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CONTENTS.

IN connection with the exhibition of building appliances which is to be held in the new rooms of the Massachusetts Charitable Mechanic Association next month, it has been decided to provide for showing architectural drawings. A well-lighted series of rooms has been secured for them, and it is hoped that architects generally will lend their aid in making this not the least interesting feature of a very interesting technical exhibition. To lend additional attraction to the occasion, and bring out a large number of contributions, the committee have arranged for the award of medals for excellence in design and in construction, and wish to exhibit working-drawings as well as sketches. The main object of the undertaking being to interest architects, who can understand the technical merits of designs, however roughly indicated, it will be unnecessary to aid their effect by elaborate finish or by framing: a meritorious constructive device, a skilful plan, or a beautiful elevation, will not want appreciation, even though hastily rendered. Following the method found so successful at the annual exhibitions in Paris, it is proposed to leave the nomination of the jury to the contributors themselves. Each contributor will name four architects as judges, and the committee will count the votes and notify the four gentlemen receiving the greatest number of ballots. If any one should be unable to attend, the next in order will be notified, and so on until a jury is obtained. The attendance of architects will, it is hoped, be very large, from all parts of the country, so that contributors need not confine their nominations to any particular locality. The contributions of the jurors so chosen will be marked H. C., and debarred from competing for awards. Free tickets of admission will be issued to contributors, which can be obtained from the committee. Contributions, accompanied by nominations for members of the jury, may be sent at once to any member of the committee, or to the editors of the *American Architect*. No contribution will be received after September 1. The committee consists of Mr. John S. Damrell, Mr. Henry A. Turner, and Mr. T. M. Clark, all of Boston.

A GOOD deal of feeling has been aroused in Chicago by a proposition to reduce the fire-limits, so as to allow the erection of wooden buildings in the less thickly settled portions of the city. The ostensible reason for the introduction of the measure is the desire to reduce the cost of workingmen's cottages, — a rather unfortunate argument, since it is easy for its opponents to show that at present prices the first cost of a brick building of that class is little, if at all, greater than that of a frame cottage; while the saving in repairs and fuel will make it much the cheaper of the two at the end of a few years. The disadvantage of permitting wooden buildings to be constructed in situations where they are certain to be surrounded by those of masonry within very few years is obvious. Such buildings, sandwiched in between brick houses and stores, form a standing menace to the whole district in which they occur, and the example of New York and Boston, where wooden fire-traps of the most dangerous description, a century or more old, alternate with the most costly buildings in the city, shows that the peril, once incurred, can never be removed. A similar measure has unhappily already become law in New York, where its evil effects will be still more quickly and more seriously felt than would be the case in Chicago, partly by reason of the rapidity with which the limited remaining area of Manhattan Island is being covered by the solid blocks of the advancing city, and still more on account of the costly character which distinguishes the average New York building from that of all other cities, and by so much increases the amount of property which will be exposed to perennial risk by the neighborhood of cheap, inflammable structures. No doubt the self-interest of short-sighted real-estate speculators has much to do with the promotion of such measures, which should be resisted by all who interest themselves in building matters. Among these, the insurance companies might be expected to be the most energetic in their remonstrances, but so far they appear to have given the subject no attention whatever. An increase of rates on brick buildings situated outside of the new reduced limits would be only just to the policy-holders and the companies; but the timely warning of such increase would do more than anything to avert the legislation which would render it necessary.

AN interesting case under the New York Building Law is now before the courts, and its decision will be a matter of interest to all architects who have occasion to practise in that city. Not long ago the present owners of a large house on the corner of Fifth Avenue and Fifty-second Street applied to the Building Bureau for permission to put two additional stories on the building, making it six stories high, with walls eighty-nine feet above the curb. The statute now provides a certain rather excessive thickness of walls for buildings of this height, and as those of the structure in question, built some time ago, would fall below the limit, the permit to alter was, as in scores of similar cases, refused on the ground that the requirements of the law would not be complied with. The next step, under such circumstances, usually is to request the appointment of a board of examiners, whose constitution is fixed by the statute, and who may recommend that the provisions of the Act be modified to meet the special case. If the examiners consent to make this recommendation, the chief of the Bureau may authorize a special exception to be made from the statute in accordance with the recommendation, but without such reference and recommendation, no deviation from the letter of the law is permitted. The owners of the house having referred the matter in due form, and received a favorable reply from the examiners, applied to the Bureau, after the usual course, for a new permit, in accordance with their recommendation. Much to their surprise, it was refused, and the Bureau persisting in its refusal, the owners appealed to the Supreme Court, which by law takes cognizance of cases under the Building Act, for a mandamus to compel the issuing of the permit. The mandamus was granted, but the Bureau in its turn appealed to the highest court, and succeeded in obtaining a stay of proceedings until the decision on the appeal.

JUDGE CULLEN, in granting the stay of proceedings, expressed his opinion that the terms of the law required the favorable action both of the Board of Examiners and the Bureau to authorize any deviation from the letter of the statute, with the intention of limiting in such cases the discretionary power of the Bureau, but not of providing an appeal from its decisions. If it were made compulsory on the Bureau to confirm the judgments of the examiners, its discretionary authority would be abrogated, and, as the judge said, it would become "a mere conduit for the transmission of applications to the examiners." This argument seems forcible, and as an appeal is still left, we presume, from the superintendent's decisions to the courts, there is much to be said in favor of clothing him with all reasonable authority, and holding him to a proportionate responsibility. That the recorded approval of an impartial board should be necessary to any deviation from the strict meaning of the law is important as guarding against too great laxity of administration, and if any superintendent should show himself disposed to surpass even the examiners in strictness, the public will gain as much as private proprietors will lose. For the latter, the proper remedy against the needless hardships which they sometimes suffer under the present statute is not the weakening of the superintendent's authority, but

the amendment and amplification of the Building Act, which, good as it is, leaves many contingencies either wholly unprovided for, or subjected to general rules which, although suitable for small buildings, develop into absurd results when applied to the more important modern structures.

The Buffalo Soldiers' Monument still continues to be the subject of discussion. At our last advices no definite steps of any kind had been taken, and in the rather peculiar state of mind which now appears to characterize the committee, it is impossible to predict anything in regard to the ultimate decision. Mr. St. Gaudens and Mr. Stanford White, the sculptor and architect of the Farragut monument, have, it seems, been consulted. Mr. St. Gaudens had even signified his willingness to accept the commission if it should be offered him, but this did not appear to satisfy the committee, who, having, so to speak, tasted the blood of architects, were unwilling to let another escape without some attempt upon him. "That the design should be acceptable," said Judge Smith, "should be the condition: otherwise the contract would be at an end." Mr. Greiner thought that it "would be inaugurating a one-man power if the contract was awarded before a design had been accepted." Mr. Beebe thought that if a contract were entered into with M. St. Gaudens, "it would be for something of which the committee had no knowledge as to its character and merit." One gentleman, whom we refrain from naming, was afraid that the committee might in this way "contract for a monument for fifty thousand dollars, and have a design submitted which would only cost ten thousand," but this painful view of the subject was not shared by the remaining members, and as there appeared to be no prospect of persuading Messrs. St. Gaudens and White to do any work for nothing, it was finally resolved to send a sub-committee to New York and hold another conference with them. In spite of the singular way in which they attempt to carry out their purpose, it must be acknowledged that the Buffalo committee have the object of obtaining a conspicuously excellent monument very much at heart, and the example of their earnestness and self-sacrifice in that cause may be commended to the attention of all similar bodies.

The Prefect of Police for the city of Paris has recently occupied himself with studying the question of fires in theatres, and has drawn up, as the fruit of his investigations, an ordinance which is not only a model of its kind, but is a valuable contribution to the science of construction. Unlike the measures sometimes proposed by persons less thoroughly acquainted with the subject, the Prefect's regulations are simple, easily applied, and perfectly adapted to the requirements of theatre building and management; and there is no reason why the whole ordinance should not be incorporated without change in the building laws of every community civilized enough to possess such statutes, to the great benefit of all concerned. Only the briefest abstract can be admitted here, but certain provisions will be novel and interesting even to those most familiar with the improved modes of construction. After prescribing that every theatre shall be divided into three distinct parts, the auditorium with its lobbies, the stage, and the administrative portion, including the dressing-rooms of the performers, each divided from the others by thick walls, and kept absolutely distinct, so that no store-closets or workrooms of any kind shall be allowed within the boundaries which surround the portion devoted to the audience, the regulations, descending to particulars, prohibit any recesses or offsets in the walls enclosing the stage, which might in time accumulate combustible dust or débris; and provide that balconies shall be made in them above the level of the flies, accessible both from within and from the outside, which will permit the firemen to command the interior, and to escape in case of danger. The proscenium opening is in all cases required to be fitted with a curtain of wire netting, held by combustible cords, which will allow it to fall when burned off. The Prefect mentions that some experts regard this curtain as of little use in resisting the flames, and likely to frighten the audience by its fall, but the advantages which it certainly possesses, of preventing the fall of blazing canvas or wood-work among the spectators, as well as of turning back for a time the current of air which is always drawn outward from the stage toward the ceiling ventilator of the auditorium, seem to justify him in making its employment compulsory.

Most fires in theatres proceed from some defect in the arrangements for lighting, and the Prefect devotes special attention to this subject. Gas-pipes of large size are required to be of iron, instead of the lead or tin still generally used in Europe; every light must be surrounded by wire netting, and the footlights must be fitted to have the flame directed downward, instead of upward. For light in case of accident to the gas-pipes, oil lamps are required to be kept burning throughout the performance, in sufficient number to allow the audience to move about readily; and each division of the theatre is to be fitted with a separate meter. Electric lights are not, the Prefect thinks, without danger, and it is too early yet to enforce their substitution for gas. For further precaution, all scenery and wood-work about the stage, and the hangings of the auditorium, are to be made incombustible by means of chemical solutions, and inspected every six months to make sure that they have not lost their fire-resisting quality by the gradual separation and fall of the crystalline salts employed; and all scenery not in actual use must be stored beyond the limits of the building. While the representation is going on, firemen are to be stationed close to the stage, and electric bells must communicate with the nearest *caserne*. Stand-pipes are required at various points on the outside, and iron ladders must be placed on the lateral faces and in the courtyards of all theatres, not only for the use of the firemen, but, in extremity, for the actors and spectators. If any scene should require the use of fireworks, gunpowder, artificial lightning, mimic conflagrations or other dangerous elements, the fire department is to be notified, in order that special precautions may be taken; and all inflammable materials are to be placed in charge of the firemen during the performance.

The *Révue Industrielle* contained a few weeks ago some news regarding the progress of elevated railways in the United States which will be interesting to our readers. According to this account, three plans for elevated roads are now under consideration before the municipal authorities of St. Louis; active operations are in progress in Brooklyn and Philadelphia, and Boston is only hesitating "for purely æsthetic reasons; it is feared that the perspective of certain *monuments* will be injured." The opponents of these roads in Boston will probably be a little surprised at seeing themselves translated to the rank of martyrs in the cause of art, but that is at least an honorable position, and they may as well appropriate what good there is in the advice which is offered them, — to "remember that their interest lies in promoting the increase in the value of their property which the construction of elevated railroads would bring about; and not to push their worship of art so far as to reject the millions which extend their arms to them." The article, after mentioning that the Sixth Avenue elevated road in New York is now making arrangements for the transportation of baggage and light parcels, closes with a lament that Paris should be so far behind the American cities in conveniences for internal transportation, and predicts that the establishment of railways either above or below the streets will be only a question of time in all large towns.

M. de Lesseps has come to the aid of the Commandant Roudaire in urging upon the attention of the French Government his well-known scheme for inundating the marshy depressions lying between the desert and the southern border of Tunis and Algiers, by means of a canal from the Mediterranean. The recent expedition against Tunis has served, as most French military operations do, to collect some exact and scientific information about the country traversed, and by repeated and careful levelling and boring it has been positively ascertained that only a narrow ridge of limestone, overlaid with sand and loam, separates the sea from the low lands of which the swamps called the "schotts" form the points of greatest depression. The conversion of this basin into an inland sea would, M. de Lesseps thinks, modify in the happiest manner the climate of the neighboring districts, and offer to commerce a new and important means of communication, besides serving an important purpose in the military operations continually necessary upon the southern frontier of the French possessions in Africa. To the scientific world it would present a new and most favorable point of departure for exploring expeditions to the interior of the continent, giving them immediate and easy access to the very threshold of the most mysterious and interesting portion of Africa, while France is hardly likely to be blind to the advantages which it would afford for the successful prosecution of the enterprise which she has already shown many signs of having in mind, the attainment of a domination in Africa similar to that which, but for England, she would long ago have gained in Asia.

BUILDING SUPERINTENDENCE. — VIII.

WHILE the furring is going on, the plastering mortar should be mixed, and the door and window frames set. In brick buildings the latter are usually set in place at the beginning, and the walls built around them, and this is sometimes done in stone structures, but not by the best builders, as it is difficult to keep the frames from being knocked slightly out of shape by the setting of the heavy stones against them; and by laying the stone-work separately, with plumb rule and level, and afterwards trimming it, a much smoother and straighter surface is obtained, against which the frame can be fitted weather-tight, without the unreliable and often unsightly pointing from behind with mortar which the other method involves.

With the best of workmanship, however, crevices are sometimes left through which the wind can penetrate, and wherever the wind can go, rain and snow will follow, so that a certain amount of packing is generally necessary. This can best be done with cotton, driven in between the wood and the stone, where it is kept permanently in place by its own elasticity, while it checks the current of air very effectually.

The plastering is briefly specified to be the best three-coat work, sand finished throughout. At least as soon as the furring is begun, the superintendent should see that the materials are at hand for making mortar enough for the whole of the plastering. By recollecting that one hundred square yards of three-coat plastering require three casks of lime, three one-horse loads of sand, one and a half bushels of hair, and about two thousand laths, the total quantity needed of each is easily reckoned. A place should then be prepared without delay, where the whole mass requisite for the first, or scratch, coat can be mixed and allowed to cool for a week before any of it is put on the walls. In this way only can we guard against the occurrence of particles of unslaked or partially slaked lime in the mortar, which will continue to absorb moisture after being spread on the laths, and perhaps months later will cause small cracks or blisters, or throw off little chips from the plastering, disfiguring it very much when it is too late to remedy the evil.

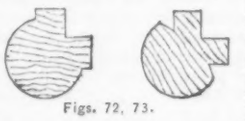
In regard to the manner of mixing, the practice varies. Occasionally a mason is found who is willing to slake the lime by itself, and leave the paste for several days or weeks, — a year, even, in some cases, — during which it becomes somewhat more firm, and acquires a beautifully smooth, "fat" quality, something like cream cheese. This heap of paste is drawn upon as wanted, and mixed with the proper proportion of sand and hair, then put immediately on the walls. The disadvantages of this process are the difficulty of distributing the hair evenly through the stiffened paste without the help of water to loosen the tufts, and the increased labor required for working the mortar. The advantages are the perfect hydration of the lime, by which chip-cracks and blisters are wholly avoided, the smoothness and hardness of the finished plastering, and its greater tenacity, since the hair, not being added until the lime is cold, retains its full strength, instead of being burned and corroded by steeping in the hot, caustic mixture which is the first result of slaking. Few builders, however, are disposed to proceed in a way so inconvenient to them, and content themselves with spreading out the lime, pouring on water from a hose, and after a little stirring adding the hair, which is mixed into the steaming liquid, and the sand immediately thrown over it, incorporated as well as may be, and the whole mass piled up for use. The hair in this case deteriorates as fast as the lime improves, and a season of cooling which would be very beneficial to the latter ingredient will nearly destroy the former, so that a course must needs be taken midway between the two extremes.

Whatever mode is adopted, a clean floor of planks must be laid, with sides a foot high or more, to keep dirt from being mixed with the mortar. There is a process, said to be in vogue in certain country districts, of slaking the lime upon the ground, and then hoeing up grass, roots, soil and lime into a viscid mess, which is spread upon the laths, where it stays long enough for the mason to get his pay; but such methods of construction are not within the scope of this work.

It is not always easy to tell by the appearance of a heap of plastering mortar whether the lime, sand and hair are of good quality and in suitable proportion. If properly mixed, which will be shown by the absence of streaks in the mass, a small quantity of the mortar should be taken up on a trowel, slate or piece of board. If it hangs down from the edge without dropping off, the quantity of hair is sufficient; or, if it is practicable to see the mixture made, one bushel of hair to each cask of lime in the first coat will be the proper proportion. The quality of the hair can be tested in the same way. Long ox-hair is perhaps the best. It is strong, and the fibres an inch or more in length. Goat's-hair is longer, but not so strong, and short cattle and horse hair is of the least value. On drying a small quantity of mortar, an excess of sand will be shown by its being easily rubbed away with the fingers. The quality of the lime is best tested by observing the slaking. For plastering, lump-lime only is used in ordinary cases, and it should slake energetically and fall into a smooth paste, without any refractory lumps or particles of "core." If such are found, all the casks of that brand should be rejected.

