Eastern cities.

Boston, Mass.

There has been considerable doing in the building line, and the figures for the month of October show that there was more activity than in the previous month both in brick and frame construction. During October there were 142 applications for building permits, of which 67 were for brick and 75 for frame structures, as against 55 for brick and 61 for frame during the month preceding. The operations were also conducted in more wards of the city than previously, thus showing a greater spread of the building movement.

A matter of special interest to architects has been the decision of the Supreme Court of Massachusetts, holding valid the law limiting to 90 feet the hight of buildings around Copley square. The court holds that the law gives rights in the nature of an easement over lands facing the square, which easement is annexed to the square for the benefit of the public, for whose use and enoyment Copley square was laid out, and that these rights are similar in their nature to rights in highways and in navigable waters of the Commonwealth. For a deprivation of such public rights an individual, unless he has suffered damages different in kind from those to the public in general, cannot maintain an action.

Charles A. Brown, Supervising Architect for the School Committee, has recently been making a visit to the principal cities of the country for the purpose of observing the newly constructed school buildings which have been put up there. The Boston Committee on New Buildings is particularly interested in the new schools constructed on the letter H plan, and it is said to be their intention to adopt this plan on several buildings to be erected in Boston next year.

Chicago, Ill.

There is beginning to be some complaint upon the part of architects and others engaged in the construction of buildings that the cost of erection has increased to such an extent as to check new work on the part of owners and investors. This, of course, causes a cessation of building activity, and coupled with the peculiar situation which now exists in the city, and which is referred to somewhat extensively in another part of this issue, tends to render the outlook somewhat uncertain. The building statistics for the month of October show a slight falling off as compared with the month before, the permits being taken out numbering 265, covering a frontage of 7524 feet and involving an expenditure of $1,184,150, as against 281 buildings in September, covering a frontage of 8205 feet and costing $1,217,950. These figures compare with 354 buildings covering a frontage of 9266 feet and involving an expenditure of $1,799,450 for the month of October last year.

The members of the Chicago Architectural Club held a "smoker" at their rooms in the Art Institute on Monday, November 13, dinner being served at six o'clock. After refreshments the members were regaled by some interesting papers by Arthur Frantzen on "Electric Lighting Construction" and by F. Cortez Wilson on "Acetylene Gas Lighting."

At its annual meeting the Illinois Chapter of the American Institute of Architects elected Samuel A. Treat, president for the ensuing year; W. C. Zimmerman, first vice-president; Peter B. Wight, second vice-president; H. W. Wheelock, secretary, and George Beaumont, treasurer.

Columbus, Ohio.

The building situation in this city is in a very satisfactory condition, and architects, contractors and builders seem to be fully engaged. The outlook for the coming year is regarded as extremely gratifying, and for one of the best years Columbus has ever experienced. About every branch of labor has advanced in price, and the indications are for further increases. According to the report of City Bulding Inspector Fred. Weadon, the month of October was the largest, so far as building operations are concerned, of any month in the history of the department. During the month 90 permits were issued for new buildings, the total cost aggregating nearly $200,000. Many new factories, shops and additions to dwelling houses are under way and others are in contemplation.

At a recent meeting of the Stone Contractors' Association held in the rooms of the Builders and Traders' Exchange, it was voted to allow an advance of 5 cents an hour in wages to be paid to stone masons beginning January 1, 1900. The present scale is 35 cents an hour, and the masons in view of the amount of work to be done think their wages should keep pace with the universal prosperity of the country, and therefore demanded the increase, which was readily granted.

At the meeting of the Builders' Exchange held on Wednesday evening October 18, resolutions were unanimously adopted to the effect that no member of the exchange be permitted to raise or lower his bid on any job when in competition with another member of the exchange after the time limit. If, however, an error is discovered by the bidder after the bids are opened and he refuses to proceed with the work at his figure, he shall withdraw his bid and have nothing further to do with the job either through the architect or owner, but shall have the right to correct any mistakes, providing it is done before the time set for letting. The resolutions also provide for a penalty for any violation of them, and the member to stand suspended or expelled until the penalty is satisfied. A copy of the resolution was sent to the architects of Columbus with the request that they apply to persons figuring in their offices who are not members of the Builders' Exchange.

A number of improvements in the exchange rooms are contemplated, which Secretary Gardiner states will cause them to take favorable rank with the best in the country. The general room which is used for meeting purposes and for the transaction of the business of the exchange has been newly fitted up with writing desks and lock boxes for the use of the members. A library of books of reference has been started, and all the latest books and catalogues of interest to builders and traders will be kept on file.

Jersey City, N. J.

The architects and builders of Jersey City, N. J., recently requested the Board of Aldermen to amend the building laws in many essential matters, and as a result of this petition the Board finally introduced a resolution embodying the changes desired, these to go into effect at once. The laws so amended are as follows:

The walls of all brick buildings hereafter to be erected in the city and the foundations, when of brick, of all frame buildings shall not be less than 12 inches in thickness under a penalty of $50 for each and every day that such foundation or wall is allowed to remain standing after written notice of 24 hours from the inspector of buildings.

For all two story and attic buildings 21 feet and less in width and 40 feet and less in depth, walls above grade line can be 8 inches in thickness providing, however, that said wall above grade line will be not more than 4 feet in hight.

That all foundations of cellar wall footings are to be at least 3 feet 6 inches below grade line.

In all buildings hereafter to be constructed with party walls, such party walls shall be carried at least 18 inches above the roof beams of such buildings.

In all frame buildings the party walls shall be properly framed and studded up and brick nogged with good sound brick from sill or cellar of foundation walls to top of roof beams.

The side walls of all brick dwellings 25 feet in width or less than 8 inches thick shall not be more than 30 feet in length and not more than 12 inches in hight.

Every pier and wall front and rear shall be well anchored to the beams with wrought iron anchors, which anchors shall hook on the second beam. Floor or roof beams in all buildings, brick or frame, shall not be less than 3 x 8 inches, in all dwellings, however, of 20 feet in width and less and under three stories in hight, floor and roof beams 2 inches thick can be used when supported by girders or partitions, conditional that said beams are of sufficient depth to insure proper stiffness.

Corner and center posts of all frame bulidings over two stories in hight shall not be less than 4 x 8 inches.

Corner and center posts of braced frame buildings and corner posts of balloon frame shall be not less than 4 x 6 inches.

Los Angeles, Cal.

The commission appointed some time ago to revise the building laws of the city have practically completed their work, and among the more important changes suggested is the creation of a department of electricity. One section of the proposed ordinance provides that all factories, work shops, &c., shall be provided with ample fire escapes, these being demanded on all buildings over two stories in hight, and stand pipes on all buildings of four stories or more in hight. If a building is found to be unsafe the building superintendent has authority under the proposed laws to notify the owner of the repairs needed, and if the owner fails to make them after due notice, the work is to be done at the city's expense and then the owner sued to recover the amount.

