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CONTENTS.

JUST as we were going to press last week we received the news that the broil,—we can hardly give it a more dignified name,—between Mr. Dudley, the Superintendent of the New York Department of Buildings, and the Fire Commissioners,—or rather, Mayor Cooper,—had come to an end by the surrender of Mr. Dudley, who, not wishing, as it appears, to prosecute an appeal from the decision of Judge Potter regarding the constitutionality of the law which deprived him of office, somewhat unexpectedly made a formal offer to the Fire Commissioners to transfer to them the papers and property of the Department over which he lately ruled. The proposition was accepted, and after a few preliminaries, officials were set at work to make out an inventory of the property, in order that the transfer might be fully completed. The conclusion of peace between the principal disputants was followed by the prompt passage of a resolution by the Board of Apportionment, transferring to the Fire Department the unexpended balance of the appropriation made to the Building Department for the year 1880, which has been held by them to await the cessation of hostilities. The resolution as passed provided for the payment of the employés of the late Building Department until August 1. Mayor Cooper endeavored to punish Dudley's subordinates by proposing that their salaries should cease June 10, the date when the Public Burdens Act, abolishing the Department, nominally went into operation, but was fortunately unsuccessful.

MR. ESTERBROOK, the new appointee, is said to be about sixty years old, and to have been a practical builder forty years, and an architect eight years. He is a good business man, and has a considerable private property, which is fortunate, as his salary is to be much less than that which Mr. Dudley received. He seems to bear a very good character, and the fact that although a Republican, he was chosen by a Democratic commission, speaks well for his reputation in the community. Of his professional attainments we are not informed, but however great these may be, they will be tested to their utmost within the next few years; and unless the much-trumpeted indictment of his predecessor is an intentional and foolish farce, he may count on heavy punishment for defects of knowledge or mistakes in judgment. The appointment of his subordinates is taken away from him and vested in the Fire Commissioners, and the force of the Department is to be very largely reduced. Not more than twenty persons will be employed, it is said, in place of the eighty-three who served the former Department. The total effect of the beneficent changes wrought by the new law may thus be summed up: (1.) The Superintendent of Buildings, instead of being necessarily selected from a list of candidates examined and recommended for the office by a committee of the New York Chapter of the American Institute of Architects, is chosen at random by a commission, just now composed, as we acknowledge with pleasure, of gentlemen thoroughly able, upright, and devoted to the good of their city, but possessing no special qualifications for judging of the fitness of their appointee to meet the severe requirements of the office. (2.) The control of the superintendent over his deputy-inspectors, on whose faithfulness in executing orders his whole efficiency depends, is taken away from him, with the power of appointment and removal. (3.) The number of officials, so small before as to make almost impracticable that regular supervision which accompanies the circular has not been adopted, but that without which no efficient control can be maintained over building operations, is diminished to a small fraction of the former force. What will be the consequence of these retrograde steps need hardly be predicted. With a stringent law, feebly executed, to mask his operations, a Department ready to shoulder the whole responsibility for his failings, and a pretence at inspection, from which he has nothing to fear, New York will soon become the jerry-builder's paradise.

CLEOPATRA'S NEEDLE, if the New York obelisk has really a right to that name, does not seem to meet with a very warm welcome in that city. The Park Commissioners seem to have given way to a little fit of the sulks at first, partly owing, perhaps, to their failure to agree on a place to set it, and partly to their disgust at the criticism and advice of the daily papers, and one of them is said to have informed a reporter that they did not propose to take any action on the subject until they knew more about it; that they had no official intimation that they were expected to provide a place for the stone, or that they had a right to receive it; that, for all they knew, Commander Gorringe "might have stolen it," and so on. This position, however, must have seemed a rather untenable one, and a meeting was finally held, at which the decision was referred to the Executive Committee of the Commission, consisting of Messrs. Conover, Lane, and Wenman, who forthwith drove to the Park, and after "talking over" the matter, voted to place the obelisk in the position originally suggested, a knoll southwest of the Art Museum, rising about thirty feet above the present driveway. The trees now standing near the site are to be cut down, and the knoll is to be cut and trimmed so as to reduce it to a symmetrical shape. So far, it must be acknowledged that the affair has been managed, at least so far as the New Yorkers are concerned, in a way which does no credit to their city. To say nothing of the want of enterprise or forethought, which deferred the selection of a site until the monument had actually arrived, the discourtesy of such conduct both to Commander Gorringe and to the Viceroy of Egypt, is unpleasantly apparent.

NO doubt many of our readers have seen copies of the prospectus issued by the Barnum's Museum Company, which is understood to have bought the ground lately occupied by the Madison Square Garden in New York, measuring two hundred by four hundred and twenty-five feet, and proposes to erect upon it a fire-proof building of which the general distribution, and the purposes for which its different parts will be occupied, are set forth in the circular. So far as the uses to which the building is to be devoted are concerned, nothing could be more attractive, or indeed more judiciously arranged, than the combination of large and small concert-rooms, opera-houses, arena, museum and *jardin d'hiver* which the programme includes, but some problems of construction would seem to be involved, on which we may perhaps dwell a moment. According to the prospectus, the basement is to form a vast open room two hundred by four hundred feet, intended to be used for "chariot races, steeple-chases, trotting matches, public balls, military drills" and the like. The story above is to be divided to form one large opera-house, "the most spacious and complete in America," a smaller theatre, a concert-hall, aquarium, skating rink, stores, offices and zoölogical department. Above this are three more stories, divided in various ways. For the ordinary professional mind, we can hardly say which would seem the more difficult; to design a ball-room, (also to be used for steeple-chases,) of the dimensions given, whose ceiling should be able to carry safely the weight of four fire-proof floors above, with a roof, and a considerable number of fire-proof partitions besides; or to construct a "well-appointed opera-house" without the privilege of using the basement under the stage. But if it is possible to go without traps, and devise new endings for Don Giovanni and the wicked nuns, it has hitherto been considered impracticable to support iron and brick floors of two hundred feet span in any manner which would allow of steeple-chasing beneath them. By the ordinary construction, the basement of the building in question would contain something like eight hundred piers, but as these would be incompatible with balls, or military drill, or any athletic sports, except perhaps puss-in-the-corner, it must be presumed that some other mode of holding up the superstructure is intended. We believe that the illiterate and awkward design

competitive plans are being prepared by good hands. We shall be curious to know how they treat the problem.

The fifth year of the School of Drawing and Painting, carried on in Boston under the auspices of the Museum of Fine Arts, begins October 5, next, with some changes in the courses and terms of study. We note particularly, that the tuition fees, though remaining the same, are made payable in a different way. Instead of the ten-dollar entrance-fee, and the ten-dollar payment, monthly, which entitled the students to be admitted to their classes, the season is to be divided into three terms, of twelve weeks each, and, after the entrance-fee is paid, a payment is required of forty-five dollars in advance, at the beginning of the first two terms, instruction for the last term being gratuitous to those who have attended and paid for the others. This seems a judicious change, not only saving the school from losing the fees of those students who leave the city before the close of the last term, — in the middle of June, — but inducing, perhaps, some of the pupils to protract their work, since they can save nothing by making their season short. The scheme of instruction is somewhat enlarged, comprehending tuition in architectural and decorative form, intended particularly for engravers, and designers of ornament and metal work, besides teachers, and lectures on sculpture, architecture, costume, and the theory and history of ornament, with other allied subjects. The life class formerly held in the rooms of the museum, under the instruction of the directors of the school, is discontinued, but in its place a free class is provided for, open to artists and experienced draughtsmen, but without instruction. This class we would earnestly commend to all architectural draughtsmen and students within reach of the museum. The opportunities for studying the living model in so congenial an atmosphere are rare, and the generosity of the authorities of the museum in opening their doors on such terms should be availed of by those who are desirous and capable of using one of the best possible means for educating that sense of beautiful and subtle outline, modelling and proportion, on which good architecture depends.