Before lathing, grounds must be put on wherever necessary. These are strips of wood planed carefully to a uniform thickness, seven-eighths of an inch or more where the plastering is to be three-coat, or three-fourths for ordinary two-coat work, secured to the furrings in such a way as to give convenient nailings for the subsequent finishings; one row, for instance, being set an inch or so below the top of the future base-board, two or three in the height of a wainscoting, a border around each door and window, and so on. Being of equal thickness, and usually straightened with the straight-edge and plumb rule to correct any irregularity in the furrings or studs, they afford guides for bringing the plaster to an even surface. Further guides are formed by the angle-beads, or grounds of other shapes, which are secured to the corners of the walls before lathing. The customs of different localities vary in this point, and the superintendent will probably be asked to decide on some particular mode, if the specification gives no definite instructions.

In the Eastern States, where walls are almost invariably papered or decorated as soon as finished, it is usual to nail to the studs at the angles a moulding in section like Fig. 72 or 73. This serves as a guide for putting on the mortar, and when the plastering is completed gives a finish to the corner which is not readily broken or scratched, and is easy to cover with paint or paper to good effect. In New York and other places where a pure white hard-finished surface is or has been fashionable, it is customary to turn the corners by means of a "rule-joint," worked in the plastering itself, and consisting of a vertical semi-cylindrical moulding some three-fourths of an inch in radius, which stops against a bevelled surface a little below the cornice and above the base-board or wainscot (Fig. 75).



Figs. 72, 73.

These rule-joints are beautifully executed by the best plasterers, but they cause a rather awkward succession of breaks in the vertical line of the angle, since the plaster must be fully brought out to the corner above and below all mouldings, as otherwise a troublesome horizontal surface would be left (Fig. 74), which with the small wooden angle-bead is not noticeable; and they are liable to scratches and abrasion during the progress of the work and afterwards. This risk of abrasion is with plaster angles a serious matter, and the difficulty of the common rule-joint is sometimes overcome by squaring out the plaster to the edge, and subsequently putting on a wooden saddle-moulding (Fig. 76) cut out of a solid piece, but this device has little to recommend it. For so large a building as a church, the rule-joints have a massive look which is pleasing, so we choose this method of finishing the corners, and leave the lathers to their task, first enjoining upon them to set the laths at least three-eighths of an inch apart, and to break joint every six courses.

Fig. 74.

The weather having now settled to steady cold, it will be necessary to heat the building by artificial means, to prevent the plaster from freezing, which will disintegrate it and cause it to crumble and fall off the laths. Some supervision should be exercised over the stoves or furnaces employed for the purpose, as workmen are incredibly careless and indifferent about the dangers to which they expose the property of other people. The windows must be well closed with boards, and temporary windows inserted.

After the first, or scratch, coat is partly on, the superintendent should endeavor to look behind the laths, to see if it has been well trowelled, so as to press the mortar through the openings and cause it to bend over by its own weight, forming a hook by which the plaster is held to the laths. As this is the only way in which the whole substance of the plastering can be kept on the walls, it is very necessary that ceilings should clinch well over every lath, and walls over every second or third lath. The scratching should be thoroughly done, as it affords the key for the second coat, and there should be no appearance of tufts of hair, which would show that the mortar had not been thoroughly mixed.

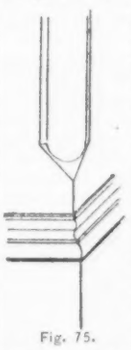


Fig. 75.

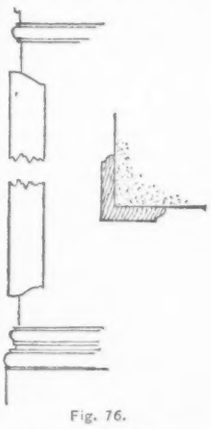


Fig. 76.

Care should be taken to see whether the specification directs that the plastering shall be carried to the floor everywhere, or only to the grounds.

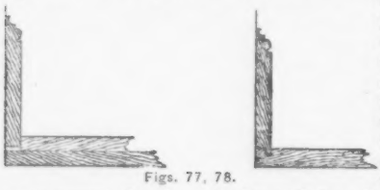
It is so habitual with builders to plaster only to the grounds that they frequently overlook the directions which require a better mode. Of course it is unnecessary to carry the hard-finish behind the wood-work, but the first two coats should be required, if any plastering in that position is specified.

By the second, or brown, coat, all the surfaces must be brought to a true plane, the angles made straight, the walls plumb and the ceilings level, since no effectual corrections can be made afterwards. The wall-spaces in the interior of the church are so broken that no great care is required to obtain a true surface, and we may content ourselves with a close examination of each, to detect irregularities and tufts of hair, which will make unsightly spots in the finished work. The brown coating must on no account be allowed to begin until the first coat is thoroughly dry. Men accustomed to two-coat work, in which the first coat is often only superficially hardened when the second is put on, frequently treat three-coat work in the same manner, thereby weakening or sometimes ruining the whole. If part of the walls are to be plastered on brickwork, and others on laths, the scratch coat is put only on the laths, and when this is dry, the brown coat is spread over the whole, including the brickwork.

After the brown coat is dry and hard, the rule-joints at the angles should first be made, and the hard-finish then applied. This, instead of being mixed with little or no sand, and with a portion of plaster of Paris, as would be proper for a smooth surface, should for our purpose contain a large proportion of rather coarse sand, sifted so as to be uniform in grain, and little or no plaster of Paris, which would set so quickly as to hinder the thorough rubbing with the float which is necessary to bring the sand evenly to the surface.

The plastering once dry, the wood finishing can proceed without hindrance. The superintendent must henceforth devote himself conscientiously to the study of the detail drawings as they arrive from the architect's office, and endeavor to forestall any slight mistakes or misfits, which are sure to happen through the unavoidable variation of the finished work from the exact dimensions shown on the plans. If a panelled wainscot is shown, he should measure on the spot the lengths of the various portions of wall to which it is to be applied, and compare them with the drawings, spacing off the panels as shown in the details, so that there may be no awkward want of continuity, or disproportionate members at the angles. The stock for the wood-work must also be looked after. A load of hard-wood lumber inevitably contains a large percentage of worm-eaten, stained or otherwise defective pieces, which must have the defects cut out in working them up, and a sharp eye is needed to see that this is done, — that a piece of black walnut streaked with white sap is not put into an out-of-the-way panel, or a knot cut out and a patch inserted in another place, where it may be unobserved while fresh from the sand-paper, but will grow more conspicuous afterwards. Any carelessness or want of decision on the part of the superintendent is apt to be taken advantage of.

Generally, where the floors are double, all bases and wainscotings and other "standing finish" are put on before the upper boarding is laid. In this way the base-boards, which extend half an inch or more below the surface of the upper boarding, which is laid up against them, can shrink, as they are certain to do more or less, without opening a crack between them and the floor, and no care is needed in fitting them to the floor (Fig. 77), while with a single flooring it is customary either to "scribe" the base to the boards, so as to fit minutely all their irregularities, which answers well enough until the shrinkage of base and floor-beams draws them apart; or to plough the base laboriously into the boards (Fig. 78). In our building we follow the former course in all parts except the chancel, whose tiled surface cannot well be fitted against the wood-work. As tiles and marble are easily injured by the operations of workmen, we will wait as long as possible before undertaking this portion, carrying the nave nearly to completion before touching the chancel at all.



Figs. 77, 78.

When all the wood-work in the nave is finished except laying the upper floor, the marble steps at the chancel entrance may be set upon the brick wall built up to receive them.

The young superintendent should be familiar, from observation and comparison at some good marble-worker's, with the appearances which characterize the different qualities of marble: in this way only can he judge with certainty whether the proper kind of material is furnished. Often pieces of marble whose appearance is injured by obtrusive spots or streaks are sent instead of the best quality, under the pretext that there is nothing better, and sometimes even a coarse, soft Vermont marble, streaked with a blue somewhat resembling the Italian, is palmed off on a contractor in place of it, but the inferior kind can easily be distinguished by its coarse grain, and the yellowish cast of the white portions.

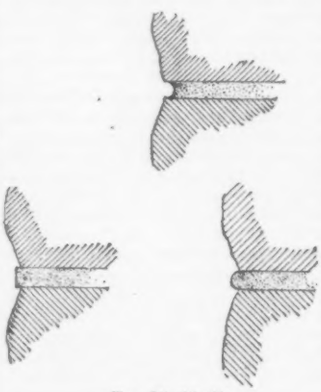
As soon as the steps are accurately set, they should be protected with boards, and the laying of the tiles may begin. For convenience in building, an under floor has been laid over the chancel, as well as the nave and aisles, and this rough flooring should now be taken up, sawed into short pieces so as to fit between the beams, and these pieces laid in, on strips previously nailed to the sides of the beams.

The best, and the only durable, way of laying encaustic tiles on a floor framed with wooden beams is to make the foundation for them of bricks set edgeways on the short pieces of board between the beams, but to save material the bricks are sometimes laid flat, though the result is much inferior. In our case the proper mode is specified, and it is only necessary for us to make sure that the strips or "fillets" are nailed on at the proper distance from the top of the beams, a matter about which workmen are very careless.

The tiles are from $\frac{1}{2}$ to $\frac{5}{8}$ of an inch thick, and to ensure a continuous but thin bed of cement between them and the brick, the top of the latter should be $\frac{3}{4}$ of an inch below the line of the finished floor. The brick to be used may measure from 3 to $4\frac{1}{2}$ inches in width, according to locality, so we try those on the ground, and find them to vary from $3\frac{1}{2}$ to $3\frac{3}{4}$ inches. The maximum width must be taken, which added to the $\frac{3}{4}$ of an inch for tiles and cement gives $4\frac{1}{2}$ inches depth from the finished floor to the boarding, or, as the boarding is $\frac{7}{8}$ of an inch thick, $5\frac{3}{8}$ inches from the finished floor to the top of the fillet. The beams should stand in the same relation to the tiling as they would to a wooden floor of double boarding, in order to avoid a disagreeable break between the chancel floor and that of the adjacent robing-room, and as each portion of the double flooring is $\frac{7}{8}$ of an inch thick, the whole distance from the finished floor to the beams will be $1\frac{3}{4}$ inches, which being deducted from the distance last found will give $3\frac{5}{8}$ inches as the proper gauge from the top of the beams to the top of the fillet. A thorough understanding of this matter will save much subsequent annoyance and expense in cutting off brick which are too high, or concreting up from a surface set too low.

It is better and much more economical to have tiles laid by the parties who furnish them, and contracts are generally made for the floor complete, but cases may occur where the local masons will be called upon to do the work. In such cases the brick surface must be swept clean and *thoroughly wet*, and the tiles must be soaked in water for some time before they are used. Without these precautions, either the brick or the tile will absorb water from the thin layer of cement between them, making it powdery and useless. The best Portland cement only is suitable for use — the American brands, if fresh, being quite equal to most of the English as generally found in our markets — and is to be mixed rather thin, without any addition of sand. The pattern must be commenced *from the centre*, which is to be very exactly ascertained by previous measurement, and straight-edged strips of board should be put down as guides for each day's work, not only for regulating the lines of the pattern, but also for securing a uniform surface, which is done by first levelling them carefully, and setting the tiles by means of a straight-edge resting on the strips. Each tile is set in a bed of cement spread for it, and beaten down to the proper point with the wooden handle of the trowel. After a sufficient number have been laid, the joints may be grouted with liquid cement, which must, however, be immediately wiped off the surface of the tiles, since it is difficult to remove it when dry.

If the cement is good, the tiles cannot, after a few days, be removed without breaking, so that too much care cannot be exercised in placing them properly at first. When the pattern reaches the edge it is usually necessary to cut many of the tiles. This can be done by soaking them well in water, and then scoring a line with a sharp chisel where the separation is to be made; then placing the chisel exactly on the line, a sharp blow will divide the tile neatly. Wide chisels should be used, and unless the tile is well soaked, it is apt to fly into fragments.



Figs. 79, 80, 81.

After the floor is done, it is covered with sawdust an inch or two deep, and planks laid over it to walk on. The base-boards and wainscoting are then fitted down upon it. The marble tiling is laid in the same way, on bricks set on edge, but the marble is thicker, usually varying from seven-eighths to one and a quarter inches, the under side being quite rough; and the fillets should be set accordingly. The laying is much easier than that of clay tiles, and mortar of cement, lime and sand in equal parts may be used.

By the time our building has reached this point, spring has advanced, and the warm, moist days of May present the best possible opportunity for pointing and cleaning down the exterior of the stone-work. The brownstone ashlar will look best if pointed with mortar of nearly the same color as the stone, which can be made by mixing burnt umber with the cement used. The best Portland cement is preferable to any other, and is to be thoroughly mixed with an equal bulk of sand, and such coloring matter as may be required, but with only just water enough to give the compound a mealy consistency. The old mortar is raked out of the joints to a depth of an inch, or if, as is likely, that in the upper part is found to be frozen and powdery for a greater distance inward, it should be completely removed as far as the freezing has extended; then the pointing mor-

tar is inserted and strongly driven in with a steel jointer or S-shaped instrument, rubbing it until the moisture is squeezed out upon the surface. The tool is formed to mould the edge of the joint in various ways as it is rubbed. The most durable form is the hollow (Fig. 79), but the half-round (Fig. 80) is often used, as well as the fillet Fig. 81). In the two latter the mortar is less thoroughly compressed, and the projecting part may fall off.

The cleaning down is done with muriatic acid and water, applied with a sponge, and followed with pure water. This removes the lime stains, and leaves all neat.

The subsequent operations in the church, such as painting, glazing, and decoration, can best be studied in connection with other constructions in which they play a more important part.

PART II. — THE SUPERINTENDENCE OF DWELLING-HOUSES.

One of the most difficult portions of an architect's business is precisely that which amateurs usually imagine to be the easiest, — the superintendence of the work connected with dwelling-houses. It is natural to suppose that an intelligent householder, who has spent a large part of his time for years in observing the defects in his own habitation, and comparing it with those of his neighbors, would find no difficulty in directing the construction of a similar building, but experience soon shows that the knowledge which most persons have of the structures they live in is a very superficial one, consisting in the observation of results, rather than of the processes by which the results are obtained; so that the amateur house-builder is apt to find himself quite at fault in endeavoring to give the necessary preliminary directions for securing the particular objects of strength, durability, healthfulness, appearance or finish which he had most at heart. Nevertheless, it is often necessary, and always desirable, that unprofessional persons should be able to direct the operations of mechanics, and make contracts for various kinds of work, and it is hoped that the suggestions contained in the following pages, although intended primarily for young architects and superintendents, will not be found too technical for the ordinary reader, and that the explanations given with regard to the objects which it is desirable to seek, and the means by which they can be attained, will be found serviceable to the large class of persons who are interested in building, either for themselves or others, as well as to those occupants of houses already built who would be glad to understand more clearly the structure of their dwellings, with a view either to the correction of defects, or the planning of improvements. The point in which amateurs are particularly liable to fail is the choosing of a proper site, and as even experienced architects are not always successful in this respect, a few directions in regard to the placing of houses upon the ground should not be omitted.

Determining Location.

In all cases it is essential to determine the position approximately before the plans are begun, in order that the building may be so arranged as to present an agreeable appearance from the neighboring streets, securing at the same time the greatest pleasantness of prospect from the windows, with the most cheerful light and sunshine in the rooms, that the situation can be made to yield. In our climate, the best aspect for the windows of living-rooms, particularly of bed-chambers, is south or south-east. Such rooms are warm in winter and cool in summer, and cheerful at all seasons. Next to a southern exposure, the eastern is the pleasantest, and may be appropriated for dining-rooms, which will thus enjoy the advantage of the early morning sunshine, with coolness during the rest of the day. Between the western and the northern aspect there is little to choose; the cheerlessness of the one is hardly more objectionable than the heat, on summer evenings, of the other, so that these sides of a dwelling-house should, as far as possible, be given up to inferior rooms, halls and stairways. Of course, considerations of prospect and position with respect to the approaches must affect the plan more or less, but the skill of the designer will be shown by the success with which he contrives to satisfy all the requirements at the same time.

Aspect.

Other points will, however, claim the attention of the skilful architect, besides the more obvious ones of situation and exposure, and the final staking out of the building should never be attempted until they have been thoroughly considered. Foremost among these is the character of the ground, — whether wet or dry, springy or well-drained. The only certain test of this consists in sinking pits at different places, to the depth proposed for the future cellar, or a little below, if the trials are made in the dry season; but indications may be found in the conformation of the surface. Depressions, or level spots hemmed in by ledges of rock, or elevations, even slight ones, generally retain water near the surface. The ridges which enclose the basin may be at some distance, but the effect will be the same. The upper part of hill slopes, also, contrary to the common notion, is very apt to be wet and springy, while rocky regions seldom furnish dry cellars unless unusual precautions are taken.

Character of Ground.

ARCHITECTURE AT COLUMBIA COLLEGE.

At the request of the Trustees of Columbia College, Professor Ware has addressed to them the following memorandum as to the proposed course of architecture in the School of Mines, which we reprint from the College Catalogue: —

The chief difficulty in the study, as well as in the practice, of architecture is its many-sidedness. There is hardly anything which, in theory, an architect should not know. In the practice of the profession, of course, every man simplifies the problem for himself, by devoting himself mainly to one side of the subject, one distinguishing himself chiefly in design, another in practical affairs, a third in the applications of science to the art. But a school cannot so narrow its range, and although, in fact, the French courses of study are mainly artistic, and the German scientific, and the English practical, they all, from this very fact, fail to furnish the model we should wish to follow.