Milwaukee, Wis

The building trades of the city have witnessed a very prosperous season, as is evidenced by the figures issued by the building inspector. His report shows that from January 1 to November 1 of the present year the cost of the buildings projected foots up $3,146,383, to which must be added some $200,000 up to the middle of November, with the balance of the year to be heard from. The total for the 12 months of 1898 was $2,991,813, from which it will be seen that the improvement this year has been quite marked. The members of the building fraternity, as well as nearly every member of the Builders and Traders' Exchange, look forward to the coming year as one of unusual activity, owing to the fact that buildings are needed in large numbers. On account of the remarkable rise in the prices of iron and other building materials, however, some projects have been temporarily suspended, but as people become somewhat accustomed to the high prices and will not delay building any longer than absolutely necessary, it is probable that the coming spring will witness the inauguration of great activity in the building line.

The Builders and Traders' Exchange is going on with its good work, and the membership roll shows a slight increase over last year. The Entertainment Committee will soon arrange for another series of social entertainments during the winter to be held at the exchange rooms. This feature was introduced last year and met with remarkable success, not only as a source of entertainment, but by reason of the fact that it brought competitors in business into closer social intercourse and created a friendly feeling all around.

New York City.

In view of the general prosperity prevailing in all parts of the country, it is interesting to note that in the boroughs of Manhattan and the Bronx the number of new buildings projected during the past year and their estimated cost are record breakers. Elsewhere in this issue we refer to the amount of building operations during the first nine months of the current year, and including what has been done since September and estimating what is likely to be done up to December 31, it is probably safe to say that $100,000,000 as the estimated cost of the projected strucures will be very considerably exceeded. The high prices of building maerials of all kinds have, of course, tended to largely increase the cost and thus raise the total of capital required.

Operations on about 50 of the larger buildings in the city have been delayed somewhat by reason of a strike of the housesmiths and bridgemen, who went out on a demand for an advance of wages from 25 to 40 cents an hour.

The Plain and Ornamental Plasterers' Society of New York contemplate the formation of a co-operative company under the laws of New Jersey, with the idea of doing contract work in the same manner as other contractors. It is the intention to run the company on the same basis as syndictates or trust companies, and the claim is made that in giving the company contracts for work builders will have the assurance that no strikes will occur to prevent the work being finished on time.

Secretary Gage of the Treasury Department has approved the finding of the commission appointed to select a design for the New York Custom House, and has chosen Cass Gilbert as the architect.

At the annual meeting of the New York Lumber Trade Association Charles L. Adams was elected president; Richard S. White, first vice-president; W. P. Youngs, second vice-president; Charles E. Pell, treasurer, and W. R. Bell, secretary.

On the morning of Monday, October 16, the Employers' Association of Roofers and Sheet Metal Workers of the Greater New York and adjacent cities were compelled to lock out their men, owing to a dispute between two unions. It appeared, according to a statement issued by the association named, that for some years past a controversy has existed between the Amalgamated Tin and Sheet Metal Workers' Benevolent Association and the Tin and Slate and Metal Roofers' Union. It also appears that the latter union claimed a certain class of work which was considered by those concerned to belong to the cornice and sheet metal workers, with whom the Employers' Association made an agreement that they should perform said work. Some months later members of the Roofers' Union struck for not conceding certain clapboarding to their men, and although the question between the unions was submitted to arbitration and a decision reached in favor of the cornice and sheet metal workers, the roofers still refuse to return to work: hence the action of the Employers' Association above indicated.

Pittsburgh, Pa.

Superintendent J. A. A. Brown is authority for the statement that never in the history of the city has such activity in the building line prevailed as during the month of October. The cost, as indicated by the permits issued for that month, aggregated $1,169,807, the number of permits being 226. This is an increase in the number of buildings and additions over last year of 98, and an increase in cost of $571,556. It is said that in only two other months of the present year has the cost exceeded the million-dollar mark. These were May and July, but for a month coming so late in the year as October the record is all the more remarkable. A report of the building inspector for Allegheny for October shows permits to have been issued for 50 new buildings and additions valued at $82,900.

A commendable feature of the present activity is the character of the houses which are being erected. The extraordinary demand for small houses in large numbers has led architects to study the question, and the result is a better house for less money—that is, a house which is said to be cheap does not necessarily imply that it is poorly built, either as regards its architecture or quality of its construction. Even at the present advanced cost of building it is said to be possible to buy better houses for less money than the market ever offered before. This is brought about by reason of the fact that the houses are put up in large numbers instead of one or two at a time. An instance of this kind may be found in the operations which are being conducted in the Nineteenth Ward, where on Stanton avenue 15 brick and stone houses are being erected by G. A. Brooks.

St. Paul and Minneapolis, Minn.

The carpenters of St. Paul and Minneapolis are preparing to ask contractors for an eight-hour day with nine hours' pay, the request to be made some time before December 15, so that the new schedule can go into effect the first of the year. The carpenters are now working nine hours, for which they receive a minimum pay of $2.25 and a maximum of $2.75. Until last summer the union working day for carpenters was ten hours. Last spring an agreement was reached with the contractors whereby the union men secured a nine-hour day with pay for ten hours. Now they want to reduce it to eight hours, and they will also endeavor to induce the contractors to pay enough more per hour for the eight-hour day to bring the wages up to a minimum of $2.50 a day and a maximum of $3, or else agree on a straight scale of $2.50 per day.

St. Louis, Mo.

The building business in St. Louis during the past year has not been in the aggregate fully up to the expectations held early in the spring. There are, however, many building enterprises under way, among which may be mentioned several large warehouses, and it is hoped that the year 1900 will show increased activity. It is expected that the world's fair will bring good times in the building line for the next two or three years, as expositions of this character usually stimulate building operations for a time at least.

There have been no important labor troubles in the city, and the statement is made that none are at present anticipated.

Notes.

The city authorities of Baltimore, Md., have decided not to issue any more permits for builders to excavate beyond the building line for private uses. The Mayor has reached the decision that it is illegal to grant permits for the extension of the cellar or sub-cellar of any building out under the sidewalk of the street, and that in the future no permits will be granted except under extraordinary circumstances.

The building outlook in Washington, Pa., is very gratifying, and operations in and around that city are on the increase. There is considerably more building going on this fall than was the case last year at this period. The reason for this is said to be the general impression that the prices of material instead of being lower by next spring may be higher.

Building Inspector O'Keefe of New Bedford, Mass., reports that during the nine months of the year 321 building permits were issued, as against 336 for the same period last year, the amount involved being $519,864, as against $406,-420.

