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A BILL is now pending before the Massachusetts Legislature for relieving mortgages from taxation, which, as it is of vital importance to the future of real estate and building interests in that State, deserves the attention of those whose profession connects them with such interests. Under the present law, the owner of mortgaged real estate in Massachusetts is compelled to pay taxes on the full valuation of the whole property, whatever may be the worth of his equity, while the mortgagee is taxed again for his share in the same estate, and he of course demands, and the owner of the property has to pay, a rate for the loan which includes the amount of this tax in addition to the ordinary net interest, the result being the exaction of double taxes from the holder of such property. This is a matter of no moment to rich proprietors, who own their possessions clear of all incumbrance and so pay only a single rate, but it bears heavily upon men who do not possess, or cannot conveniently take from their business, the full amount of the valuation of their dwellings: while upon those who inherit or acquire estates already mortgaged, as well as upon builders who erect houses for sale, it becomes a severe burden. To illustrate by example the effect of the present law, we will suppose a man to inherit an estate assessed at eight thousand dollars, mortgaged for six thousand to some savings bank. The assessed value of his inheritance is then two thousand dollars, and if invested in bank stock or other personal property he would have to pay, on an average, one and one-half per cent on that amount as annual tax, or thirty dollars. Being so unfortunate as to have it in real estate, however, he is compelled under enormous penalties to pay, not only one and one-half per cent on the whole eight thousand dollars for which the estate is assessed, but in addition the bank charges him six and one-half or seven per cent interest on its loan, in place of the four or five per cent which all other well-secured loans command, in order to cover the tax which it also pays on its six thousand dollars: in other words, from the owner of such property is extorted an annual tax of one and one-half per cent on fourteen thousand dollars, or two hundred and ten dollars.

BUT the builders suffer the most from the burden thus imposed on borrowers of money upon real estate security; a burden which has practically put an end, throughout the State, to what would otherwise be the principal part of their occupation, the construction of dwelling-houses for sale, and has driven them into an uncertain dependence upon casual job-work, or the risks and anxieties of contracts. In a few fashionable streets in the largest cities, where sales are quick and profits large, it is still possible to erect dwelling-houses on building loans, and dispose of them without loss, but elsewhere the discriminating tax against such operations has made them unprofitable, and one of the safest, steadiest and most legitimate of all kinds of business is virtually prohibited, by the smallness of the scale to which its transactions are confined. In any other branch of trade, the most careful operator is considered as justified in adding to his cash capital a credit of four or five times as much more, in other words, in trading, with cash in hand to the amount of twenty-five thousand dollars, on a basis of one hundred and fifty thousand; and this not only gives him all the security that his creditors require, but such an expansion, in these days of small profits, is necessary to procure for him adequate returns on his own cash investment. From the special security which real estate offers to lenders, and the staple character of the merchandise in which they deal, house builders in other localities are able to extend their transactions far beyond this limit, but the man who puts capital into such business in Massachusetts, even on a very modest scale, invites certain ruin, as scores of those who, seeing the vast numbers of houses which are annually erected and profitably sold in this way in other states, have endeavored to do the same there, know to their cost. Under the Massachusetts laws, if any one invests his twenty-five thousand dollars in house-building, borrowing additional capital to the amount of one hundred and twenty-five thousand, instead of using the same money to buy one hundred and fifty thousand dollars' worth of groceries or dry goods, he is, supposing his credit to be of the highest class, obliged to pay five and one-half per cent on his mortgage loans, instead of the four per cent which other mercantile paper would be worth, the difference, one and one-half per cent on one hundred and twenty-five thousand dollars, or eighteen hundred and seventy-five dollars per annum, being the tax on the mortgage loan. In addition to this, he is compelled to pay the same rate on the whole value of the finished houses, one hundred and fifty thousand dollars, making twenty-two hundred and fifty dollars more, or four thousand one hundred and twenty-five dollars per year for taxes alone, on an original capital of twenty-five thousand, this being the penalty for engaging in the construction and sale of houses in the same manner as with other merchandise. Seeing his capital rapidly consumed by these exactions, he forces sales, thus beating down his own market in the necessity for escaping the steady drain of his resources and ultimate ruin. This heavy penalty, which the present Massachusetts law imposes on all who build or buy real estate with borrowed capital, can be avoided by the rich, who are able to hold such property without incumbrance, and therefore pay only one tax, but few builders are either willing or able to employ as much of their own funds, and are thus cut off from the privileges which other business men enjoy. After some years' effort, a bill which will relieve them from a large portion of their burden has some prospect of becoming law, and it might be worth their while to exert the influence which they hold in the community to promote its passage, and thus re-open for themselves a way of employing their spare resources through which their fellows in other places, and themselves in former times, have profited so largely.

GENERAL DI CESNOLA, after having been subjected to so many aspersions and annoyances, for which, it seems, there was not even the shadow of an excuse, has been completely vindicated by the report of the investigating committee. Every charge of tampering with or improving upon the antiquities committed to his care which has been made public, has been thoroughly sifted by the committee, and in their own words, "each and all of them are without foundation." They find "that there have been no restorations, and no cutting or engraving of objects, but simply repairs by the replacing and reunion of such original fragments as existed and could be identified; and that the engraved illustrations which accompany the charges, inaccurate in general, are very incorrect in some of the most important details;" while the description which they give of the tests which they applied, soaking apart the fragments which had been united, leaves no room for doubt that their conclusions are correct. It is impossible to imagine what could have been the object of so wanton and groundless an imputation upon General di Cesnola, but no one can read the account of the proceedings of the committee without feeling that the attack has not only failed utterly of its purpose, but has in the end been the means of placing him before the world in the light of a singularly conscientious and faithful guardian of the objects entrusted to him. In other matters we are disposed to think that it is possible to carry the opposition to any restoration too far; as in a late case in England, where a country rector, having applied for permission to abolish a rusty old stove-pipe which disfigured one end of his church, was gravely admonished by the Association for the Preservation of Ancient Monuments to beware of "tampering with features which served to illustrate the habits of our ancestors;" but in the responsible head of a great museum the thorough and minute fidelity with which General di Cesnola is proved by this investigation to have thus far administered his office is as valuable a quality as it is, unfortunately for art, rare,

Senator Morrill's bill for assisting with public money the patriotic associations which may be formed to raise funds for erecting monuments on Revolutionary battlefields, which is now in the hands of the Senate Military Committee, will, it is said, be favorably reported by them, and will probably pass both houses. Meanwhile, a special bill appropriating funds from the Treasury in aid of the Saratoga Monument scheme has passed the House of Representatives, and is pending before the Senate Committee, who naturally prefer to give precedence to the Morrill bill, which is of general application, over all special ones. We should be glad to have the Saratoga Association, which has worked so hard and so unselfishly for its patriotic object, helped at the public expense, but it is still more desirable that similar favors should, under Mr. Morrill's excellent bill, be attainable by all those who will make similar exertions. If it passes the present Congress, we hope its full intent will be carried out, in making it the means of developing the artistic sense of the country, for which it will afford an unequalled opportunity. The cost of a vulgar, ignorant or tawdry monument is as great as that of the most exquisitely refined and noble memorial, and if any capacity for design of this class exists among us, the succession of conspicuous works to which the passage of the Morrill bill would lead offers a means of cultivating it to the utmost by rivalry and practice such as will probably never occur again.

The Society of Decorative Art of New York offers a number of very liberal prizes for designs for various furnishings, which ought to call out a large number of competitors. The most important prize is one of five hundred dollars for the best design for a *portière* or window-hanging; one hundred being offered for the second-best. For the best design for a screen, of not less than three panels, two hundred dollars is offered; and one hundred and twenty-five for a design for a frieze or band, applicable to a table-cover, lambrequin or other decorative purpose; second prizes being also offered for these. In addition to these premiums, special prizes, ranging from twenty-five to one hundred dollars, are offered by members of the Society for table-covers, for examples of needlework, for designs in outline work on silk and linen, for drawn work, and for a figure design suitable for a panel; while the *Art Interchange* offers a gift of twenty-five dollars to the author of the best color treatment of any design entered in the competition. The competing works are to be publicly exhibited, and the awards are to be made by a committee of experts. We shall print next week the full text of the circular, and commend the contest to the attention of our readers. Many architects cherish ideals of interior fittings and furniture, which circumstances or fashion prevent them from ever carrying into execution, and it would be a positive pleasure to such as can spare the necessary time to put their fancies into definite form. From this source, indeed, are likely to come some of the most original among the designs, and very possibly the most successful.

The "defective flue" has been playing a part in thoroughly frightening the occupants of the Metropolitan Hotel in New York, by its agency in causing the destruction of the dining-room attached to the building. Fortunately for the guests, this apartment, which seems to have been unusually combustible even for an American hotel, was separated from the main structure by substantial walls, and no real injury was suffered by any of the occupants, although they were notified to leave their rooms, and complied with unnecessary, but not unnatural alacrity, many of them throwing their boxes and valises into the street below, and immediately following themselves, by means of the fire-escape ladders, to finish their toilets. Some had even prepared to throw their children out of the windows, but the fire-engineer pronounced this unnecessary, and finally induced the poor frightened people to descend by means of the stairs, which were quite unobstructed. We are glad to learn that twelve thousand dollars' worth of "silver and crystal" chandeliers, and ten thousand dollars' worth of mirrors were destroyed, besides other furniture, and hope it will prove that some of the loss was uninsured. It is barely eighteen months since the same room was burned out, in the same way, and refitted at great expense. Perhaps a severe pecuniary loss might induce the owners, in rebuilding again, to devote a few cents to putting the flues in safe condition, and the anxiety to preserve their silver and crystal chandeliers, which are rare, may be the means in future cases of saving human life, a commodity less rare, but hardly less precious.

Captain Eads has a business-like way of talking about his ship-railway scheme which will, we imagine, gain him in the end quite as many supporters among his countrymen as will be attracted by the gold and silver medals which are said to have been promised to the Panama subscribers. The point which just now occupies his attention is the proposed guaranty by the United States for fifteen years of six per cent interest on fifty million dollars of the company's bonds. He says, and no doubt truly, that he and his associates can at once obtain a charter from the Mexican Government, and that private parties, as well as some foreign powers, are ready to assist in the work; but they are desirous that their own nation, whose interest in the railway is far greater than that of any other, should have the first opportunity of lending its credit to the enterprise, and of obtaining in return privileges and franchises of great material value. His proposition is that if the United States will guarantee this amount of interest for the limited time specified, he will, for the company, undertake, within ten years after the expiration of this time, to repay all money which may have been advanced by the United States, and will in addition grant to the United States the exclusive right to reduce the tolls charged for transportation, provided the reduction shall not prevent the earning of eight per cent annual dividends; to discriminate in toll-charges in favor of American and Mexican commerce; and to have its own war-vessels, troops, property and mails transported free; and will also agree that no vessels or contraband of war belonging to any nation at war with the United States shall be conveyed over the road. It must be acknowledged that these concessions would be well worth a comparatively small advance of money, all of which was to be repaid within ten years; and Captain Eads regards this as certain, saying that a toll of a dollar and a quarter per ton will, with the business which is anticipated, produce a revenue sufficient to relieve the United States of its guaranty, while it would remain in full possession of its privileges. With characteristic confidence, Captain Eads proposes that no portion of the guaranty shall attach until ten miles of the road are completed, with the terminal works, and a loaded vessel weighing four thousand tons has been transported at the rate of six miles an hour over the road and back again, and placed in the water, without injury to it, the road, or the terminal works. When this is done, five million only of the guaranty shall attach; and five millions more for each additional ten miles similarly completed. These favors seem modest compared with those granted the Pacific railroads.

Judge Macomber, of Rochester, N. Y., has rendered a decision in the case of the Johnston Harvester Company, which is of considerable interest. The Harvester Company sought to have the Moulders' Union restrained by injunction from "enticing away" its workmen, and the judge refused the application, on the ground that it was inexpedient to interfere with the freedom of action of workmen, unless they abused it to the extent of violence, trespass, or breach of the peace. The *Iron Age*, in some sensible remarks upon this decision, observes that under such a doctrine the operatives in a rolling-mill are at liberty, by a concerted signal, to throw down their tools, leaving charges in the furnaces and iron in the rolls, and inflicting a ruinous blow upon the business of their employer, provided they commit no breach of the peace in so doing. We hope that the *Iron Age* misunderstands the judge's meaning, and that such conduct as this would be regarded by him as a trespass, for which those who were guilty of it should be held rigidly responsible. There are indications that the trades unions have begun to see the folly, if not the criminality, of inflicting wanton injury upon innocent persons for the sake of a trifling and temporary gain to their members, and the outrages which were once committed with impunity, — such, for instance, as the abandonment of a train full of passengers on the Grand Trunk Railroad, in the dead of winter, in order to gain a few cents additional pay for the treacherous and cowardly firemen and engineers, — would not now be tolerated. There is much truth in Judge Macomber's opinion that workmen and servants are entitled to the position, which in many respects they have not yet attained, of free agents, at liberty to come and go as they will, responsible only, like other persons, for violation of their contracts or their duty; and it is very possible that the best way to create a sense of duty and responsibility among those who appear devoid of it is to allow them as much liberty as is consistent with the liberty of those with whom they come in contact.

BUILDING SUPERINTENDENCE. — II.

THE CONSTRUCTION OF A STONE CHURCH. — CHAPTER I.

Construction of Stone Buildings.

THERE are many advantages in beginning the study of construction with stone buildings. Such structures require a minuteness of attention, and a precision and accuracy of workmanship, superior to that which is generally bestowed upon buildings of any other material, and the careful and continual measuring, levelling and verifying which they demand, together with the foresight which must be exercised in order that all parts of the masonry and wood-work may come together without error, tend to form habits which are of great value in the direction of any kind of building operation. Moreover, the construction of most stone buildings involves calculations of thrust; of pressures, vertical and oblique; the resistance of materials, and many other technical problems well fitted to exercise and develop the capacity of the young professional man, while the comparative slowness with which they are erected affords him sufficient time for a careful consideration and solution of such questions, which is not always possible in the case of lighter structures.

If it is considered also that stone-masonry of some kind enters into nearly all building operations, and that foundation-works, even of light erections, sometimes require the overcoming of serious difficulties, the propriety of introducing the general subject by its most intricate and technical branch will be sufficiently plain.

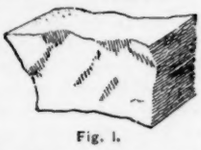


Fig. 1.

The church, of which we propose to follow the construction, is intended to be situated on an elevated ground, descending irregularly toward the east. The soil appears to be gravelly, but variations in the appearance of the grass over the lot indicate that the sub-soil is not uniform. The total difference in the level of the ground in the length of the proposed building is about six feet.

The church is to be cruciform in plan, with clerestory and nave aisles; the chancel to be without aisles, as wide as the nave, and with a semicircular apsidal termination. The principal entrance is to be through the tower, which stands at the south-west angle, forming the termination of the south aisle of the nave, and there is a second entrance, opening into the transept through a small enclosed porch which occupies the angle between the transept, which has considerable projection, and the south aisle of the nave. East of the north transept is the organ-chamber, with wide openings into transept and chancel. The corresponding angle between the south transept and the chancel is occupied by the robing-room, with private entrance from the outside. Under the chancel is a society-room, entered directly by steps from the outside. The rest of the space under the building is used for a cellar, reached by a circular stone staircase in a staircase-turret attached to the main tower. The same stair ascends also to the bell-chamber. The whole building, including the spire, is faced with brown freestone from the floor-line upward. The basement-wall, from the floor-level to the ground, is faced with granite. The foundation-walls, and the backing of the walls above ground, are of a slaty local stone. The spire and staircase-turret are backed with brick.

Fig. 2.

In the interior, the clerestory arches, and the caps and bases of the columns which carry them, are of Ohio freestone. The plinths and shafts of the columns are granite, the shafts being polished. The chancel steps are of marble; the vestibules are tiled with marble; and the chancel floor is laid with encaustic tiles. The outside steps are granite, and the winding stair in the turret is of hard brown sandstone.

Fig 3.

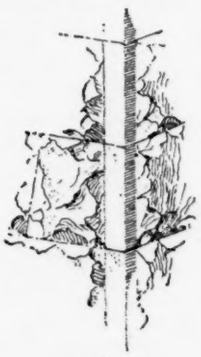


Fig. 4.

Ashlar.

The exterior stone facing is specified to be "neat random ashlar, quarry-face, with pitched joints." This means that all the exposed surfaces are to be freshly split, without weather-worn faces, such as would be admissible if *rock-face* were specified, and that the joints, instead of irregularly projecting, as is permissible in some engineering work (Fig. 1), are to be "pitched off" to a line previously drawn around the stone, all parts of which lie in a true plane at right angles with the surfaces formed by the joints. This is done with a "pitching tool" or wide chisel with a very thick edge (Fig. 2), and the result is to furnish blocks which, however rough and projecting in the centre, all possess four well-defined edges, by means of which they can be placed upon and beside each other with as much accuracy as the smoothest-faced stones, presenting a surface like that shown in Fig. 3.

Modes of Dressing Stone.

Pitched Joints.

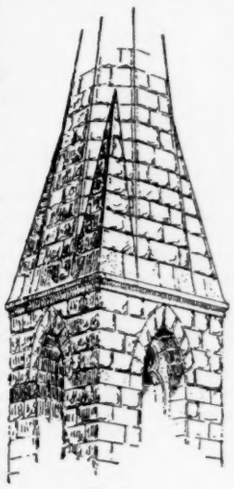


Fig. 5.