The problem before us in this country is to devise a course of study so carefully adjusted that the practical, scientific and artistic studies may receive equal consideration. Ultimately, after he gets out of school, the student will prosecute his studies in one way or in another, as the bias of his mind may determine, and he will have plenty of time for this. The period of pupilage lasts, for the architect, until he is thirty years old, for though he is able to support himself before that time, he is not, till then, in general, ready to take an independent position. Up to that time he is in the attitude of a student. If this is the case already, with young men whose training is accidental and imperfect, it will certainly be true of the thoroughly educated men which it is the object of a first-rate school to produce. All the time they can gain, through better adjusted means of study, will be needed for the exploration of the wider field opened to them. The time spent at school is then not more than a third or a half of their term of professional preparation; and it should be spent, it seems to me, first in learning good methods of study and of work, and then in the acquisition of a minimum of knowledge and skill in each of the three departments I have indicated, not neglecting, at the same time, the languages and literature. But these studies should I think, for professional students, be directed along special professional lines, and made to co-operate with the critical and historical work of the professional course.

A considerable restriction of the range of study would, of course, be imposed by the number of branches to be taken up. The student of architecture cannot, for instance, follow the full course of scientific construction taken by the student of civil engineering, and have any time left for the artistic and practical studies which are, after all, the distinctive characteristics of his work. But it is also necessary to limit the range of school-work in order that what is learned may be made so familiar that it can never be forgotten. The main principles of scientific construction, for instance, and their applications in practice, should be so reiterated and enforced as to seem matters of course, so that they may not lie in the mind as something external to it, likely soon to drop away, but may be thoroughly assimilated, instinctively controlling the judgment and informing the common-sense. Then the student whose later studies lie wholly in the field of design will spontaneously conform to the requirements of construction, and the student who gives himself mainly to practical affairs will comprehend and adapt himself to the requirements of design. Later in life two such men can comprehend each other's work, as can never happen where the mere engineer and the mere designer try to co-operate with each other.

How the artistic and historical studies of such a course had best be conducted is not a very difficult question. The experiments we have here been trying, partly founded upon the example of the Schoo of Fine Arts in Paris, very well indicate, both in their successes and through their failures, how the elements of architecture, as an art of design, may be systematically taught, and with what illustration, of theory and of historical examples, they may conveniently be accompanied.

The scientific side of the subject is not so easily disposed of. The principles of scientific construction are, of course, the same for the architect and for the engineer. But the student of architecture is at a disadvantage, compared with the student of engineering, both in understanding them and in applying them. All the text-books are written from the point of view of the engineer, all the examples relate to engineering work. When the engineer gets through his studies and takes up the practice of his profession, he finds himself quite at home, his mathematics and mechanics having made him quite familiar with the field, in advance. The applications of science to his art are already familiar to him. The student of architecture, on the other hand, finds a great gulf fixed between the region of scientific studies and the world of his professional life. His statics and dynamics seem unrelated to his daily problems. The subject-matter is the same, but the point of view is different, and unless he is distinctly of a scientific and engineering turn of mind, — which he had better not be, in most cases, — the task of establishing a connection between the two will be beyond his powers.

What is needed in a course of architectural education is, that the scientific studies necessary to an architect shall be pursued, throughout, from an architectural point of view; that the chemistry, physics and mechanics should at every turn have their bearing upon the arts concerned in building clearly pointed out. Whether this can best be done by simply furnishing special examples and applications, by way of notes to the ordinary text-books, or by more specialized courses of scientific study — this is one of the questions which is waiting to be answered. If the answer were obvious, experiment and investigation would not be needed.

The third point to be made in a satisfactory scheme of architectural study, though more novel, perhaps, presents fewer difficulties. This is the study of practical matters, of the arts ancillary to architecture, the arts of the plumber, painter, mason, plasterer, etc.

It is not necessary that an architect should be a skilful workman at these trades. But he does need to understand them, technically, and to be a good judge of work in each. At present it is difficult for a student to learn, in any way that is possible for him to remember them, even the elements of such knowledge. Office life, of necessity, gives him but little opportunity to accomplish himself in these respects. The only way to secure this seems to me to be by means of a properly organized laboratory, in which the principles of these arts can be learned by handling the tools, nor can I doubt that what is thus learned will be easily remembered. Such a workshop need not be expensive either in its equipment or in its administration, and it would do more than anything I can think of to strengthen the profession in what is now its weakest point, — and it is to improve the profession that schools of architecture are founded.

The question is sometimes raised, whether, architecture being counted among the fine arts, it does not belong in a school of art rather than in a school of science. But if a thorough and comprehensive course of study is to be established, a school of science seems the most convenient place for it. Two out of its three branches are certainly more germane to scientific pursuits than to painting and sculpture, and it is easier and cheaper to add the apparatus needed for the study of elementary design to a school of science, than to bring the work-rooms and laboratories of a school of science into a school of art. Still, it needs to be distinctly recognized that the atmosphere of exact science is unfavorable to the growth of the artistic sentiment; and that in temper and methods a school of architecture must always be, so far as relates to design, at least, not quite at one with the purely practical schools with which it is associated. It must accordingly require special pains to create for it an atmosphere of its own, favorable to the harmonious development of its own students.

W. R. Ware.

Boston, March 5, 1881.

THE NEW FRENCH SYSTEM FOR THE CONSTRUCTION OF HOSPITALS.

The effort to substitute small isolated structures as hospitals for the monumental buildings of the past has at last received in France practical sanction as well as theoretical support. In spite of the antagonism of private interests and the force of routine, the new system has been adopted for military and civil purposes at St. Denis, at Courbevoie, by the Paris Municipal Council, by the Eighth Army Corps at Bourges, at Autun, at Cosne, Macon, Montpellier, etc. The idea of isolated small structures of only one story instead of large hospitals was first advocated in France by M. Le Roy, in a paper submitted to the Royal Academy of Sciences in 1777. The first application on a large scale of this principle was during the Crimean War, when in some instances the patients were separated as much as possible. The experiences during the War of Secession and during the Franco-Prussian War clearly demonstrated the advantage of tent and cottage hospitals. The deaths after surgical operations in these hospitals during the American war amounted to 34 per cent, while during the Crimean War in the old-fashioned hospitals the French lost 74.8 per cent of the soldiers who had undergone surgical operations.

The method of construction which is now generally adopted in France, wherever the new principle is admitted, is known as the *système Tollet*, and was patented by M. Tollet, a distinguished engineer, Knight of the Legion of Honor, etc. This gentleman has sought to build in harmony with the laws of hygiene rather than merely in keeping with some special school of design; he has realized that the object of a hospital is not to ornament a town, but to cure its inhabitants; that its sanitary qualities are far more important than its monumental appearance. We need not trace the well-known arguments which would lead a person actuated by these principles to propose small cottages or pavilions standing well apart and surrounded by free currents of air, for the re-introduction of which the *Builder*, in the first instance, did so much; but it is essential to inquire in what the Tollet system differs from the English cottage-hospitals or the wooden huts of the American civil war.

The first important difference is in the form adopted. The great object was to expose as large a surface as possible of the hospital to the purifying influence of the external air, and as little as possible to the contaminating influence of the internal air. For this purpose cross-beams, angles, ceilings, and numerous floors, garrets, and staircases should be avoided where practicable. A vaulted roof would not present the same multiplicity of angles as a flat roof or ceiling, where the corners cannot be readily reached by the currents of air and by the scrubbing-brush. But the choice of the right curve was a puzzling problem. The full-centre arch, the circular arch, the ellipse, the depressed arch, would all give a curve that is too flat in the upper part and too vertical in the inferior half. This would make the introduction of a "*matelas*" of air of even thickness a matter of some difficulty, and also the traction would necessitate the placing of rafters across the vaulted roof to prevent the spread; but rafters would not only increase the cost of the structure, but also the amount of material employed and capable of absorbing injurious emanations and of harboring dust and dirt, while reducing by their presence the space for air in the wards. All these objections led to the ultimate adoption of the ogival or pointed arch. The framework of the hospital is made of iron girders or ribs, placed at a distance of four feet from each other, meeting at the point of the arch. The peculiar shape of the girder gives the iron double the resisting power it would otherwise possess; and, this being the case, it does not matter of what substance the wall is made, so far as its durability, or rather its strength, is concerned. For field ambulances the intervening space is filled up with wooden planks, which can be burnt each time there is a change of quarters, thus reducing the chances of infection and the weight of the materials to follow in the wake of the army, both these advantages being of the greatest importance.

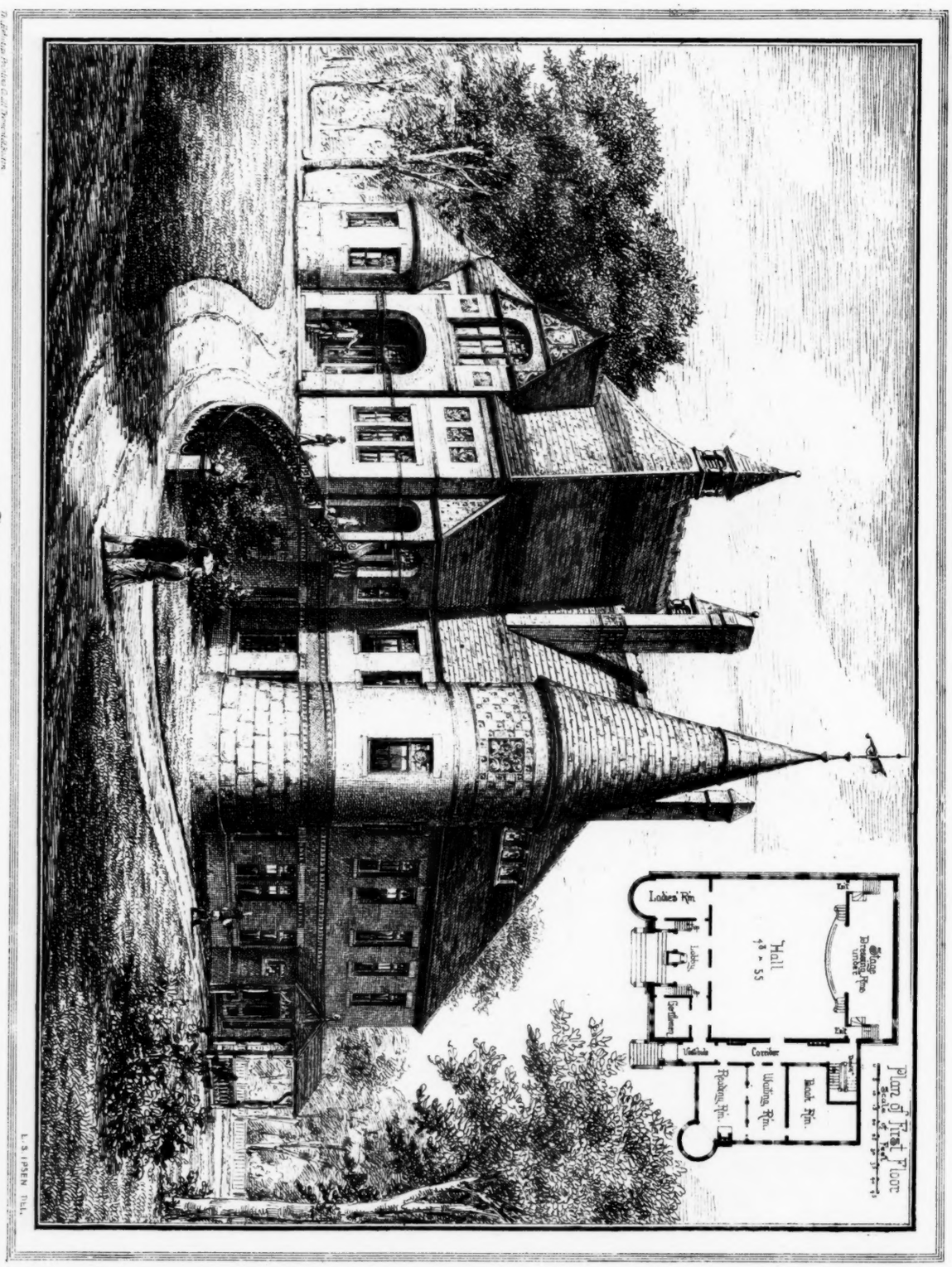
Where the hospital is to be of a more permanent character, bricks or stones are used. The most important hospital of this description is that of Bourges, which holds 220 beds. It is situated on a gentle slope, and covers six hectares and fifty ares of ground (about fifteen acres). This is equivalent to 2,582 square feet of land per bed, whereas the new Hôtel Dieu of Paris will only give 386 square feet of land per bed if it is to hold 600 beds, and 290 square feet if the full complement is to be 800 beds. The Bourges Hospital consists of twelve one-floor ogival pavilions, erected at a distance of 52 feet from each other, the principle being that the intervening space of open air or garden should be twice as wide as the structures are high. These pavilions are divided into two rows, and the garden separating the one row from the other is about 164 feet wide, while the amphitheatre, dead-house, etc., are erected at a still greater distance. The pavilions measure 120 feet in length by 26 feet in width, and are raised about 5 feet above the earth. They contain 28 beds, nearly 4 feet being allowed between each bed, and more than 9 feet between the two rows of beds. Altogether each individual has 57 cubic metres of space, though in the American hospitals the space allowed barely exceeded 40 cubic metres, and 27 cubic metres were considered the minimum.

The outer surface of the wall of this structure is allowed to retain its porous character, as pure air only plays upon it. Between the vaulted roof and the outside covering of tiles there is a "*matelas*" of air eight inches wide, and the bricks employed for the wall are perforated, so that a current of air passing within the wall excludes the damp and modifies the excess of cold or of heat. The inner surface of the wall is covered with silicate, so that it is rendered smooth and non-porous; it can, therefore, be washed with an antiseptic solution, or, better still, it may be daubed over with petroleum and scorched by its flame. The building is made exclusively of non-combustible materials, and vapors condense on the walls, run down the side, but do not sink into the pores, where the organic matter is prone to ferment. The floor at Bourges is made according to the Gourguechon patent, of wood, thoroughly covered with a bituminous substance, so that the hospital dust cannot sink in, — an important consideration when we remember that this dust has sometimes been found on analysis to contain thirty-four per cent of organic matter.

One of the leading advantages of the ogival form is the facility it affords for the complete ventilation of the hospital. In winter the warmed air naturally rises to the point of the arched roof, where there is a ridge that can be opened running along the entire length of the pavilion, and communicating with cowls placed at short distances one from the other, which draw off the air when the ridges are closed. There are numerous large windows on both sides of the pavilion, and above them small louvre windows, that can be readily opened by a rope. The doors at each end of the pavilion are surmounted by a *rosace* that helps to ventilate in a longitudinal direction whenever the course pursued by the wind renders lateral ventilation not so advantageous. The ridge at the point of the arch is four inches broad, runs the whole length of the building, and is divided into sections of about fifteen feet each. One or all of these sections can be opened by means of ropes, thus allowing an outlet for the vitiated air at the apex of the arch, where it would naturally ascend. The air is admitted by small apertures pierced both below the beds and at some elevation above them, and is drawn in by the heat of the stove in winter. A space of five feet underneath the floor of the pavilion also admits of all manner of experiments in respect of ventilation, as here the air can be collected, cooled or warmed, moisture added, or it can be charged with medicated vapors.

At the end of the pavilion, facing the entrance, there is a door that communicates with a little *annexe*, which is severed from the main building by a covered passage, open on both sides, and about nine feet long. Here are the closets, communicating with a tub placed in the open air immediately below. The sides of the tub are provided with a spongy substance, soaked with a disinfectant, so that the matter received is at once purified. Near to the tub, and also in the open air, under this *annexe*, is a little cart, which receives from above the soiled linen, so that it is at once removed from within the walls of the hospital. The main building, or pavilion, apart from the dormitory with its twenty-eight beds, contains on each side, on entering, a small separate room, the one for the nurse, the second for any patient it might be desirable to keep isolated. At the other end of the ward there is a small dining or sitting room, a bath-room, and a small kitchen for making poultices, etc. Such is the Tollet Hospital at Bourges. Each of the pavilions is like its neighbor, excepting the pavilion not built for the patients, but for the administration offices, pharmacy, kitchen, etc. With some slight modifications, the same system has been adopted throughout. There now remains to be seen what sanitary and financial advantages have been achieved.