Building mechanics of all kinds find plenty of work this fall at Glen Cove, L. I., where a number of dwellings are in progress as well as a new church, barns, stables, &c.

It is stated that contractors and builders in Wheeling, W. Va., have no reason to fear a dearth of work this fall and winter. Some handsome residences are in progress, while the improvements contemplated are such as to warrant a considerable degree of activity.

Recent advices from Iowa City, Iowa, are to the effect that the demand for bricklayers is greater than the supply, and that work on the $275,000 collegiate building of the State University of Iowa is progressing slowly on that account. It is said that long time jobs at $3.50 a day are offered to competent bricklayers.

The carpenters and joiners of Bay Shore and Islip, N. Y., have secured a nine-hour work day.

The builders in Brockton, Mass., have been doing a great deal of work, and it is said considerable difficulty has been experienced in getting good carpenters.

The carpenters of Dallas, Texas, have notified the contractors and builders of a desire for an eight-hour day to begin May 1 of next year.

In connection with the recent labor troubles at Scranton, Pa., it is interesting to note that the union plumbers who have been on strike since June have arrived at an agreement with their employers and early in November returned to work. They will work nine hours a day as heretofore, but hope to secure an eight-hour day soon.

The carpenters of Rock Island, Ill., have determined to ask the building contractors to inaugurate an eight-hour working day at the beginning of the coming season.

The demand for carpenters in Leadville, Ind., is said to have been very strong for some months past, and all are likely to have plenty to do as a number of new homes are being put up while old ones are being enlarged and improved.

Carpenters and bricklayers are actively employed in Bangor, Maine, and a prominent contractor is said to have expressed the view that there has not been a time since the Civil War when there was such a demand for good men in the lines indicated.

At the time of going to press a strike is in progress in Buffalo, N. Y., which seems likely to assume large proportions before a settlement can be reached. The men engaged on the iron work in connection with buildings went out on strike some time ago, and in order to force a settlement union men in other branches of the trades were called out. It is stated that something like 4000 men are affected.

CARPENTRY is not ranked among the exact sciences, but the other day Spencer Rogers and A. D. Smith, well-known carpenters of Portland, Me., were called upon to make independent estimates of the cost of some work in their line, and, without consultation, arrived at conclusions which differed, the one from the other, but one-third of 1 per cent., or at the rate of 33 cents in $100. This leads to the reflection that if some of the scientific men called as expert witnesses in important legal cases were as competent or as honest, the testimony of experts would be held in higher esteem than is generally the case.

Ornamental Iron Gates.

A beautiful example of the artistic effects that may be produced by the clever manipulation of wrought iron is the double gate illustrated herewith, and specially designed by the manufacturers. It forms part of a fence intended for a fine residence on Lindell Boulevard, St. Louis, Mo., the total length being 300 feet. It has two double gates, all supported on a stone foundation. The gate posts are made of 1½ x 1½ inch iron, the scrolls of ¾ x ¼ inch iron, and the horizontal bars of 1½ x 1 inch iron. The fence is a very handsome specimen of ornamental iron work, and is exceedingly creditable to the manufacturers, the Ludlow-Saylor Wire Company, of the city named.

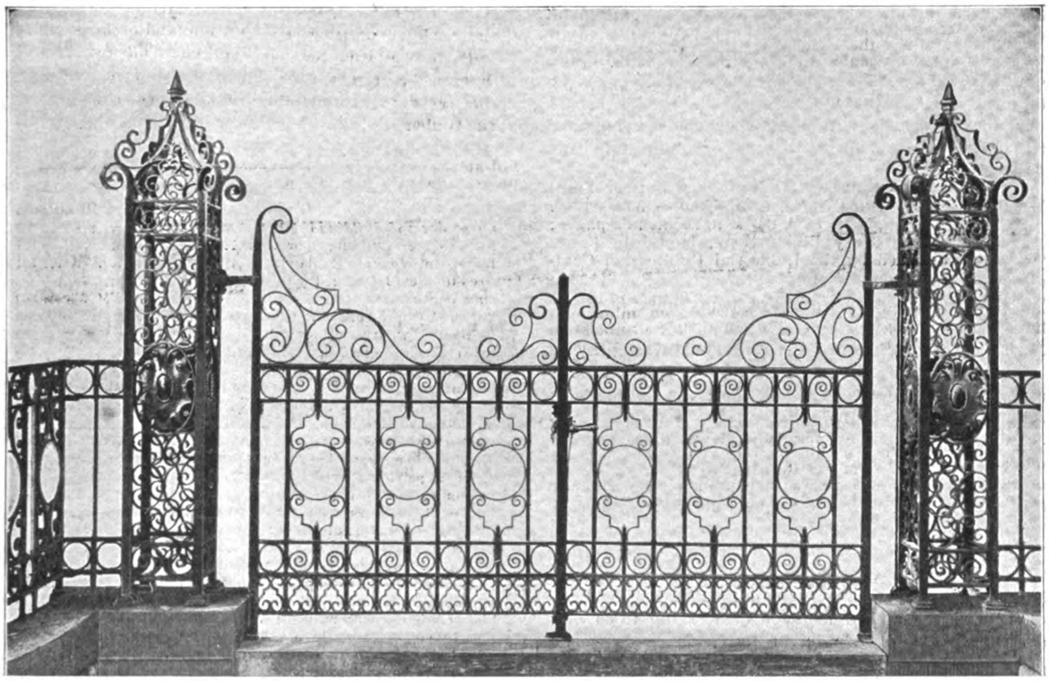
New Publications.

ESTIMATING FRAME AND BRICK HOUSES. By F. T. Hodgson. Size, 5¼ x 7 inches; 147 pages; illustrated by means of scale drawings with constructive details reproduced from *Carpentry and Building;* bound in cloth with gilt side title; published by David Williams Company, 232-238 William street, New York City. Price, postpaid, $1.

One of the phases of the building business with which the contractor and builder should be thoroughly familiar is that of estimating quantities of material and the cost of labor required in the execution of his work. On his ability to correctly estimate may depend his success or failure in the building business, and he should therefore make it a point to include in his library of trade literature such works as will assist in keeping him fully posted on the most approved methods of estimating. The matter contained in the publication above noted has been prepared by a well-known writer on architectural subjects who deals with estimating in a way to prove of great value to those desirous of acquiring a good understanding of this important branch of the building business. "Estimating Frame and Brick Houses" is a thoroughly practical and comprehensive treatise, showing in a progressive manner the method of estimating the cost of labor and the quantities required of the various materials which enter into the construction of frame and brick buildings. The estimator is carried along step by step in an easy, simple manner, and in such a way as to enable him to understand every detail of the work, while at the same time the methods are applicable to all sections, the figures being based upon local rates of labor. The work is undoubtedly the best adapted for the purpose which has ever been issued, and it cannot fail to meet a well defined want on the part of the great mass of those engaged in the building business.