Other parts of the exterior stone-work are differently treated; the spire is to be a "broach" (Fig. 5), and the arrises, or edges, of the octagonal spire, as well as of the broaches, are to have chiselled draft lines (Fig. 4) two inches wide. There will be also draft lines one and one-half inches wide around all openings, and the reveals of openings, together with all cornices, copings, weatherings of buttresses, washes of sills, roof of staircase-turret, and bands in spire will be crandled; that is, brought to a plane surface by means of the crandle (Fig. 6), which is a toothed hatchet composed of eight or ten pointed chisels wedged tight into a frame with a handle. With this tool the surface of the stone is obliquely struck until the inequalities have been reduced and the surface is covered with short parallel furrows, all running in the same direction. (Fig. 7.) The position of the workman is then changed, and the tool applied in the other direction, so as to make furrows crossing the first. By this means a comparatively smooth surface is formed, covered with a net-work of short lines. (Fig. 9.) Before beginning the work a line is drawn around the stone, and the joints either pitched off to this line, as before described, or a chisel draft sunk all around the face until the line is reached. (Fig. 8.) Whichever mode is adopted, by removing the rough projections of the central portion first with a toothed chisel and then with the crandle until it is reduced to the plane of the draft line, a true surface is obtained. It need hardly be said that the first operation in all stone-cutting is to form the joints, and from these four surfaces, at right angles to each other (Fig. 10), all the other bounding planes of the finished stone are derived.

Crandle.

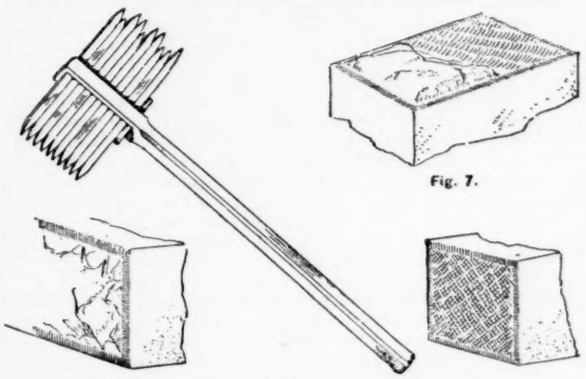


Fig. 8. Fig. 6. Fig. 9.

Fig. 7.

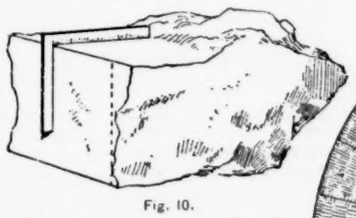


Fig. 10.

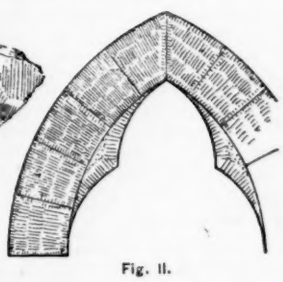


Fig. 11.

Droving.

The tracery of the windows is droved; that is, finished by working over the entire surface with a wide chisel, so as to cover it with parallel lines, all running in the same direction, except around arches, where they radiate from the same centre as the curve of the arch. (Fig. 11.)

Of the granite, the ashlar is quarry-faced, with pitched joints like the sandstone. The "wash" or upper inclined surface of the water-table is pene hammered; that is, pounded with a heavy, double-edged hatchet, or "pene hammer," until the inequalities are chipped away and the surface is reduced to a plane, determined by draft lines previously drawn, and covered with coarse parallel lines. The outside steps, and the reveals

Pene Hammering.

and sills of basement openings, receive a further finish, by being pounded all over, after the pene hammer has done its work, with a "bush hammer," or as some say, "patent hammer," in which several parallel blades are bolted into an iron frame with a handle. This instrument (Fig. 12) also leaves parallel marks on the stone, but much finer than those of the pene hammer. For the outside work, a tool having six blades to the inch will give a sufficiently smooth surface, which is specified as "six-cut." The plinths of the interior columns are first pene hammered, then six-cut, and finally "ten-cut," with a bush hammer having ten blades to the inch, which leaves the stone very smooth: Eight blades would give an intermediate finish. The joints and beds of the granite are "pointed," or brought to a roughly plane surface by means of the "point," a short, thick chisel, with a very short edge, often less than a quarter-inch in length.

Bush Hammering.

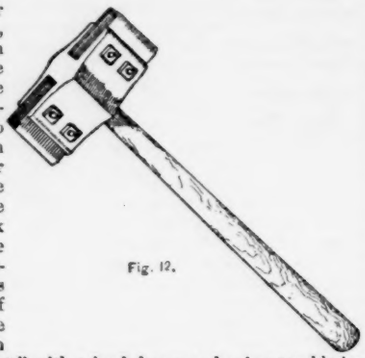


Fig. 12.

The interior capitals and a portion of the arch mouldings, as well as the finials and some other outside work, are carved. The marble steps to the chancel are polished. In the carved work it is important to leave all the marks of the chisel untouched. Inferior workmen sometimes smooth and rasp the carving, to the destruction of its crispness and beauty. The rest of the interior freestone, on the contrary, will be rubbed. This is usually done by laying stones sawed to a suitable thickness, either with steel blades supplied with sand and water, or with the much more rapid diamond saw, face downward on a large mill-stone revolving horizontally. This smooths off the lines left by the saw, and the surface thus given is left to form the face of the work. The granite shafts are polished by machinery, emery of different grades being first used, after the stone is brought to a smooth surface with tools; followed by "tin putty," or precipitated oxide of tin, which produces a glass-like lustre. For red granite, the so-called jewellers' rouge, or crocus, which is really an oxide of iron, is used for polishing, and the particles which find their way into the crevices of the granite are allowed to remain, for the sake of heightening the color. Occasionally the final gloss is given with wax, but this fraud can be detected by the application of a hot cloth, or by exposure to the weather, which quickly removes the lustre so obtained.

The roof is open-timbered, with hammer-beam trusses and arched ribs, the trusses, as well as the purlins, being of hard Southern pine. The trusses are covered with matched pine boards, tarred felt, and slate, and the panels formed by the purlins and trusses are lathed and plastered. The interior is furred with studding, lathed and plastered. A panelled wainscot, four feet high, runs around the room.

The interior of the tower, which forms a vestibule, is lined with a four-inch wall of face-brick, separated by a two-inch air-space from the outside wall, but tied to it with iron anchors. This lining extends the whole height to a ceiling of moulded girders, forming panels filled with matched-and-beaded sheathing, and covered with tin on top. The space above this, though accessible from the staircase-turret, is left rough, up to the "bell-deck," also covered with tin, on which stands the framing for the peal of bells, which should be as far as possible independent of the tower walls.

The interior of the society-room beneath the chancel is lined with a four-inch brick wall, separated by a two-inch air-space from the outside masonry, and tied to it with iron, and is plastered on the inner brickwork. The walls of the robing-room and organ-chamber are furred, lathed and plastered. The tiled floors of the vestibules and chancel are set on bricks laid upon boarding cut in between the beams. All the other floors are double, the under boards of spruce throughout, and the upper flooring of Georgia pine in the society-room; elsewhere of white pine. Interior finish is of hard wood.

The foregoing description contains a brief abstract of the specifications. In accordance with these the contract has been signed, and the builder, or the contractor for the excavation, as the case may be, meets the architect upon the ground to lay out the work. If a special plan has been prepared, with the exact dimensions of the walls and the lengths of the diagonals in plain figures upon it, the setting-out will be much simplified, and there will be less danger of mistake, but the cellar plan is often the only drawing provided for the purpose, and the additions or subtractions necessary to give the dimensions of the trenches must be made on the spot.

Setting out the Building.

In important works it is best to call upon an engineer to set out the lines, but circumstances may make it necessary to do without such professional aid. In any case, the architect should always be present.

Some builders, and a few architects, possess an engineer's compass, by means of which they can "turn off" the various angles around the building with precision; but in most cases the parties will arrive at the spot furnished only with a tape-measure, a few stakes, and a "mason's square," consisting of three pieces of wood nailed together in such a way as once to have formed, perhaps, a right-angled triangle. Even these rude instruments will, however, suffice, if the tape is accurate, and especially if the architect has had the forethought to bring a second tape, which will much facilitate matters.

The first thing to be done is to stake out the outside lines of the main walls of the building, the "ashlar lines," as they are called. Many persons neglect these in the first laying out, and run only the exterior lines of the cellar-wall, which usually projects three or four inches beyond the ashlar lines, but the danger of mistakes is much lessened, and the work in the end simplified, by setting out at the beginning the perimeter of the main walls, and then drawing parallel lines outside of these to indicate the face of basement-walls, or the line of excavation, as the case may be. By this means the exact relation of foundation and superstructure is shown at a glance, and there is no danger of a line drawn to indicate the face of the foundation being mistaken for the ashlar line, and the wall being built several inches outside of it, as sometimes happens where only one line is given at first, much to the detriment of subsequent work.

The staking out of the plan must begin by the establishment of some main rectangle or triangle, to which the various projections can be added one after the other. In this instance, the preliminary figure may be the rectangle formed by the nave, including the aisles, from the west front as far as the transepts. Having fixed upon the location of the building, the line of the west front is determined, and upon this line is measured the width of the nave with the aisles, to the outside of the aisle walls. A short stake should be driven into the ground at each end, and a copper tack in the head of the stakes will indicate the exact points. The next step is to run lines from these points at right angles with the first line, which will represent the face of the aisle walls. If a surveyor's compass is at hand, the right angle is easily turned off; if not, the best way of proceeding is that shown in Fig. 13, where A B is the line of the west front, X Y marking the width of nave and aisles. Find from the plans the distance Y T, from the west front to the angle of the transept, and calculate the diagonal distance from X to T, by adding the squares of X Y and Y T, and extracting the square root of their sum. (*The square of the hypothenuse of a right-angled triangle is equal to the sum of the squares on the legs.*) Then take two tapes and placing the ring of one at X, and of the other at Y, measure from X on the first the length of the diagonal just found, and on the second the distance X T, and bring the two points together. Mark the place where the measurements on the two tapes coincide with another stake and copper tack. Change the tapes over, and measure X S equal to Y T, and the diagonal Y S equal to X T, and mark the spot where the points again coincide with a fourth stake and tack. Verify the work by measuring the distance between the two eastern stakes, S and T, which should equal that between X and Y. If the measurements have been accurately made, the four stakes will form the corners of a perfect rectangle. Care must be taken to keep the measuring-tape level. If the ground falls in any direction, the tape should at the lowest point be held up so that the ends will be at the same level, and a plumb-line dropped from the correct point on the tape to the ground will give the position of the stake. It will save time and trouble to have the lengths of the diagonals calculated beforehand and marked on the plans; not only for the main rectangle but for minor ones.

Preliminary Rectangle.

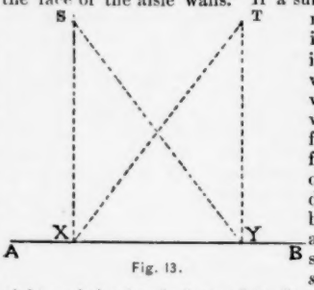


Fig. 13.

Measuring Diagonals.

Tapes to be Level.

Perhaps two tapes will not be at hand, or the mathematical attainments of the party may not extend to the extraction of square roots. In that case, after setting out the line of the western front as before, measure off one of the two long sides of the preliminary rectangle, as nearly at right angles with the base line as possible.

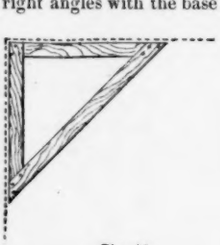


Fig. 14.

Fig. 15.

By stretching a string for the base line, with another for the long side of the rectangle, the latter can be brought approximately to the proper direction by the help of the mason's square (Fig. 14) or by the application of the "three, four and five rule"; which consists in marking a point on one string three feet from the angle, and on the other four feet from the same angle, then adjusting the relative position of the two until

"Three, Four, Five" Rule.

a straight line drawn diagonally across the angle, between the two points, measures exactly five feet. (Fig. 15.) Then the two strings will form a right angle, since 5 is the hypothenuse of a right-angled triangle whose other sides measure 4 and 3 feet.

Having found the angle approximately by these means, a stake should be temporarily driven at the extremity of the long side of the rectangle so found, and the other side set out parallel with this, by measuring the distance C D (Fig. 16) equal to A B, from the point C, distant on a second line, A C, as far from A as D is distant from

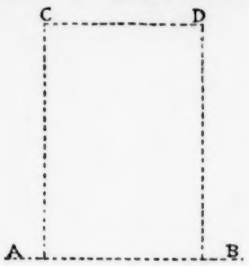


Fig. 16.

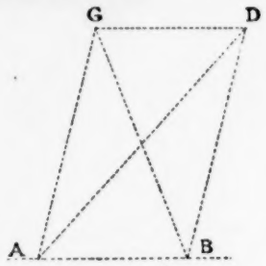


Fig. 17.

B. Then the figure A C D B will be a *parallelogram*, since its opposite sides are equal; but it may not be a *rectangle*. As a test, the diagonals should be measured. If they are unequal, the figure, instead of being rectangular, has the form of which Fig. 17 is an exaggerated representation. To remedy this, move the stake D, at the farthest extremity of the longest diagonal, toward the stake C, a distance about equal to two-thirds of the difference in length between the two diagonals. Then move the stake C an equal distance in the same direction, so as to keep the length of that side of the rectangle correct. Measure the diagonals again, and if now found to be equal, verify all the measurements, then drive the stakes firmly and set copper tacks as before. This preliminary rectangle having been accurately marked out, the rest of the work follows easily.

Lay out the transepts by stretching a line through the eastern side of the rectangle just found, prolonging it indefinitely at each end.

Secondary Rectangles.

Prolong also the north and south sides of the rectangle indefinitely eastward. Lay off the projection of the transept, as figured on the plan, on the extension of the east side of the rectangle; from this point, parallel to the main axis of the building, measure the proper width of the transept. Measure the same distance on the prolongation of the north and south sides of the rectangle, and from the points thus found lay off again, approximately at a right angle, the projection of the transept. Join, if they do not already coincide, this point to the corresponding one found by measuring parallel to the axis; the place of meeting will be the true north-east or south-east angle of the transept. Drive stakes at all the angles thus found, and set copper tacks to mark the exact points.

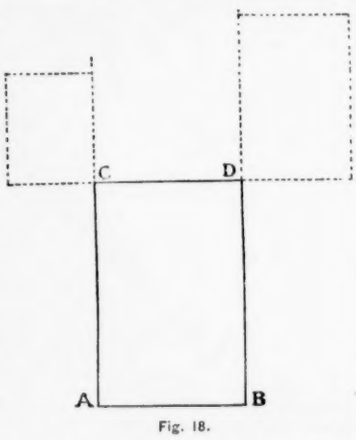


Fig. 18.

These secondary rectangles, representing the transepts, will have their angles correct without further trouble, since A C D B having been made truly rectangular, the angle, F D E, included between the prolongations of the lines, D B and C D, which include a right angle, will itself be a right angle, and one angle of the parallelogram, D F G E, of which the opposite sides are measured equal, being a right angle, the others are also right angles.

To determine the apsidal curve, both for the walls and the excavation, it is necessary to fix the centre, from which an arc of the requisite radius can be struck whenever needed. (A, Fig. 19.)

Centre of Curve.

The usual way of striking such an arc is to drive a strong stake at the centre, with a nail or spike inserted at the proper place in the head of the stake, and using a long rod with a notch fitting against the central spike and cut to the requisite radius to describe the curve. At the first setting-out, such a stake may be driven for temporary use, the apsidal semicircle described and marked with a number of small stakes or a line cut in the turf with a spade. Then the excavation can begin at this line, but as the central stake would soon be dug away, it is necessary to provide means for recovering it at pleasure. This can best be done by fixing points entirely outside the excavation from which lines can be stretched which will by their intersection indicate the point required. For our purposes four such points will be necessary. Two of these, J K, may with advantage be situated on the prolongations of the lines which show the northern and southern ashlar lines of the transepts, and the distance from the angles, G and H, of the transepts should be twice the distance from the centre of an imaginary line connecting G and H to the point, A. Then two cords, one stretched from H to J, and the other from G to K, will cross each other over A. One more step remains to be taken. As the stakes which at first indicate the actual points, G and H, will

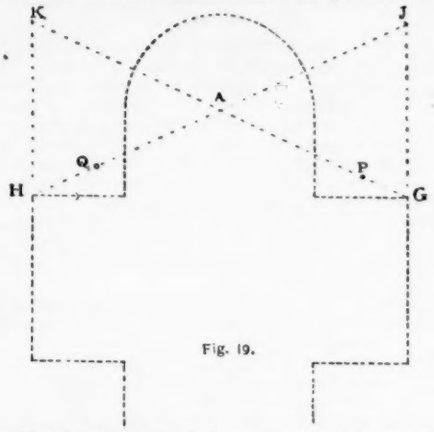


Fig. 19.

be removed by the excavation, it is necessary to drive supplementary stakes, P and Q, with copper tacks in their heads at any point on the lines just found. Then cords, stretched from these intermediate points, will serve the same purpose as if drawn through to G and H, and the stakes which mark them will not be disturbed. The secondary rectangles, which are formed by the aisles, tower, porch, robing-room, or organ-room, can be easily laid out in the same manner as that described for the transepts.

As the stakes which now mark the corners of the building will be dug away as soon as the excavation is begun, it is necessary to provide some further means by which their positions can still be shown when the stakes themselves are removed. This is done in much the same way that the centre of the apse circle was fixed, — by making the point to be marked fall at the intersection of two straight lines drawn from some more distant stations, which in the case of the corners of a rectangle may best be situated on the prolongations of its sides, as shown in Fig. 20, where the point, A, is marked with as much precision by the intersection of the lines stretched from the indefinite points, X and Y, as it would be by a stake.

Fig. 20.