It is easy to perceive that the main features of the Tollet system are susceptible of a very wide application. There is even a Swedish



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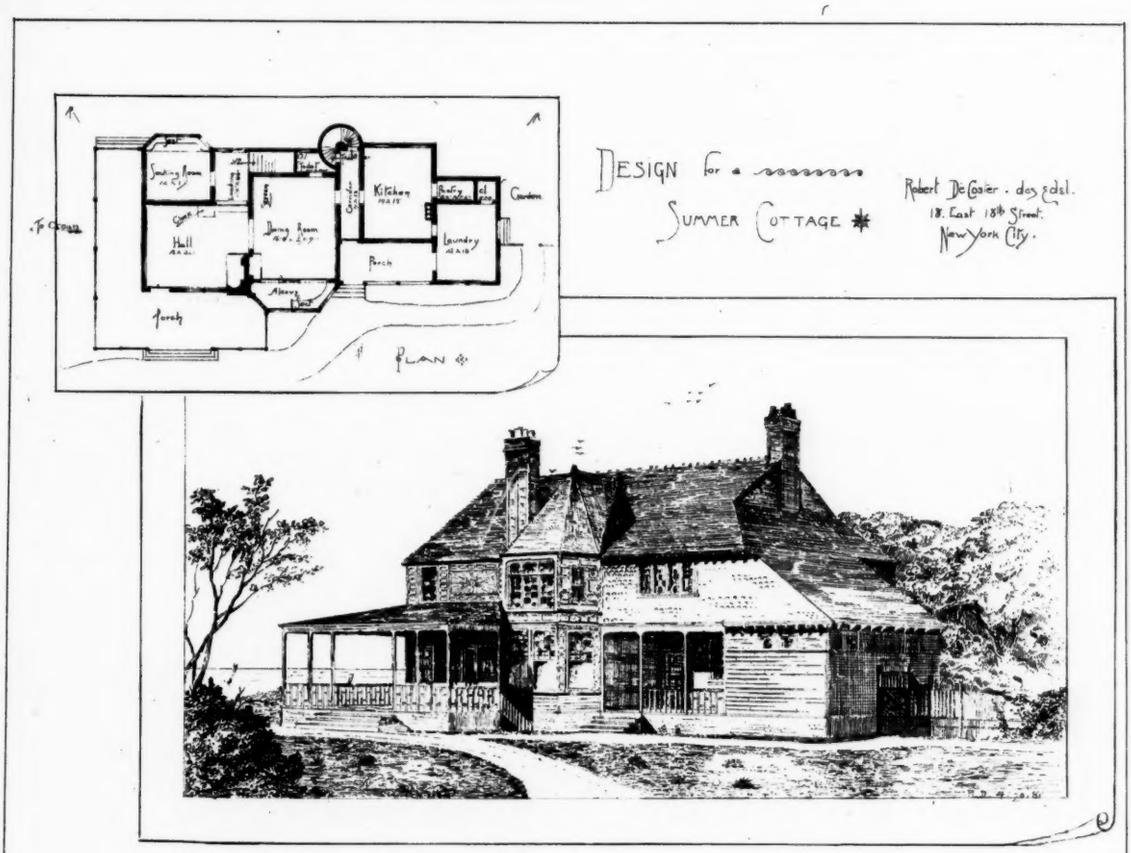
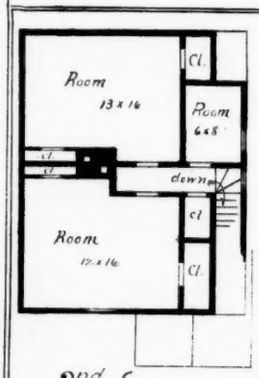


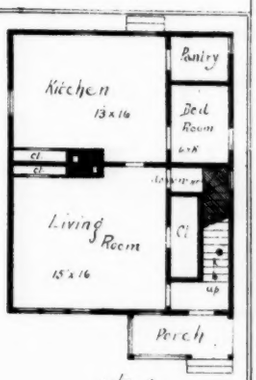
DESIGN for a SUMMER COTTAGE

Robert DeCoster - des. & del.
18. East 18th Street.
New York City.

Low priced Cottages
at Fairmount N. J.

Rossiter and Wright Architects





SIDE ELEVATION

FIRST FLOOR PLAN

SCALE OF FEET FOR PLANS AND ELEVATIONS

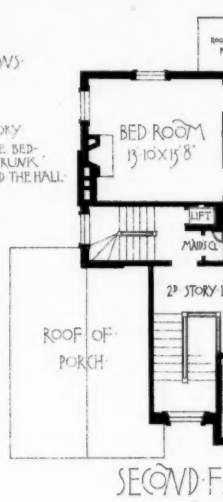
40

20

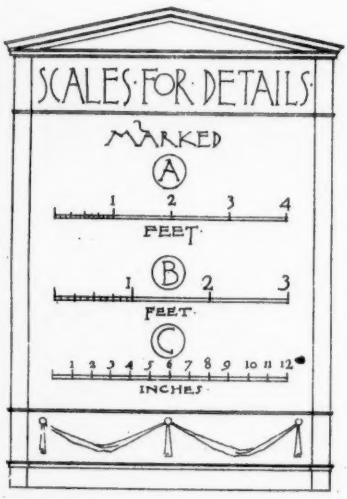
10

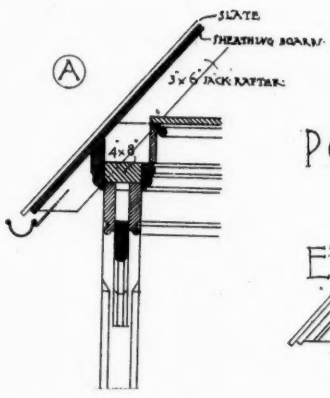
IN BASEMENT IS THE LAUNDRY, STORE-ROOM, FURNACE &C.

IN 3D STORY ARE THREE BEDROOMS, A TRUNK ROOM AND THE HALL.



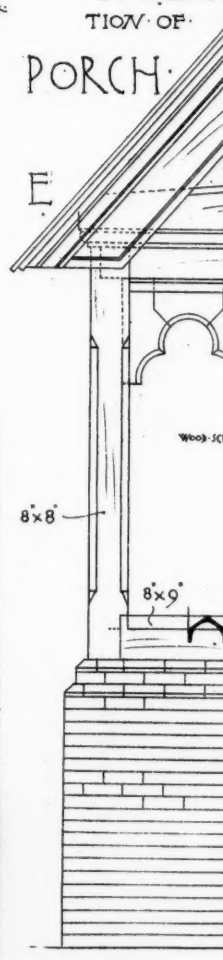
SECOND F





SECTION AT E.

PART ELEVATION OF PORCH E



WHITE BRICK IS USED IN FIRST STORY WITH RED BRICK FOR JAMB HEADS AND SILLS AND TILE IN BAND. STORY DARK BLUE SLATE ON ROOF. ALL THE OUTSIDE WOODWORK IS PAINTED CHOCOLATE COLOR IN TWO TINTS RELIEVED WITH INDIAN RED.

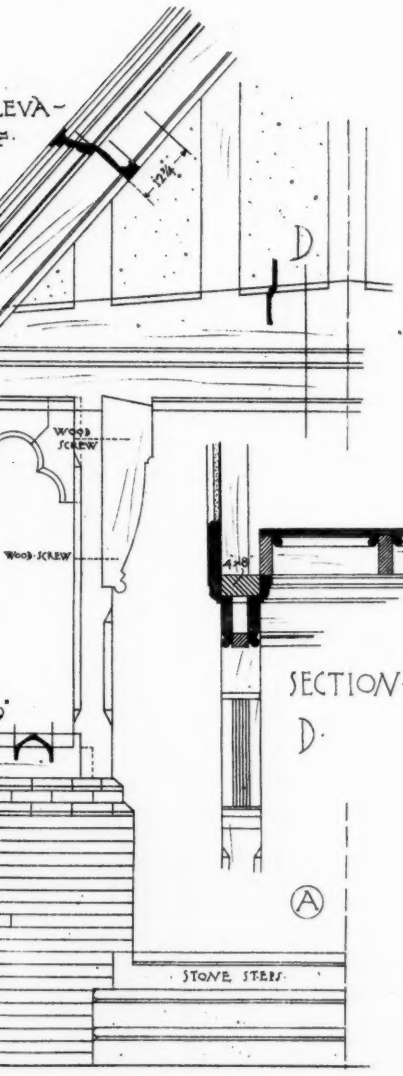
PERSPECTIVE VIEW

DWEL

PENN R

REAR ELEVATION

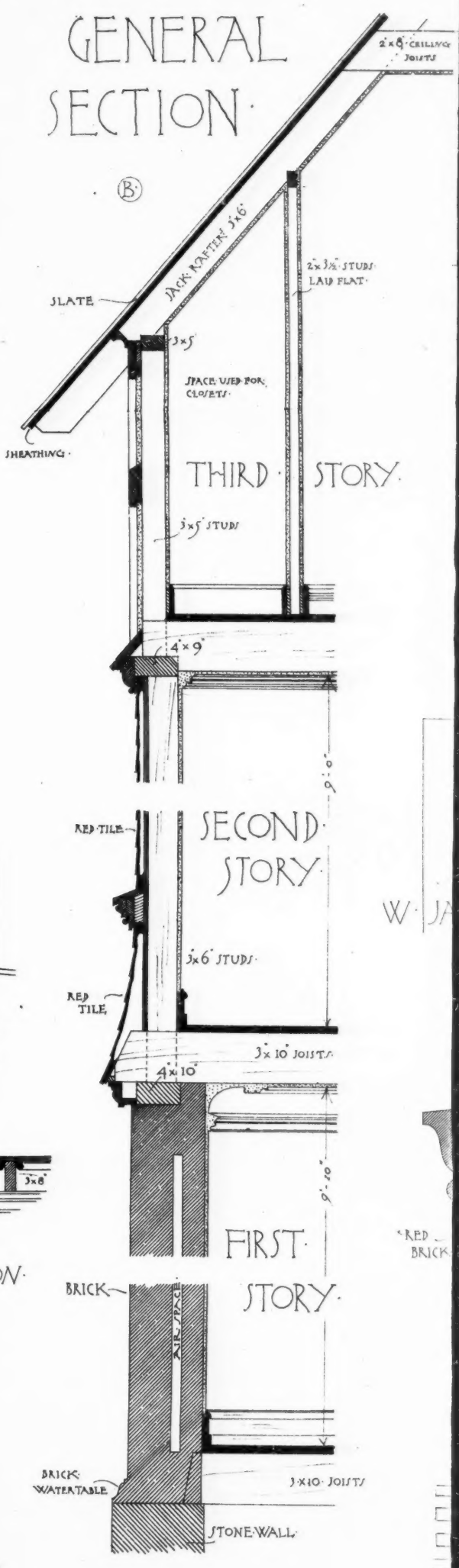
VD FLOOR PLAN



SECTION D

GENERAL SECTION

(B)



W JA

RED BRICK

ELLING WAYNE STATION

N.R.R. W. BLEDDYN POWELL. ARCHITECT. PHILADELPHIA

ELEVATION

GENERAL SECTION

(B)

2×6 CEILING JOISTS

JACK RAFTER 3×6

SLATE

2×3½ STUDS LAID FLAT

3×5

SPACE USED FOR CLOSETS

SHEATHING

THIRD STORY

3×5 STUDS

4×9

9'-0"

RED TILE

SECOND STORY

3×6 STUDS

3×10 JOISTS

4×10

9'-10"

4×8

3×8

SECTION D

FIRST STORY

BRICK

AIR SPACE

BRICK WATERTABLE

3×10 JOISTS

STONE WALL

STONE STEPS

(A)

BROWN ROOFING FELT

SHEATHING

RED TILE

GROOVE TO RECIEVE WILSONS PATENT VENETIAN ROLLING BLINDS

POUR STEEL BOLTS THREE EIGHTHS INCHES DIAMETER DRIVEN IN FROM BACK TO PREVENT SILL FROM WARPING

3×6 STUD

RED TILE

BROWN ROOFING FELT

WINDOWS 2D STORY

PEBBLE DASHED CEMENT

FRAMING

2¼ ×6

SER

PO

(C)

PEBBLE DASHED CEMENT

CASEMENT WINDOW 3D STORY

PLASTERING

W JAMB 1ST STORY

POUR STEEL BOLTS THREE EIGHTHS INCHES DIAMETER DRIVEN IN FROM BACK TO PREVENT SILL WARPING

RED BRICK

(C)

SECTION THRO SILL 1ST STORY

FIRST STORY

1½ RADIUS

2 7/8 RADIUS

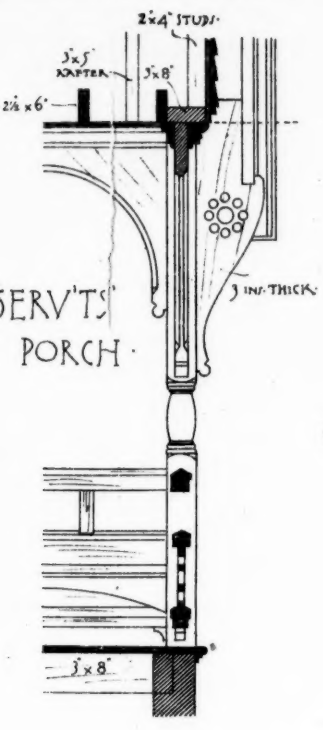
(D)