DETAILS OF BUILDING CONSTRUCTION. By C. A. Martin, Assistant Professor of Architecture, Cornell University. Size 9¾ x 12½ inches; illustrated by 33 full page plates. Published by Bates & Guild Company. Price, $2.

In offering this work to the public the author announces that it is not the result of a deliberate attempt at book making, but rather the outcome of the efforts by a teacher of architectural instruction to present a part of his subject to his students. The drawings, consisting of rough sketches on large sheets, were at first used for temporary illustration only, but the results proving so satisfactory it seemed best to study the work more carefully and to put it into more permanent form for class room use. In scope the work is limited to a presentation of such details, principally in wood, as are to be found in common use in domestic architecture and in smaller public buildings. The subject of framing has been entirely omitted, partly because it has been amply treated elsewhere and partly because it does not lend itself readily to the method of treatment shown in the work under review. In the make up of the matter the descriptive text appears in the shape of notes on the plate pages, this arrangement growing out of the original idea of the author, which contemplated only separate plates. The drawings have been carefully prepared after a long and practical experience, supplemented by a large collection of working drawings in the offices of leading architects. No pains have been spared to remove them as far as possible from the taint of local practice, and while not all that is shown is unreservedly recommended by the author, great care has been taken not to include anything that has not the authority of good practice and that may not fairly be called good construction when the element of cost is considered. The major portion of the



Ornamental Iron Gates.

plates shows details of window and door construction, the last nine plates dealing with gutters, cornices, miscellaneous exterior finish, general interior finish, stair details, kitchen and pantry dressers, wainscoting and architraves, fire place details, &c.

HAND BOOK ON CEMENTS.—By Addison H. Clarke. 96 pages; size 3½ x 6 inches. Published by William W. Clarke & Son. Price, $1, postpaid.

The author of this little work states that, realizing the importance and usefulness of cement to architects, engineers, mechanics, builders, house owners, together with the general lack of knowledge on the subject, he has endeavored to gather together in convenient form from the best authorities such information as will enable the most inexperienced to know what cement to procure and how to use it to the best advantage. In the make up of the work there is an early chapter on the classification of mortars, while others deal with the testing of cement, strength of mortars, preparation of concrete, safe loads on foundations, cost of concrete, some notes on the preparation of sidewalks and cement floors, after which attention is given to the subject of cement stucco for walls, pebble dash, &c. A chapter on lime and cement will be found of special interest, as will also some remarks on efflorescence. A number of pages at the close of the little volume are given up to a list of some of the principal authorities on cement, together with advertisements likely to prove of interest in this connection.

THE PRACTICAL STONE CUTTER AND MASON'S ASSISTANT. By Fred. T. Hodgson. Size, 6¾ x 10 inches; 52 pages; over 100 explanatory illustrations; bound in paper covers; published by the Industrial Publication Company. Price, postpaid, 75 cents.

The volume is the outcome of many questions that have been put to the author by inquiring progressive masons during the quarter of a century he was editor of a building journal. The information given is not claimed to be original, but the best and most concise methods and descriptions from the author's point of view are presented. The claim, however, is made that the treatise contains enough useful matter, if well studied by the young man, to enable him to accomplish any ordinary work that he may be called upon to do. The work consists essentially of a collection of everyday examples showing arches, retaining walls, buttresses, skew arches, vaults, domes and semi-domes, quoins, groins, &c. These are accompanied by explanations of the most approved and economical methods of working them out, together with a description of the tools employed by stone cutters, showing methods of use, &c.

Trade School Lectures for Electrical Workers.

The New York Trade School, First avenue, Sixty-seventh and Sixty-eighth streets, New York City, are constantly enlarging their sphere of usefulness, and for this season have made preparations for a course of lectures that will be much appreciated. They have secured the services of Arthur A. Hamerschlag, who is giving a course of 12 lectures for journeymen electrical workers, the purpose being to provide information that will be helpful to the journeymen in their practical work, problems of daily occurrence being discussed and explained, accompanied by practical demonstrations. The lectures are given on Friday evenings at 8.15 o'clock, with an interval of two weeks between each lecture. The charge for the entire course is $1, that securing a season ticket admitting the bearer to all the lectures. In referring to the course it is mentioned that many of the lectures given nowadays on electrical subjects are too scientific for practical workmen, and are more fitted for the engineer. The course outlined for the Trade School is intended to be absolutely practical, each lecture being arranged with a view to meeting the needs of workmen. The lectures consist of simple talks illustrated by experiments and demonstrations and give information of value to journeymen in relation to materials, proper method of doing work and the reasons for doing work in certain ways. On the conclusion of each lecture questions may be asked by any one on topics relating to the subject under discussion.

THE Montana State Penitentiary, a handsome brick and stone building, capable of accommodating 500 prisoners, and said to be one of the finest buildings of the kind in the country, has a somewhat novel history, according to a local paper. The work, which would have cost at least a quarter of a million, was done by the inmates of the prison within a space of four years, at a cost of only about $50,000. With the exception of the superintendent, the foreman of the brickyard and the tinner who had charge of the covering of the roof, all the work was done by "criminals," many of them unskilled laborers. Even the architect who furnished the design for the building was a prisoner whose sentence expired only a few weeks prior to the commencement of the construction. There were no quarrels among the men, no insubordination and no attempted escapes while the work was in progress. Without chains or fetters and with few guards the men quarried the rock, cut and dressed the granite blocks, molded and burned the bricks, dug the sand, burned the lime, cut the logs and sawed the timber.

CONTENTS.

Carpentry and Building

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NOVELTIES.

Yankee Ratchet Screw Drivers.