Mr. Edison seems to have turned his attention to a problem which promises a much easier solution than that of the electric light. This problem is the one already partially investigated, and with some promise of success, of driving locomotives by means of electricity. Several ridiculous devices purporting to accomplish this have made their appearance within a year or two, only to be laughed into oblivion, but steady progress has nevertheless been made, abroad as well as here, in perfecting the apparatus by which the electric current is converted into mechanical force. The long lines of continuous conductors which railroads present have always tempted electricians, but the electro-motors hitherto constructed have attained but a feeble power. Now, however, whether study of the dynamo-electric machines has afforded hints for the conversion of force in the reverse direction or not, engines capable of drawing a load of some tons have been constructed, and are in actual use, one of them at Mr. Edison's place of Menlo Park. The inventor very naturally considers them peculiarly fitted for use on the elevated railways, which present conditions of level roadbed, perfect insulation of track, and light burdens to be transported, such as surface lines do not afford. It is hardly prudent to rely upon the figures which reporters bring from Mr. Edison's studio, but he is said to assert that the cost of operation will be much less with electricity than by the present system. Unit for unit, the power applied through the medium of electricity is about one half more expensive than that derived from the direct application of steam, but in the stationary boilers which will be used under the new system it is asserted that one horse power can be obtained with the consumption of two and one-half pounds of coal per hour, against ten pounds consumed in doing the same work by the wasteful and extravagant locomotive furnaces. Moreover, dust-coal can be used in the stationary boilers, at a greatly reduced cost. To the public the complete abolition of smoke, cinders and steam from railway travelling would be an object so desirable that every one will rejoice if the scheme proves really practicable.

One of the heaviest losses which literature has lately suffered is the destruction by fire of Professor Mommsen's library, at Charlottenberg, near Berlin. Mommsen himself has long been engaged in the preparation of a history of the Roman emperors, and had accumulated much new material in addition to his former collection, which was one of the richest in the world in books relating to Roman history. The fame of his previous works had enabled him to borrow many valuable manuscripts and books which would not have been lent on any terms to a less noted scholar, and it is said that manuscripts from the Vatican Library, and those of Vienna, Heidelberg and Berlin, were destroyed. Like many students, Professor Mommsen had fitted up the upper story of his house for his own avocations, and had collected his books there, the family and the reception rooms occupying the lower floors; and the vicinity of so much inflammable matter to the roof-timbers rendered the fire fiercer, while its height above the ground added to the difficulty of reaching it with water. The poor professor is said to be heart-broken at the loss of the borrowed books, as well as his own, and suffered severe injury in his attempts to save some of them. The precautions necessary to preserve books, closely packed on library shelves, from burning are not very costly, and it is rather strange that so valuable a collection, comprising forty thousand volumes, should not have been better defended. It is reported that both gas and petroleum were used for lighting the rooms, and the origin of the fire is attributed to a match thrown upon the floor among the loose papers, after lighting a bedroom candle.

A rather lively little dispute lately took place in the columns of the Paris *Constitutionnel*, concerning the genuineness of certain pictures of the Flemish school, which were sold to an amateur as veritable works of Paul Potter, Mignon, and Karel Dujardin. The purchaser was to pay for them in three instalments, but when the time came for settling the first, he refused to pay anything, asserting that the pictures were spurious, and therefore worthless; and citing, in support of his opinion, the authority of M. Féral and another expert. The seller summoned his unbelieving customer before the tribunal of "first instance," which ordered a new examination by the painter Gérome, M. Michielis, a writer on the history of art, and a Belgian artist — about the kind of expert jury which courts usually appoint — and these unanimously declared their belief that the pictures were genuine, whereupon the defendant abandoned his case. The *Constitutionnel*, in its report of the matter, indulged in some disparaging remarks about the judgment of M. Féral, which called forth from that person a reply, in which he says, with considerable show of reason, that the opinion of artists of great original talent is by no means conclusive as to the authenticity of ancient pictures, of which they may be very poor judges; and that of a historian of the fine arts, however erudite, is if anything still less convincing; and he reiterates his declaration that the signature of Paul Potter, appended to one of the pictures, is a forgery, the picture itself being feebly painted, and showing not even a resemblance to the manner of the artist to whom it was attributed. He says also, that it would be impossible for the present owner to sell the picture again for a veritable Paul Potter, and believes that men whom he calls competent, directors of museums, for example, would support his opinion.

The Presbyterian Board of Church Erection has adopted the sensible plan, in cases where it supplies funds to help in the construction of a church edifice, of requiring a policy of insurance to be taken out, at least sufficient to cover the amount advanced, and deposited with, as well as made payable, to the Board. In this way, if the churches are burned, the money which was given toward their erection returns to the donors, and may be again advanced to help in rebuilding, or not, as may seem best. The Board reports that it is now in possession of eleven hundred and fifteen policies, insuring nearly a million of dollars. Within the last twelve months it has recovered sixteen hundred and twenty dollars, insured for its benefit on four churches that had received assistance from its funds, all of which would have been lost except for this wise foresight. This example may be commended to many similar bodies, and even to some not similar, who have only their selfish interest to consult. Railroads for instance, as has often been suggested, would, it seems, derive great advantage from a contract with some accident insurance company, by which every ticket sold should constitute a policy of indemnity for the trip. Most passengers would, we fancy, be glad to pay the insignificant additional cost of this security, while the benefit to the railroad corporation of having the underwriters bear at least a part of the heavy burden which an accident throws suddenly upon them would be very great, and would be obtained without any expense, since the passengers would practically pay their own indemnity.

NOTES ON ELEVATORS.[1]—III.

AGAIN, the platforms of much used elevators are often piled up with cases of goods to the very underside of the beam, in such a way that the spring, if relaxed, has no room to assume its convex shape, and the action of the levers is totally prevented. Guards ought to be, but never are, placed to prevent this dangerous accumulation.

Still another source of peril with the spring apparatus is found in the possibility, which is sometimes realized, that the elevator may fall without slackening the rope. When this breaks at the winding drum or in any place distant from its attachment to the beam of the platform, the loose end forms a considerable weight to be lifted by the falling car. In addition it often becomes partially entangled in dragging over the various pulleys and through the shaft, so as to keep it always taut enough to resist the elastic effort of the spring, but without catching firmly enough to stop entirely the descent of the car, the effect of whose fall is little mitigated by such a comparatively feeble check. A similar result follows from the slipping of the belts on the pulleys in elevators driven by steam, which allows the platform to descend with fatal swiftness, without slackening the suspension rope sufficiently to permit the safety-spring to act.