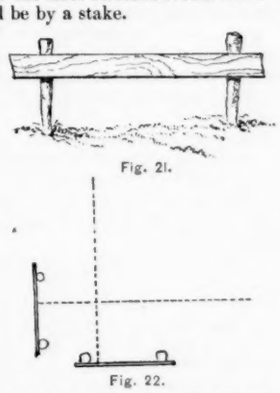


Fig. 21.

Fig. 22.

In practice, the points, X and Y, are usually given, not by stakes, but by notches, or horizontal "batter boards," which are nailed to stout stakes, five or six feet apart. (Fig. 21.)

Batter-Boards.

Two of these batter-boards are necessary to determine each angle (Fig. 22), and as it is of great importance that they should be firm and permanent, they must be set up four or five feet back from the edge of the excavation, or more, if this is to be very deep, and the stakes set firmly in the ground. They must, moreover, be as nearly on a level as possible, those which stand at the lower portions of the site being raised on high but strong stakes. Having set up these batter-boards opposite the corners already found, lines should be stretched between them (Fig. 23) so as to coincide with the lines already marked by the stakes. Plumb-lines suspended from the cords over the stakes will show when they pass exactly over the copper tacks which mark the precise points to be transferred, and as each line is accurately fixed, a small notch should be cut in the board where the string passes over it. When all the lines are fixed upon the batter-boards, the first set of notches will, if the ashlar face of the walls was taken for the measurements, serve at any time to fix the line of that face for any wall. The projection of the water-table or base course beyond the ashlar surface, the projection of the outer face of the foundation, the thickness both of the foundation and the superstructure, can be indicated by notches on the batter-boards, measured from the original notch,


Fig. 23.

and marked so that they can be readily distinguished, as shown in Fig. 24.

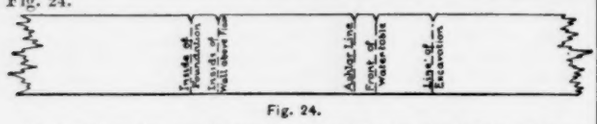


Fig. 24.

Bench Mark.

It is well to fix one batter-board, at least, at the height of some given level of the building, as for instance, at the top of the water-table. If an engineer is at hand, or if the architect or contractor can use a level, there is a great advantage in setting the top of all the batter-boards at exactly this height: then the masons will be able, when the time comes for setting this course, to level across from the batter-boards at various points, and thus obtain a line more perfectly horizontal, and with less trouble than would be possible by starting from a single point.

The fixing of the batter-boards completes the setting-out of the building, and a line may then be cut with spades, some fifteen or sixteen inches outside of the original stakes, which can then be removed and the work of excavation begun.

All the business of staking out the building belongs properly to the contractor, unless an engineer is employed, but the architect should always be present to see it done and verify the measurements, and especially to observe the accuracy of the angles. The crucial test of the rectangularity of the lines is the measurement of the diagonals, and this should be insisted upon and the stakes shifted patiently until they are correct. If this is not attended to at the outset, the superintendent is very likely to see subsequently the upper walls here and there overhanging the foundation, in the attempt to bring back the superstructure to its proper shape (Fig. 25); or, in the finishing, to find doors and windows unexpectedly cramped or thrown out of centre, the pattern of the tesselated pavement tapering off to nothing at one end, the frescoed ceilings misshapen, carpets fitting badly or some other of the innumerable vexatious and irremediable consequences of incorrect setting-out.

Importance of Correct Plantation.

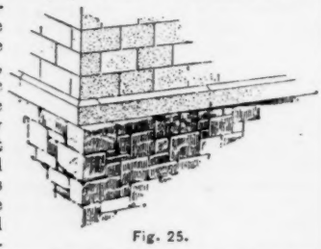


Fig. 25.

THE ILLUSTRATIONS.

DESIGN FOR A COTTAGE AT MT. DESERT, ME. — MR. BRUCE PRICE, ARCHITECT, NEW YORK, N. Y.

HOUSE FOR C. E. WALLACK, ESQ., LONG BRANCH, N. J. — MR. G. A. FREEMAN, JR., ARCHITECT, NEW YORK, N. Y.

The walls of the second story are covered with California redwood.

COMPETITIVE DESIGNS FOR A HOTEL ENTRANCE-HALL, BY MESSRS. C. H. WALKER, C. I. BERG, G. R. TOLMAN, W. H. DABNEY, JR., C. GILBERT, AND OTHERS.

We quote from the report of the jury published in the *American Architect* for Jan. 8 the criticisms which are applicable to the designs here reproduced:

"After the preceding design '*Tabard's*' seems peculiarly ingenuous. Its author has not yet much architectural baggage, and thus lightly weighted, presents a straightforward solution of the problem, attractive from its cheery, homelike character. This unaffected simplicity with an excellent plan are its merits. The sheet of details offers nothing of interest, and much that is crude and badly drawn; but the perspective, though inexperienced, is sketched with spirit, and helps to earn an honorable mention.

"'*Puck's*' design is thoughtful, and for study and ingenuity in the details deserves a mention, but the plan is neglected unwarrantably; the clerk's office and private office for no apparent reason just fail, by a little, to divide the hall symmetrically, which would have been an advantage in the ceiling-panelling, while the mantel thrown in at hap-hazard adds to the confusion.

"A first glance at '*Bee's*' hall shows a bright and decorative effect, but the plan lacks the study which would have made it satisfactory. It is a defect for the clerk not to see or be seen by those entering, and if necessarily hidden by the stairs, he should have had a clear view and access under them. The fireplace would seem better placed in the opposite wall, away from the draught of the front door. Study, too, would have insured firmer arches or supports under the stair-landing, and would have provided something more artistic than the doubtless 'authentic' colonnettes of the mantel. '*Bee*' need but be true to his *nom de plume* to come out well in the future.

"'*Lux*' sends us a design with good work in it, but his ambition ran away with his judgment when he threw his strength into a palace hall. His horizontal row of lanterns is a novel and pretty way of lighting. The plan is complicated, and there are some bad slips in the perspective of the niches.

"'*Faithful and Grateful*' is a quaintly conceived, old-fashioned interior, simple in plan and honest throughout, but the decoration cannot be said to have been studied, nor any details designed.

"The author of the design marked with 'a circle inscribed in a square' fails from inexperience. His mantel-piece is interesting, but his pilasters and wood finish throughout are too heavy.

"'*Atelier*' has a good plan and does not lack ideas, but his ability as a draughtsman must be improved before he can express himself fairly."

VAULTS.[1] — VII.

SPRINGERS.

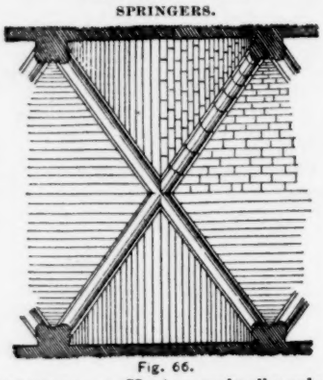


Fig. 66.

2. Quadripartite. — *a.* Having groin-ribs only. (Fig. 66. Durham Cathedral.) This is not exactly rib and panel vaulting, but rather solid vaulting with groin-ribs.

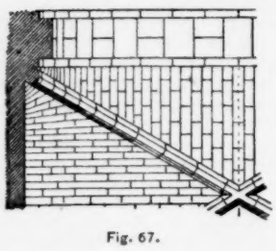


Fig. 67.

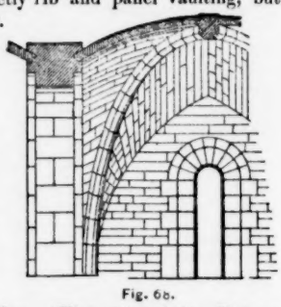


Fig. 68.

b. Groin-ribs and transverse arches. (Figs. 67 and 68. From a church at Gerland, in France.) Both ribs and arches are in this case semicircular.

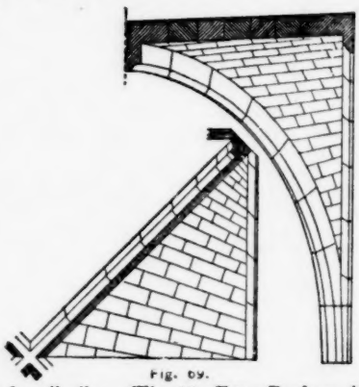


Fig. 69.

c. Groin and wall ribs. (Fig. 69. From Bayham Abbey.) The groin-ribs are semicircular, the wall-ribs pointed. The ridge descends slightly to the centre.

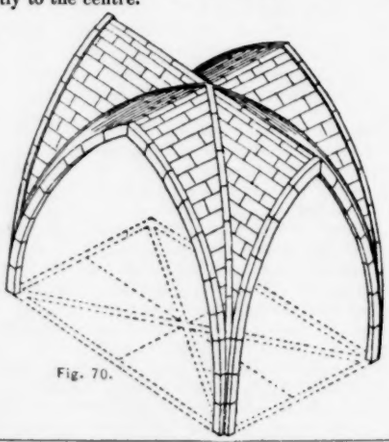
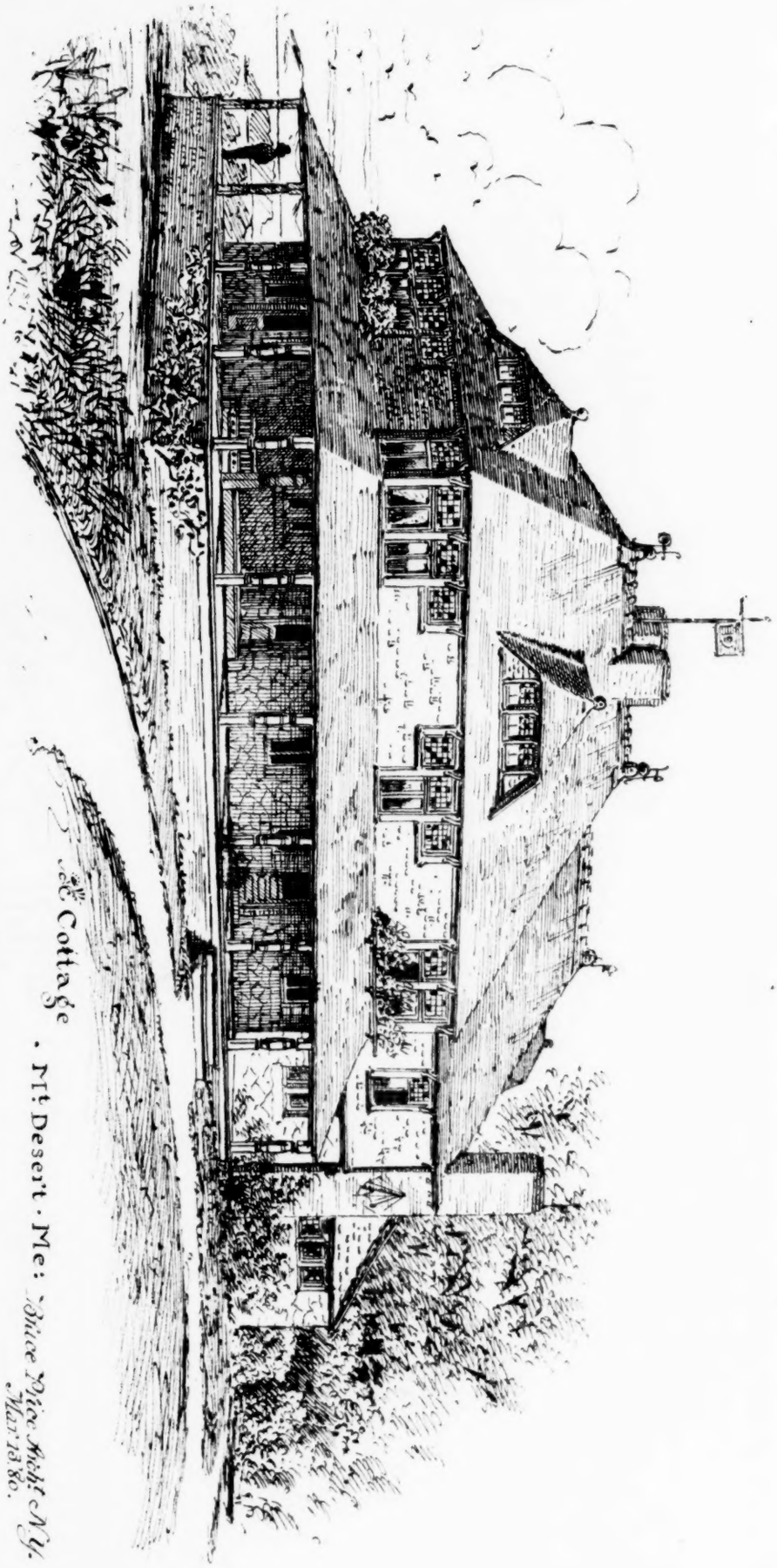


Fig. 70.

[1] These papers, by Professor Charles Babcock of Cornell University, will be printed in monthly parts.

The House of Mr. Chas. E. Walker, Long Branch, N.J.

G. A. FREEMAN, JR., ARCH'T. 111 BWAY, N.Y.



A Cottage · Mt Desert · Me: Shingle Style Architecture.

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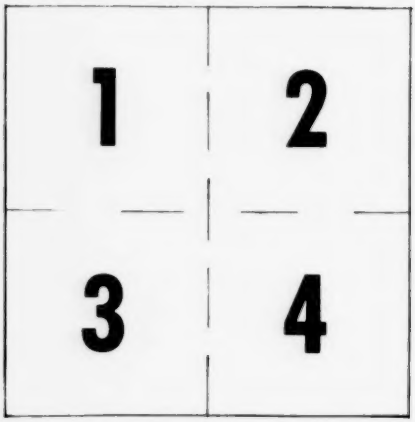

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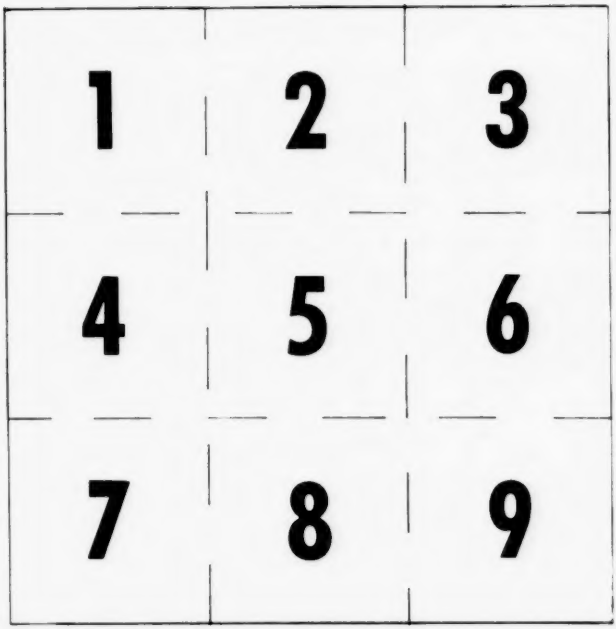

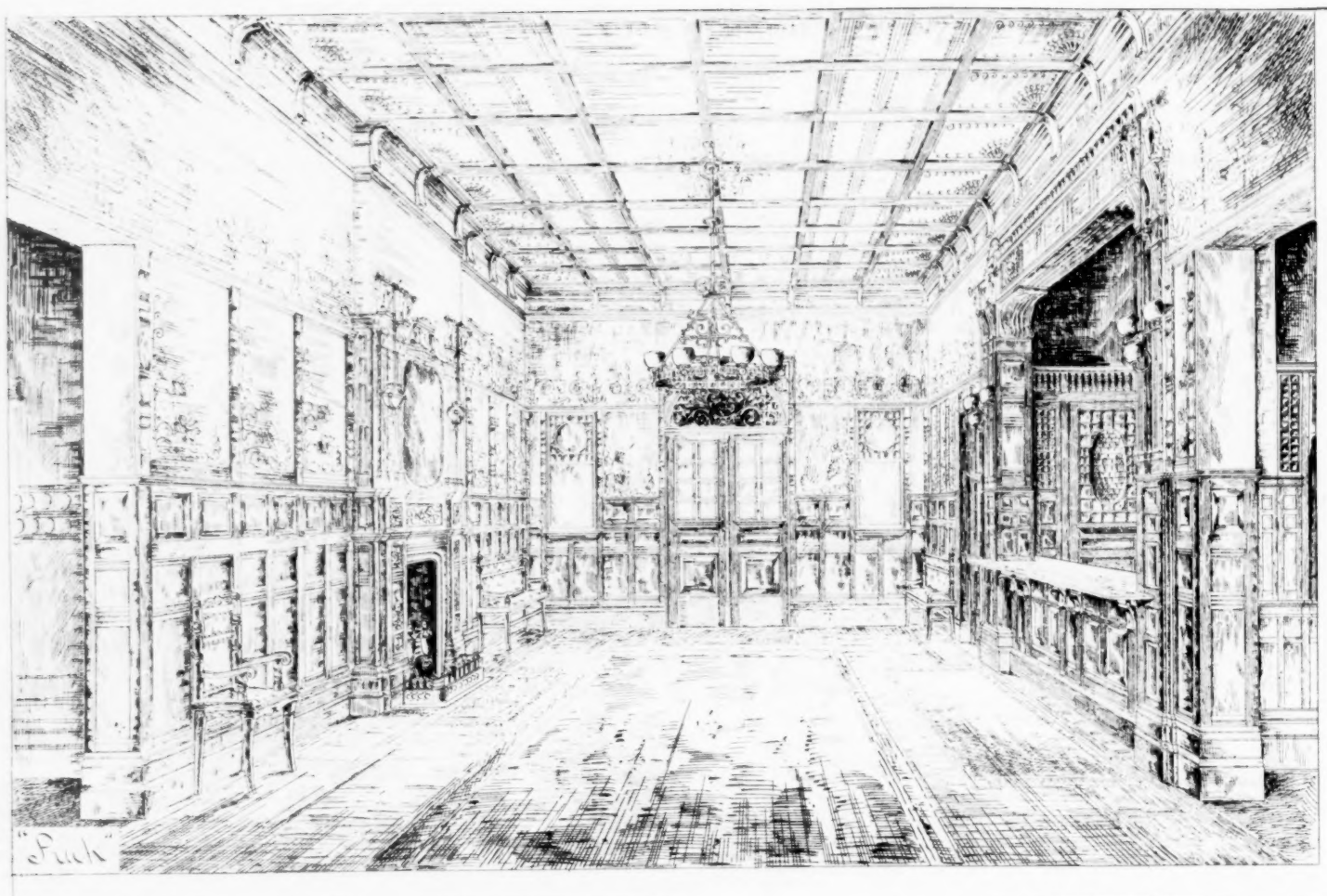

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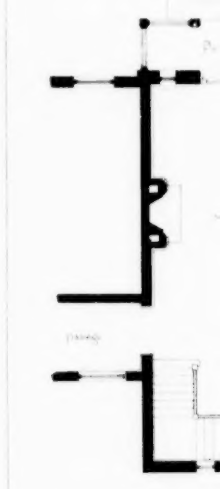