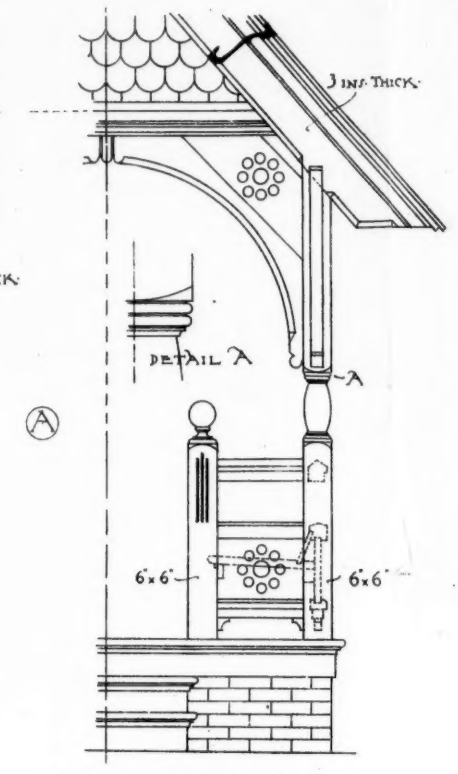
BRICK WINDOW SILL

G WAYNE STATION

W BLEDDYN POWELL ARCHITECT PHILADELPHIA

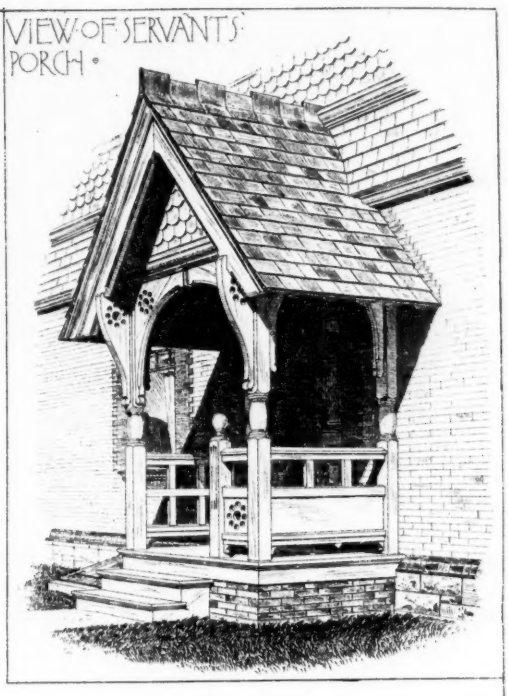
THE HELIOTYPE PRINTING CO 211 TREMONT ST. BOSTON

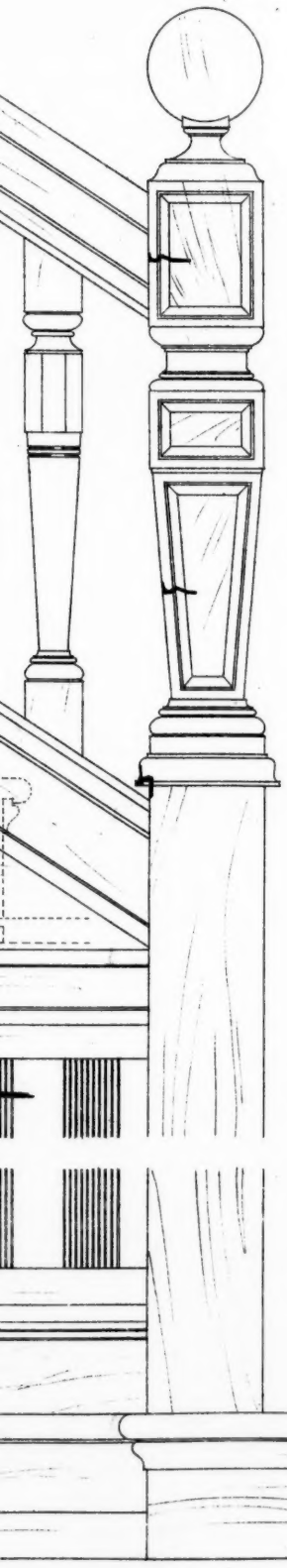


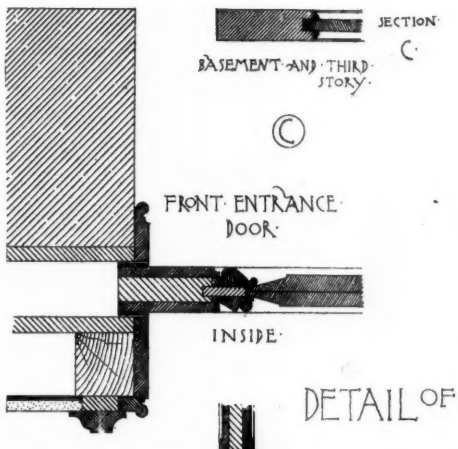


SERVANTS' PORCH

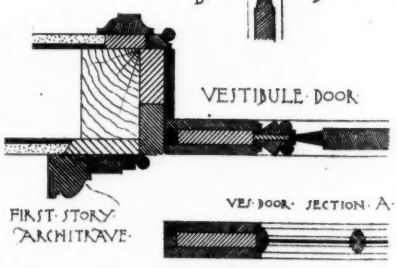
VIEW OF SERVANTS' PORCH

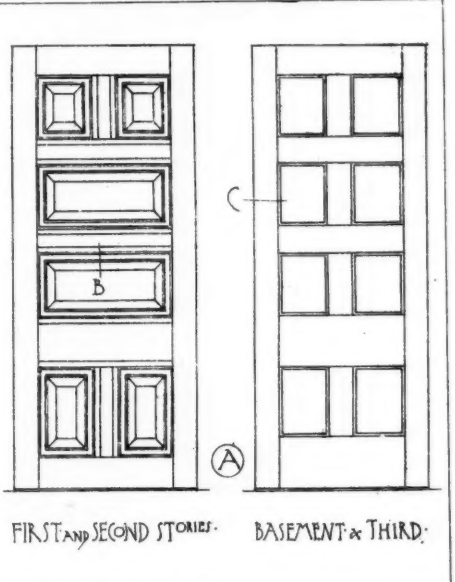




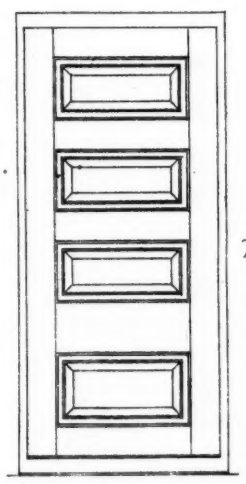


DETAIL OF DOORS



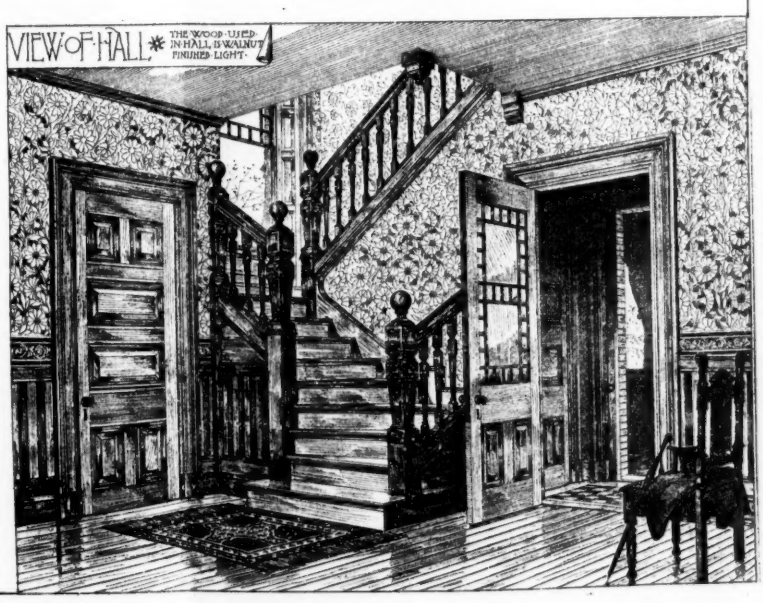


FIRST AND SECOND STORIES
BASEMENT & THIRD



FRONT ENTRANCE
VESTIBULE

STAIR-WAY DETAILS



church built in Paris according to these principles, and its application for stables naturally suggests itself. There are Tollet stables for the French cavalry, but the new method of construction has been most extensively applied in the building of barracks. The sanitary results realized by the Tollet barracks will explain their great popularity. At Bourges there are barracks on the Tollet system for 1,471 men of the Thirty-seventh Regiment of Artillery, where the mortality amounted to 7.6 per 1,000 in 1876, instead of 11.88 per 1,000, the average mortality of this branch of the service during the year in question. In 1877 the deaths were 5.43 for the Tollet barracks, and 10.50 for the other artillery barracks. At Bourges in 1876, there were 468 cases of illness per 1,000 artillery-men, and in 1877 only 428, whereas the proportions per 1,000 for the two years in the other barracks were 552 and 506 per 1,000. At Autun, there are infantry barracks on the Tollet system for 844 men, and at Cosne for 745 infantry. In 1876 the average illness of the French infantry amounted to 528 cases per 1,000 soldiers, but this was reduced at Autun to 136 cases, and at Cosne to the singularly small number of 22 cases per 1,000. During the following year the average sickness of the infantry amounted to 482 cases per 1,000, but at Autun there were only 111 cases per 1,000, and at Cosne 71 per 1,000, and no deaths at either place. Of course it is unfortunate that as yet we have only statistics for two years, still they are sufficiently emphatic to leave but little room for doubt as to the good achieved; nor had any case of typhoid fever occurred in any of the Tollet barracks, though this disease has been very prevalent among the French troops; indeed, the Ninety-fifth Regiment of the line was recently quartered at Bourges, one battalion in the old-fashioned barracks of St. Sulpice, another in the barracks du Grand Séminaire, and the two remaining battalions in the new pavilion or Tollet barracks of Sérancourt. In a short time typhoid fever broke out in both the old barracks; there were thirty cases, and no fewer than eighteen deaths. The twenty pavilions of the Tollet system were within a hundred paces of one of the old barracks, and the soldiers who inhabited them were of the same regiment, and yet not a single case of typhoid occurred among these men!

With respect to diseases of the respiratory organs, the statistics are equally satisfactory. During the two years 1876–77, the number of cases were only equal to 20 per 1,000 at Bourges, Cosne, and Autun, whereas at Dijon and Nevers, where the climatic influences are the same, the proportion was 40 in the 1,000. The diseases of the respiratory organs are most frequent among the regiments quartered in the high lands of the Rhone, the Alps, the Dauphiné, and Savoy. In these districts the statistics show 54 cases per 1,000. With the Thirteenth Army Corps in Auvergne, the figures are also 54 per 1,000; with the Eleventh Corps in Brittany, 50 per 1,000; with the Twelfth Corps in Limousin, 50 per 1,000. The minimum is with the Seventeenth Corps, namely, 31 per 1,000, and the Eighth Corps, occupying the Bourges district, 32 per 1,000; while in the Tollet barracks the proportion is, we repeat, 20 per 1,000. These few figures will suffice to show what important results have been attained, though much more might be said on the subject.

While the reform in the construction of hospitals and barracks has thus insured a great saving in the life and health of the French soldier, it has been equally beneficent to the pocket of the French tax-payer. The hospital at Bourges was designed for 320 patients, and would have cost £112 per bed. But when the works had begun, the scheme was altered, and the number of beds reduced to 220; this caused a considerable increase in the proportionate expense, and the hospital actually cost £144 per bed. The cheapest French hospital is estimated at £180 per bed, with 40 instead of 57 cubic metres of space for each patient; but the cost per bed amounted at Lariboisière to £720, at Ménilmontant to £640, and at the Hôtel Dieu to the fabulous price of £2,400! In the construction of barracks, according to the new system, we are promised an economy of, at least, about 30 per cent.

Under these circumstances it is not surprising that the proposed reforms should have found many warm advocates, and achieved some notable theoretical as well as practical successes. The most recent achievement has been the conversion of the Paris Municipal Council. The necessity of increased hospital accommodation in Paris has long been felt, and the Municipal Council have finally voted a sum of £17,600 for the construction of a hospital according to the Tollet method at St. Ouen. The municipalities of Courbevoie and St. Denis, near Paris, are now constructing hospitals according to the same system. Havre has a similar project in consideration. At Montpellier it was decided to abandon the old central hospital where the *clinique* of the university was held, and to build a Tollet hospital in the outskirts of the town. The same system has been adopted for the engineer barracks at the fort of Corneilles, for the cavalry and infantry at Macon, for the artillery at the fort of Langres, etc.

Abroad the Tollet system has been adopted for the Austrian army, and almost every European power has sent special commissioners to visit Bourges and report on the innovation. In this respect, the Danes and the Russians have been particularly active. The Grand Duke Constantine, in person, conducted the inquiry, and has had many lengthy interviews with M. Tollet. The time has, therefore, come when English sanitary reformers should take further note of what is occurring among our neighbors in this very intricate and important question.[1]— *The Builder.*

[1] In connection with this subject reference may be made to the illustrated account of the Sturges Pavilion, Bellevue Hospital, New York, — *Builder*, Vol. XL., page 68, etc.

THE ILLUSTRATIONS.

TOWN-HALL AND PUBLIC LIBRARY, BELMONT, MASS. MR. H. W HARTWELL, ARCHITECT, BOSTON, MASS.

BESIDE the hall, ante-rooms, and stage, the library and reading room, this building contains, in the basement, rooms for the various town officers, with a fire-proof vault in the base of the tower. The materials of the walls are brick and terra-cotta; interior to be finished in brown ash; cost of building, about $40,000.

HOUSE AT WAYNE STATION, P. R. R., PA. MR. W. BLEDDYN POWELL, ARCHITECT, PHILADELPHIA, PA.

DESIGN FOR A SUMMER COTTAGE, BY MR. ROBERT DE COSTER NEW YORK, N. Y.

LOW-PRICED COTTAGE, FAIRMOUNT, N. J. MESSRS. ROSSITER & WRIGHT, ARCHITECTS, NEW YORK, N. Y.

LEGAL NOTES AND CASES.

Real Estate. — Building. — Fixtures.

A DWELLING-HOUSE was occupied as a residence, and used also as a saloon, and there was erected on one side of this main building, and next to the saloon, to be used as a dancing-hall, a building thirty-two feet square. The sills were fastened together at the ends with nails or spikes; the studding was fastened to the sills in the same way, and four or five feet apart, and on the top of the studding the plate were fastened likewise. The sills and plates were thirty-two feet in length, and two by eight or two by ten inches square. The sills rested in part on the ground, and in part on cedar posts set in the ground. A floor was laid over the whole space, in the centre of which stood a post eight feet high, and six by eight inches square, from the top of which extended four rafters to the plates. The roof was intended to be square and four-cornered, and consisted of brush. There was no space between the buildings, and in it were constructed seats for the musicians, twelve feet long, upon cross pieces fastened to both buildings, and a door was intended to open from the saloon into the dancing-hall. It was in an unfinished condition, but used for the purpose intended; and it was intended to be made more complete and permanent, and to permanently remain, to be used in connection with the main building for domestic purposes, and in connection with the saloon-business as a dancing-hall. The building was levied upon as personal property, and taken away by the sheriff. The owner then sued the sheriff, and the court said: "The testimony on behalf of the defendant as to the frail character of this building, and the testimony offered by him, and rejected, as to similar structures and how they were regarded, do not in the least militate against this statement of the evidence. From the character, situation, and intended uses of this building, as disclosed by this evidence, there can be no question that it was affixed to the soil and is a part of the realty. By the current of authorities it has all the requisites to make it such. It was constructed by the owner of the land. It has sufficient actual physical attachment to the main building and the soil, and was intended to be permanent, and to be always used, not only with the main building, but for similar purposes, and not intended ever to be removed. To support this ruling, I need only to refer to some of the late decisions of this court, and in cases where the facts were not nearly as conclusive as in this case, and yet the constructions were held to be fixtures and not personalty. *Huebschman vs. McHenry*, 29 Wis., 655; *Kimball vs. Darling*, 32 *Ibid.*, 675; *Jenkins vs. McCurdy*, 48 *Ibid.*, 628; and *Taylor vs. Collins*, 8 N. W. Rep., 352." *Lipsky vs. Borgman*, Supreme Court of Wisconsin, May 10, 1881. H. E.

Damages. — Specific Work at Fixed Price. — Breach of Contract.

The rule of damages for the breach of a contract for a particular piece of work to be done at a specified price is the loss of the profit which would have accrued upon the performance of the work, and not the difference between the contract price and the sum earned by the contractor at other work during the time he would have been employed on the work under the contract. *Nelson vs. Morse*, Supreme Court of Wisconsin, May 10, 1881. H. E.

Street Grading. — Surface-Water. — Storms.

A municipal corporation in making grades and gutters to carry off surface-water is not bound to lay them so that they will protect the surrounding property against extraordinary storms. All the city is obliged to do is to prepare the grades and gutters so that they will carry off the ordinary flow of surface-water. *Hoffman vs. Junk*, Supreme Court of Wisconsin, June 14, 1881. H. E.

Patents. — Preliminary Injunction. — Decree by Consent.

A preliminary injunction was applied for to restrain the defendant in a suit for the infringement of a patent, upon the ground that a decree for the patentee had been rendered in a suit in one of the circuit courts of the United States. It appeared that the decree was entered by consent. The court denied the application, saying that there had not been such an adjudication upon the patent as should lay a foundation for a preliminary injunction in another circuit. *De Ver Warner vs. Bassett*, United States Circuit Court, D. Connecticut, April 5, 1881. H. E.

Easement. — Overhanging Branches of Tree. —Nuisance. — Clipping Branches.

The branches of a tree overhung the boundary line from five to fifteen feet, and an action for damages was brought by the adjoining

owner. The complaint was dismissed as unprecedented, and the court said: "It would be intolerable to give an action in the case of an innoxious tree whenever its growing branches extend so far as to pass beyond the boundary line and overhang a neighbor's soil. The neighbor has a remedy in such case by clipping the overhanging branches, especially if the owner refuses to do so on being requested. Gale & Whately on Easements, 210, 211; 20 Viner's Abridgment, 417, title, "Trees," E; Washburn on Easements, 677; Addison on Torts, 289, 290. *Countryman vs. Lighthill*, Supreme Court of New York, April, 1881. H. E.

Contract of Employment. — Hours of Labor. — Service for another out of Business Hours.

An employer under his contract is entitled to the labor and skill of his employee in the duties undertaken by him during the ordinary hours of work, but beyond that he has no control of the employee. And such employee may contract for and render service to a third person after business hours. *Wallace vs. De Young*, Supreme Court of Illinois, May 14, 1881. H. E.

Mechanics' Lien. — Employment of Workman by Firm.

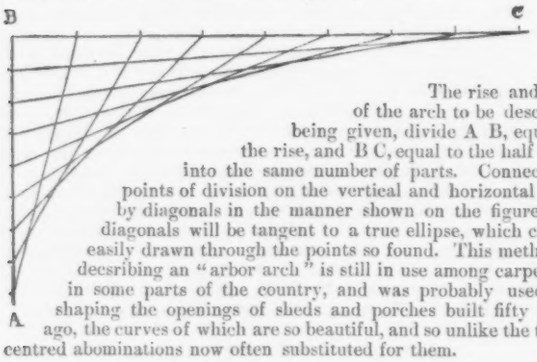
A mechanic was employed by a firm of contractors in the erection of a building, and some of the materials upon which he was working belonged to one of the partners only, and a part of this work was not used for any partnership purpose. He filed a lien which was opposed. The court said, that as he was not in any way informed that the work he was doing was not for the firm, he could recover from the firm his whole demand; and that notwithstanding a part of the material upon which he worked was not used for any partnership purpose, he had a lien upon the building for whole amount due him. *Spruhen vs. Stout*, Supreme Court of Wisconsin, June 4, 1881. H. E.

Partnership. — Member. — Share of Profits in Compensation.

It will not constitute a person a member of a co-partnership by giving him one-half of the profits, in addition to a regular monthly sum, as compensation for his services. In such a case he would not be bound for the losses. 10 Met., 303; Collyer on Partnership, § 34. *Holbrook vs. O'Berne*, Supreme Court of Iowa, June 14, 1881. H. E.

HOW TO DRAW AN ELLIPTICAL ARCH.

Just at this moment, when so many draughtsmen are perhaps struggling in vain to draw elliptical arches with ordinary dividers, a suggestion of a simple mode of accomplishing the object desired without the use of trammels or strings may be useful.



The rise and span of the arch to be described being given, divide A B, equal to the rise, and B C, equal to the half span, into the same number of parts. Connect the points of division on the vertical and horizontal lines by diagonals in the manner shown on the figure; the diagonals will be tangent to a true ellipse, which can be easily drawn through the points so found. This method of describing an "arbor arch" is still in use among carpenters in some parts of the country, and was probably used for shaping the openings of sheds and porches built fifty years ago, the curves of which are so beautiful, and so unlike the three-centred abominations now often substituted for them.

SUNKEN FLOORS.