The North Brothers Mfg. Company, Philadelphia, Pa., have just added to their extensive assortment of specialties some new tools of interest to carpenters, builders and mechanics, general illustrations of two styles of which we present in Figs. 1 and 2 of the engravings. In Fig. 1 is shown the Yankee ratchet screw driver No. 15, which is a modification of their No. 10 driver and is made to meet the demand for a light blade screw driver for small screws in electric work, &c. It has on its blade a knurled washer by means of which the blade may be turned with the thumb and finger. This permits the hand grasping the tool to press steadily against the screw and prevent the latter from wabbling, while the thumb and finger turns or ratchets the blade until the screw is well started in its place, when it is driven home by the hand on the handle. In taking out a screw it is started by turning the blade by means of the handle until loose and then running out by the thumb and finger operating the knurled washer. The adjustment for right or left hand is the same as in connection with the company's No. 10 Yankee ratchet screw driver. In order to ratchet a screw in place it is only necessary to push the slide to the end of the slot toward the bit, while to ratchet a screw out the slide is pushed toward the handle of the driver. If the slide is placed midway between the ends of the slot the blade is held rigidly and the driver can be used as an ordinary screw driver with fixed blade, and in all cases either with thumb or thumb and finger. The company state that every tool is guaranteed and that in all the sizes made the blade is 7-32 inch in diameter. It is made in four sizes, which are 2, 3, 4 and 5 inches in length. In Fig. 2 is shown the Yankee spiral ratchet screw driver No. 20. This is a modification of the company's No. 30 Spiral ratchet screw driver and is designed to push or ratchet screws in place, but not to take them out in that way. It is arranged to be used as a ratchet driver by simply moving the shifter to the opposite end of the slot. The construction of the ratchet and pawl, it is claimed, permits of a very compact arrangement, rendering the tool convenient in size and of light weight, yet strong in these vital points. The nut working in the spiral is of brass and with the spiral groove in the rod are so designed that the wear has been reduced to a minimum. It is pointed out by the manufacturers that the friction in the ratchet mechanism is so slight as to be hardly felt, and that the backward movement is very easy and almost noiseless. The tool is made in three sizes, having lengths of push or stroke of 4, 5 and 6 inches respectively.

Owing to numerous requests for means to use drills in connection with their No. 30 Yankee spiral ratchet screw drivers the company have brought out a small chuck which is illustrated in Fig. 3 of the engravings. The outside of the chuck corresponds to the end of the screw driver bits used in the device named, while the inner portion of the chuck is made to conform to the ends of the drill points used in their No. 40 Yankee automatic drill. In using the chuck the drill point is first put into the chuck as shown and the two together placed in the chuck of the No. 30 Yankee spiral ratchet screw driver in the same manner as bits are put in the screw driver, being set for right hand and operated for push or ratchet movement of the screw driver. Eight drill points from 1-16 to 11-64 inch, inclusive, are furnished with each chuck, the chuck and eight drill points being put up in a small round wooden box. John H. Graham & Co. of 113 Chambers street, New York City, are the selling agents for these goods.

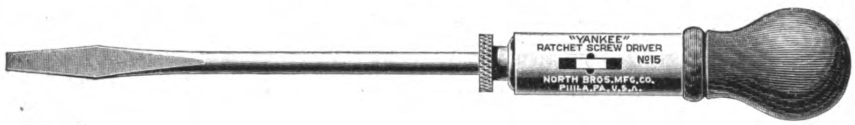


Fig. 1.—Yankee Rachet Screw Driver No. 15.

Fig. 3.—Chuck for Use in Connection with Yankee Spiral Rachet Screw Driver No. 30.

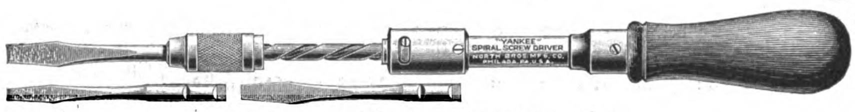


Fig. 2.—Yankee Spiral Rachet Screw Driver No. 20.

Novelties.—Yankee Rachet Screw Drivers.

New Combination Saw Table.

The saw table shown in Fig. 4 has recently been placed on the market and embodies a number of features deserving of more than passing mention. The machine takes up but little room, is provided with countershaft, tight and loose pulley and belt shifter, the bearings on the countershaft being adjustable to keep the belt tight, thus enabling the use of an endless belt for sawing. The saw can be raised and lowered while in motion by the hand wheel and can be clamped rigidly at any desired point, thus adapting it for dado and grooving work. The table tilts to any desired angle up to 45 degrees and is held rigidly at any point. There are two fences provided, one for ripping and one for cutting off, each being adjusted to any angle. By this arrangement any kind of bevels can be cut. The machine takes in saws up to 14 inch. The frame is of

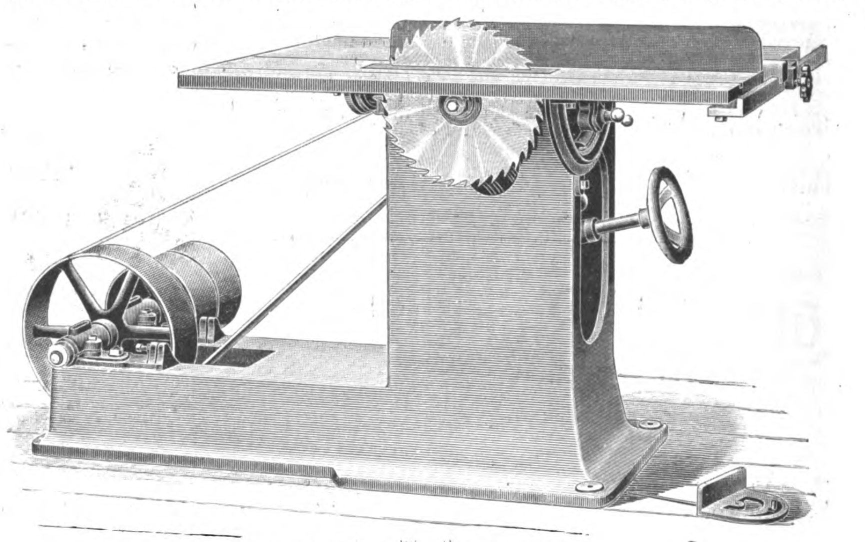
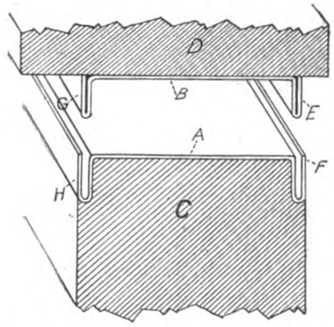


Fig. 4.—New Combination Saw Table.

neat design and so shaped that saw dust is easily cleaned away. The machine, as well as a complete line of band saws, is described in a small pamphlet which has been issued by the manufacturers, the Crescent Machine Company, 1 Front street, Leetonia, Ohio. A copy can be had by sending to the address given.

The Pittsburgh Metal Weather Strips.