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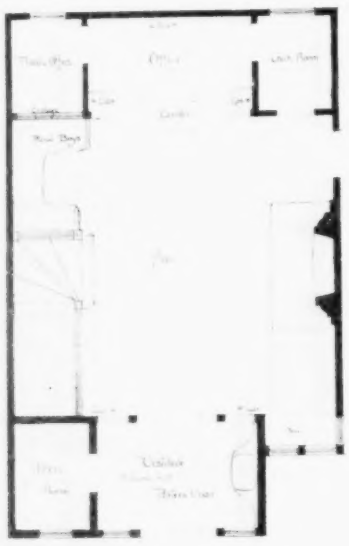

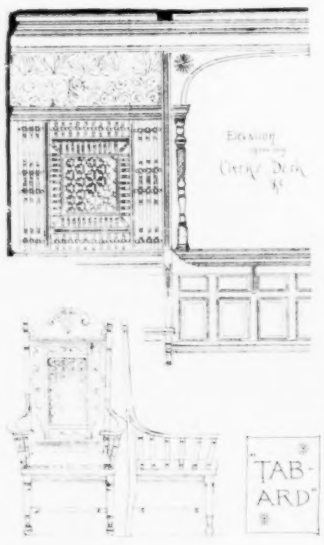

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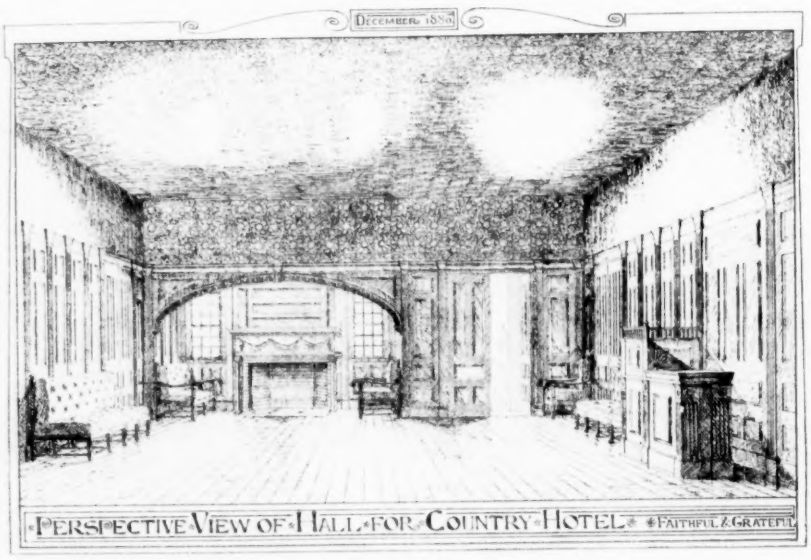
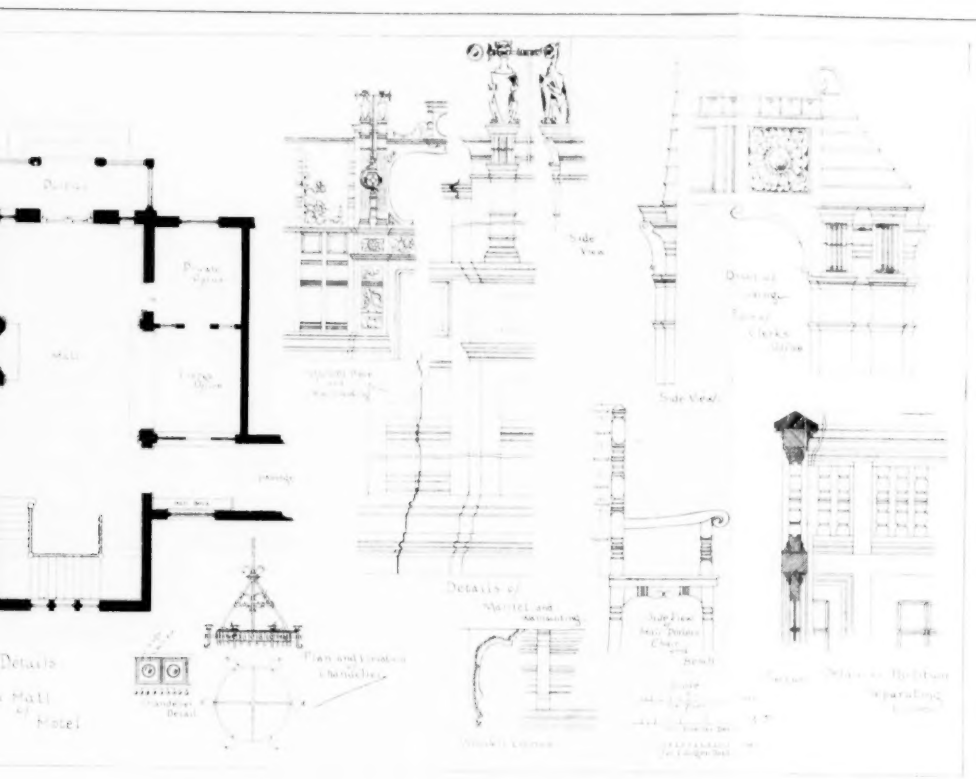


PERSPECTIVE VIEW OF HALL FOR COUNTRY HOTEL. FAITHFUL & GRATEFUL

Design



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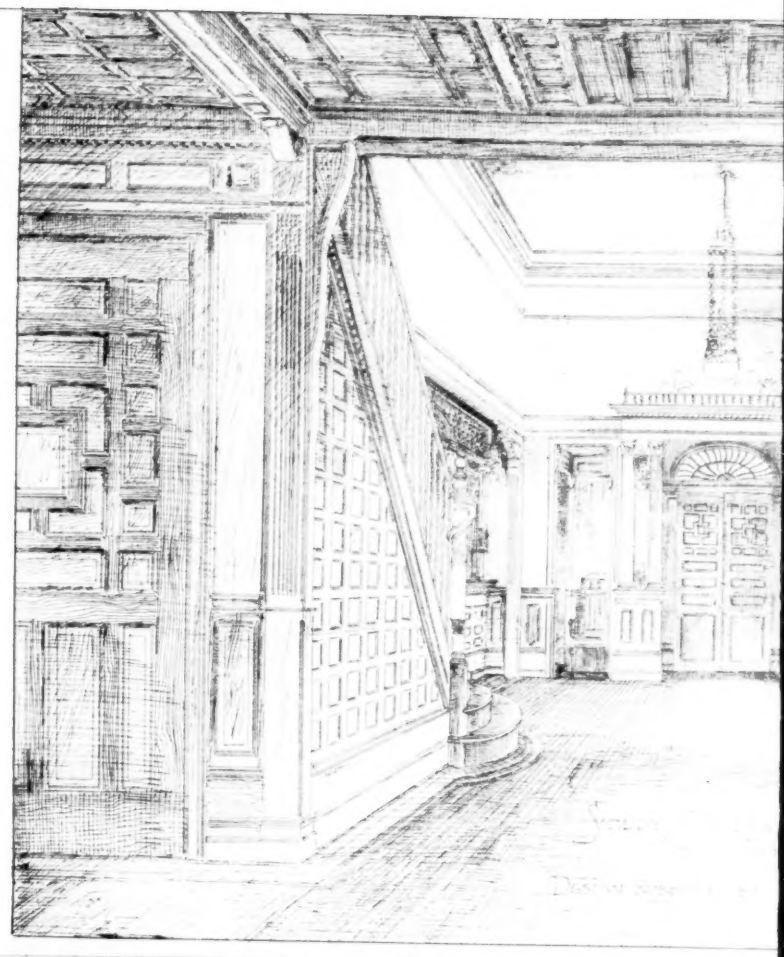

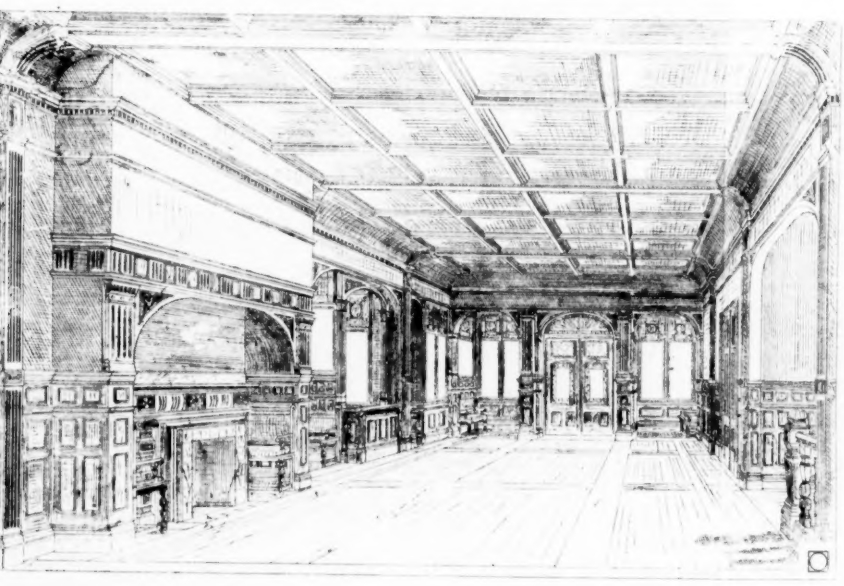

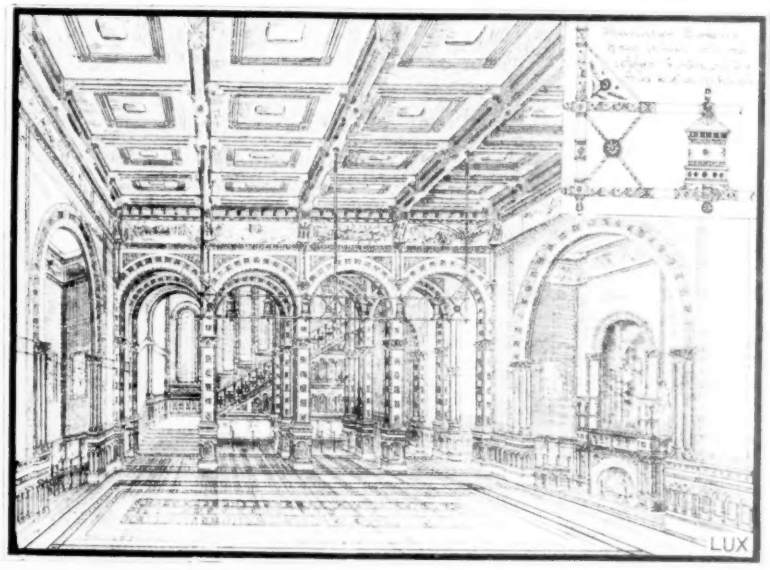

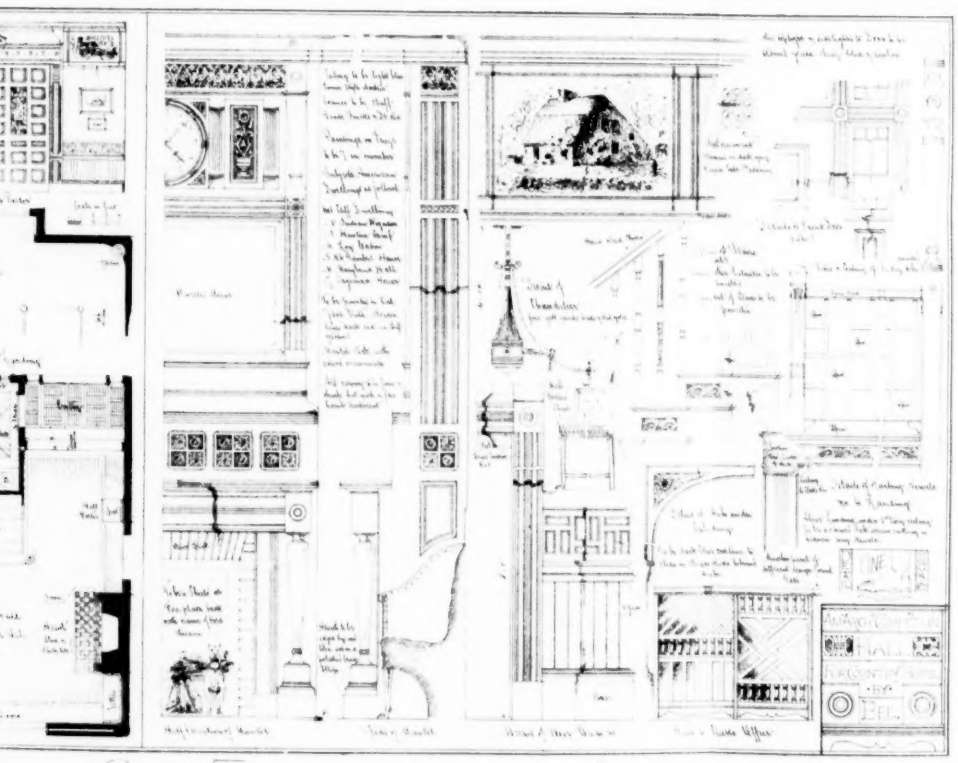

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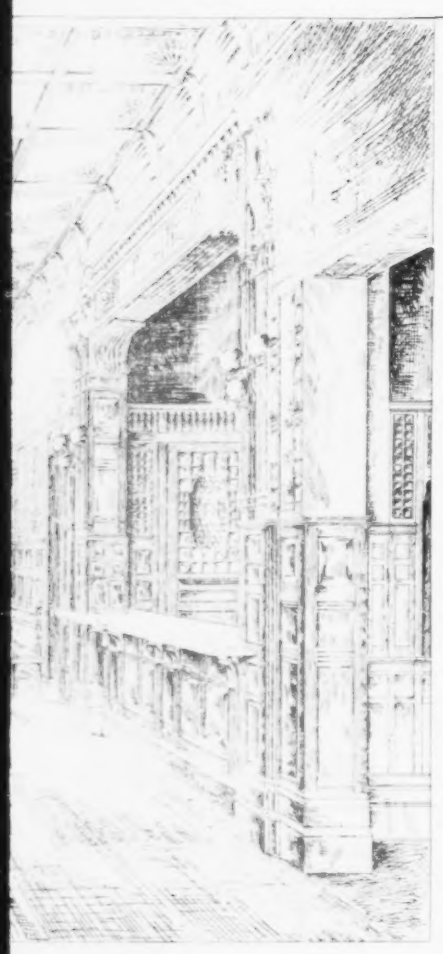