At first glance it would seem as if the absolutely certain action of gravitation might with advantage be substituted for the imperfect movement of a spring, by loading the inner ends of the safety-levers with heavy weights, which would be held up by the suspending rope, and would drop when this parted; but a moment's reflection will show that the car falls *as fast as the weights*, so that the latter would not change their position relative to the platform in time to have any effect. Nevertheless, the force of gravity can be indirectly utilized. This is done in Merrick's patent hoist in the manner shown in Fig. 7.

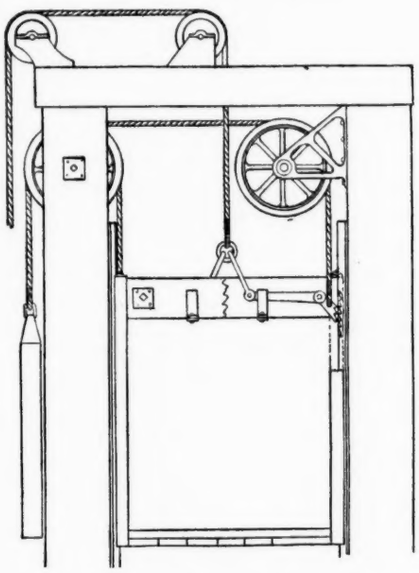


Fig. 7. Merrick's Patent Safety Catch.

Here the suspension rope, instead of being attached either to the beam or to a spring, is connected to the inner ends of two bent levers, or pawls, very similar to those employed in the ordinary safety-catch, and holds them in like manner back from the toothed rack so long as the weight hangs suspended. To the outer ends of the levers are attached ropes which run to the top of the shaft, and over a pulley, there connecting with a heavy counterbalance weight, which rises and falls simultaneously with the elevator, but in the reverse direction. The levers are thus balanced between two forces, the action of the counterbalance tending to lift the pawls into contact with the teeth of the rack, while the pull of the suspension-rope, corresponding to the weight of the platform and its load, draws them away. The platform, being somewhat heavier than the counterbalance, prevails, and the levers are held back until the parting or slipping of the hoisting-rope relaxes the strain which it maintains while in a normal condition, when the force of the counterbalance becomes the stronger, and the pawls are lifted so as to catch in the rack. An incidental feature of this hoist which is commendable is the placing of the safety apparatus in such a position that its action cannot be interfered with by the piling up of goods on the platform.

This device is, however, confined in its use to elevators furnished with counterbalances, a comparatively small proportion of those in use, at least for the conveyance of freight, though passenger lifts usually possess them. They increase somewhat the first cost of the machine, and although they save in running the expense of hoisting their own weight at every trip of the platform, it often happens that where a large amount of power is used for other purposes, the extra cost of lifting five or six hundred pounds through the building a few times a day is inappreciable. The weights, when used, are usually plates of cast-iron, three or four inches thick and twenty inches or more wide by thirty or forty long. In the best elevators, the counterbalance moves between guides in a space left for it at the side of the shaft, and enclosed by sheathing, but with very many there is no enclosure or other means for keeping it in place, and in case of the snapping of the rope by which it is held, it falls into the shaft, frequently breaking its way through the car in its descent, with fatal effect.

There is another ingenious safety-catch which acts in the same way by the throwing out of toothed levers with notched racks, but without the use of springs and also without necessitating the employment of a counterbalance weight. For the application of this, a small wire rope is stretched from top to bottom of the shaft, passing through or immediately beside the car, so that the latter moves up and down over it much in the same way as over the shipper-rope. To the top of the car is fixed an apparatus precisely like an ordinary steam engine governor, with two movable arms loaded with weights at the ends, which revolve in a horizontal plane. A turn of the small rope about a pulley connected with this governor by bevel wheels keeps it in motion as the car passes up and down over the cord. So long as the governor revolves at a moderate volocity, the car moves freely, but any acceleration of the speed with which the platform travels, either by the breaking of the hoisting-rope, the slipping of the belts, or any other cause, increases the rate of rotation of the governor, and with it the centrifugal force exerted on the loaded arms, which fly out, lifting the ends of a lever attached beneath them, and throwing out the pawls into the teeth of the rack, so as to arrest the descent. This apparatus goes under the name of Otis Brothers' Patent, but such devices are in a certain sense common to all the manufacturers, who adopt each other's improvements if their interest demands it, under some agreement as to royalty. Still another contrivance, known as the "Positive Motion" safety-catch, requires a double hoisting-rope, the two ends of which are attached to the arms of a short lever, pivoted in the middle and secured to the beam of the platform. It is presumed that the two suspension-ropes will never break at absolutely the same instant, and if either breaks by itself, that end of the lever drops, and the car will hang suspended from the other rope, while at the same time the descending end of the short lever throws out the pawls, as in the ordinary catches.

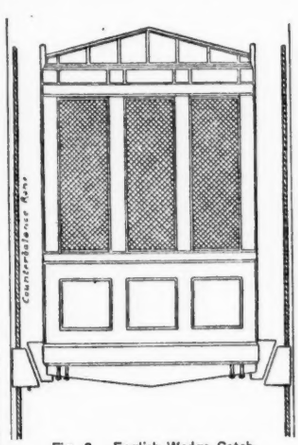


Fig. 8. English Wedge Catch.

Next to the rack and pawls, some form of wedge is the active force of perhaps a larger number of safety-catches than anything else. In one very simple apparatus, quite popular in England, a wedge-shaped projection of wood is formed at the bottom of the platform or car on each side, next to the guide-posts. Just below them hang inverted wedges, also of wood, and suspended to the counterbalance ropes so as to move up and down with the car, keeping always at the same distance below it. On the breaking of the hoisting-rope, the counterbalance ropes draw up the loose wedges to meet the falling car, and the inclined surfaces at the bottom of this, slipping over them crowd them, so firmly against the sides of the guide-posts as to stop the descent of the load. This contrivance has the merit of arresting the fall of the car quite gently, compared with the violent shock which the sudden action of pawls and ratchet occasions, and it is said to act with reasonable certainty, — at least, the proprietor did not hesitate to exhibit the machine at the Brussels Exposition by ascending in it repeatedly to the top of the building and then cutting the rope over his head.

Another form of the wedge which is occasionally seen, is illustrated in Fig. 9. With this apparatus a smooth guide-bar of soft steel or wrought-iron is secured firmly to each of the upright posts, extending the whole height of the lift, and a heavy block of iron or cast-steel is bolted to the platform on each side, with a notch which embraces the guide-bar. This notch is made considerably wider than the guide-bar, and tapers upward, leaving room for a fluted roll of hardened steel, to lie loosely in the lower portion, kept from falling out by a lever, which is held up at a certain height by a rod furnished with a thread and nut for setting it accurately, and is held up by a rope attached to the counterbalance weight. So long as both hoisting and counterbalance ropes are kept taut, the lever retains its position, throughout all the movements of the car, and the roll moves loosely in its place, but if the hoisting-rope slackens or breaks, the counterbalance preponderating instantly jerks the lever upward, throwing the steel roll into the narrow part of the notch, where its

[1] These papers will appear monthly. (See Nos. 232, 236).

sharp edges bury themselves in the softer metal on either side, clutching them so tightly as to prevent further motion.