In the accompanying illustrations we show the construction and application of the Pittsburgh metal weather



Novelties.—The Pittsburgh Metal Weather Strips —Fig. 5.—End View of Sash and Frame, Showing Method of Applying the Weather Strips.

strips for windows, which are being manufactured and being introduced to the trade by the Pittsburgh Metallic Weather Strip Company of Pittsburgh, Pa. The strip is composed of two metallic pieces, one of which is formed of a flat base with a longitudinally raised portion, bent upon itself, and extending at right angles thereto at each edge of the base. By this means recesses or grooves are provided for the reception of two projecting flanges formed on each edge of a

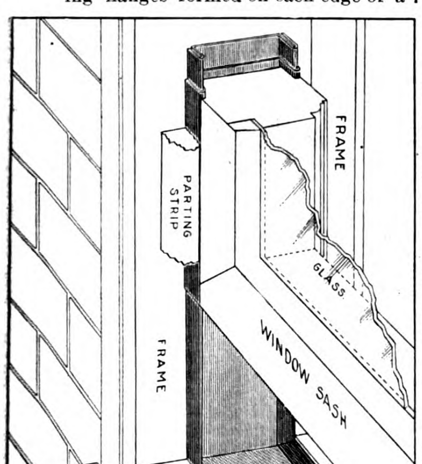


Fig. 6.—General Appearance of Strips in Use.

similar base. The construction of the device is well indicated in Fig. 5 of the engravings, in which A is the metal strip, C the sash, D the frame and B the metal strip attached thereto. The projections G and E fit into the grooves H and F. The flanged strip, being attached to the window frame between the parting strip and working in the grooves of the strip which is attached to the sash, excludes all draft, dust and moisture. The appearance of the strips as applied to a window is presented in Fig. 6 of the engravings. The strips are made of zinc, copper or brass, and in lengths ranging from 24 to 54 inches, being manufactured under a patent granted May 24 of the present year to John Follansbee. The manufacturers also commend the strip for use in connection with storm windows. Some of the good points claimed for the strips are that they prevent windows from rattling, deaden the noise of the street, never get out of order, save fuel and permit the windows to move freely.

Sash, Door and Blind Catalogue.

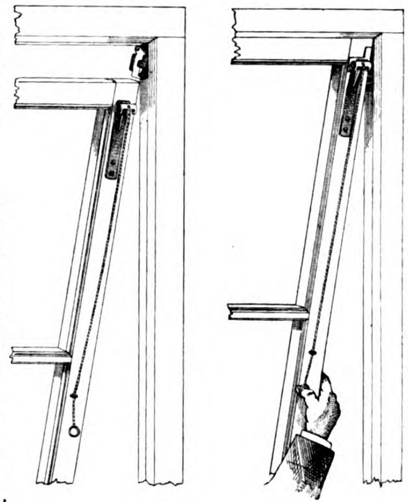
We have received from the Foster-Munger Company, West Twentieth and Sangamon streets, Chicago, Ill., a copy of their complete sash, door and blind catalogue. This is a volume of 542 pages, profusely and beautifully illustrated, giving designs and list prices in the way of stock work on sash, doors, blinds, &c., together with special work, such as grilles, mantels, wood carpet, stairs, veneered doors, leaded art glass, porch work, sliding and Venetian blinds, &c. It is claimed to be the most complete grille work catalogue published. Of the specialties mentioned, the company are doing a particularly extensive business in grilles and mantels. They make grilles in any of the hard woods and in sizes and styles suitable for any opening. In stock work, such as doors, blinds and sash, they manufacture extensively. The factory has a capacity of 1000 doors daily and of blinds and sash in proportion. They manufacture a dowel door which is claimed to be the strongest and best door made. In this door no pins and tenons are used to mar the surface of the work. They fasten the stiles and rails with 20 hard wood dowels, ten on each side. These dowels are 6 inches long, and when driven and glued make an exceedingly strong piece of work. The company state that in the three years in which they have been making these doors they have never had a complaint of open joints.

The Phenix Self Locking Hanger for Storm Sash and Screens.

Illustrations are herewith given of the Phenix self locking hanger and fastener for storm windows and entire screens, which has been placed on the market by the Phenix Mfg. Company, 614 and 616 Hubbard street, Milwaukee, Wis. This hanger has been specially designed for the purpose of hanging large window screens or storm sash on the high floors of public buildings and other structures from the inside. The applying of this hanger and the fitting of the sash are done solely from the inside, thereby obviating all work and use of ladders or scaffolding from the outside. Fig. 7 shows the manner in which the sash is slid up into the open sockets, where it is caught by the springs, forming an absolute lock. The removal of the sash is accomplished by drawing the cords downward, causing the releasing device to open the lock so as to remove the sash. The supporting sockets are placed in the upper corners of the blind rabbets and the springs are placed on the inner surface of the sash. Fig. 8 shows the several parts of this device for the right hand, a similar set being used for the left hand. All the parts are made of wrought steel with black rubber japan finish. No screw driver or tool of any kind or step ladder is required to unlock and remove the sash from the window.

Friedley & Voshardt's New Catalogue.

One of the finest catalogues devoted to architectural sheet metal ornaments that has recently come to our notice



Phenix Self Locking Hanger for Storm Sash and Screens.—Fig. 7.—Showing Manner Sash is Pushed Up and Held by the Lock.

is that just issued by Friedley & Voshardt, 194 to 200 Mather street, Chicago, Ill. It comprises 220 pages of large size, being 10½ x 13½ inches. Unlike most catalogues issued by manufacturers this one consists almost exclusively of illustrations. The firm believe evidently that the representations given of their work will speak for themselves and require no extravagant expressions of their merits.

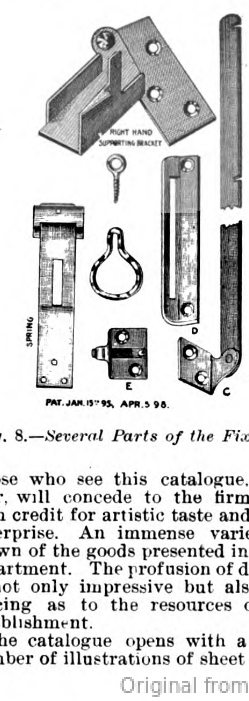


Fig. 8.—Several Parts of the Fixtures.

Those who see this catalogue, however, will concede to the firm very high credit for artistic taste and great enterprise. An immense variety is shown of the goods presented in every department. The profusion of designs is not only impressive but also convincing as to the resources of the establishment.

The catalogue opens with a large number of illustrations of sheet metal statues which have been furnished for public institutions in various parts of the country. The pages following are devoted to ceiling designs, gargoyles, garlands, circular moldings, volutes, scrolls, points, rosettes, capitals, conductor heads, leaves, shells, shields, finials, letters, urns, center pieces, ribbons, wreaths, panels, rock face work, cresting and a profusion of miscellaneous ornaments. The catalogue has a number of tinted leaves scattered through it which are of heavy highly calendered paper and therefore show off half-tones with excellent effect. They are used in illustrating fronts of buildings, ceilings and special work in sheet metal, which can best be illustrated by means of half-tones. The firm call particular attention to what they are doing in steel ceilings. They have introduced as a specialty copper plated sheets with antique finish, which make an unusually attractive ceiling. Their business has grown so considerably that they have found it necessary to enlarge their plant. They recently purchased an adjoining piece of property and are now having considerable heavy machinery built for the purpose of equipping this extension.