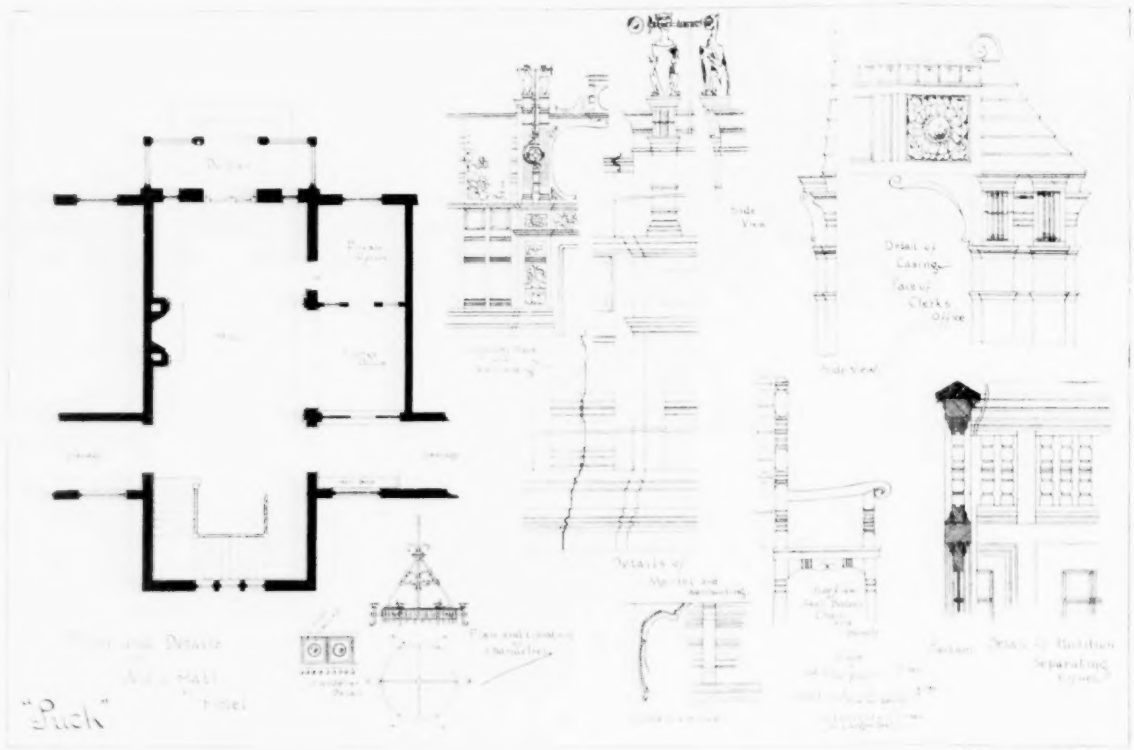

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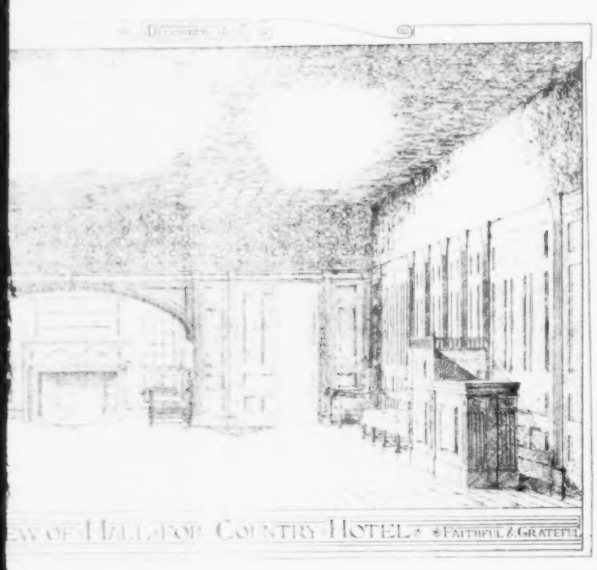
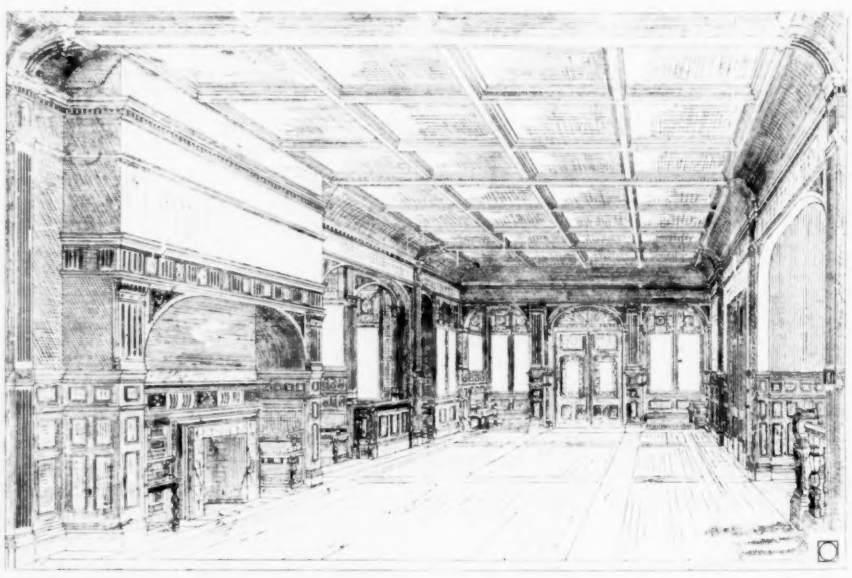
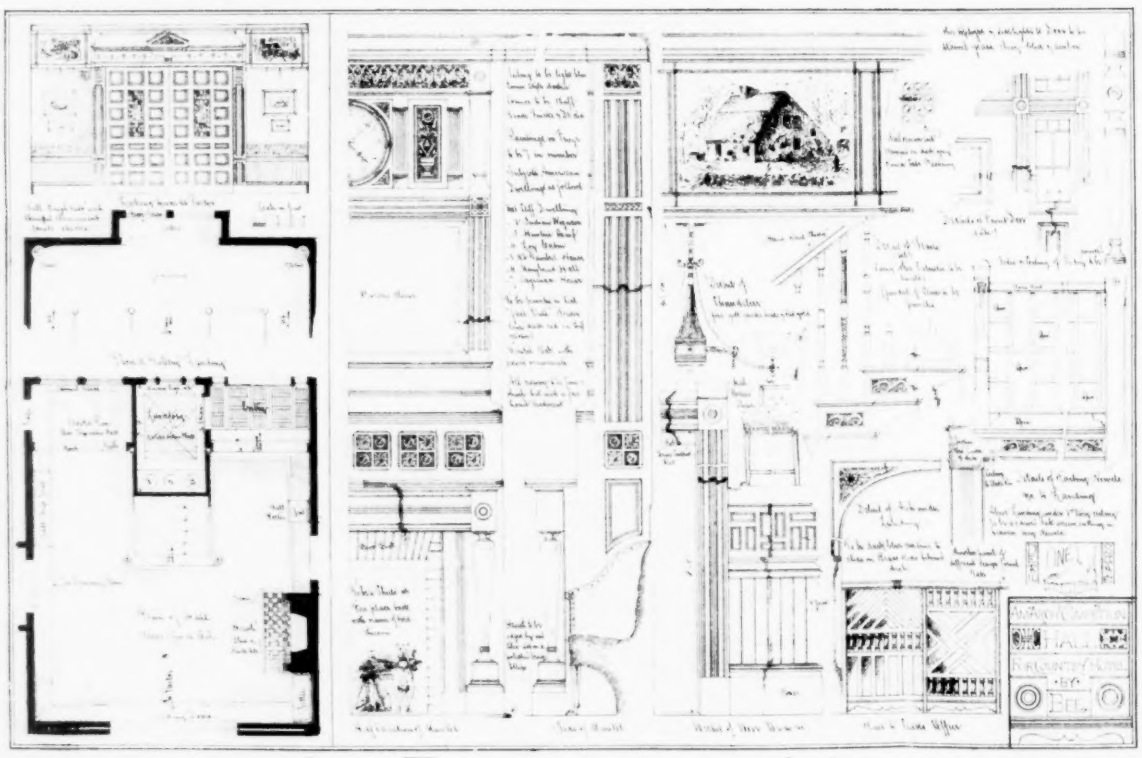
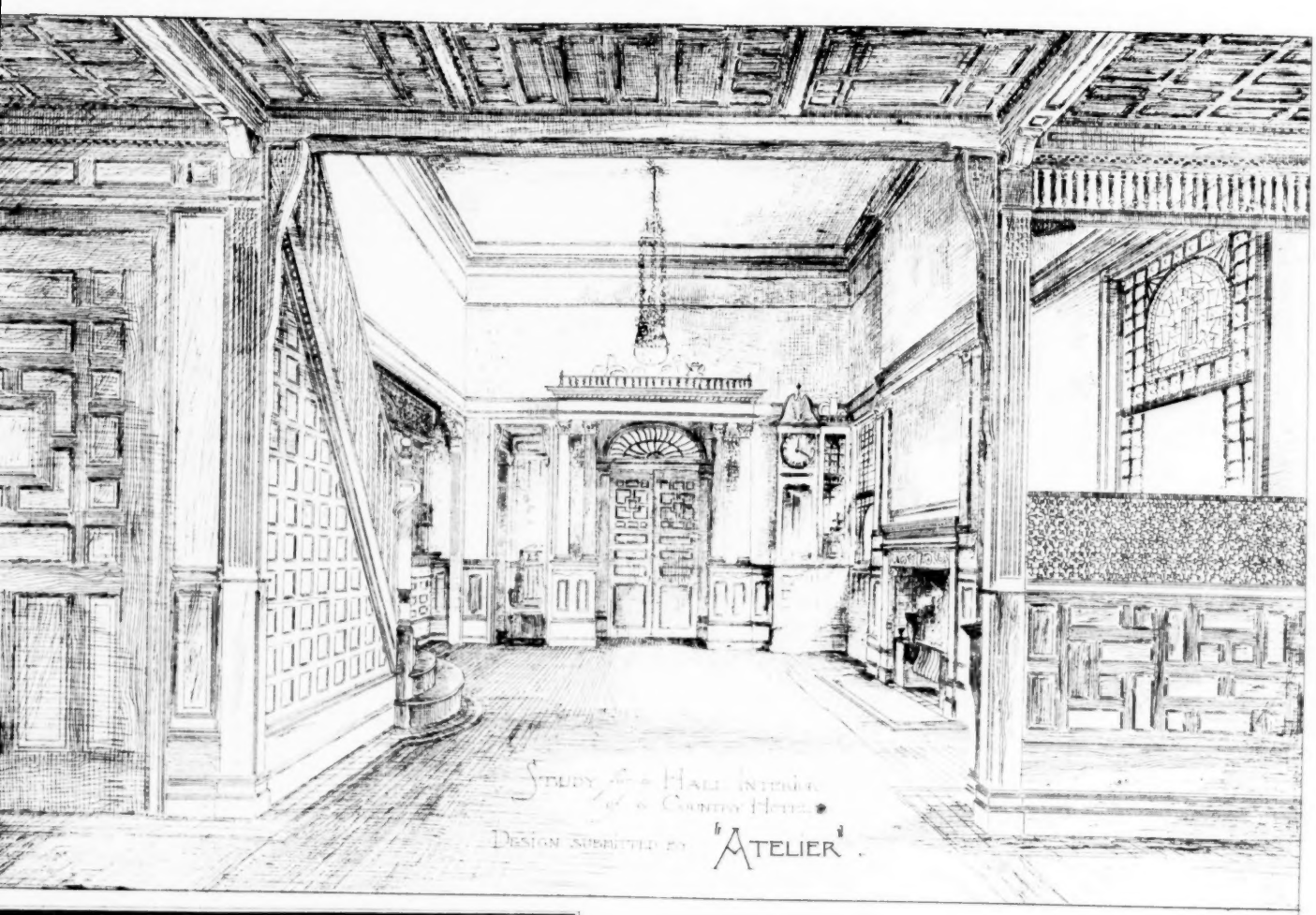






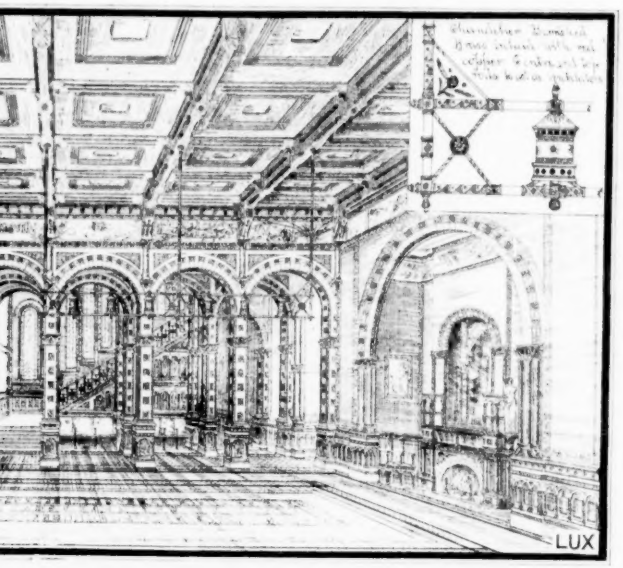
Design for an ENTRANCE HALL of a COUNTRY HOTEL

No. 267

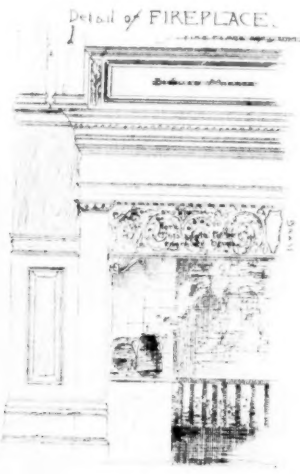


Study for a Hall Interior of a County House.

Design submitted by "Atelier".



"Lux"



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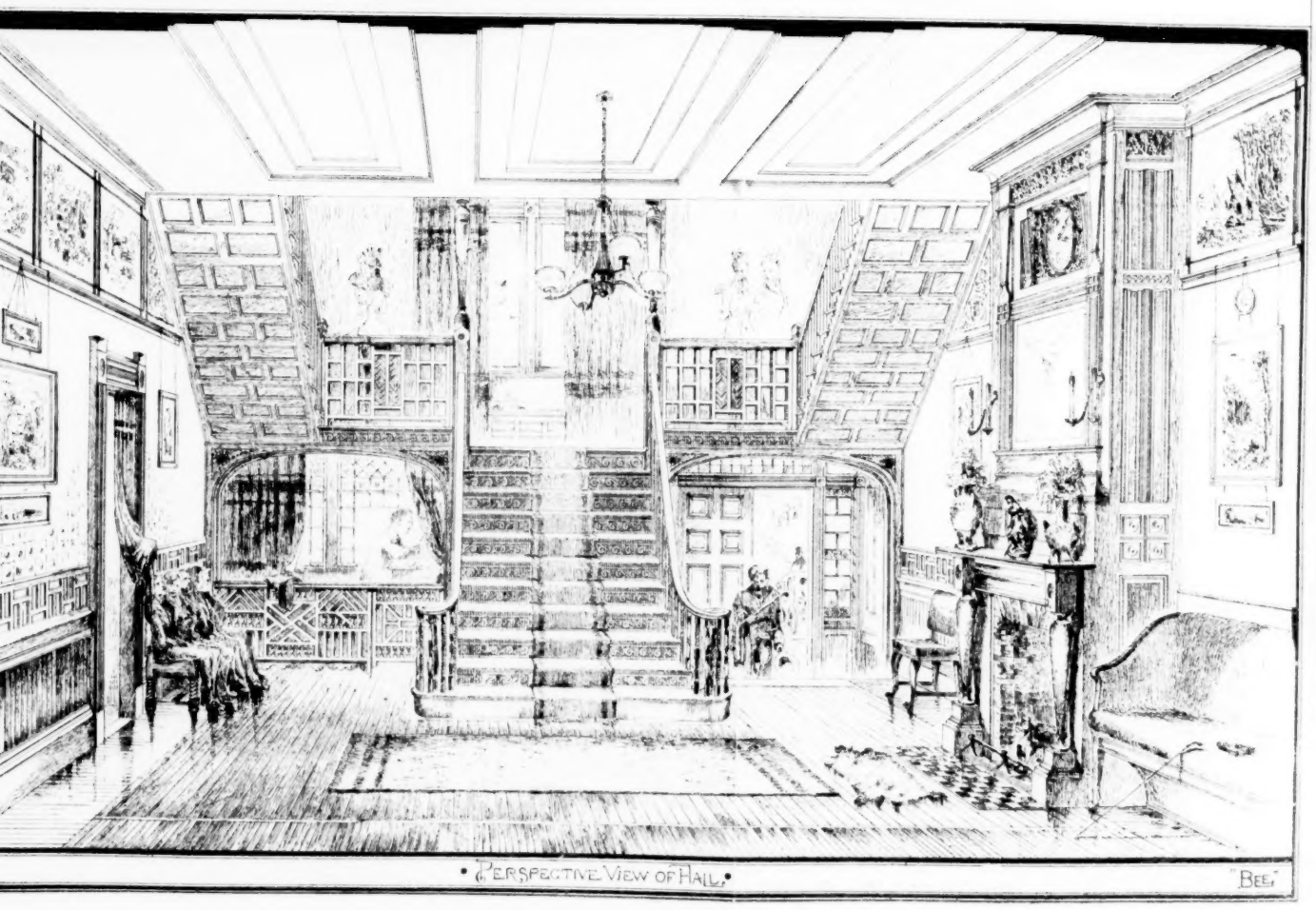


"Perspective View of Hall."

"Bee."

d. Groin, transverse and wall ribs. Ridges level. (Fig. 70.) If the panels are spheroidal, the ridges will be curved. The vaulting of the nave of Cologne Cathedral is of this kind. The transverse ribs are about twice as wide as the groin-rib. The panels are apparently of yellow brick. Those of the main vault are spheroidal; those of the side vaults have their joints parallel to the axis. Many of the French cathedrals are vaulted in a similar manner.

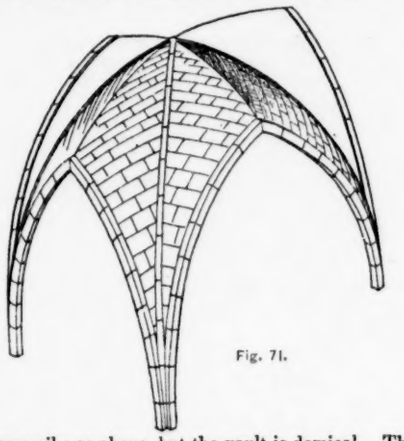


Fig. 71.

e. The same ribs as above, but the vault is domical. The apex of the wall ribs is often lower than that of the main. (Fig. 71.)

f. Welsh vaults. In these the groin-ribs cross each other before

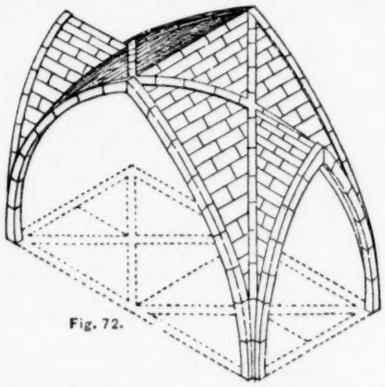


Fig. 72.

they reach the main ridge, and are continued from the crossing as liernes. Figure 72, from the Cathedral at Ghent. Or they may stop at the crossing, and be connected with the centre by a lierne rib, as in Figure 73, from the nave of Ulm Cathedral. Welsh vaults are

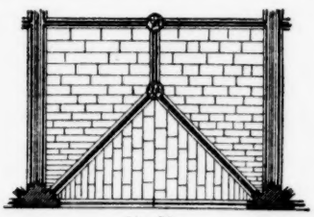


Fig. 73.

quite common, especially on the continent of Europe. They occur at Gloucester Cathedral; Melrose Abbey; the church of S. Panta-

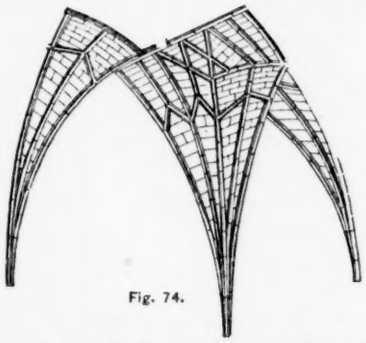


Fig. 74.

leon, Cologne; choir of St. Paul's, Antwerp; Brussels Cathedral; Berne Cathedral; Church of St. Castor, Coblenz; etc. In Winchester Cathedral (Fig. 74), the ridge of the side vault descends towards the main. The main ridge is almost invariably level. Figure 75 is a plan of a Welsh vault whose side cells have oblique axes. Two compartments are drawn in order to develop the arrangement of ribs.