The wedge safety-catches have a certain advantage both in the gradual manner in which their force is brought into action, and the small space through which they move. With the rack and pawl, the load may be expected to drop at least an inch before the lever meets with the surface of a tooth, while, if it should miss the first tooth it must descend nearly two inches more before it will meet another, the velocity all the time accelerating and the momentum accumulating, untilperhaps the shock when the pawl is finally arrested will be sufficient to tear it or the iron strip from its fastenings.

The inventor of the "Vertical Railway," in the great number of elevators which he erected after the original principle was abandoned, sought safety by multiplying the number of hoisting-ropes,

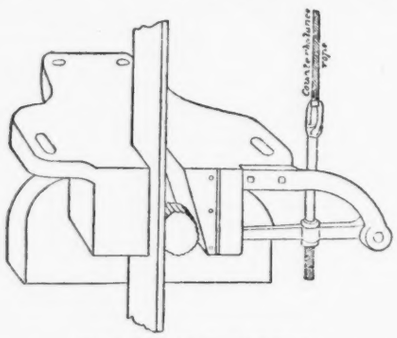


Fig. 9. Baldwin's Steel Roll Catch.

rather than in independent contrivances, believing that if a car were suspended by four separate ropes, each strong enough to hold it alone, it might be considered impossible for all the four to break at once, and as the parting of one from accident or wear would call attention to the condition of the rest, the danger of accident would be practically nothing. Time has not wholly confirmed this notion, there being instances where several ropes have broken almost simultaneously, probably for the reason that having been subjected to a very uniform wear and strain, they had all been reduced equally near to the breaking point, and the shock caused by the giving way of one was sufficient to determine the parting of the others in rapid succession, but there is no question that the multiplication of ropes affords greatly increased security, and many of the best manufacturers adopt that as well as other means of safety.

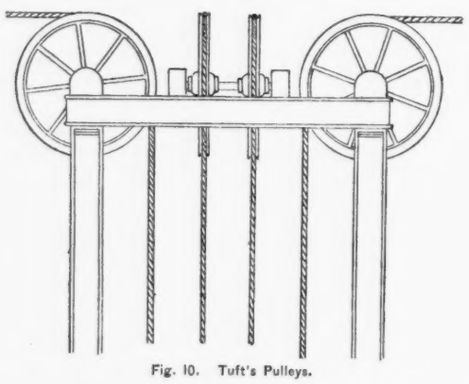


Fig. 10. Tuft's Pulleys.

In the Tufts elevators the four pulleys at the top of the shaft are separate, as well as the ropes (Fig. 10), but other makers content themselves with carrying all the ropes over one sheave and drum.

It is perhaps owing to the wide-spread use of wire ropes in the United States that they are employed here almost exclusively for elevators. Occasionally a hemp or manilla cable is seen attached to a freight-lift, but such examples are rare. The use of chains, which is the rule on the Continent for hoisting, and even for the shipper-line, is here confined to lifts for very heavy goods, and to sidewalk elevators.

One other safety-catch remains to be described, which combines the elements of multiplied ropes and a positive means for arresting the motion of the car. This is used in Hale's patent elevators, and consists of a steel rod crossing under the bottom of the platform, having at each end a sharp blade at right angles to it, something like the head of an axe. These blades project a little beyond the bottom of the platform, so that their sharp edges move up and down close to the side of the wooden guide-posts, but are kept from touching by being turned downward, from which position, however, they are easily moved in either direction. Just below them is an iron rod, secured to the bottom of the car by two short posts, which are pivoted to the car in the direction of the length of the rod. So long as these remain in a position perpendicular to the rod, this is held away from the blades, but as soon as this position is disturbed, the hinging of the posts causes them to be drawn up with the rod flat against the bottom of the car, striking the blades upward by the same movement, when these bury themselves in the wood of the guide-posts and bring the car to a stop. The elevator is suspended by four ropes, all wound on the same sheave at the top of the shaft, and the platform is provided with two beams of metal. Two of the ropes are attached to one beam, and the remaining two to the other. Each beam is provided with a suspension rod at each end, one of which is simply carried down through the car and secured by a nut and washer, while the other is attached to the movable bar under the platform, by a pivoted angular connection; one beam holding one end of the movable rod, and the second beam the other. The effect of each beam would be to draw the movable bar sideways, allowing it to flatten up against the bottom of the car, but so long as the strain upon each pair of ropes is the same, the effort of one beam neutralizes that of the other, and the rod being exactly balanced between the two opposing forces, retains such a position as to keep the movable posts vertical, and thus holds itself at a distance from the platform and the safety-blades. By the slightest variation in the tension of any rope the equilibrium is upset, the movable rod is drawn up, and the safety-blades thrown into action. This is perhaps the most sensitive, so to speak, of all the automatic catches. Even the stretching of any one of the four ropes would stop the car at once.

There is a source of danger against which some safety-catches give no reliable protection, while the Tufts and other elevators which depend wholly on the multiplication of ropes cannot be said to afford any security against it whatever. This danger, which in many freight-elevators is a very serious one, arises from the possibility that obstructions of some kind in the shaft may stop the descent of the platform momentarily, while the hoisting-ropes continue to unwind. If the obstruction yields, or is removed suddenly, the momentum of the falling load is sufficient to snap the cables, however numerous, like threads, and to tear away any safety appliances which do not come into action until the fall has reached the end of the rope. Unless, as in some machines, the slackening of the hoisting-rope stops the movement of the winding-drum, only spring-catches, or those which act by the counterbalance, will avail against such accidents, which often occur from the careless protrusion of a stick, a board, or case of goods, over a hatchway, or perhaps from the partial action at unseasonable times of a badly adjusted safety-catch.

There is a different class of contrivances, intended, instead of automatically stopping the fall of a platform, to break it, so that the movement may be checked so gently as to avoid injury to the elevator or its load. This is a comparatively recent feature in the construction of such machinery, but much has already been accomplished. One method, used in certain kinds of elevators, consists of a brake, acting by friction against the guide-posts, and operated from within the cab by the attendant. With a sufficient amount of presence of mind on his part, such an apparatus works well, but everything depends upon this. Another device, which has the merit of not being dependent upon the nerve or intelligence of frightened human beings for its action, consists of a framework of stout planks set around the lower end of the shaft, enclosing a space large enough to receive the platform, but somewhat smaller at the bottom than at the top. These planks are hinged at the top to a solid framework behind, while the lower ends are held out by strong spiral springs. On the fall of the car, the bottom of which is fitted with "fenders" of strong timber, the gradual compression of the springs as the platform penetrates the tapering end of the shaft, acts like a brake, and brings the falling load safely to a stop.

The employment of the elasticity of air to a similar purpose would suggest itself very naturally, and several modes of application have been patented, although none seem to have yet obtained extensive reputation except the "Ellithorpe" apparatus.