So few of the floors constructed in new houses are equal to their work, that the attention of architects and builders might be profitably called to the subject. In going over some of the newly-erected houses in the suburbs of London, it is not infrequent that one finds dwelling-house floors which have sunken so much in the centre as to destroy the comfortable assurance that they are safe. These instances occur chiefly in houses erected by speculative builders, who seem to be under no regulation of any kind in respect of floor-timbers. We have noticed serious deflection in the floors of a house rented at over £100 per annum, the consequences of which are cracked ceilings below, opening crevices between skirting and floor, and an uneven surface which makes every table shaky, and prevents large pieces of furniture like sideboards and bookcases being placed against the walls without a considerable propping underneath their front supports. Numerous books on the strength of materials have appeared, but the builder seems to regard such knowledge as merely theoretical, and is generally guided by the sizes of other timbering which he has found answer. He does not always seem to understand the well-established theorem, that the strength of two pieces of timber of equal length is not always in proportion to the area of cross-section. Many practical builders have a conviction that if a timber as a joist has a larger cross-section than another it must be stronger. Thus they fancy a piece of timber 8 inches by 3 inches, which equals 24 square inches in sectional area, cannot be so strong as a piece 5 inches by 6 inches, which has 30 inches in area. The fact is, the smaller piece is the strongest of the two if both are placed upon edge, as every one knows who has studied the principles on which the strength of beams depends. It is easy to convince the most practical of this seemingly inexplicable fact. If two beams of like size are placed side by side, the two will resist twice the amount of one of the pieces. This is so self-evident that experiment is not needed to establish the fact; in the same way, three beams will resist three times as much as one, and so on of any number. In plain English, when lengths and depths are equal, a beam of 6 inches in breadth will bear three times as much as one of 2 inches in breadth. It may be shown by experiment quite as readily, that the strength increases more rapidly with the depth. In point of fact, another law of proportion is observed, — namely, that having two beams of the same breadth and length, but of different depth, the strength increases more rapidly than the depth: thus it is found a beam 9 inches deep bears more than three times as much as one only 3 inches deep. These are very simple statements derived from facts and experiments, and no complex conception of the resistance of certain fibres on both sides of a neutral axis, or equations in algebra, are required to establish them.

In dwellings the load on a floor is chiefly made up of furniture, though this is generally placed, at least the heavier articles, round the walls of rooms. The space occupied by tables and other objects in the centre of a room reduces the available standing area, and thus, for all ordinary floors, 70 pounds per superficial foot may be calculated for as the full load in extreme cases. Rules founded upon the resistance of beams to rupture are, however, of little use, as the floors may be seriously affected by deflection, and deflection is directly as the cube of the length. In regarding stiffness, the load per foot has been given by one authority as 90 pounds per foot, including weight of materials; and the rule involving several dimensions is expressed in the formula

$$c\, l^3 = i\, b\, d^3$$

from which, by inversion, the distance from centres, the length, the breadth, and the depth of beams may be found. Thus, the first of these will be generally found the most convenient in practice; which may be expressed by

$$c = \frac{i\, b\, d^3}{l^3}$$

in which c denotes distance apart from centres of beams, l the length of beam, both in feet, i a coefficient for the wood used, and b and d the breadth and depth. It makes all the difference to place joists an inch nearer, though builders like to give as much interval as they can, for economy's sake. Instead of joists being placed 12 inches apart, it is oftener to find them 13 inches or even 14 inches, and the consequence is, a scantling which has been found to answer in a well-built house fails when it is introduced with a greater distance or interval. Then, the modern speculative builder's floor is seldom properly stiffened by cross-bridging; there is only one row, instead of two, or more. Of course, no practical man will deny the advantage of bridging his floor-joists; it helps wonderfully to prevent deflection under a concentrated load, for the joist immediately beneath the load is relieved of direct strain, and the joists on each side take a share of the weight. Generally, it may be taken that a properly bridged floor is capable of sustaining, without mere deflection, twice as much load as the same floor without bridging, so that the cost of the introduction is amply repaid. It is a misfortune the Building Act does not deal with floors as it does with walls, by laying down certain scantlings for the guidance of builders, as a weak deflecting floor in course of time tends to render the house unstable, by acting injuriously upon the walls. Builders might be willing to follow regulation scantlings for their joists and rafters who could not be induced to calculate for themselves, who would scorn the idea of studying moments of resistance, or who would never be able to work out a formula. — *The Building News.*

"BEATING THE BOUNDS."

In these days of maps and surveyors a dispute about boundary lines is, or should be, quickly and easily settled. Reference is made to the maps and descriptions on file in the county offices; a surveyor and assistants, armed with theodolite, chain, and poles, set out for the disputed territory; and after discovering the initial point run lines of the properly recorded length and direction to the stakes or stones as described, or to the points where the stakes or stones ought to be: and the question is determined without further fuss.

That was not the way things were done in the "good old days" in "merrie England," whatever may be the general practice now. Judging from some peculiar cases before English police courts last month, the old methods have not wholly fallen into disuse. In two parishes, that of Brentford, made famous in the Duke of Buckingham's "Rehearsal" by its "two kings" who "enter hand in hand, smelling at one nosegay," and that of Hanwell, appropriately famous for its lunatic asylum, the old custom of "beating the bounds" to furnish witnesses for possible lawsuits growing out of boundary disputes is still kept up, and, judging by the result of this year's whacking perambulation, with more zeal than discretion. It cost one of the Brentford "bounds beaters" a month's imprisonment because on last Ascension Day he tumbled an unsuspecting citizen into the river to impress upon his mind the fact of the parish boundary crossing the stream at that point. The Hanwell "beaters" were even more daring. The senior curate of the parish was encountered by the jolly "beaters" in the course of their rounds, and a sudden

doubt seized them that the reverend gentleman might not be exactly sure of the territorial limits of his parochial authority. In a trice the grave and dignified clergyman was seized by arms and legs, and his body bent into the shape best fitting it for use as a battering-ram. With a lusty swing he was "bumped" against a bystander, who was "knocked endways" by the unexpected blow, and thus two parish witnesses were simultaneously secured, an important boundary fact being rammed into each of them at that point of his anatomy where old-fashioned pedagogues were accustomed to drive the Latin tenses and respect for authority into the pupils as the most direct route to the brain. To the astonishment and indignation of the "beaters" the clergyman objected to the process, and had the operators arrested for assault and battery. In fining them five pounds each the magistrate pointed out the error of the "beaters." Had they bruised their revered pastor's sitting provision against a "stake or stone" legally established as a boundary mark, they might, perhaps, have pleaded justification by ancient custom, but they had bumped him ignominiously against "a movable person," which was against all precedent, and therefore without excuse.

The mistake of the Brentford boundary markers had been paralleled several years ago in the parish of Walthamstow, on the river Lea. A disciple of the worthy Izaak Walton was sitting in a secluded spot upon the river-bank on a Holy Thursday afternoon, gently whipping the water with his fly, and meditating on the beauties of a trout in his basket and the attractions of a buxom dame at the roadside inn where he intended taking his fish supper. A confused clamor of voices broke in on his solitude, and through a gap in the hedge behind him came an extraordinary procession. Foremost was the beadle, imposing in the dignity of gold-laced cocked-hat and shouldered mace. A portly church-warden with tall white hat, and rosette in his buttonhole, was closely followed by a restless throng of men and boys, some with ribbons in their buttonholes and others with peeled willow-wands in their hands. A whispered consultation between the beadle and his principal supporters was followed by a stern inquiry from the church-warden if the angler knew that he had been sitting on the exact spot where the lines of the ancient parish of Walthamstow entered the Lea? Piscator answered humbly that if he had committed such a sacrilegious act it was done in utter ignorance. The words were no sooner uttered than he was caught up by four powerful arms and flung headforemost into the river, with the admonition to "remember well the boundary line of Walthamstow parish." The drenched angler succeeded in convincing the neighboring magistrate that as he was not a dweller in Walthamstow parish the parishioners had no warrant for making a parish record of him in this summary manner, and his assailants were fined fifty pounds and costs.

The irreverent excess of the Hanwell "bounds beaters" had a counterpart in the London parish of Paddington, four years ago. The procession was passing gravely along the Edgeware road, cocked-hatted beadle, rosetted church-wardens, and willow-wanded parochial schoolboys in due order, when the boundary stone was reached where a boy should have been whipped to insure his future remembrance of the place. Suddenly the programme was reversed. The boys by simultaneous movement seized the beadle, and in spite of his commands, threats, and beseechings, they "bumped" him against the stone with such vehemence and rapidity of succession that at the customary social gathering in the back parlor of the "Pig and Whistle" that evening he declined to "take the chair," and remarked as he responded feelingly to the toasting of his "good 'elth," that it would be "sort of restin' to lean against the chimbley-piece during the festivities."

Whatever may have been the origin of "beating the bounds" of the parish, the procession whose progress was marked at intervals by such uncomfortable proceedings had at one time a strong religious character. Centuries ago, on Ascension Day, or on one of the other days of "Rogation Week," the parish officers, headed by priests and cross-bearers, and followed by the boys of the parish duly marshalled, made the rounds chanting hymns, and stopping at times for priestly benedictions upon farms and people. After the Reformation the procession continued with the service slightly changed, certain appointed portions of the Gospels being read over the standing corn, litanies recited in which curses were invoked on him who "translateth the bounds and doles of his neighbors," and addresses made by the pastor to the company following him. Later on, the marking of special boundary points by religious services was changed for the more effective memorizing method of whaling the small boys, pitching them into the streams, knocking their heads together, bumping them against posts, trees, and barn corners, and then compensating them for their sufferings by occasional "snacks" of bread and cheese, a good supper at the end of the "perambulation," and a few pence of pocket-money.

The writer has a lively recollection of the method of "beating the bounds" in a West of England parish "a long time ago." He and some other small boys were interrupted in a game of marbles by the approach of the "bounds beaters," a squad of whom made a dash upon the marble-players with intent to flog into their memories the fact that the great oak near which they were indulging in "ring taw" was on the parish boundary line. There was a hurried scamper across fields and over hedges, and all but one luckless urchin escaped. Two or three years later the "bounds beaters" were followed part of their way at a safe distance, and great delight was taken in the scuffle at a farm-house on the route where the "beaters" insisted on passing in at the kitchen door and squeezing through a low dairy window — upsetting a pan of cream in the passage — because the house unfortunately stood in two parishes.

Like many ancient practices that had at one time something of a religious character, the custom of "perambulating the bounds" has been ascribed to a pagan origin, and is alleged to have descended from the Terminalia, or observances in honor of the god Terminus, the Roman topographical deity. It is a curious fact, mentioned in Wallace's "Russia," that the Cossacks have a somewhat similar method of preserving evidence as to boundary lines. When a boundary dispute occurs, a meeting is called and a hearing had on the spot. As soon as the line has been fixed, a number of boys are placed upon it and severely punished to impress the circumstances of the settlement and the location of the boundary line strongly on their memories. This is a curious coincidence, if nothing else. — *Cleveland Herald.*

CAST-IRON FLAT-HEADS.

A REMARKABLE experiment, which is likely to create considerable discussion in the engineering world, was made at Frankford, Pa., July 13. It was an endeavor on the part of a firm of boiler-makers to refute the theories advanced by a recent coroner's jury, which was composed of picked experts. The firm in question, Messrs. Sidebotham & Powell, were the builders of the boiler which exploded with such disastrous results at the dye-works of Gaffney & Co., in Kensington, in the early part of June. The boiler had been placed in position, new from the workshop, less than a month before, and had been passed as perfect in every particular by the Inspectors of the Hartford Company. The jury, however, ascribed the explosion to the improper use of cast-iron in the flat-head of the boiler, and the inspectors who certified to its safety were severely censured. The builders, instead of airing their opinions in print, determined to demonstrate that cast-iron flat-heads were as safe as could be demanded by any system of inspection. They were more anxious to take this step from the fact that in the course of a business which has covered over twenty years only two boilers from their workshops have exploded. Accordingly, they set about the construction of a boiler the counterpart in every respect, save that of length, of the one which created such havoc in Kensington, for the purpose of subjecting it to the hydrostatic test until it burst, the intention being to ascertain how much pressure would be required to break a flat cast-iron head. The boiler, which was completed a few days ago, was thirty-six inches in diameter, forty-two inches in length, and constructed of the substantial iron known in the trade as No. 3 Birmingham wire gauge. The door of the man-hole was the same which did a similar service in the Gaffney boiler.

Invitations had been sent to the members of the jury which had pronounced against these heads, and to the Commission on Steam-Boilers appointed by Mayor Stokley. At the time appointed five out of the six jurors — Messrs. J. B. Fontaine, of the firm Fontaine, Abbott & Co., machinists; J. Shields Wilson, Superintendent of Neafie & Levy's Penn Boiler Works; Samuel R. Marshall, formerly of the Wilkesbarre Machine Works; W. W. Williams, President of Keystone Council of Stationary Engineers; and J. W. Nystrom, civil engineer — were on the spot. With them were Mr. John Overn, Chief of the City Department of Boiler Inspection, who had accepted the invitation to apply the test; Mr. J. Naylor, of the People's Foundry; Mr. J. H. Taylor, of Nicetown Lane; Mr. S. N. Hartwell, of New York, a well-known boiler expert; nearly one hundred prominent steam-users from the city, Frankford, and the neighboring settlements, and two inspectors of the Hartford Company.

When everything was in readiness the pressure was applied. The usual sapping at the rivets was apparent when the gauge registered 105 pounds, but beyond this the boiler did not exhibit any symptoms of a strain. At 130 pounds the water began to ooze through a small sand-hole in the head, above the man-hole, showing that the head was slightly defective. The pressure was then reduced, while Inspector Overn affixed a contrivance to the rear end for the purpose of measuring the extent of expansion. Pressure was again applied until the gauge marked 140 pounds, then 160, 180, and 200. At this amount of pressure the seams on the side of the boiler began to weaken, and from one spot a spray of water as fine as steam was discharged. At 250 pounds this had increased to a good-sized squirt, and at 350 the water was issuing with such force as to be thrown four feet away. Still the heads remained intact. At 400 pounds half a dozen similar fissures appeared in a close row in the same seam. The pressure was then gradually increased to 425 pounds, and the lookers-on were beginning to wonder whether the boilers would hold out forever, when a sudden crack was heard in the front head, and the water commenced to run down from a fissure extending half-way across the head. The gauge showed that the boiler had given out at a pressure of 450 pounds, and a subsequent examination showed that the break had commenced at the leaky sand-hole before mentioned. Had it not been for this defect the head would probably have stood an additional fifty pounds' pressure before giving way. The measurements taken by Inspector Overn showed that the rear head had expanded one-sixteenth of an inch at 200 pounds and three-sixteenths at the time of the break.

The members of the coroner's jury had little to say concerning the result. Three of the five sat some distance away while the pressure was being applied, and apparently took but little interest in the proceedings. Before leaving they held a short confidential con-

sultation, in the course of which one remarked: "This is no reflection on us. If we undertake to answer it we shall never be done of the subject." "Yes," responded another, "we would start a discussion which would never end." Several of the jurymen, when asked to give their opinion of the experiment, emphatically declined to express themselves on the subject.

Several weeks ago, when the Hartford Company decided not to pass any boilers with flat cast-iron heads over thirty-two inches in diameter, City-Inspector Overn addressed a communication to City-Solicitor West, asking what authority, if any, the City Inspector could exercise in the same direction, and also requesting advice as to how he should govern himself in passing upon steam-boilers. In reply, the City Solicitor says that the questions are more fitted for a mechanical expert than for a lawyer, but that legally he would advise the Inspector when, in his judgment, a boiler is safe, to approve it, and give a certificate, without regard to its mode of construction or the material used. Mr. Overn has consequently decided to adhere to his usual practice of passing all boilers with the obnoxious heads if they have safely withstood the cold-water test. — *Philadelphia Record.*

DISTEMPER.

Ceilings and walls are often finished in distemper, but very often turn out unsatisfactory from the want of knowledge in the mixing and laying on. Absorption in the wall should be checked or stopped, or one part will absorb more color than another, and an uneven or spotty appearance results. Various preparations are used for preparing walls and to stop absorption. One of these is to mix about a dozen pounds of the best whiting with water, adding thereto enough parchment or other size to bind the color, about two ounces of alum, and the same weight of soft-soap dissolved in water; mix well, and strain through a screen or coarse cloth. In mixing the distemper, one writer says, "two things are essentially necessary: clean and well-washed whiting and pure jellied size." The whiting should be put to soak with sufficient soft water to cover it well and penetrate its bulk. When soaked sufficiently, the water should be poured off, which will remove dust from the whiting. It may then be beaten up to a stiff paste by the hand or spatula. Size is next added and mixed together. Care should be taken not to break the jelly of the size any more than can be avoided. Another caution is that distemper should be mixed with jellied size to lay on well; the color then works cool and floats nicely, but when the size is used hot it drags and gathers, and works dry, producing a rough wall. A little alum added to the distemper hardens it and helps to dry out solid and even. The best size is made from parchment clippings, which are put into an iron kettle filled with water and allowed to stand twenty-four hours, till the pieces are thoroughly soaked; then they are boiled for five hours, and the scum removed. The liquid is then strained through a cloth. For mixing colors, the whiting and the color required, finely ground, are dissolved separately and then mixed to the required tint. For example, lamp-black mixed with whiting makes gray, and the most delicate to the darkest shades may be obtained. For French gray the whiting required is taken and soaked in water, and Prussian blue and lake finely ground in water are added to produce the necessary shade or tint. Buff may be made by dissolving in like manner, separately, whiting and yellow ochre. A little Venetian red gives a warm tone. A good salmon tint is produced by adding to the dissolved whiting a little of the same red, just sufficient to tinge. Drabs of various tints can be easily made by grinding up finely a little burnt umber and mixing it with the dissolved whiting. The sooner the distemper color dries after being laid on, the better, and the best plan is to close windows and doors during laying, and throw them open afterwards. — *The Building News.*

HOUSE-PAINTERS' HAND-BOOK.

To the Editors of the American Architect: —

Dear Sirs, — We would like to know of some book or books giving practical information as to modern style of house-painting, with hints as to combination of colors, both for exterior and interior work; also as to best methods of finishing natural woods. J.