The Ormsby Ventilating System.

In the device for handling window sash manufactured by E. A. Ormsby of Melrose, Mass., the horizontal rod connecting with the windows is provided with pinions which engage racks. One end of the latter is attached to the window sash, as shown in Fig. 9 of the engravings. In the case of a monitor roof the sash may be hung either at the center or top or bottom. The racks, in all positions, are entirely out of the way of any crane or other machinery. The sashes may be operated through rods and beveled gears extending to a conveniently placed handle. If more convenient they may be shifted by means of a vertical rack connecting with the horizontal rod extending across the windows. The device may be attached to sliding sashes, as indicated in Fig. 10.

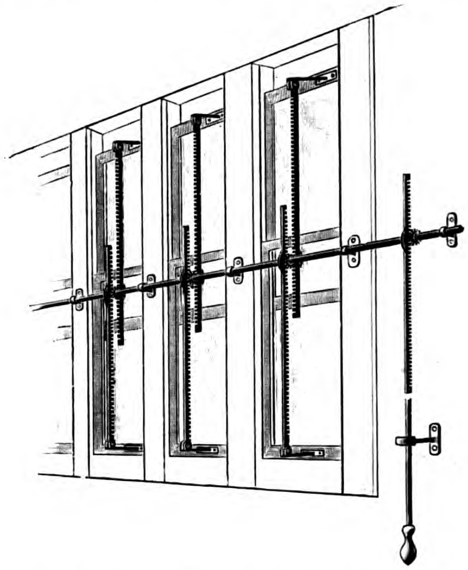
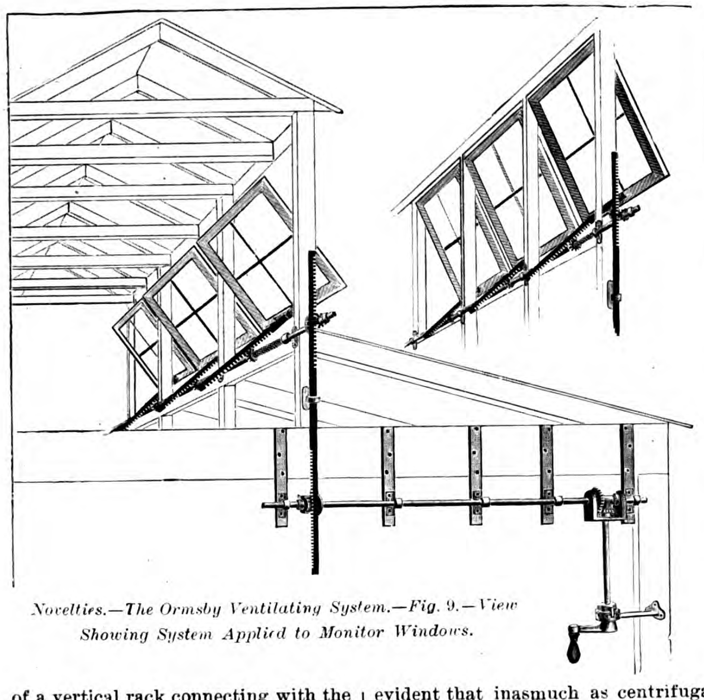


Fig. 10.—Device Applied to Sliding Windows



Novelties.—The Ormsby Ventilating System.—Fig. 9.—View Showing System Applied to Monitor Windows.

The Sturtevant Exhaust Head.

One of the important features of a modern steam plant is the exhaust steam pipe head. To be effective it must thoroughly separate the water from the steam, and thereby prevent the constant spraying of roofs and walls, with consequent deterioration and expensive repairs. In the form of exhaust head built by the B. F. Sturtevant Company, Boston, Mass., the principle of centrifugal force is utilized to secure complete separation. Dry exhaust steam weighs only 0.038 pound per cubic foot, while water of the same temperature weighs 59.36 pounds per cubic foot. It is therefore evident that inasmuch as centrifugal force is proportional to the weights of the bodies in motion, the water will be thrown outward with $\frac{59.36}{0.038}$, or 1562 times the force exerted upon the steam. In this head the steam passes up the interior pipes, is discharged tangentially close to the shell and is thereby given a vigorous whirling motion. The entrained water—likewise the oil—flies outward, strikes the cool side and trickles down to the outlet at the bottom. The steam, now perfectly dry, finds ready escape through the central opening above. These heads are built in sizes to fit pipes from 1 to 20 inches. All sizes above 10 inches are flanged instead of tapped.

The Mietz & Weiss Kerosene Engine.

Those who have occasion to use moderate power in their wood working shops or for any purpose whatsoever will be interested in the kerosene engine which is being manufactured by August Mietz of 128 Mott street, New York City. The construction is such that the engine receives at full power an impulse at each turn of the crank shaft, this being done in the most direct way and with the simplest mechanism. The requisite amount of oil is forced into the cylinder by a small pump placed on top of it. The crank shaft is placed in a cylinder, which is made air tight and which forms practically an extension of the rear end of the cylinder. The side heads of this chamber carry the crank shaft bearings, thus assuring rigidity. The lubrication throughout is positive and automatic, the oil for this purpose being forced by pressure to the parts needing it as long as the engine is in motion. The engine is provided with an ordinary flame igniter placed on the outward end of the cylinder, which is only required during the two or three minutes occupied in first starting After that the igniter is extinguished, the ignition of the mixture of oil, vapor and air being accomplished by the heat arising from their compression. The engine is entirely noiseless in operation and runs with great smoothness and uniformity in speed. The economy of the engine is shown by the statement that the cost of 1 horse-power per hour is less than 1 cent with kerosene at 7 cents per gallon. The claim is made that the engine requires no attention whatever and the escape of burnt gases is so thorough that cleaning is unnecessary. The machine is made in sizes from ½ up to 25 horse-power.

Towsley's No. 9 Lumber Truck.

The John T. Towsley Mfg. Company of 1039-1047 Evans street, Cincinnati, Ohio, have brought out a new style lumber truck, a view of which is shown in Fig. 11 of the engravings. Trucks of this kind are designed for use around lumber yards, buildings in progess of construction and in other places where the convenient handling of heavy loads is required. The frame is made of 2-inch hard maple shaped to give increased strength with the least weight. It is 3 feet wide by 7 feet long, firmly bolted together, the legs being firmly braced so as to swing under the frame when desired. The axle is 1¾ inch steel turned to 1½ inches at each end to receive the wheels. The manufacturers point out that the wheels are one of the most important features of this truck and are made entirely of steel 40 inches in diameter and have a 2½-inch face. The hubs are 7 inches long, bored to fit the axle and have a large oil chamber. They also point out that the swinging leg at each end of the truck is an advantageous feature not found in other devices used for similar purposes.