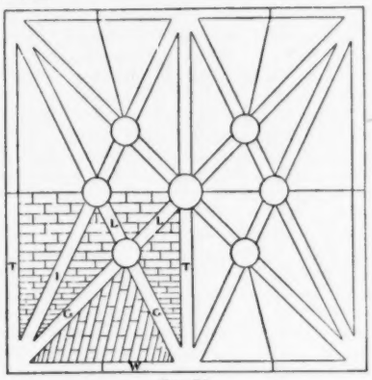


Fig. 75.

g. Vaults with groin, transverse, wall and intermediate ribs. (Fig. 53.) Sometimes, as in the nave of Lichfield Cathedral, the

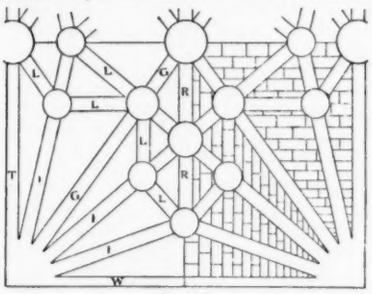


Fig. 76.

transverse ribs are omitted. Liernes are often added, as in Figure 74; and in Figure 76, from the nave of Canterbury Cathedral.

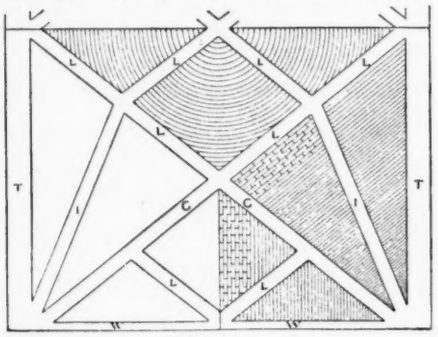


Fig. 77.

Figure 77 has intermediates and liernes: it is from Brussels Cathedral. The ribs are of stone; the panels of brick, spheroidal.

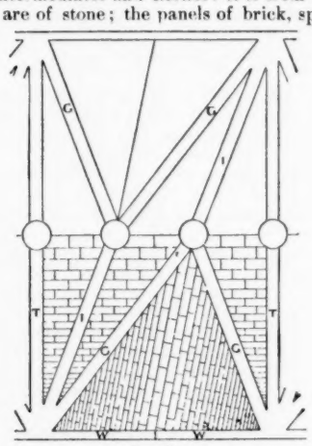


Fig. 78.

h. Side vaults oblique, reaching to the main ridge, but not opposite to each other at the apex. Figure 78, from the choir of Lincoln Cathedral. The groin-ribs on each side are met at the centre, not by their other halves from the opposite side, but by an intermediate rib. The intermediate is on one side only of the transverse.

BLASTING.[1]

In this age of improvement I know of no important industry in which so much hard labor and money is lost for want of intelligent study and use of modern improvements as in the simple operation of blasting.

When you bear in mind the fact that blasting of minerals lies at the very foundation of all that distinguishes civilized from barbarous life, you will at once admit that its importance makes it well worthy of our attention.

You are all aware that the houses of civilized men are very much superior to those of the barbarous races. The first point of difference is in the foundation, and almost the first things needed for the foundation of a house for civilized man are powder and blasting to get stone for the foundation.

Another point of superiority of civilized life is the abundance of manufactured iron and glass, yet I think that not one pound of all the immense quantities of these articles manufactured around Pittsburgh is obtained without drilling and blasting to prepare either the coal, iron ore, limestone or sand used in its manufacture. But the very nature of the work of quarrying seems to draw to it many men of one idea who work hard and think little; who having made holes in rocks for many years insist, therefore, that they know all about blasting and persistently oppose all modern improvements.

Many farmers are living yet who have cut many harvests with a sickle before the days of cradles, mowing and reaping machines, etc. These might with the same propriety resist the use of mowing and reaping machines because they know all about farming.

Another reason why improvements are not introduced in blasting is because the owners of mines seldom give any personal attention to blasting, but leave it all to others, who seldom take any interest in improvements, and are often prejudiced against them and condemn them without a trial.

The subject of blasting may be divided into three divisions:

1st. The hole and how to make it.

2d. The explosive used.

3d. The manner of firing the charge.

1st. *The Hole and How to Make It.* — The common way of making the hole is by either churn or jumper hand-drills. Three men usually form a gang, and the gang make from eight to twelve lineal feet of hole per day in hard rock.

By either of these modes it is practically impossible to make a round hole — generally a three-cornered hole being made, which is very objectionable, because, if the hole is perfectly round it will present a uniform circular surface to the pressure, and retain the blast until its force is fully developed. But with a three-cornered hole the pressure on the long sides of the hole is concentrated at the corners, which, being required to resist more than their share of the pressure, give way and permit the explosive gases to escape before their force is fully developed, and only a large amount of smoke is produced.

A much better plan is to have the holes made by machinery; this secures a cheaper and better hole, being perfectly round, and thus retains the explosive gases until their power is perfectly developed, and do more execution on the rock and with less smoke. In close or underground work, where the air is bad, this is found to be of great advantage. With the latest improved steam-drills a gang of three men often make from seventy-five to one hundred feet of hole in one day.

2d. *The Explosive Used.* — Explosives may be divided into chemical and mechanical combinations.

Chemical explosives embrace what are known as nitro-glycerine, gun-cotton, dynamite, dualin, hercules, Ditmore powder, rend-rock, mica powder, etc.

These are produced mainly by the combination of nitric acid, sulphuric acid, and fatty matter or glycerine, with cotton, tan-bark, paper pulp, sawdust, soda, mica scales, pulverized charcoal, etc., as absorbents.

These will explode under water, which makes an excellent tamping. Most of them are unfit for sporting or military use, because their explosion is so instantaneous as to rupture the gun before the ball can start. Their force is more like the blow of a large sledge, whose force is spent in an instant, while the explosion of black powder is more like the action of a powerful spring, which starts the projectile more slowly and continues to propel it until it escapes at the muzzle of the gun.

The manufacture of chemical explosives is of comparatively recent date, and in many cases is as yet imperfectly understood. Many alarming accidents have occurred in the handling of some of them, which has given a bad name to the whole family. But enough is now known about some of them to prove them to be perfectly safe when properly understood and handled, and very profitable in certain kinds of blasting.

Mechanically combined explosives are common black powder, carbo-azoteen and mahoning powder.

These are composed mainly of saltpetre or nitrate of soda, sulphur and charcoal, or tan-bark.

All of these ingredients are first finely pulverized separately, and then mixed in certain proportions, and incorporated by being run under heavy wheels or rollers for from two to six hours, so as to mix uniformly and bring a certain proportion of each ingredient in immediate contact with the other ingredients.

The mass is then generally submitted to strong hydraulic or screw pressure, and then is called pressed cake. Then it is crushed by corrugated rollers, and by means of sieves separated into the different sized grains of blasting, sporting or military powder, each of which has its peculiar mark or name.

Carbo-azoteen is made by boiling these ingredients together, and has never been a success.

Mechanically combined explosives must be kept perfectly dry; even a slight degree of dampness injures them.

As a rule, the finer the grain the quicker the explosion and the smaller the charge; while for large blasts in rock, powder is now used to good advantage in grains as large as grains of corn, and in large artillery charges still larger grains are used, called pebble powder. We now come to the

3d. *Mode of Firing the Charge.* — Three modes are used — squib, fuse and electricity. Squibs are made of about six inches of rye straw filled with fine powder, and are used principally in coal blasting. The hole being drilled horizontally three to five feet into the coal, a charge of eight to twelve inches of FF blasting powder is generally put in, then an iron rod $\frac{5}{16}$ inch in diameter, called a needle, is inserted in the hole back to the powder, then the hole is tamped full by having dry clay or sand pounded solid into it, and the needle is withdrawn, leaving an open passage like a pipe through the tamping to the powder. The squib is inserted in the mouth of this hole, and a slow-match applied to the outside end; the recoil of the powder burning in the straw throws the burning squib back along the needle hole or pipe to the powder chamber, and the explosion takes place. This mode of firing can only be used in horizontal holes.

Fuse consists of a thread of black powder incased in a wrapping of tarred hemp, and called hemp fuse, or in a wrapping of cotton, and called cotton fuse; then, to make it waterproof, a tarred tape is wrapped spirally around it, and then it is called single tape fuse, and will resist dampness a long time; or a double wrapping of tarred tape is wrapped around it, and called double tape fuse, which will burn and fire a charge of powder under twenty feet of water.

In all of these fuses there is a central cotton thread, which has been saturated with saltpetre, which makes it continue to burn when it would otherwise go out. Every precaution is taken to make the fuse continue to burn until the fire reaches the powder and the explosion is produced. But, from some cause or another, holes sometimes hang fire, and are a source of great danger to the miner or quarryman. Holes thus charged, which ordinarily should explode in from one to three minutes, have been known to hang fire for twenty-four hours and then explode.

The third mode of firing is by electricity. When using it, the hole, the charge and the tamping are the same as in firing with a fuse, but, instead of inserting the common fuse already described, an electric exploder is used, which is made thus:

A copper cap, one-fourth of an inch diameter and about one inch long, is filled one-third full of fulminate of mercury, into which is inserted the ends of two insulated copper wires connected by a small thread of platinum wire, and the end of the cap is then closed by means of melted sulphur, making it waterproof. Electric fuses are made four, six, ten and fifteen feet long, with about two inches of the outer end stripped of the insulation and tinned.

In using them, the blaster selects an electric fuse long enough to reach the bottom of the hole and leave a few inches of wire out of the hole, then puts in enough powder to cover the bottom of the hole one-half an inch deep, then his exploder, then one-fourth less powder than if fired with a fuse, and tamps the hole the same as with ordinary fuse; any number of holes may be thus prepared of equal or unequal depth or distances apart.

Directions for Firing. — One wire of the first hole is now connected to one wire of the second hole, and the remaining wire of the second to one wire of the third hole, and so on until all are connected; there will then be one wire of the last hole and one wire of the first hole left unconnected. These wires are then connected by means of long conducting wires to the battery at a place of safety, and when everything is ready the circuit is closed and the small thread of platinum wire in the bottom of each hole becomes red hot and each cap is exploded with great force at the same instant, and each hole assists its neighbor. And thus by simultaneous explosion, with only three-quarters of the powder used in ordinary fuse blasting, more than double the rock is moved with the same drilling.

In quarries where fuse is used it is not uncommon to find six inches or a foot, or even two feet of the bottom of the holes remaining unruptured after the blast has been fired and cleared away — the drilling of the unexploded piece of hole was so much hard labor lost, and the powder it contained was lost, for if the powder had done what was intended no part of the hole would have been left unexploded. No part of the hole is thus left unexploded where electricity is used, because in firing by electricity the first point ruptured is at the bottom of the hole, and the full force of all the explosive is spent in enlarging the rupture.

For profitable blasting by either mode of firing, the bottom of the hole in open work should be at least one-tenth less from the open front of the rock than the depth of the hole; thus, if the hole is ten feet deep, the bottom of the hole should not be more than nine feet from the face of the rock, and in some rock not more than eight feet, so as to make the bottom of the hole the weakest part of the blast.

[1] Paper, by Arthur Kirk, read before the Engineers' Society of Western Pennsylvania, Oct. 19th, 1880.

But if the hole is ten feet deep and filled up four feet with powder, and fired with a fuse at the top of the powder, there will only be six feet of rock on the top of the first point of rupture, and there being nine feet in front of the hole makes the top the weakest part, and the result is a great discharge of projectiles through the air, to the great danger of all around, and much of the material is lost; but if the same single hole had been fired by electricity at the bottom of the hole, the bottom rock would have been forced out, and the top rocks would tumble down and do no damage, and all be in place to be handled.

The contrast between firing with a squib and by electricity is still greater, because a fuse may sometimes burn to the bottom of the hole before firing the blast, but a squib must always fire at the top of the powder, and as the needle hole is a full quarter-inch in diameter, the first blast is a jet of orange flame from the needle hole, which is partly consumed powder, and cools into dense smoke, to the great annoyance of the miner; in light work, only the top is blown off the hole, the first point of rupture taking place at the top of the powder.

In conclusion, to show this is not idle theory, but actual fact, I may point to the shaft sunk this summer for the Chicago and Connellsville Coke Company, near Uniontown, under the superintendence of Mr. James Harrison.

Mr. Harrison has had great experience in everything connected with modern mining improvements, and on commencing work on the shaft procured the latest and best improved steam rock-drill, an electro-magnetic battery and safe chemical explosives, and with the assistance of Mr. Thomas, an experienced Welsh shaft-sinker, he broke ground about the 15th of last March, and two weeks ago he had sunk the shaft three hundred and twenty-five feet to the coal; has got his ovens and all his buildings up, and I presume is now making coke, which under the old plan of sinking he could not have done before next April.

I can also point to the shaft now being sunk by Mr. J. K. Taggart for E. K. Hyndman, near Connellsville, and to another near the same place, now being sunk by Mr. Hopkins for Mr. Wickham, of Connellsville, both of whom are using electricity and chemical explosives to good advantage.

I may further add that theoretically blasting by electricity has been known to engineers for thirty or forty years, for large blasts such as Hellgate. But it has only been within the last few years that the apparatus has been made so simple and portable as to be of any practical benefit in quarry work. It has now been made so simple, and is so easily handled, that a youth can take the apparatus out of the tool-box, lay down the cable to a safe place, charge five or six holes, tamp and fire them, and take up the cable and replace apparatus in tool-box, all inside of ten minutes.

DEFECTIVE DRAINS IN HOUSES.

High Court of Justice, Chancery Division. — Before Vice-Chancellor Hall.

VICE-CHANCELLOR HALL lately delivered judgment in this action. It involved the question how far an insanitary condition of the drains is any defence to an action to compel specific performance of an agreement to take a dwelling-house, and afforded an illustration of the maxim *Caveat emptor*. The plaintiff was the widow and executrix of the late Mr. A. M. May, of 5 Clifton Gardens, Maida Vale, who held his house for the residue of a term which would expire at Lady Day, 1886. In February, 1879, Mr. May (who was in ill health), through the plaintiff, instructed Messrs. Deeks, Gibbs & Co., house agents, to find him some person willing to take an assignment of his lease, and they accordingly gave Mrs. Verity, the wife of the defendant, Mr. B. Verity, an order to view the premises. Mrs. Verity made particular inquiries of the plaintiff whether the house was healthy and properly drained, and was assured by her that the house was healthy and the drainage in good condition. It was, however, one of the points at issue in the case, to what extent the plaintiff's representations had gone; for she maintained that nothing had been said about the drainage, and that she had only stated that the house was healthy, as in her experience it had been. After some negotiation as to the obtaining a renewal of the lease and the sum to be paid for fixtures, Mr. Verity, on March 7, 1879, while those negotiations were still pending, wrote a letter to Messrs. Deeks & Co., stating that he was willing to take the house and do all necessary repairs, painting, and decoration, but must decline paying anything for the fixtures, as the house was much dilapidated; and, subsequently, Mr. and Mrs. May having meanwhile left the premises, he applied for the key, which was given to him. He then went over the house with his surveyor, who advised that there was something wrong with the drains, and that a thorough examination should be made. This was done, when it appeared, according to the evidence on the part of the defendant, that under the house ran a drain-pipe which discharged into the main sewer not only the drainage of the house itself, but also the drainage of three adjoining houses, and that in addition to these structural defects the drains themselves were in a thoroughly bad condition, the brick and mortar work being rotten and the pipes perforated so as to make the adjacent soil foul and damp, and to permit the access of sewer-gas into the house. The defendant then, on May 5, 1879, wrote to the freeholders of the house to say that, in consequence of the insanitary condition of the premises, he declined to complete the agreement for the lease, though he would be happy to pay any costs that might have been incurred in the preparation of it, and also for the reinstatement of everything disturbed. Mr. May having died in June, 1879, his widow brought this action against Mr. Verity, and claimed a declaration that he was bound to accept an assignment of the lease of the house, with an order that he might execute the same and pay damages to the plaintiff.