In this, a tapering tank, much like that formed with planks and springs, is constructed at the foot of the shaft, but it is made air-tight, and very strongly built and bound together. The tank is made large enough to permit the descent of the platform to the bottom, but a rubber flange is fitted around the lower edge of the car, so as to make an air-tight joint with the sides of the tank. Openings are, however, left at certain places, to allow the gradual escape of the compressed air, whose elasticity would otherwise cause the car to rebound, and by carefully adjusting the size of these the movement of the platform is controlled with extraordinary precision; elevators heavily loaded having been dropped from heights of a hundred feet or more without the slightest injury to eggs and delicate glassware placed in them for experiment, or inconvenience to the persons who had the courage to ride in them. It has been proposed to make the whole shaft virtually air-tight, but this would be difficult, and of no advantage over the Ellithorpe system. Another patented contrivance consists in one or more air-tight cylinders attached to the bottom of the car, with pistons projecting downward. As the car meets the bottom of the shaft, the pistons are driven into their cylinders, and the compression of the air serves to mitigate the shock of the fall. It is quite conceivable that by allowing a certain escape for the compressed air, to prevent the rebound of the car, especially if a number of cylinders with pistons of varying lengths were employed, the downward movement of the car could be safely and gently terminated in this way.

VAULTS.[1]—I.

WE propose in these papers to explain and illustrate the various forms of vaulting. The importance of the subject in the study of architecture need not be dilated upon here; nor, for our purpose, is the precise historical order of development of any special moment. So much has been said, and, on the whole so well said, by numerous writers on these points, that we will not occupy space by repeating what can readily be found elsewhere. In making notes on vaulting, by way of preparation for the instruction of students, we were surprised at the paucity of illustrations in any one treatise — saving that in Viollet-le-Duc's Dictionnaire Raisonné de l'Architecture — and the absence of any attempt to classify the various forms. We therefore set about collecting, drawing and arranging a continuous and orderly series of examples. The result of our labors is here submitted for the benefit of those who desire to obtain a clear and comprehensive view of the subject. We have by no means exhausted our materials, however; we have omitted many unique and complicated specimens. The reader will probably find, in his travels and investigations, many examples that apparently do not conform to any of the regular and typical shapes that are here presented; but if he studies carefully such as are given, he will have no difficulty in analyzing the odd, fanciful, distorted, mixed, and irregular forms that he may meet with.

We have adopted an analytical order as the only feasible one. The historical would require separate treatment for the examples from each country. The simplest forms are, of course, the earliest; but in some cases they are the latest also, and in others they prevail, almost to the exclusion of the more complex, throughout the entire period of a style. Our object is not to give the history of vaulting, but to set forth its principles of construction, and to show the forms which it assumes. As a rule, only existing specimens will be presented; and one example at least will be named under each division. Precise dates are often unknown, uncertain, or disputed, and the reader must take upon himself the trouble of ascertaining them.

We shall be gratified if this paper, which, as a first attempt to systematize the subject of which it treats is necessarily imperfect, leads any one else to prepare a more extended treatise, to add to the materials we have collected, or to correct any errors into which we may have fallen.

SOLID VAULTING — SIMPLE.

I. The simplest form of vault is that which is known as the barrel, tunnel, cradle or wagon vault. It is merely an arch extended in the direction of its axis so as to cover a space or compartment of a building. The typical form, and the most common, though perhaps not the oldest, is the cylindrical (Fig. 1), the cross-section being semi-circular, and the intrados, generally termed the "vaulting surface," a portion of the surface of a hollow cylinder. A barrel-vault may, however, have its cross-section semi-elliptical, segmental, pointed, three-centred, four-centred, etc. It may be constructed of brick, stone, or concrete. When it is of stone or brick, the leading or coursing-joints are usually parallel to the axis, and the cross-joints in planes perpendicular to the axis. The coursing-joints we shall designate simply as "the joints."

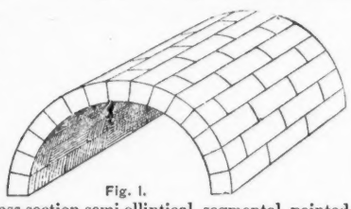


Fig. 1.

Barrel-vaults are very common and very ancient. Examples, both cylindrical and pointed, are found at Nimroud, and in the pyramids at Meroë, which must be dated as far back as 800 B. C. There is a very perfect one of stone, in four rings, covering the chamber of a tomb at Ghizeh, dating about 650 B. C. (Fig. 2). The angular structure beneath it is a vault with plane surfaces. The Cloaca Maxima is a well-known Roman example, of stone, in three rings, generally stated, but probably incorrectly, to have been built as early as 400 B. C. In all the above cases the vault is merely a mechanical or engineering work used in hollow places where it could not be seen, and having no properly architectural features. It was a device for covering spaces with materials of small size, instead of with large slabs of stone. Its inventors seem to have been ashamed of it. The Romans adopted it as a visible structure, worthy of ornamentation. They turned barrel-vaults, for instance, over the cells of their temples, to form ceilings. It may here be noted that in architectural structures vaults are generally ceilings only, not roofs. Those in crypts carry the floor above them; and sometimes, as in Milan Cathedral, and notably in the Romanesque buildings of southern France, the nave and aisle vaults carry a solid roof of masonry. (Fig. 3.) It seems probable that the vaults of the earlier Byzantine churches served as both roofs and ceilings. Whether the great vaults of the Roman baths had roofs over them is a disputed question. It is quite certain, however, that in most cases vaults are but ceilings. They are to be seen, therefore, and their architectural effect is to be studied, from the interior; although the construction is often best exhibited in a drawing which gives an exterior view.

Fig. 2.

Fig. 3 furnishes an example of the use of half barrel-vaults over aisles. These serve not only as roof, and ceilings, but also as continuous flying-buttresses, receiving and resisting the outward thrust of the nave vaults. They are common in Auvergne, Languedoc, Lyonnais and Provence, being constructed about the year 1100. A very interesting illustration of a Roman method of building barrel-vaults of brick is given in Viollet-le-Duc's Raisonné de l'Architecture.[2]

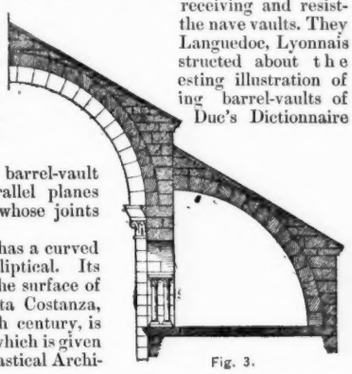


Fig. 3.

II. A skew arch is a barrel-vault whose ends are in parallel planes oblique to the axis, and whose joints are spirals.

III. An annular vault has a curved axis, usually circular or elliptical. Its intrados is a portion of the surface of a cylindrical ring. Santa Costanza, Rome, built in the fourth century, is an example, a drawing of which is given in Gally Knight's Ecclesiastical Architecture of Italy.[3]

IV. Expanding vaults are larger at one end than at the other, and consequently have inclined ridges. Their surfaces are parts either of cones or of conoids.

a. Conical vaults are quite common in Romanesque buildings, forming pendentives for reducing a square to an octagon. (Fig. 4.) The joints are radiating; the cross-joints are in planes parallel to the base of the cone. Such vaults are apparently not used, in their single form, for any other purpose; but they may form parts of compound vaults. There is an example, too, of a simple pointed vault, whose surfaces appear to be portions of two intersecting cones, over the choir galleries of Notre Dame de Mantes. (Fig. 5.) Its ridge is very nearly level.

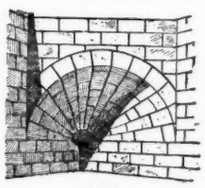


Fig. 4.