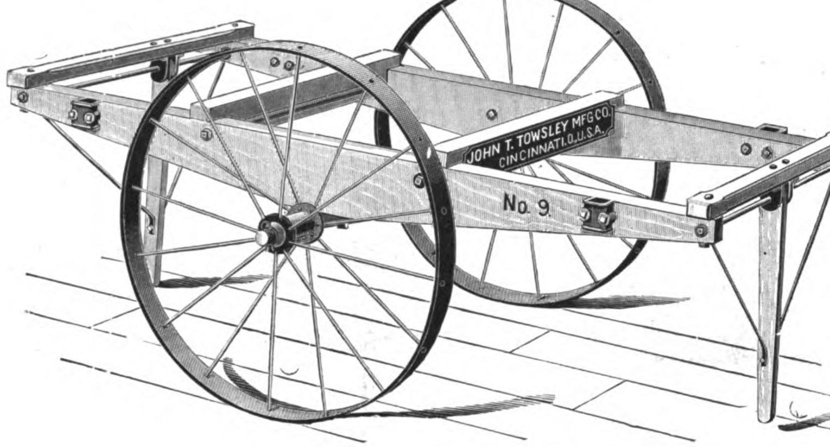


Fig. 11.—Towsley's No. 9 Lumber Truck.

TRADE NOTES.

The G. Drouve Company, Bridgeport, Conn., are distributing a card calling attention to a device of special interest to builders. It is often necessary, in connection with buildings in process of erection or undergoing repairs, to provide some means of heating before the regular plant is installed, and particularly is heat required by masons and plasterers for drying out their work or to prevent freezing after the plastering has been applied. The company announce that they have placed on the market a stove designed especially to meet this want and which is intended for burning either hard coal or coke. The card which is being sent out carries upon one face a blank order designed to be filled out by the recipient and mailed to the company.

The Central Brick Company, formed by the consolidation of a number of brick concerns in the Pittsburgh district, are erecting a new plant on Soho street, Pittsburgh. The site is prepared for the foundations of the buildings and the placing of machinery, which will include a new patent dryer. All machinery will be of the latest design. The plant will have a capacity of 65,000 brick per day, and the concern have already received sufficient orders to keep them busy for some time to come.

A pretty little pamphlet is distributed by the Canton Steel Roofing Company, Canton, Ohio, in the interests of their steel ceiling and side wall. The 15 pages contain numerous half-tone illustrations showing the handsome designs and finish of these goods. Plates of various sorts are illustrated, and also examples of side walls and interiors showing ceiling work, while moldings of various kinds are also illustrated. The little circular is a sort of preliminary advertisement, and those who are really interested are invited to write for the company's complete catalogue.

W. J. Burton & Co., 164 West Larned street, Detroit, Mich., are sending out a card calling attention to the roofing materials which they are prepared to furnish on short notice. They state that they have in stock several thousand squares of asbestine, asphalt, felt, iron and steel roofings and metallic shingles, together with conductor pipe, eave trough, galvanized sheets, stove pipe, iron, tin plate, solder, &c.

The E. Van Noorden Company of Boston, Mass., recently booked an order for over 30,000 feet of metal skylights for the new plant of the Great Northern Paper Company at Millinocket, Maine. This is said to be one of the largest orders for metal skylights ever placed. The Van Noorden Company have just completed the shipment of 1500 feet of metal skylights for the mills at Madison belonging to the same company.

American Tool Chest Company of 200 West Houston street, New York City, have issued Illustrated Catalogue No. 19, in which are shown tool chests in great variety for boys, youths, gentlemen, housekeepers, carpenters, farmers and planters, together with chests adapted to railroad and mine use. There are also empty tool chests for machinists and pipe fitters. The chests filled with tools list from $12 a dozen to $300 apiece, and are suitable for amateurs or professionals.

Exhibits at National Export Exposition.

Among the displays at the National Export Exposition, which closes in Philadelphia, Pa., on November 30, there are many likely to prove interesting to readers of this journal.

Merchant & Co.

of Philadelphia have a booth of good proportions constructed almost entirely of their own products. A very novel feature in the display is the installation of a huge tank at a point above the roof of the booth, from which is discharged water in streams, so as to closely resemble a fall of rain. Falling on the roof the water is carried by a gutter to an outlet pipe which communicates with the main sewer of the exposition. The object of this novel arrangement is to demonstrate the storm proof qualities of the copper tiles with which the roof of the booth is covered, as well as the Star ventilators, which are mounted upon the roof. The ceiling of the booth is beautifully decorated in metal and the rear of the structure is covered with copper shingles. Within the booth are attractively displayed metal tiles, tin shingles, Star ventilators, various brands of solder and babbitt metals, seamless brass and copper tubes, tin plates, &c. It is pointed out to visitors that the company's metal Spanish tiles are to be seen on the buildings at the main entrance to the exposition, also on the hospital building and the buildings in the Chinese village.

The Joseph Dixon Crucible Company

of Jersey City, N. J., have a handsome exhibit covering their well known productions. The display is inclosed within an arcade structure of polished cherry wood, and the general arrangement reflects much credit upon the taste of the designers. On either side of the principal entrance is a large plumbago retort, generally used for smelting silver, zinc and other metals, but here utilized as a vase for holding a pot of beautiful ferns. At each corner of the exhibit are large plumbago bowls and crucibles, also utilized as receptacles for potted plants and ferns. Graphite in various shapes and conditions of manufacture, from the crude material to the finest product, is shown, together with an assortment of ordinary crucibles, boxes, phosphorizers and other articles made from plumbago. At the south front of the exhibit and forming part of the arch is an electrically illuminated sign carrying the name "Dixon's."

Morse, Williams & Co.

of Philadelphia have an interesting exhibit covering the different styles of elevators which they build. Owing to the great space which would be necessary to show the elevators in commercial size, the manufacturers use models which serve admirably to show the working qualities of the machines. A model of an electric elevator intended for residences and places where no operator is employed is shown in operation. The elevator is controlled entirely by push buttons and is designed to comply with all the requirements necessary for convenience and safety. A working model of a direct electric passenger elevator is also shown, as well as a working model of a freight elevator working on the hydraulic pressure tank system. Another feature of the exhibit is an invalid hoist, full size, and operated by hand power.

The Chicago Pneumatic Tool Company

of Chicago, Ill., show among other things the Whitelaw wood boring machines, Haeseler's reversible wood boring machine, Boyer stone carving tools, air compressors, &c.

—WOULD BE SATISFIED.—"Let me make the wheels of the nation," said the cycle manufacturer, "and I care not who makes the laws."—*The Wheel.*