The Vice-Chancellor said that in his opinion the Statute of Frauds had been complied with, and that, if not, there had been a part performance by the defendant's taking possession, while it had not been made out that the representations as to the healthiness of the house were untrue to the knowledge of Mrs. May, or were more than the experience of Mrs. May and her family on that subject. It had been made out, as it appeared to his lordship, since the defendant took possession, that the house was subject to an easement, consisting of drainage through it from adjoining houses, which constituted so material a defect of title that the defendant ought not to have judgment against him for specific performance. It had been said that this liability of the property was disclosed by the lease, and that the defendant must be taken to have known the contents of the lease when he took possession, but in his lordship's opinion the lease did not disclose the defect or even put the defendant sufficiently on inquiry. The lease reserved to the lessor the free passage of "water" coming from the house or buildings near or adjoining thereto in and through the channels and drains belonging to the demised premises, and the lessee covenanted that the lessors and their tenants should have free liberty of water-course through the premises by means of the sewers or drains to carry off "water" from the adjoining houses, and such provisions showed that the passage of water only was intended. This being so, the covenant by the lessee to contribute towards the expense of repairing and cleansing party-walls, "gutters, and drains," belonging to the demised premises, and used in common with the adjoining premises, which was relied upon by the plaintiff's counsel, must be construed as relating to an easement as to passage of "water" only, as that was the only subject of reservation. At all events, its application to sewage was far too questionable a construction to force upon a purchaser. The lease was misleading in this respect, and if there had been an intention to reserve the passage of soil, there were well-known forms by which this could have been effected. This defect, then, having become patent after possession had been taken, the court would not decree specific performance, and there must be judgment for the defendant, but such judgment would be without costs, as a great part of the costs had been occasioned by defence which had not been sustained, and by charges amounting to frauds which had not been established.

FELT AND GRAVEL ROOFS.

BARRIE, Jan. 25, 1881.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Will you kindly inform us through the next edition of your paper, the best and most approved method of putting on felt and gravel roofing material where exposed to severe frost, and also laying flag-stones in vestibule entrances? By doing so you will confer a favor on Your most obedient servant, SUBSCRIBER.

[THE modes of putting on composition roofing vary with every contractor. In general, such roofs, particularly in cold climates, should be made permanently elastic by the addition of natural asphaltum, or mineral tar, to the artificial coal-tar, which becomes very brittle by exposure. Trinidad asphalt is commonly used for the purpose, and felt is sold, saturated exclusively with it, besides the refined product for spreading in a melted state between the layers and on the top, but this makes a rather expensive roof in first cost. The number of felt layers is also of importance. Two, three, four, or five are used, the durability and cost of the work increasing with the number. Another essential point is the manner of forming the flashings and edgings. Tin is commonly used, but copper is much better, though much more expensive. As a rule, roofs almost perfectly flat give the best satisfaction in this material. Under a hot sun, the tar flows slowly down even a slight slope, leaving the upper portions imperfectly saturated, and liable to rot.

"Subscriber" does not say what kind of foundation he has for his flag-stones. If wooden beams merely, let him nail fillets to their sides at the proper height, to be ascertained by careful measurement: then fit in short pieces of board between them, and lay upon these bricks in mortar, *on edge*, well fitted in. After this is dry, lay the flag-stones in clear Portland cement. A bed of cement one-fourth of an inch thick is enough, and if the surface of the bricks is uneven, it may be brought up with concrete of Portland cement and sand. Plaster of Paris is sometimes used instead of cement, but has little permanence. — EDS. AMERICAN ARCHITECT.]

THE STRENGTH AND STIFFNESS OF FLOORS.

NEW YORK, Jan. 22, 1881.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Having read with interest the article with above heading in the *American Architect* of January 1, I would respectfully call attention to several points and results therein found, which may admit of questioning.

It is stated that "the building laws of the cities of New York and Boston require that the distance between the bearing-walls of all buildings, except churches, theatres, and other public buildings, shall not be more than twenty-five feet, unless girders are substituted in place of the partition-wall."

The New York law reads: "Every building hereafter erected more than thirty feet in width, except churches, theatres, school-houses, car-stables, and other public buildings, shall have one or more stone or brick partition-walls running from front to rear, or iron or wooden columns." Again, at the end of the article, the size of beam given twice as $2\frac{1}{2}$ by 9 inches should be, I think, $4\frac{3}{8}$ by 9 inches.

While the results obtained by using the several formulas and constants given are certainly safe, the question may be asked whether

they do not call for unnecessary amounts of material. Take the weight of a packed assemblage of persons. This will not exceed 70 pounds per square foot, instead of 120 pounds. (See "Hatfield's Transverse Strains," p. 77 *et seq.*) If we take 4 as the factor of safety, instead of 6, we do not have a result exceeding the limit of elasticity in any of the woods usually taken for floor timbers.

The use of constants for the breaking strength of the different woods somewhat higher than those mentioned is justified by the results of numerous tests made expressly to determine them.

The given Example II., if worked out with the above substitutions, would give the following result:

$$c = \frac{2 \times 2 \times 100 \times 850}{4 \times 256 \times 90} = 3.69 \text{ feet},$$

or a distance from centres double that given in the example.

If our practice will give sufficient strength of floor for any possible emergency, and we think it will, then the use of constants, as in the article published, would require in the above floor twice the amount of timber we think necessary.

In the formulas given for stiffness, the constant e is equivalent in value to 40 divided by the value of F in the table on page 530 of above-mentioned book.

By comparison we find in cases of white pine and spruce almost identical results, while in that of yellow pine we have .0067 against .0125, or about one-half, a certainly very wide difference.

R. F. Hatfield.

BOOKS ON CONSTRUCTION.

Minneapolis, Jan. 18, 1881.

To the Editors of the American Architect:—

Dear Sirs,—Will you please give me the name of the best work on construction in both timber and stone and where they can be got, and oblige, Yours truly, Draughtsman.

[The best single work for "Draughtsman's" purpose is the "Notes on Building Construction," in three volumes, published by Rivingtons, London. The first volume is an elementary *résumé* of the whole subject, and can be had separately if desired. The work is for sale by Messrs. Bicknell & Comstock, New York. The price of the first volume is $3, of the other two, completing the treatise, $9. As a supplement to such a work as this, Hatfield's "American House Carpenter," published by Wiley & Son, Astor Place, New York, will be useful. Although a large portion of the book is occupied with rudimentary geometry and other matter which "Draughtsman" will hardly need, it contains details of our ordinary modes of construction which cannot be found in the English works, besides special tables of much value for reference.—Eds. American Architect.]

A QUESTION OF PAYMENTS.

January 18, 1881.

To the Editors of the American Architect:—

Gentlemen,—I have a case that I never have read a parallel to, and if you can give me your opinion on it you will greatly oblige.

A gentleman came to me and desired me to make sketches and working drawings of an elevator, and to make them satisfactory to a certain gentleman who had had considerable experience in the line of business. They were very anxious to have this gentleman take the contract for the entire job. I made sketches and went to see the gentleman who was to decide upon them, and he made a few alterations in them, but still left the plans materially as I had them. I then made a full set of working drawings, consulting this gentleman several times during that time. When I had finished the drawings, I took them to the contractor, who kept them for a few days and then sent for me to have the plans altered. The alterations required an entire new set of drawings, which I made, continually consulting the gentleman as before, so as to have them perfectly satisfactory. When this second set was finished I took them to him and he said they were all right. Well, the work went on, and as I was not employed to superintend, of course did not see much of what was going on. Lately, the gentleman for whom I made the plans sent in for his bill, and claimed that my consideration should be considerably less, as the contractor had not been able to use my drawings, and had made an entirely new set himself. Now in your opinion how should I settle the matter? Very respectfully yours, Subscriber.

[It is impossible to form any opinion on this case without hearing all the testimony on both sides. "Subscriber" seems to have had some difficulty in making his drawings conform to the requirements of the contractor and the other party interested, and it is at least conceivable that the contractor, unwilling to spend more time in criticizing and correcting the plans sent him, quietly abandoned them, making new ones of his own. In such a case, the party who ordered the plans would have some reason for wishing to obtain some deduction from his bill. No doubt, courtesy would require that the contractor should keep sending back the plans for correction until he was satisfied, but this would take time, which might be too valuable to lose. We do not say that this supposed case resembles the real one, but at least we would advise "Subscriber" to make inquiries, and if he finds that any misunderstanding or inexperience on his part really lessened the value of his drawings to his client, to agree with him upon a fair deduction from their price. If he has been in fault, his client will think none the worse of him for acknowledging it, and if not, he can claim his full commission with better grace by offering evidence of having done his work properly.—Eds. American Architect.]

Discoveries at Herculaneum.—The ruins of a once magnificent bathing establishment, covered over by more than 30 feet of ashes and lava, have been discovered by Prof. Giuseppe Novi, near Herculaneum. From all descriptions they appear to surpass anything of a similar nature hitherto excavated, either at Herculaneum or at Pompeii. The sculptured fountains and tanks are of Oriental granite, the floors are of colored glass mosaic, and the walls of the buildings are richly adorned with paintings and stucco-work.

NOTES AND CLIPPINGS.

Cements for the Shop.—*Iron Cement for Closing the Joints of Iron Pipes.*—Take of coarsely powdered iron borings, 5 pounds; powdered sal-ammoniac, 2 ounces; sulphur, 1 ounce; and water sufficient to moisten it. This composition hardens rapidly; but if time can be allowed, it sets more firmly without the sulphur. It must be used as soon as mixed, and rammed tightly into the joint.

2. Take sal-ammoniac, 2 ounces; sublimated sulphur, 1 ounce; cast-iron filings or turnings, 1 pound; mix in a mortar and keep the powder dry. When it is to be used, mix it with 20 times its weight of clean iron turnings or filings, and grind the whole in a mortar; then wet it with water until it becomes of convenient consistency, when it is to be applied to the joint. After a time it becomes as hard and strong as any part of the metal.

Cement for Uniting Leather and Metal.—Wash the metal with hot gelatine; steep the leather in an infusion of nutgalls (hot) and bring the two together.

Cement for Leather Belting.—One who has tried everything, says that after an experience of fifteen years he has found nothing to equal the following: Common glue and isinglass, equal parts, soaked for ten hours in just enough water to cover them. Bring gradually to a boiling heat, and add pure tannin until the whole becomes ropy, or appears like the white of an egg. Buff off the surfaces to be joined, apply this cement warm, and clamp firmly.

Steam Boiler Cement.—Mix two parts of finely powdered litharge with one part of very fine sand, and one part of quicklime which has been allowed to slake spontaneously by exposure to the air. This mixture may be kept for any length of time without injuring. In using it, a portion is mixed into paste with linseed oil; or, still better, in boiled linseed oil. In this state it must be quickly applied, as it soon hardens.

Turner Cement.—Melt one pound of rosin in a pan over the fire, and when melted, add one-quarter of a pound of pitch. While these are boiling, add brickdust until by dropping a little on a cold stone you think it hard enough. In winter it may be necessary to add a little tallow. By means of this cement a piece of wood may be fastened to the chuck, which will hold when cool; and when the work is finished, it may be removed by a smart stroke with the tool. Any traces of the cement may be removed from the work by means of benzine.

Gutta-Percha Cement.—This highly recommended cement is made by melting together, in an iron pan, two parts of common pitch and one of gutta-percha, stirring them well together until thoroughly incorporated, and then pouring the liquid into cold water. When cold, it is black, solid, and elastic; but it softens with heat, and at 100 degrees Fah. is a thin fluid. It may be used as a soft paste, or in a liquid state, and answers an excellent purpose in cementing metal, glass, porcelain, ivory, etc. It may be used instead of putty in glazing windows.—*Scientific American.*

The First Casting of Iron.—Cast iron was not in commercial use before the year 1700, when Abraham Darby, an intelligent mechanic, who had brought some Dutch workmen to establish a brass foundry at Bristol, Eng., conceived the idea that iron might be substituted for brass. This his workmen did not succeed in effecting, being probably too much prejudiced in favor of the metal with which they were best acquainted. A Welsh shepherd-boy named John Thomas had, some little time previous to this, been received by Abraham Darby into his work-shop on the recommendation of a distant relative. While looking on during the experiments of the Dutch workmen, he said to Abraham Darby that he thought he saw where they had missed it. He begged to be allowed to try; so he and Abraham Darby remained alone in the work-shop all night struggling with the refractory metal and imperfect moulds. The hours passed on and daylight appeared, but neither would leave his task; and just as morning dawned they succeeded in casting an iron pot complete. The boy entered into an agreement with Abraham Darby to serve him and keep the secret. He was enticed by the offer of double wages to leave his master, but he continued faithful; and from 1709 to 1822 the family of Thomas were confidential and much-valued agents to the descendants of Abraham Darby. For more than one hundred years after the night in which Thomas and his master succeeded in making an iron casting in a mould of fine sand contained in frames and with air-holes the same process was practised and kept secret at Colebrook Dale with plugged keyholes and barred doors.—*Exchange.*

A Big Weathercock.—One of the largest linen-drapery establishments of Paris is constructing near the Champ de Mars, where land is comparatively cheap, a vast building which will serve as coach-house and stables for the numerous horses and wagons belonging to the firm. There is nothing peculiar about these stables; the spirit of novelty and originality has manifested itself solely in the erection of a gigantic weathercock, which will be as remarkable in the artistic character and execution of its design as in its size. In height it will measure 26 feet, and its width no less than 13 feet. Nor will the design resemble that of ordinary weathercocks. It will consist of a heraldic lion rampant, holding up with its forelegs a gigantic initial; and the design of this monster has been entrusted to one of the most able heraldic engravers of Paris.

The Camera as an Art Detective.—A new use for photography in connection with the higher arts has been found in the discovery that it may be relied on to detect restoration or tampering in any way with old paintings. On recently examining the first proof of a well-known Madonna, in the British National Gallery, it was observed that there was a disfiguring blur over the forehead. No such blur was discernible in the original—at least at first glance. But the magnifying-glass showed, on careful inspection, that the restorer had been at work. He had repaired some casual damage with a skill that reproduced the color, the touch, and the texture of the painter, but he had not used the same pigments, and this was instantly detected by the subtle chemistry of light.—*Washington Star.*

BUILDING INTELLIGENCE.

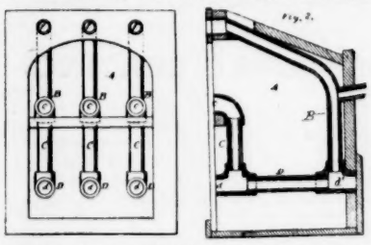
[Reported for The American Architect and Building News].

[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.

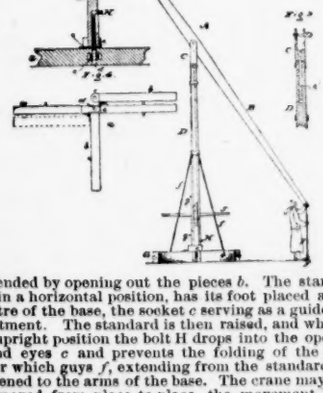
[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

236,370. FIREPLACE. — James G. Smith, Alliance, O. This invention relates to open stoves and fireplaces, and it consists in constructing the grate and hot-air flues of sectional tubes and couplings so that air entering them may be heated and discharged into the same or adjacent rooms, as may be desired. A designates the fire-place, and B B B curved tubes rising from couplings *d'* at the rear of the hollow grate-bars D, and following the conformation of the back wall and top of the fireplace. These tubes have discharge-openings, *f*, at their upper ends, which may be controlled by dampers. E is a discharge-tube leading from each of the tubes, through the back wall, into an adjacent room. A coupling, *d*, is employed at the front end of each of the hollow grate-bars D, and



rising from it is a vertical hot-air flue, C, having at its upper end a curved flue or discharge, *c*. The coupling *d* is open at its outer end for the admission of cold air to the hollow grate-bar D. The tubes D and couplings *d d'* and tubes C form the grate. The cold air enters at *d*, passes through the tubes D, B, and C, and is heated during its passage, and discharged into the same or the adjoining room. Dampers may be employed to control the discharge ends of the flues.

236,605. FIRE-ESCAPE. — Edward T. McKean, Philadelphia, Penn. Referring to the drawings, A represents a crane formed of an arm, B, which is pivoted to a vertical piece, C, having a stem, A', which is fitted in a socket at the upper end of the standard D, the arm B thus swinging on the piece C, and the latter rotating on the standard. One end of the arm carries a swinging chair or basket, E, and the other end has connected to it a rope or chain, F, under the control of the firemen. G represents the base of the device, consisting of a piece, *a*, of tubular material, to the centre of whose sides are hinged pieces *b*, which may be set out from *a* at a right angle, or folded parallel with it. In order to set up the crane the base G is



extended by opening out the pieces *b*. The standard D, in a horizontal position, has its foot placed at the centre of the base, the socket *c* serving as a guide and abutment. The standard is then raised, and when in an upright position the bolt H drops into the opening *d* and eyes *c* and prevents the folding of the base, after which guys *f*, extending from the standard, are fastened to the arms of the base. The crane may then be moved from place to place, the movement being facilitated by an arm J, which is passed horizontally through the standard. By proper manipulation of the chain F the chair E may be elevated and projected into any window. The person to be rescued can then reach the chair. The arm is operated so as to swing the chair from the window, and clear of the building, and the lowering of the chair is readily accomplished. On the seat of the chair is formed a stop, K, which projects downwards from its front, the object of which is that when the chair is rested on the sill of a window the stop abuts against the inner side of the sill and acts as a safeguard for preventing outward movement of the chair while endeavors are being made to occupy it. In order to increase the height of the standard D other standards or pieces may be fitted to it by splicing.

236,869. APPARATUS FOR OBTAINING HEAT FROM GAS. — Augustus L. Allen and Geo. W. Harris, Poughkeepsie, N. Y.

236,876. SAW. — Charles H. Douglas, Chicago, Ill.

236,885. MINERAL PAINT. — Darwin E. Goodell, Germano, Ohio.

236,890. TOOL-HANDLE. — Isaac W. Heysinger, Philadelphia, Penn.

236,891. HEATER FOR CHURCHES. — James J. Johnston, Columbiana, Ohio.

236,895. LATCH. — Thomas Kirwan, Boston, Mass.

236,905. WATER-CLOSET. — Chas. H. Moore, Yonkers, N. Y.

236,910. DOOR-CHECK. — Francis V. Phillips, Chicago, Ill.