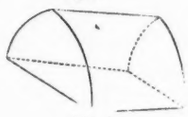


Fig. 5.

b. An example occurs in the aisle of the church which Charlemagne built at Aix la Chapelle, in the year 790. A vault whose surface is that of one half of a frustum of a conoid whose smaller base is a circle, and the larger base an ellipse having its minor axis equal to the diameter of the circle. (Fig. 6.) *r r* is the ridge line. This form may be termed the straight-sided conoid. Used simply, as above, it is quite rare; but as part of a compound vault, as we shall see further on, it is very common. The joints are usually straight and radiating. If, however, the vault be pointed, as is often the case, being composed of parts of the surfaces of two such conoids, the joints may run spirally, appearing also, when viewed on a horizontal projection, to radiate from points beyond the larger ends of the conoids.

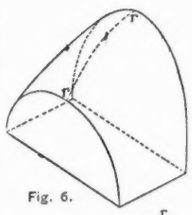


Fig. 6.

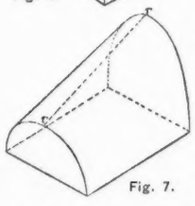


Fig. 7.

c. In the form shown in Fig. 7, the bases of the conoids are as in Fig. 6, and, as in that case, the elements of the surface at the springing are parallel to the axis, but the ridge is curved. Though the term may not be quite correct, we will call this a "convex-conoidal" vault. It rarely occurs single, but in compound vaults it is one of the most common forms, especially in Romanesque work. It may be composed of parts of two surfaces, and so be pointed.

THE CAUSE OF THE EXPLOSION OF GAS NEAR TOTTENHAM-COURT ROAD, LONDON.

IT is now seventy-eight years since the Soho Factory, near Birmingham, was first lighted with coal-gas by William Murdoch, and it is sixty-seven years since Clegg, Manby & Murdoch erected apparatus for the lighting of London by the same agency. The first public display of the new illuminating power was made on the occasion of the visit of the emperor of Austria, the Czar, and the King of Prussia to the city, when they received the hospitality of the Lord Mayor in the Guildhall. At that time the direst predictions were made as to the danger that London would be blown up. With the exception of local cases of damage (such as that in the house of Mr. Gambart, in the Avenue road, Regent's Park), due to neglect in shutting off the gas-cocks, no approach to the fulfilment of such menaces has occurred

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

[2] Vol. IX., p. 466.

[3] Vol. I., plate 4.

until, on Monday, July 5th, the series of explosions in the neighborhood of Tottenham-court road, described in our last number, led many persons to form the conclusion that London had been visited by an earthquake.

The reason of this long immunity from mischief is simple; and simple is the reason of the catastrophe which has just occurred. And while lamenting the loss of life, the terror, and the distress occasioned by the explosion, it is satisfactory to be able to point out the causes both of the safety which is the rule, and of the destruction which is the exception, and to show that alarm has been exaggerated, and that recurrence of such an event is rendered more unlikely than was the explosion itself, after an experience of three-quarters of a century.

We do not forget, of course, the explosion of a gas-holder, or deny the danger attendant on the use of coal-gas, except under proper supervision. But we can reassure our readers against such a thing as the sudden discovery of a new source of danger for the inhabitants of the metropolis, which has been the comfortable prediction of certain sensational announcements. Although caused by the explosion of gas, the catastrophe in Tottenham-court road cannot be brought under the category of accidents likely to arise from the ordinary use of gas. In fact, it has a much closer analogy to those explosions of which, year after year, we have so many instances to lament in our coal-mines.

Coal-gas, our readers pretty generally are aware, as it is sent through the subterranean pipes which honeycomb the metropolis is not by itself either explosive or combustible. To burn or to detonate it requires an admixture of oxygen. This may be supplied from the atmospheric air. And so far is the carburetted hydrogen gas used for the illumination of our cities from being a dangerous explosive substance, that the slight pressure which is measured by half an inch of water is enough to maintain such a current as to allow the issuing gas to burn freely, without the least fear that the flame should make its way into the pipe that supplies the burners.

The reason of this safety lies in the fact that coal-gas is only explosive when mixed with a certain proportion of oxygen. Pure hydrogen burns with a pale blue flame of intense heat, and carburetted hydrogen with a more luminous, though less hot, flame, if allowed to catch fire at the moment of its coming into contact with the atmosphere. The brilliant oxyhydrogen light is produced by the inflammation of these two gases at the moment they are brought into contact in the proportions which constitute water. The action, comparatively, is gentle. But, on the other hand, if carburetted hydrogen be mixed with a certain proportion of oxygen, or of common air, it forms a dangerous explosive. Quiet combustion is then impossible; and on the contact of flame, spark, or red-hot metal, the whole mixture instantly explodes.

This is what occurs in the workings of the collieries. From all newly-cut bituminous coal, carburetted hydrogen gas more or less rapidly issues. At times stores of this gas are tapped by the miner, and a large volume issues from the workings. One main aim of the ventilation of coal-mines is to keep up such a constant circulation of air as shall prevent the formation of an explosive mixture. And, as it is known that this precaution will at times fail, the other element of safety is the absence of any naked light with which the gas may come in contact; the use, in fact, of the safety-lamp.

What occurred on the 5th of July was this. Gas had leaked from the mains in use into a new main which was in process of fitting, and which had not yet been connected with the gas-works. It was supposed that this pipe, which is of the large diameter of 36 inches, was in the same condition as the surrounding atmosphere, that is to say, that it merely contained ordinary air. By some unsuspected filtration, however, coal-gas had made its way into this pipe. Of course no current of ventilation had been provided, and the phenomena which occurred showed that the mechanical mixture which had taken place was irregular and imperfect, attaining in some places highly explosive proportions, and in the intervals only combustible proportions. It is to be borne in mind that this infiltration of gas was entirely unsuspected. The terrible warning which has occurred will teach the gas-fitter hereafter to regard an empty pipe as a possible source of danger. But we are unaware of any circumstance which pointed in that direction before last week; and we apprehend that, if any engineer had been asked, "Can there be any coal-gas in the 'dead main,'" he would have replied, "Certainly not." How it got in is matter of question. But its presence is proved by the explosion. So also is the fact that explosive mixtures were only locally formed, although there was enough carburetted hydrogen in the mains to communicate flame from one to another of these local mixtures along the whole length marked by the successive explosions.

It may be regarded as most unlikely that such a catastrophe should recur. The laying of a three-foot main is not an ordinary occurrence. And for the future, being now aware that such a main may become a possible source of danger while being laid, the engineer will take precautions of which no one ever dreamed before the recent event.