[John Wiley & Sons, New York, published in 1878 an excellent little hand-book, by John Stevens, entitled "The Art of House-Painting." Price, 75 cents. — Eds. American Architect.]

D'ANGERS'S STATUE OF JEFFERSON.

July 30, 1881.

To the Editors of the American Architect: —

Dear Sirs, — In your issue of July 16 you give an amusing but inaccurate statement of the treatment of D'Angers's statue of Jefferson, and its reclamation with soap and water for the purpose of holding it for a rise in the price of bronze.

This statue stood for many years in a plot of sward between the Treasury Building and the Executive Mansion, where it could only be viewed from an elevation of some twelve feet or more. It was never rated better than second-class, and being of zinc, the exposure of forty years had eaten it full of holes.

General Orville E. Babcock, a gentleman of a great deal of taste and appreciation for art and beauty, caused the statue to be cleaned and removed to a place where it could be properly viewed, and be safe from weather. Under Babcock's auspices the public parks and grounds of Washington changed from neglected pig-wallows to spots of beauty and verdure, and he cared for the monuments under his charge with loving hands.

Among the works of art that he preserved is a small bronze fountain by Rhinehart, which formerly was in the delivery corridor of the Post-Office.

It is a gem of beauty, representing a pensive Indian sitting over a fountain from which he is about to drink.

This beautiful drinking-fountain, perhaps the finest work of art in the capital, was honored by an appreciative public by being used for the purposes of a cuspadore and waste-paper basket, or perchance the resting-place of some loafer.

Babcock, after having it cleaned many times, removed it to some place where, if its beauties are not admired, it at least is free from pollution. Will he kindly state where he put it?

Respectfully yours, C. N. D.

NOTES AND CLIPPINGS.

Porcelain Lamp Pedestals. — Two enormous lamp pedestals of blue and white porcelain, twenty-three feet high, have been made at Seto, in Onasi, Japan, a place celebrated for its fine pottery.

Fired by Electricity. — An interesting illustration of the danger attending the manufacture of some kinds of rubber goods was shown in the origin of the recent fire which occurred in the Ætna Rubber Mills, at Jamaica Plains. The cement which fastens the seams of rubber coats is largely made of naphtha. The mere act of lifting a piece of rubber cloth from a pile of half-a-dozen similar ones, cut for garments, developed so much electricity that a spark was observed to escape. It came in contact with the naphtha cement, or with gases arising from it, and instantly the whole room was in a blaze. Fortunately the fire was extinguished without destroying the mill, the loss being only about a thousand dollars. It is not known that anything can be done to prevent the occurrence of another accident of precisely the same kind, whenever all the atmospheric conditions are favorable. One would suppose, however, that a certain degree of dampness would remove all danger from that source. — *Commercial Bulletin.*

Wages and Materials in Cincinnati. — The revised schedule of the labor wages which appears in another column of this issue tells of the present wages paid to the different mechanics, but by no means does it fully show what is, and has been, for months past, the state of labor and materials in this vicinity. It may be set down as a fact, no matter how much we may try to get around it, that building is 30 to 35 per cent higher than it was a year ago. Brick are $8 per thousand delivered, or about $12 laid in the wall; this for common work. Limestone is $2 per perch delivered, or $4 laid in the wall. Lumber has experienced two advances within the last month, not to mention several advances since spring; and now ordinary yard sizes are held at $19 per thousand, and even at that price, you can get no promise of delivery before October. There are not enough mechanics of any branch to supply the demand, and so there is a great deal of dissatisfaction with the way in which work goes ahead. Every job is from one to five months behind time, and every one is pushing and crowding so as to get his work finished or plastered before cold weather sets in. The whole trouble can be traced back to two causes. First, to the excessively cold weather of last winter, which lasted from November 10 to the middle of April, during which time nothing in the way of outside work could be done, and very little inside; and secondly, to the innumerable strikes, first in one department and then in another; and a third cause might be added, to wit: a scarcity of workmen and materials. In this connection it may be added as a curious fact that the carpenters' strike inaugurated last spring has never been settled; neither the bosses nor the men have yielded, but the men have all gone to work at an advance in pay, but most of them have changed bosses.

Artesian Well at Streator, Ill. — The work of boring the artesian well, which was begun at Streator, Ill., by the city authorities about the middle of last October, is completed. The well is now down 2,496 feet — just four feet less than the contractor had agreed to go. The Potsdam sandstone in which the water was found was struck at a depth of 2,163 feet. The first fifteen feet was of a dark drab color, followed by 35 feet of reddish buff sandstone. Then came the pure white sand, into which the drill went 283 feet, where it stopped at a depth of 2,496 feet, and through a vein of Potsdam sandstone 333 feet thick. A vein of water was found in the St. Peter's sandstone, at about 285 feet below the surface, which rose to within 40 feet of the top; but, as the drill went on down, it passed through some porous limestone, which absorbed a portion of the water and let it down to 80 feet below the surface, where it remained for some time. When the drill was down to 2,248 feet, being 35 feet into the white vein of Potsdam, the water began to rise, and continued so to do. When the drill was at 2,278 feet the water began to flow over the top. At 2,297 feet it flowed 85 gallons per minute, and at 2,448 feet it flowed 100 gallons. This flow has been increased to 107 1-16 gallons, at which time the boring stops. Tests show that the well has a head of 45 feet 2 1-2 inches above the surface of the ground, being higher than the cornice line of any building in the city. The water is very salty, and also contains some magnesia and iron. Several other minerals are present, but in very small quantities. The taste of the water is at first unpleasant on account of the salt; but, after one becomes more accustomed to drinking it, it is more palatable. Many persons pronounce it very similar to the Congress springs at Saratoga. The temperature is 74 degrees when it flows from the well. Many of the citizens are keeping it regularly in their houses, and seem to think that it possesses rare medicinal qualities. The piping of the city will begin immediately, and it is hoped that Streator will now have an abundance of pure, fresh water, free from the sulphur which predominates in many of our surface wells. — *Chicago Tribune.*

THE AQUEDUCT OF BOLOGNA. — After a lapse of sixteen hundred years, the aqueduct built by the Emperor Augustus to supply Bologna with water was restored to use June 5. Nineteen hundred years ago the imperial engineers tapped the Setta near its junction with the Reno, about eleven miles from Bologna, and brought its water to the city through an underground passage. They followed the course of the Reno, tunnelling the hills, sinking their work beneath the beds of the precipitous torrents which rush from the mountains into the river, and bringing the waters to the gates of the city, where they were divided, one portion going to supply the public baths, and the other probably destined for the fountains of streets and public squares. The work of tunnelling and the masonry were so thoroughly well done that both stone-work and brickwork are still as solid as the rock itself, the only considerable breaks being where the turbulent Reno had washed away with its clayey banks several portions of the aqueduct, or where the headlong torrents which rush down into its stream had excavated their own beds and carried away the artificial sub-structure. The restoration of this important work is due chiefly to Count Gozzadini, who caused an accurate survey of the aqueduct to be made about twenty years ago, and in 1864 published the results of the investigation in an elaborate memoir. Since then the work of restoration has been going on with a thoroughness and skill calculated to make the new work as enduring as the old. The aqueduct was originally made of brick and stone cemented with lime and volcanic sand, and the unbroken portions remained as hard as granite. — *Scientific American.*

STABLE VENTILATION. — It has been stated by Dr. Parkes that a horse requires at least 2,466 cubic feet of fresh air per hour. The army regulations allow in new stables to each horse 1,605 cubic feet, and 100 square feet of floor-space. This allowance is shamefully deficient in many stables. The most necessary thing in planning stables is, as Capt. Galton says, to have the air moving freely through every part of them, above and around the horses when they are standing, and in all the angles between the floor and walls when the horses are lying down. How this freedom of circulation is secured, it is difficult to see in the ordinary plans of these buildings. There is the door and the windows along the front; there may be, in addition, end openings and a few air-bricks; but the main spaces, occupied by the horses in the stalls, are quite closed against any free current of air, and the foul air stagnates naturally along the stalls and boxes, particularly if there be no top ventilation. As for stables with lofts and living-rooms above them, they are simple abominations, and rooms in the lofts of stables are little better than fever-dens. The most effective plan that can be adopted is to construct louvre openings along the ridge, or to introduce in it a few of the ventilators on the induced air-current system. But these should be well chosen, and placed in proper positions; air-inlets, in connection with these, are necessary, above the stalls and under the mangers, so that no stagnant air can remain in these positions. — *Building News.*

NOTABLE MASONRY ARCHES. — According to the *Scientific American*, this country possesses the largest masonry arch in the world, — an arch which forms part of one of the most important engineering achievements of recent years, the aqueduct by which the city of Washington is supplied with water. The arch in question carries the aqueduct over the Cabin John Creek, with a span of 220 feet. The height of the arch is 101 feet, and the width of the structure 20 feet. The arch forms an arc of a circle, having a radius of 134.2852 feet. When the centre scaffolding was removed, the arch (unlike all other works of the kind) did not settle, the keystone having been set in winter, and the centre struck in summer. The other notable masonry arches of the world are the Chester arch across the River Dee, at Chester, England, with a span of 200 feet; the famous centre arch of the new London Bridge over the Thames, with a span of 152 feet; Pont-y-Prydd, over the Taff, in Wales, 140 feet; the bridge across the Seine, at Neuilly, France, with five spans each of 128 feet; the nine spans of Waterloo Bridge, London, each 120 feet; and the celebrated marble Rialto Bridge in Venice, with a span of 98 1-2 feet.

FIRE PROTECTION FOR VIENNESE THEATRES. — The disastrous burning of the opera-house at Nice has been the cause of a thorough inspection of the theatres of Vienna, and of admirable precautions against fire in them. Among other regulations, it is provided that all the stair balustrades must have secure supports in the adjacent walls, that the doors must be sheathed with iron plate, and the corridors and halls be supplied with lighted oil lamps, in addition to the usual gas-lights. Besides this, the gas-pipes that supply the stage and the auditorium are to be separated, and during every performance persons trained in the use of fire-extinguishing apparatus must be stationed in the galleries, corridors, and behind the stage. Finally, an engineer connected with the city fire department is to be in attendance at the perfórmance, to see that these various regulations are all strictly observed.

THE HANCOCK HOUSE [INN]. — The Boston *Index* says that in these days of great conflagrations, it may be stated as a remarkable fact, that the city of Boston contains a building within its business centre two hundred and forty-eight years old which has never been on fire. The building is of brick, granite, and wood, and is situated on Corn Court, in the rear of Merchants' Row. It was built in 1633, and occupied as an inn by Samuel Coles, and possesses an historical interest from the fact that Governor Vane in colonial days held a council there with Miantonomoh, the Narragansett chief. Talleyrand was a distinguished guest in 1797. It is known as the Hancock House, and the building, so long known as a relic of the seventeenth century, untouched by flame, has a peculiar interest to fortunate underwriters of the past two centuries.

A NOVEL SAND-BLAST. — A water-pipe underlying a gas-pipe at Peoria, Ill., burst the other day, and the escaping water boiled the sand against the gas-pipe till a hole was worn through, when the water entered and ran all over the city.

A NATIVE OBELISK. — Mr. H. Q. French writes as follows to the New York *Times*: — "In view of the attention recently given to the obelisk brought and set up in Central Park at a reported expense of over $100,000, the height of which, exclusive of pedestal, is 69 feet 1 inch, the following may be of interest to your readers: At our Westerly (R. I.) quarries we have just obtained a single stone 150 feet long, 10 feet wide by 8 feet thick, weighing over 1,000 tons, and the stone was loosened by one oblong blast-hole in such a simple and perfect manner that the theories and conjectures advanced by many as to the methods of the Egyptians appear absurd. Here is a stone that could be finished and erected in our own progressive land which would far exceed the largest stone the ancients are so far known to have handled.

"'The obelisk of the most extraordinary proportions of which ancient writings give us any record was that of Queen Semiramis, which is thus described by Diodorus Siculus: "Semiramis likewise caused a great stone to be cut out of the mountains of Armenia, 125 feet in length and 5 feet in breadth and thickness." (So that it was twenty-five times as long as it was broad and thick.) "This," Diodorus continues, "she had conveyed to the river by the help of many yokes of oxen and asses, and there put it on board ship and brought it safe by water, to Babylon, and set it up in the most remarkable highway of that city as a wonderful spectacle to all beholders. From its shape it is called an obelisk (*obelos* in Greek signifying a spit), and it is accounted one of the seven wonders of the world."' — *From a Paper by John Bell.*

"The block I mention contains over 12,000 cubic feet, and would be worth, cut into pieces, about $30,000, while if we desired to use it in its present shape the value would be far greater. I am quite positive this piece could be brought to this city, finished, and erected for about $150,000, but our demand for this granite is so great that we shall soon cut it into smaller pieces, with a possibility of getting another that would equal, if not excel, this monstrous stone."

TESTING THE DURABILITY OF STONE. — W. Mattieu Williams, in a paper communicated to the *Building and Engineering Times*, describes some experiments which he made some time since to test the durability of stone in an atmosphere more or less infected with sulphuric acid. Some pieces of stone were immersed in moderately strong solutions of sulphuric and hydrochloric acids respectively, and were afterward carefully examined with reference to any action occurring. At the same time the crushing pressure of samples in their natural state was tested, and similar pieces, after being submitted to the acids, were likewise tested. In cases where there were no evidences of internal disintegration after several days' immersion, it was inferred that the stone would stand the acid vapors of the Birmingham atmosphere. Subsequent practical tests proved these conclusions to be correct. Experiments of this kind indicated that the worst of material for exposure to acid atmosphere is sandstone, the particles of which are held together by limestone or are otherwise surrounded by, or intermingled with, limestone. On the other hand, the best ordinary material for resisting acid atmospheres is a pure sandstone quite free from lime. Compact limestone, such as good homogeneous marble, stands fairly well, although even it is slowly corroded. The corrosion, however, in this case is purely superficial and tolerably uniform. It is a very slow washing away of the surface without any disintegration, such as occurs where a small quantity of limestone acts as binding material to hold together a large quantity of silicious or sandy material, and where the agglomeration is porous and the stone so laid that a downward infiltration can take place. It must be remembered that although the acid originally exists as vapor in the air, it is taken up by the falling rain and the mischief is done to the stone by this acidified water. This, of course, is very weak acid indeed, that which was used for testing the stone being many thousand times stronger. On the other hand, the stones in being tested were exposed for only a few days.

AN IRON OBSERVATORY FOR BOSTON. — The *Iron Age* gives the following account of the iron observatory that Abisha Miller, president of the Atlantic Iron Works, Boston, with several other gentlemen, propose to build for Boston: The models, plans, etc., have all been completed, and its site partially agreed upon. The structure will be built of the best iron adapted for such a purpose. The foundation will be sufficiently strong to support a structure weighing a thousand times more than will be the weight (200 tons) of the observatory, and the shaft itself will be cruciform in shape, with a "well" 3 1-2 feet square in the centre. The shaft will be secured by 16 galvanized guys, or steel-wire cables, each with the strength of 40 tons, the lower ends being anchored 10 feet in the earth, imbedded in stone and cement, and arranged in the form of an octagon. The shaft will have two opposite angles and a car in each, and each car will be operated by independent engines. About half-way up the shaft there will be two galleries, in the opposite angles, each capable of accommodating twenty-five or thirty persons. These galleries will afford pleasure to visitors in various ways. Near the top there will also be two galleries, from which flights of steps will lead to a room twenty-five feet in diameter, filled with seats, and glasses for making observations. This room will be large enough to accommodate several hundred people. Above this room there will be a lookout for those who may wish to go still higher. The first landing below, already mentioned, will be about half-way up the structure. The observatory will be 325 feet from the ground, and 345 feet above sea-level, and, although built upon a low spot of ground, it will be 68 feet higher than Bunker Hill Monument (from the sea-level) and over 100 feet higher than the cupola of the State-House, and also further from the ground than the dome of the Capitol at Washington.

A MYSTERIOUS MILL-STREAM. — It is said that at Argostoli, or Cephalonia, where Lord Dufferin lately touched on his way to Constantinople, is a mill worked by a stream flowing from the sea. An Englishman discovered that the water always ran one way, and built a mill which made his fortune. He tried hard to find where the water, which disappears into the earth, ultimately went, and among other experiments poured oil on its surface, but its course remains a mystery.

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[*Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.*]

BUILDING PATENTS.

[*Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.*]

244,734. Sash-Fastener. — Joseph Blyston, St. Louis, Mo.

244,741. Wood-Turning Lathe. — Henry J. Colburn, Fitchburg, Mass.

244,749. Boring-Machine. — John Hammond and William L. Holman, San Francisco, Cal.

244,754. Try-Square and Bevel. — George B. Kirkham, New York, N. Y.

244,759. Master-Key Lock. — Daniel K. Miller, Philadelphia, Pa.

244,762. Steam-Radiator. — Robert C. Paul, Frostburg, Md.

244,767. Paint-Can. — William F. C. Quehl, St. Louis, Mo.

244,775. Door-Hanger. — Walton D. Smith, Prophetstown, Ill.

244,811. Rolling Steel Beams. — Anthony C. Kloman, Allegheny, Pa.

244,842. Locking-Latch. — John H. Barnes, New Haven, Conn.