236,912. STOVE-PIPE THIMBLE AND COVER. — Moses B. Scribner, Boston, Mass.

236,913. STOVE-PIPE DAMPER. — William Scully, Detroit, Mich.

236,921. STOVE-PIPE FASTENER. — Albert Trollope, Detroit, Mich.

236,925. SAW-HANDLE. — James R. Woodrough, Cincinnati, Ohio.

236,980. MACHINE FOR BENDING WOOD. — Edward L. Buckingham, Jefferson, Wis.

236,985. STOVE-PIPE DAMPER. — John K. Clark, Buffalo, N. Y.

236,995. BITUMINOUS CEMENT. — Edward J. De Smedt, Washington, D. C.

237,005. PENCIL. — Bradley A. Fiske, Naperville, Ill.

237,014. TURRET, TURRET SKYLIGHT, ETC. — Geo. Hayes, New York, N. Y.

237,017. PAINT. — James F. Hoffman, Cincinnati, Ohio.

237,036. WATER-CLOSET. — Henry C. Meyer, New York, N. Y.

237,041. BENCH-CLAMP. — James Murphy, San Antonio, Tex.

237,049. SAW-SET. — Artemas Rush, Leon, Iowa.

237,056. TOOL-HANDLE. — Henry B. Sherwood, Westport, Conn.

237,060. WATER-ELEVATOR. — William A. Smith and R. F. Smith, Terrell, Tex.

237,065. SCREW-DRIVER. — Nelson Stow, Binghamton, N. Y.

237,066. SEWER TRAP. — Henry Textor, Brooklyn, N. Y.

237,075. DUST AND WIND GUARD FOR WINDOWS. — Rufus M. Brundige, New York, N. Y.

237,076. BURGLAR ALARM AND DOOR FASTENING. — Chas. F. Crary, New York, N. Y.

SUMMARY OF THE WEEK.

Baltimore.

BUILDING PERMITS. — Eight building permits have been issued since the last report; the following only are of sufficient importance to be mentioned: —

Trego Thompson, three-st'y brick factory, n e cor. Central Ave. and Aliceanna St.

Otto Deeker & Co., one-st'y brick building, addition to factory, cor. Canton Ave. and President St., 28' x 89'.

NEW SILVER VAULT. — Seven proposals have been submitted for the construction of the new silver vault at the Baltimore Sub-treasury, and sent to the Secretary of the Treasury. The contract has not yet been awarded.

IN GENERAL. — The indications are that the present year will be one of great activity in building operations in this city. The architects report considerable new work, but not sufficiently advanced to be mentioned.

PUBLIC BUILDINGS. — Ordinances have been brought before the City Council, appropriating liberal sums for the erection of new public schools, market-houses and engine houses. No action has been taken on them as yet.

Brooklyn.

BUILDING PERMITS. — *Flushing Ave., No.* 1003, 1 three st'y frame store and tenement, 25' x 50', tin roof; owner, Geo. Ressebring, 968 Flushing Ave.; builders, A. Vath and H. Loeffler.

McKibben St., n s, bet. Graham Ave. and Humboldt St., 1 three-st'y frame factory, 24' x 30', gravel roof; owners, Harlingsworth & Darbee, McKibben St., near Graham Ave.; builders, J. Fuchs and John Rueger.

Putnam Ave., n e cor Irving Pl., 1 three-st'y brick flats, 24' x 53', felt and gravel roof, wood cornice; owner, Wm. O. Thompson, 9 Putnam Ave.; builder, O. D. Thompson.

ALTERATIONS — *North First St.*, s e cor. First St., repair damage by fire; cost, $2,000; owner, Mrs. Richardson, 40 Grand St.; architect, W. H. Gaylor; builders, W. & T. Lamb and Jenkins & Gillies.

Water St., No. 265, add one story to part of building, tin roof, etc.; cost, $2,000; owners, E. R. Durkee & Co.

Wythe Ave., Nos. 88½ and 90, one-st'y brick extension, 25' x 40'; cost, $3,500; owner, William Ross, 55 Wythe Ave.; architects, Parfitt Bros.

Boston.

BUILDING PERMITS. — *Wood.* — *Howard St.*, corner Myrtle St., for Burnham C. Dennett, dwell., 24' x 30', two stories and hip roof; Burnham C. Dennett, builder.

Hemlock St., near Bellevue Ave., for Thomas Patterson, dwell., 18' x 24', two stories, hip roof; Thomas Patterson, builder.

Neponset Ave., near Mt. Hope St., for Robert L. Frampton, dwell., 22' x 30', two stories, L 12' x 16'; Wm. R. Hudson, builder.

SCHOOL-HOUSES. — The brickwork of the grammar school-house, Egleston Square, is completed to the third story, and the coming fall will see the building ready for occupancy. The appropriation for this house is $45,000.

The primary school-house, Seventh St., South Boston, is to be of brick, and contain eight rooms, and will cost, for land and building, the sum of $50,000. The foundations are in, and the superstructure will be commenced in the early spring, and the building completed in the coming fall.

Buffalo.

STORES. — Mr. E. C. Bébe has completed plans for a block of four stores, to be built on Eagle St., near Main St.; owner, Gibson T. Williams; cost, $25,000.

Mr. P. L. Bachert, of this city, is going to build a store on Tennessee St., near Oak St., 50' front by 60' deep; will cost about $18,000; Mr. Geo. J. Mitzger is the architect.

Chicago.

BUILDING PERMITS. — J. J. Rice, two-st'y brick store and dwell., 21' x 45', 3510 State St.; cost, $2,000.

Kroeschell & Bro., one st'y brick boiler-shop, 40' x 100', Michigan and Kingsbury Sts.; cost, $1,600.

W. L. and C. I. Peck, four-st'y brick store, 80' x 135', 106 Lake St.; cost, $35,000.

C. Werner, three-st'y brick dwell., 24' x 60', Cottage Grove Ave. and Twenty-Fifth St.; cost, $7,000.

M. Laberset, two-st'y brick dwell., 22' x 50', Taylor St., near Centre Ave.; cost, $3,000.

Henry Strong, five-st'y brick store, 60' x 90', Fifth Ave. and Monroe St.; cost, $3,500.

New York.

BUILDING PERMITS. — *West Twenty-Ninth St., No.* 507, 1 four-st'y brick store and tenement, 24' 8" x 78'; cost, $10,000; owner, Daniel McElhinney, 427 West Forty-Third St.

West Sixteenth St., No. 215, 1 five-st'y brick tenement, 25' x 60'; cost, $12,000; owner and mason, Christopher Mooney, 308 West Eighteenth St.; architect, J. I. Howard.

Forty-Fifth St., s s, 250' e Eleventh Ave., 3 five-st'y brick tenements, 25' x 65'; cost, each, $9,500; owner, John Mullaly; architect, W. H. Cauvet.

Seventy-Second St., s s, 100' w Lexington Ave., 5 four-st'y brown-stone dwells., 20' x 60' and 74'; cost, each $20,000; owner, John Graham, 874 Lexington Ave.; architect, J. G. Prague.

Eightieth St., n s, 258' e Fifth Ave., 2 four-st'y brown-stone dwell's, 21' x 60' and 75'; cost, each, $22,000; owner, W. F. Croft, 5 East One Hundred and Twenty-Fifth St.; architect, J. G. Prague.

East Fourteenth St., No. 28, 1 five-st'y iron store and offices, 25' x 103' 3"; cost, $20,000; owner, Joseph J. Little, 4 Van Nest Pl.; architect, W. W. Smith.

Lexington Ave., s e cor. Seventy-Second St., 10 four-st'y brown-stone dwells., 18' x 20' and 24' x 55'; cost, each, $12,000; owners and builders, Thos. Smith and John Bannen; architect, S. D. Hatch.

Eighty-Second St., s s, 206' 6" e First Ave., 5 four-st'y brown-stone tenements, 25' x 56'; cost, each, $11,000; owner, W. R. Croft, 419 East Eighty-Fifth St.; architect, J. C. Burne; builder, J. A. Frame.

First Ave., n e cor. Eighty-Sixth St., 1 four-st'y brown-stone store and tenement, 25' 8" x 60'; cost, $15,300; owner, architect and builder, same as last.

First Ave., e s, 25' 8" n Eighty-Si th St., 3 four-st'y brown-stone stores and tenements, 25' x 60'; cost, each, $14,000; owner, architect and builder, same as last.

First Ave., e s, 100 n Eighty-Sixth St., 3 four-st'y brown-stone tenements, 25' x 60'; cost, each, $14,000; owner, architect and builder, same as last.

First Ave., s e cor. Eighty-Seventh St., 1 four-st'y brown-stone store and tenement, 25' 8" x 60'; cost, $15,300; owner, architect and builder, same as last.

Eighty-Sixth St., n s, 74' e First Ave., 1 four-st'y brown-stone tenement, 22' x 70'; cost, $16,500; owner, architect and builder, same as last.

Eighty-Seventh St., s s, 74' e First Ave., 1 four-st'y brown-stone flat, 22' x 70'; cost, $16,500; owner, architect and builder, same as last.

Eighty-Sixth St., s s, 298' w Ave. B, 5 three-st'y brick flats, 20' x 56'; cost, each, $9,500; owner, Emma J. Johnston, Astoria, L. I.; architect, Jno. C. Burne; builder, Jno. Askey.

Eighty-Sixth St., s s, 398' w Ave. B, 2 three-st'y brown-stone dwells., 12' 6" x 50'; cost, each, $8,500; owner and architect, same as last.

One Hundred and Twenty-Fifth St., n s, 381' w Sixth Ave., 1 four-st'y brown-stone flat, 19' x 55' and 20-foot extension; cost, $14,000; owners, etc., Aldhaus & Smith, 161 East One Hundred and Twenty-Fourth St.; architect, J. C. Burne.

One Hundred and Twenty-Sixth St., s s, 225' e Seventh Ave., 4 three-st'y brown-stone dwells., 19' and 18' x 52'; cost, each, $12,500; owner and architect, same as last.

Eightieth St., s s, 250' e Third Ave., 2 four-st'y brick apartment-houses, 25' x 69'; cost, each, $14,000; owner, Thos. H. Walker, 177 East One Hundred and Fourth St.; architect, J. C. Burne.

Seventy-Fifth St., n s, 95' e Lexington Ave., 4 four-st'y brown-stone tenements, 18' 9" x 66'; cost, each, $19,000; owner, Mrs. S. T. McCool, 117 East Fifty-Seventh St.; architect, Jno. C. Burne.

Seventy-Fifth St., n s, 170' e Lexington Ave., 5 four-st'y brown-stone tenements, 20' x 66', tin roof, iron cornice; cost, each, $20,000; owner and architect, same as last.

Kingsbridge Road, w s, 300' s Church St., Twenty-Fourth Ward, 1 two-st'y frame dwell., 28' x 31', and wing 14' x 17'; cost, $3,500; owner, A. E. Putnam, Spuyten Duyvil; builder, S. L. Berrian.

ALTERATIONS. — *Broadway and Crosby Sts.*, corner Prince St., Metropolitan Hotel, repair damage by fire; cost, ——; owner, Mrs. C. M. Stewart; architect, E. D. Harris; builder, W. N. Rae.

Nineteenth St., three-st'y brick extension, 9' x 15', tin roof, iron cornice; cost, $2,000; owner, John Foster, 203 East Nineteenth St.; architect, B. W. Bergen; builder, M. McGrath.

Ave. B, Nos. 292 *to* 298, cor. Seventeenth St., iron columns, new girders, windows removed, etc.; cost, $15,000; owner, U. S. Electric Lighting Co., 129 Broadway; builder, Geo. Turney.

John St., No. 81, repair damage by fire, $3,750; owner, Estate Thos. Suffern, 132 Madison Ave.; builder, Henry Wallace.

Henry St., No. 220, raised two feet, flat tin roof and three-st'y brick extension, 24' x 15'; also interior alteration, etc.; cost, $3,000; owner, Abraham Mor-

(Continued on next page.)

Publishers' Department.

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New Advertisements.

TO SUBSCRIBERS.

The publishers respectfully refer subscribers who have not yet paid their subscription for 1881, to the notification printed at the head of their respective bills, and desire to remind them that the time within which subscribers *who pay in advance* can benefit by the discount of $1.50 on the subscription price ($7.50) has nearly elapsed.

BUILDING INTELLIGENCE.

ris, 238 Clinton St.; architect, J. Boekel; builders, H. Hafker and A. Helm.

House. — A very handsome mansion is to be built for Mr. H. D. Armour, on the corner of Sixty-Seventh St. and Fifth Ave., from designs of Messrs. Lambe & Wheeler.

Ferry House. — The Hoboken Ferry Co. have requested their architect, Mr. H. E. Ficken, to prepare plans for a new ferry house at the foot of Barclay St.

Zoological Garden. — It is said that the project started two years ago is now to be consummated, and plans for the buildings connected with the Zoological Garden have been prepared by Mr. Hugh Kafka.

Office Building. — The large office building to be erected on the corner of Nassau and Beekman Sts., for Mr. Eugene Kelly, will be from designs of the architects of the Morse Building, Messrs. Silliman & Farnsworth.

Stores. — For Mr. Jos. G. Little, a new iron front store, 25′ x 100′, is to be built on premises No. 28 East Fourteenth St., from designs of Mr. W. Wheeler Smith.

On the north-east corner of Leonard St. and West Broadway a large store is to be built, and the lot No. 45 Leonard St. is to be covered by a store, 40′ x 100′, and adjoining another six-story building will be erected, from designs of Mr. J. Morgan Slade.

Materials. — Building materials show no change. Business has been almost nominal, owing to the severity of the weather.

In General. — Building permits have been large in number, and there seems to be every probability that the rush in the building department will be maintained.

Philadelphia.

Building Permits. — *Frankford Road, No.* 2766, two-st'y carriage factory, 22′ x 55′; Samuel L. Davis, owner.

Tenth St., s Diamond St., one-st'y foundry, 25′ x 50′; Geo. W. Elkins, owner.

Sixtieth St., north of Vine St., 6 two-st'y dwells., 14′ x 28′; W. W. Kane, Camden, N. J.

Additions and Alterations. — *Frankford and Wildey St.*, addition to factory, 36′ x 70′; Eldridge & Stewart.

Hancock and Huntingdon Sts., third story addition and one-st'y boiler-house to factory, 33′ x 92′; Jno. Dawson, owner.

Bucknell St., No. 756, two-st'y addition to stable, 12′ x 25′; Mr. Caldwell.

Store. — Plans have been completed for a store-building, 20′ x 149′, four stories high, to be of brick, with stone dressing; Wilson Bros. & Co., architects.

Materials. — The market remains in same condition as previously quoted.

San Francisco.

In General. — There is but little new to write as regards building matters in this city.

Lumber. — Work on small houses is almost stopped, on account of the extremely high prices of lumber, rough lumber being $22 ₱ M., and surfaced $30; so many are now waiting for a decline in prices before doing any work. This is a rise of $8 in one year.

St. Louis.

Building Permits. — Twenty permits have been issued since our last report, of which 7 are for frame structures of slight importance. Of the rest, those worth $2,500 or over are as follows:

Owners' Name.	Use.	Sty's.	Rm's.	Cost.
M. J. Weber,	Dwell.,	3	7	$3,000
D. Crawford,	Store,	3	3	20,000

General Notes.

Alliston, Ont. — A house for J. W. Howard, Esq., is to be built by Messrs. Kennedy & McVittie, of Barrie, Ont.; cost, $2,300.

Arlington, Ont. — A dwelling-house for John Small, Esq., is building by Messrs. Kennedy & McVittie, architects, Barrie, Ont.; cost, $4,000.

Atlantic City, N. J. — Extensive preparations are being made for the commencement of new building enterprises.

Barrie, Ont., Canada. — Kennedy & McVittie have the following work on hand: —

A block of 3 stores, three stories high, brick, for I. M. Bothwell; cost, $17,000.

Block of 3 stores, for L. S. Sanders, Esq.; cost, $10,000.

Dwelling-house, brick, for E. Grover, Esq.; cost, $3,500.

Dwelling-house, brick, for Samuel Graham, Esq.; cost, $3,000.

Bethlehem, N. H. — A house is being built for Miss E. C. Cleveland, at a cost of $2,500; E. D. Dunn, contractor; Messrs. Howe & Dodd, Boston, architects.

Beverly, Mass. — Mr. Wm. R. Emerson, of Boston, is the architect of a house for Mr. Alex. Cochrane and also one for Mr. Chas. G. Loring.

Bloomington, Ill. — It is said that Senator David Davis will build a large hotel here.

Camden, N. J. — Indications are favorable for active building operations as soon as the season permits.

Cohasset, Mass. — Mr. Alden, of Cohasset, is contractor for a house for Mr. F. O. Balch; cost, $3,500; Mr. Wm. R. Emerson, of Boston, architect.

Dover, N. H. — Strafford county is discussing the question of rebuilding the lately burned poor-house, and it is reported that the insurers prefer to rebuild the house rather than pay the insurance.

Haddonsfield, N. J. — Quite a number of new dwelling-houses will be built during the coming season.

Lake Rosseau, Ont. — A summer hotel, to cost $10,000, is to be built here for J. Montulle by Messrs. Kennedy & McVittie, architects, Barrie, Ont.

Lowell, Mass — Messrs. Howe & Dodd, of Boston, are architects of a stable for Mr. C. D. Palmer; V. L. Wilson, contractor; cost, $3,000.

Lynn, Mass. — Among the sites favorably mentioned for the new city hospital are the city lot in Western Ave., near Laighton St., and the estate of the late Benjamin Johnson in the same vicinity, on Boston St. The price named for this estate, which includes a mansion and twenty acres of land, is about $15,000, which is considered less than the market value

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