As to the questions "How was the light communicated?" and "How did the gas get into the main?" it is possible that we shall not be able certainly to reply. With regard to the first, nothing could be more straightforward and honorable than the evidence of the witness Hawkes. Under the circumstances we have mentioned, it is clear that no blame can be thrown on any of the officers or men employed. The peril was not, indeed, — or rather will not be in future, — as mysterious as that of earthquake, but it was quite as much unforeseen. As to the other question, the lesson is more practical. The gas companies and the water companies of London are aware of the constant loss of a proportion of their gas and of their water. The gas sent into the mains is not accounted for by the consumers by some five per cent. The loss of water is yet more considerable. If we ask how this can be, we have an immediate explanation afforded by one of the great barbarisms of our present arrangements. For a delicate system of closed pipes, conveying either water or the more subtile fluid of gas, the first element of secure maintenance is, that the joints should be undisturbed. How do we affect this? We dig a trench in the ground; lay the pipes with due care; shovel in the earth, and turn carts, vans, omnibuses, and even traction-engines and steam-rollers, over the top. We might, with as much good sense, set a gang of men to drill holes in the pipes at such intervals as pleased them. Displacement must begin as soon as a road is open for traffic. After a time leakage results. When a leakage has become so serious as to be perceptible to the nose, or by the dampness of the street, a gang of men make their appearance. They quietly deposit logs of wood or other obstacles in the way of the traffic, pull off their coats, and commence an attack on the road with enormous pickaxes. Pitching, paving, asphalte, macadam, — whatever be the artifical surface of the roadway, yields at once to the attack. The sextons of the mains delve down as if intent on carrying out a burial ceremonial of their own in the heart of the metropolis. Then come men with devils, that is to say, iron fire-baskets, which are known by that profane title, and solder the joints of the pipes. The work is carried on with the utmost coolness, the traffic having to stop or to go round, as best it likes, meantime. A good job is no doubt made of it. The leaks are stopped as far as they are discovered; and as soon as they are stopped, measures are taken for reopening them. The earth is shovelled in again, the traffic is turned on again, and the difference between the resisting power of newly filled earth and of that which has been consolidated by pressure is thus set in operation as a sure and rapid mode of producing more leaks. The whole process is good for trade. It employs a certain set of workmen in a work which, with proper arrangements, would be wholly unnecessary. It is thus in exact accordance with the ultra democratic theory of the true mode of conducting public work. The freedom of the subject is respected, the independence of the various companies is respected, — independence alike of one another and of the public convenience. If a street is ripped up to-day by the water companies, that is no reason why the gas companies should not have their innings. Thus every one is served in turn. The cost of water and of gas is increased by preventible leakage, by preventible work done in search of the leaks, and by cost of reparation. That principle which is held by some persons to underlie the social compact, — namely, the duty of the state to provide work for the working-man, is carried out to a great extent by the provision of a good deal of unnecessary work. That under such conditions leakage has for once occurred into, instead of merely out of, a pipe, need surprise no one. It has, however, had the effect of calling public attention to the one real cause of the calamity that has recently occurred.

There are certain subjects on which the public writer, after a time, learns to be silent. Not for the reason that he has nothing to say, but for the reason that, having something very important to say, he knows that so deaf an ear will be turned to his remonstrances that he loses heart in the matter. Such has been the case with regard to preventible explosions in colleries. We have more than once or twice pointed out the fact that, if a convenient and luminous safety-lamp (of which we could with certainty suggest the principle) were put in the hands of the miners, and if the men were properly searched before being allowed to descend the shaft, explosions would cease, — that is to say, if the proper regulations as to the use of powder were also enforced. In the same way we have pointed out, over and over again, the great waste of money involved in our inexcusable mode of laying the mains of the water and gas companies through the streets. If the bill of costs were cast up, it would be a heavy one. Look at the cost of repairs and reconstruction of road, the extra wear and tear of carriages, the loss of time, the injury to horses, — of all this we have often spoken. Now we have a very serious item to add to this cost, namely, that of the leakage of the gas and water pipes, at all events to a very considerable extent. If we set down 100,000*l.* per annum as an approximate estimate of the loss by leakage, we shall probably be far within the mark. Then comes the question of the amount of damage effected by leakage; and here is a very grave and important consideration. In the present case, loss of life and great alarm are added to the foregoing results of neglect. Nor need we hesitate, however much light may be thrown on the actual facts of the present case, to attribute the leakage which had so fatal a result to the false mode of laying, and to the disturbing effect of traffic. The evidence is precise as to the good condition of the valve connecting the two mains, when examined. The state of the connection at the time of the explosion cannot be arrived at from any other source of information than that furnished by the explosion itself. If other points at which gas may have filtered into the main existed, — which the successive occurrence of the explosions indicates as most probable, — it has yet to be pointed out where they were. But along the whole course of the main, actually or potentially, the great disturbing element of traffic over the pipes had to be contended with. The cost that would have been saved in London if the principle of a subway, for the purpose of sewerage, water-supply, and gas or electric lighting, had been in good time adopted, it is not easy to estimate. — *The Builder.*

THE ILLUSTRATIONS.

DOME OF THE CHURCH OF THE ORATORY, SOUTH KENSINGTON, ENGLAND. MR. H. A. GRIBBLE, A. R. I. B. A., ARCHITECT.

WE reproduce from the pages of the *Building News*, Mr. Gribble's drawing, showing the manner in which he proposes to construct the dome of the new church which is to be built from his designs, selected in competition. The drawing shows the method adopted for counteracting the pressure on the pendentives by transferring it, through the medium of concrete keys, to the vaulting on the four sides of the dome.

DESIGN FOR AND DETAILS OF A HOUSE AT MANCHESTER, N. H. MR. J. A. FOX, ARCHITECT, BOSTON, MASS.

RAILROAD STATION, CANTON, O. MR. W. W. LEWIS, ARCHITECT, BOSTON, MASS.

THE UTILIZATION OF BLAST-FURNACE SLAG.[1]

THE disposal of the enormous output of slag or scoria from blast-furnaces has always been one of the serious difficulties of the iron trade. Taking an average of all the districts in England, for each ton of iron made, twenty-five hundred weight of slag is produced, and from the official returns of last year of the iron smelted, no less than 8,000,000 tons of slag were produced. The space occupied by this mass, when loosely tipped, is something like 170,000,000 of cubic feet, or nearly twice the size of the Great Pyramid, whilst the bulk of the iron occupies only one-sixth of the same space.

There is, however, this great difference between iron and its refuse, that, whilst the former is diffused and finds its way into every corner of the world — from the hook at the end of the fisherman's line, or the hair-spring of a watch, from the magnificent steamship or the abundant works upon the various railways, to the splendid roof of many of our public buildings, or the small but infinitely long rod of the telegraph wire — whilst iron has been diffused through all these beautiful branches of the arts and sciences, its companion slag has been left behind at the smelting works, a hideous memorial, defacing the landscape, absorbing something like a quarter of a million sterling annually in its disposal, and destroying forever hundreds of acres of valuable agricultural land, forming as it were, a blot upon the face of the earth, and left as a landmark to show where this wonderful metal, iron, has been extracted, the development of which has contributed so much to bring the world to its present state of civilization.

That this state of things will entirely cease, the author does not for one moment think possible. So long as we produce such enormous quantities of iron, so long will these heaps go on accumulating. And there is little chance that these existing masses will ever be turned into a marketable product. At the same time there can be little doubt that blast-furnace slag possesses many valuable properties which may, in certain localities, be converted into things useful to the arts and sciences, and, which is a most important point, at considerable profit.