244,844. Curtain-Fixture. — Charles E. Bates, Cheshire, Conn.

244,847. Mould for Earth and Stone Fences. — Lewis R. Budd, Cambridge, Tex.

244,893. Water-Closet. — Samuel S. Hellyer, Newcastle Street, Strand, County of Middlesex, England.

244,907. Apparatus for Purifying Sewers, etc. — F. B. Lippincott, Atlantic City, N. J.

244,921. Latch. — Michael J. Mullins, New York, N. Y.

244,925. Lathe for Turning Irregular Forms. — Geo. H. Ober, Chagrin Falls, O.

244,928. Shingle-Jointing Machine. — Willis J. Perkins, Grand Rapids, Mich.

244,940. Wood-Turning Machine. — Henry R. Sillman, Brooklyn, N. Y.

244,942. Seal-Trap. — Orlando W. Spratt, Philadelphia, Pa.

244,951. Door-Securer. — Joshua W. Trussell, Rockland, Me.

244,955. Eaves-Trough Hanger. — George M. Vedder, Elk Run, Pa.

9,821 (*Reissue*). Apparatus for Supplying Districts in Cities and Towns with Heat and Power. — Birdsill Holly, Lockport, N. Y.

SUMMARY OF THE WEEK.

Baltimore.

Building Permits. — Twenty-one building permits have been issued since the last report, the following only being of sufficient importance to be mentioned: —

Henry Smith, three st'y brick building, n w cor. Marrion St. and Jew Alley.

The McKim estate, 22 four-st'y brick and stone dwells. on Calvert St., between Chase & Eager Sts.

Mt. Calvary Church, extend present building, cor. Eutaw and Madison Sts.

J. Fred. Albrecht, three-st'y brick building, n w cor. McHenry St. and Goldsmith Alley.

Geo. Dorbert, addition and improvement to building, 105 Dallas St.

Thos. J. Myer & Co., extend four-st'y brick warehouse, 90 West Falls Ave., between Easton and Canton Aves.

Cath. Frisby, two-st'y brick building, east side of Broadway, between Canton and Eastern Aves.

Geo. Bunneck, two-st'y brick building, No. 44 Exeter St., between Pratt and Still Sts.

Wm. King, extend present building, cor. Leadenhall and Jephson Sts.

Club-House. — The Merchants' Club of this city have invited plans and specifications for a new club building, to be erected on a lot 49′ 3″ front on German St. by 86′ 4″ deep, to have two full stories above the basement and kitchen above all.

Chapel. — The P. E. Mission of the Chapel of the Atonement is about to erect a new chapel on a lot on the s w cor. of John and Chester St., with a front of 60′ on John St. and depth of 120′ on Chester St., the building will be of brick with stone finish, and have belfry and stained glass windows.

Museum. — The premises 82 West Baltimore St. have been leased by Messrs. Herzog & Co., who will tear down the present building and erect a new building especially designed for the purpose of a museum; the building will be three stories high and 100′ deep, 25′ front, of brick.

Boston.

Building Permits. — *Wood.* — *Clarendon Ave.*, near Metropolitan Ave., for C. Thomelius, dwell., 22′ x 28′.

Saratoga St., rear of, near Riverside Ave., for Eli W. Hoyt, coal-house, 200′ x 40′; Chas. H. Brown, builder.

Parkman St., near Dorchester Ave., for A. W. Fice, two-st'y dwell., 21′ x 30′; Chas. Stinson & Co., builders.

Edgewood St., near Blue Hill Ave., for Chas. E. Currier, 2 two-st'y dwells., 21′ x 32′; Chas. E. Currier, builder.

Brick. — *Pleasant St., No.* 63, for L. P. Bartlett, three-st'y dwell. and store, 20′ x 72′; L. P. Bartlett, builder.

Brighton Ave., near Beacon St., for Benj. Dow, boiler-house, 24′ x 10′; Moses Burlen, builder.

Durham St., near St. Botolph St., for Ivory Bean, 9 three-st'y dwells., 20′ x 40′; Ivory Bean, builder.

9 three-st'y dwells., ditto. St. Botolph St., between West Newton and Durham Sts.

9 three-st'y dwells., ditto. West Newton St. near Durham St.

House. — Mr. D. H. Lane is to build on his land, No. 291 Beacon St., a brick and stone dwell., 24′ x 68′; to cost $25,000; S. J. F. Thayer, Boston, architect.

Brooklyn.

Building Permits. — *Powers St., No.* 257, three-st'y frame tenement; cost, $4,000; owner, Henry Kniep; architect, Theo. J. Beir.

Myrtle St., No. 57, n s, 50′ e Charles Pl., three-st'y frame tenement; cost, $3,000; owner, Geo. Krebs, 55 Myrtle St; architect, Geo. Hillenbrand; builders, Geo. Herlein and Geo. Krebs.

Washington Ave., w s, near Park Ave., 2 three-st'y brick dwells.; owners, Mrs. Fisher Howe and Peter McGoldrick, 128 Willow St.; architect, Francis Raymond; builders, John P. Anderson and Wm. Ovington.

Sumpter St., s s, 275′ w Ralph Ave., two-st'y brick wagon manufactory; cost, $3,000; owner, Henry Wend, 69 Sumpter St.

Lafayette Ave., n s, 60′ e Marcy Ave., 2 three-st'y brownstone dwells.; cost, each about $6,500; owners and builders, R. & E. W. Phillips, 109 Kosciusko St.; architect, E. W. Phillips.

Yates Ave., w s, 20′ n Lexington Ave., 4 three-st'y brownstone dwells.; cost, each, $4,500; owner, J. J. Quin, 469 Mason St.; architect, Isaac D. Reynolds; builder, M. J. Reynolds.

Gates Ave., s s, 25′ e Lewis Ave., 4 three-st'y brownstone flats; cost, each, $5,000; builder, Chas. G. Hall, 63 Patchen Ave.

Leonard St., No. 571, three-st'y frame tenement; cost, $3,875; owner and architect, John Miller; builder, Thos. F. Donohue.

Butler St., n s, about 200′ w Vanderbilt Ave., three-st'y brick and stone home for destitute children; cost, $55,000; owner, the Industrial School Association, etc.; architects, Parfitt Bros.; builders, Owen Nolan and Martin Lee.

Alterations. — *Park Pl.*, n w cor. Vanderbilt Ave., one st'y brick extensions; cost, $5,000; owner, Wright Duryea, on premises; architect, Joseph Platt; masons, John Demott & Son.

Furman St., near Wall St. Ferry, known as Nos. 4 and 5 of Pierrepont's stores, repair damage by fire; cost, $27,700; owner, Henry E. Pierrepont, on premises; architect and builder, Henry Wallace.

Court St., s e cor. Second Pl., repair damage by fire; cost, $4,700; owner, E. C. Donnellon, President St., near Clinton St.; builder, Eli Osborn.

Buffalo.

House. — Frame dwell., Linwood Ave.; owner, Jas. Adams; architects, Porter & Percival; cost, $10,000.

Church. — Brick church for the Free-Will Baptist congregation; cost, about $30,000; builder, H. Schaefer; architects, Porter & Percival.

Chicago.

Building Permits. — J. Rawson, two-st'y brick dwell., 26′ x 66′, 240 Henry St.; cost, $4,000.

F. Jansen, one-st'y brick dwell., 20′ x 40′, 736 Thirty-first St.; cost, $2,000.

P. J. Sexton, five-st'y brick stores, 38′ 6″ x 162′, Michigan Ave. and Madison St.; cost, $40,000.

A. J. Baxter, two-st'y brick barn, 24′ x 66′, Aberdeen and Monroe Sts.; cost, $3,500.

W. H. Hoyt, six-st'y brick warehouse, 80′ x 80′, Michigan and Pine Sts.

L. Hodges, three-st'y brick barn, 50′ x 170′, 2129 Indiana Ave.; cost, $18,000.

D. H. Dunton, three-st'y brick stores and dwell., 26′ 8″ x 60′, 550 Wabash Ave.; cost, $6,500.

H. C. Kriete, three-st'y brick dwell., 22′ x 57′, 407 Sedgwick St.; cost, $6,000.

C. Wohlender, two-st'y brick dwell., 20′ x 30′, 170 Brown St.; cost, $2,700.

B. F. Murphy, two-st'y brick dwell., 31′ x 75′, Michigan Ave. and Twenty-ninth St.; cost, $15,000.

Freidick & Weidinbaum, two-st'y brick dwell., 23′ x 36′, 621 Hurlbut St.; cost, $3,000.

A. Olson, 3 two-st'y brick dwells., 60′ x 55′, 839 North Clark St.; cost, $6,000.

A. Olson, 4 two-st'y brick dwells., 86′ x 58′, 827 North Clark St.; cost, $8,000.

J. R. Dixon, one-st'y brick dwell., 20′ x 30′, 1086 Hinman St.; cost, $7,000.

F. Hrodig, two-st'y brick dwell., 21′ x 56′, 110 Ewing St.; cost, $3,800.

C. Grim, two-st'y brick dwell., 21′ x 56′, Throop St., near Nineteenth St.; cost, $3,800.

M. Soman, three-st'y brick store and dwell., 24′ 6″ x 100′, Centre Ave. and Nineteenth St.; cost, $7,500.

A. Brodde, two-st'y brick store and dwell., 22′ x 45′, 250 Townsend St.; cost, $3,000.

A. Muller, two-st'y brick store and dwell., 21′ x 60′, 238 Forquer St.; cost, $4,000.

F. Rapp., two-st'y brick dwell., 28′ x 57′, 38 Fowler St.; cost, $8,000.

P. Wallinhaf, two-st'y brick dwell., 23′ 6″ x 60′, 293 Henry St.; cost, $4,400.

Vanderklost & Son, brick foundry, 55′ x 86′, Halsted and Twenty-sixth Sts.; cost, $6,000.

W. E. Rollo, two-st'y brick dwell., 20′ x 60′, 667 Washington St.; cost, $6,000.

F. L. Beckwith, two-st'y brick dwell., 20′ x 60′, 241 Park Ave., cost, $6,000.

R. Hickox, two-st'y brick dwell., 48′ x 50′, Loomis and Van Buren Sts.; cost, $18,000.

A. Dilp, two-st'y brick store, 25′ x 70′, Hinman and Lincoln Sts.; cost, $5,000.

J. R. Carmack, two-st'y brick dwell., 20′ x 35, 462 Orchard St.; cost, $3,050.

M. Steude, 6 two-st'y brick dwells., 123′ x 33′, 275 Twenty-fourth St.; cost, $7,500.

C. N. Wagner, two-st'y brick dwell, 22′ x 56′, 899 Blue Island Ave.; cost, $3,800.

G. Wing, three-st'y brick store, 24′ 6″ x 54, 691 Larrabee St.; cost, $6,500.

S. Shackford, three-st'y brick dwell., 20′ x 43′, 248 North La Salle St.; cost, $5,000.

C. Harpel, three st'y brick dwell., 25′ x 62′, 390 Oak St.; cost, $5,500.

Cleveland.

Blocks. — J. B. Perkins is building several blocks on Seneca, Superior and Frankfort Sts.; total cost, about $150,000; Coburn & Barnum, architects for block on Seneca St., Joseph Ireland, architect for blocks on Superior and Frankfort Sts.

R. C. Parsons is building a brick block on Superior St.; S. C. Kain, builder.

Acid-Works. — Marsh & Harwood are building extensive additions to their acid-works; J. M. Blackburn, architect; J. F. Watterson, carpenter; Jno. Gill, mason.

Office-Building. — L. S. & M. S. R'y office-building on the corner of St. Clair and Seneca Sts. is being pushed forward; S. C. Kain, contractor; Jos. Ireland, architect.

Post-Office. — The Post-Office building is being hurried along; Mr. Linas, contractor; cost, $150,000.

Denver, Col.

Building Permits. — William Lessig, two-st'y brick business house, 42′ x 60′, cor. Sixteenth and California Sts.; cost, $7,000.

J. S. Brown, two-st'y brick building, 25′ x 49′, Stout St.; cost, $2,600.

D. C. Dodge and C. E. Hill, two-st'y brick dwell., Lincoln Ave.; cost, $7,500.

Edward Connell, two-st'y brick dwell., Champa St.; cost, $5,500.

Alonzo Rice, brick building on Eleventh St.; cost, $4,800.

R. A. Cammeron, alteration to brick dwell. on Broadway; cost, $3,000.

C. M. Parker, two-st'y brick dwell.; cost, $3,000.

Dr. Hamer, 2 two-st'y brick cottages, Stout St.; cost, $5,250.

John Shevnin, three-st'y brick block, Arapahoe St.; cost, $9,000.

M. D. Clifford, two-st'y brick block; cost, $6,000; Emmett Anthony, architect.

S. N. Alexander, 6 two-st'y brick dwells., Thirty-second St.; cost, $16,000.

Natatorium. — The Denver Natatorium Association, one-st'y brick building, 124′ x 50′, Larimer St.; John Pearce, architect; cost, $8,000.

Church. — The Second Congregational Church, one-st'y frame building, 36′ x 60′, Arapahoe St.; cost, $4,000.

Malt-House. — Geo. Oppenlander, three-st'y malthouse; cost, $5,000.

New York.

Building Permits. — *Madison Ave.*, n w cor. Fifty-second St., nine-st'y brick apartment-house, offices in basement; cost, $1,750,000; owner, Berkshire Association, 54 and 56 Worth St.; architect, C. Pfeiffer.

Madison Ave., s e cor. Fifty-third St., five-st'y brick apartment-house; cost, $40,000; owner, Kate W. Ambrose, 575 Lexington Ave.; architect, Carl Pfeiffer.

East Tenth St., No. 3, two-st'y brick stable; cost, $7,500; owner, George W. Miller, 39 Fifth Ave.; builder, J. J. Tucker.

Tenth Ave., e s, 25′ 1″ s Sixty-seventh St., 2 four-st'y brick tenements; cost, each, $10,000; owner, Geo. A. Treacy, 1716 Madison Ave.; architect, A. Glasenapp.

Twelfth St., Nos. 712 *to* 718, 4 four-st'y brick tenements; cost, each, $10,000; owner and builder, John McGarry, 583 Monroe St., Brooklyn; architect, T. S. Godwin.

One Hundred and Sixth St., n s, 210′ e Third Ave., 4 four-st'y brick flats; cost, each, $12,000; owner, Lottie N. Dean, Second Ave., One Hundred and Twenty-first St.; architects, Atkinson & Rosenstock; builder, H. N. Dean.

Fifth Ave., s w cor. One Hundred and Twenty-fifth St., 6 four-st'y brownstone dwells.; cost, each, $11,000; owner, H. M. Edmundstone, 64 Pulaski St., Brooklyn; architect, Jas. E. Ware.

One Hundred and Twenty-fifth St., s s, 85′ w Fifth Ave., 6 four-st'y brownstone dwells.; cost, each, $11,000; owner and architect, same as last.

Madison Ave., n w cor. Sixty-eighth St., four-st'y stone and brick dwell.; cost, $125,000; owner, H. G. Marquand, 21 West Twentieth St.; architect, R. M. Hunt; builders, T. T. O'Brien & Son.

One Hundred and Nineteenth St., n s, 375′ w First Ave., 5 four-st'y brownstone tenements; cost, each $12,000; owner, S. C. Hinman, 43 West One Hundred and Thirty-first St.; architect, J. Roger; builder, not selected.

Eighty-third St., n s, 150′ e Fifth Ave., 2 three-st'y brick dwells.; cost, each, $40,000; owners, Harriet M. Arnold and F. A. Constable, 240 Madison Ave.; architect, W. Schickel; builders, Jas. Webb & Son.

West Fifty-fifth St., Nos. 142 *and* 144, 2 two-st'y brick stables; cost, each, $7,000; owner and architect, Wm. B. Baldwin, 119 East Fifty-seventh St.; builders, Kennedy & Totten.

One Hundred and Twenty-seventh St., n s, 125′ w Seventh Ave., 2 three-st'y brownstone dwells.; cost, each, $8,000; owner, A. A. Teets, 308 West One Hundred and Twenty-fifth St.; architect, W. W. Gardiner; builder, Philip Teets.

Eastern Boulevard, s w cor. Seventy-first St., six-st'y main factory, boiler-house and stable; cost, entire, $65,000; owners, Messrs. Leissner & Louis, 828 Broadway; architect, A. Wagner.

One Hundred and Fifteenth St., Nos. 319 *and* 321, 2 four-st'y brick tenements; cost, each, $8,000; owner, August Wolf & Co., 76 Ave. B.; architect, Chas. Sturtzkober; builders, Wolf & Lochmann.

Vanderbilt Ave., n w cor. Fourty-fourth St., three-st'y brick office-building; cost, $8,000; owner, New York Central Railroad Co.; builder, J. Richardson.

East Thirty-eighth St., No. 226, three-st'y brick school; cost, $28,000; owner, Mayor, etc., New York; architect, D. J. Stagg; builder, Edward Gustavson.

One Hundred and Twenty-seventh St., n s, 375′ w Seventh Ave., 3 four-st'y brick and brownstone dwells.; cost, $8,000; owner, Louisa Niebuhr, 2424 Second Ave.; architect, W. S. West; builders, W. F. & W. H. Niebuhr.

Sixth Ave., No. 263, five-st'y brick store; cost, $25,-

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