For many years the only known use for blast-furnace slag was for road-making, and for this purpose it is still largely employed. In Northamptonshire, and in certain districts of Yorkshire, the whole of the slag produced is sold at a considerable profit. These, however, are local exceptions. Perhaps the largest user of slag is Mr. John Fowler, M. Inst. C. E., engineer for the Tees Conservancy Commissioners, whose works upon the breakwater at the Tees mouth deserve to rank as some of the most interesting in the kingdom. On these constructions Mr. Fowler consumes something like half a million of tons annually. A similar class of work is also being carried on at Barrow-in-Furness, from the slag produced at the hematite furnaces in that town; but in consequence of the large amount of lime contained in the slag, much greater care has to be taken in its selection. The slag used at the Tees Breakwater is chiefly taken away upon bogies, in blocks weighing three and a half tons each. The slag is run into these blocks upon the wagons at the furnaces, a case or box being placed upon the bogie for this purpose. When the slag is sufficiently "set," this case is removed, and the wagon, with the block upon it, is taken a distance of about six miles to the breakwater. A large quantity is also tipped upon a platform on the riverside in such a position that the tide completely covers it. It is then wheeled into hopper barges belonging to and for the use of the River Tees Commissioners.

In consequence of the Tees Breakwater (known as the South Gare Breakwater) being now nearly completed, and the Tees Commissioners wishing to commence the breakwater on the opposite side of the river, called the "North Gare Breakwater," Mr. Fowler, in conjunction with the author, devised a plan for shipping the bogies with the hot balls into barges, and towing them down the river to a landing-stage constructed for discharging. Each barge is constructed to carry forty bogies, and will be about 220 tons burden. These barges will bring back the empty bogies on the return journey. The loading of these barges at all states of the tide has naturally occupied a considerable amount of attention, and the machinery for shipment, designed by Messrs. Appleby Bros., of Southwark, and called a "Titan," has been recommended by Mr. Fowler, and generally adopted.

The next stage in slag utilization is the endeavor which has at various times been made of running the liquid slag, as it flows in a stream from the furnace, into moulds; or, in other words, making slag castings. Such an idea at first sight would seem natural enough. Here, it may be said, is a material flowing to waste in a liquid state, capable of being run into moulds, and of taking impressions almost equal to those of cast iron. The castings also, when successfully made, are exceedingly durable, and even beautiful to look at. So alluring has been the idea of casting that, during the last fifty years the Patent Office has recorded almost annually the attempts of some inventor impressed with the notion that he could treat this treacherous fluid successfully, or, in some way or other, make it useful in the arts.

The remarkable hardening effect of oxides of iron in conjunction with lime, silica, and alumina, is well known, and is well exemplified in the Italian puzzolanas, where in several of the best qualities, the lime is actually as low as eight per cent, whilst the oxides of iron run up to twelve or fifteen per cent. The hardening effect of oxides of iron induced the author, prior to the development of the slag industries, to employ the dust from the ironstone clamps in place of sand, when making concrete for heavy foundations; and the setting properties and strength of this combination have upon examination been fully confirmed. Again, having to erect a row of columns for a large roof upon the bed of an old ironstone clamp, the floor of which had been accumulating for several years, it was found to be so extremely hard that the author simply levelled the bed down, and set the columns directly upon it. These, after many years, show not the slightest signs of settlement, although the ground underneath had been made up from ship's ballast.

It appears an absolute necessity for obtaining good results, that the ferruginous material should be calcined, or roasted, the effect of which is to drive off the carbonic acid and water; the reabsorption of the water, which unites in chemical combination with the material, afterwards assists in hardening.

The most important production, and the one which consumes by far the greatest quantity of slag, are concrete-bricks, known in the market as slag-bricks. These bricks are made from the sand produced by the slag-sand machine before described. The sand is dropped from the railway wagons into hoppers, or depots, at the works, from whence it is filled into large barrows, and is taken up a hoist to the top of the building, and tipped into a hopper, which supplies a measuring apparatus. Here it is mixed with a certain quantity of selenitic lime (General Scott's patent), with an addition of iron oxides. It then passes into the brick-press hereinafter to be described. The bricks are taken off the presses by girls, placed upon spring-barrows, carrying fifty bricks each, and removed to air-hardening sheds. Here they remain a week or ten days, after which they are stacked in the air to further harden, and at the expiration of five or six weeks they are ready for the market. We here have, then, the curious anomaly of bricks being made without burning, and of a wet season being favorable to the hardening process. The bricks thus produced are very tough; they do not split when a nail is driven into them, and are easily cut; they do not break in transit, and the frost has no effect upon them. According to a certificate received from Kirkaldy's testing-works, some of these bricks taken from stock three years old carried a pressure of twenty-one tons before crushing, whilst others, only four months old, crushed with nine tons pressure, showing not only great toughness, but also that they greatly improve with age. There are now two machines fully employed, making about 130,000 bricks weekly, consuming two hundred and fifty tons of slag-sand and thirty tons of selenitic lime and oxides. The preparation of this selenitic lime forms a necessary branch of the business. It is made in the following manner: —

80 per cent of unslaked common lime.
10 per cent of raw gypsum.
10 per cent of iron oxides calcined.

These are all ground together, under edge runners, into a fine, dry powder. The composition is then passed through a fine sieve, twenty-four meshes to the inch. It is then ready for the brick-press. To each thousand of bricks, 6 cwt. of this lime is used; no water is added, sufficient being held in suspension in the slag-sand to thoroughly moisten the lime; in fact, it is no uncommon thing to find flowing from the brick-press, a stream of water which has been squeezed out of the sand. The loss of bricks in manufacture is very small; in fact, after the bricks are once upon the barrows, the waste is not more than 1½ per cent. At the present rate of production there is a consumption of slag for this one article alone of about 14,000 tons per annum. The weight of these bricks is about 30 per cent lighter than ordinary red ones — 9 inches by 4½ inches by 2½ inches — weighing only 2¼ tons per thousand.

Another interesting feature in connection with these bricks is the economy in manufacture, which, including all materials, labor, wear and tear of machinery, etc., superintendence, power, and everything except interest on capital, does not exceed 10*s.* 6*d.* per thousand.

There was no machinery to be purchased that could work the slag-sand into bricks in the state in which it arrived from the blast-furnaces. In the earlier attempts the sand had to be prepared in a fine state, the result being a superior class of bricks, but of a cost so

[1] From a paper by Mr. Charles Wood, read at a meeting of the Society of Arts.

great as to exclude them from the market. The author had, therefore, to design and construct brick-presses and other machinery that could work the sand, as it came from the slag-sand machines, directly into bricks. The success of this machinery at once rescued the Cleveland Slag Company from an early collapse, but not before a large amount of money had been spent and some two years wasted.

The next product to be described is the manufacture of what is called slag-cement. The word "cement" has sometimes been objected to in connection with this material, because it is generally manufactured in a wet state, and must be used within a few hours of its being made. Upon this point the author expresses no opinion, simply mentioning the fact that, in point of strength, he finds little difference, whether the materials are ground together in a dry or in a wet state. The cost of production, however, is as nearly as possible four to one in favor of the wet state. It is made by grinding under edge runners (the finer the better) for about one hour 70 per cent of slag-sand, 15 per cent of common lime, and 15 per cent of iron oxides, calcined iron stone, or spent pyrites.

The large quantity of water held in suspension in the slag-sand is quite sufficient to make the mass in the mill into a semi-fluid state; but this water is mostly taken up in setting as water of crystallization. It is, therefore, necessary that the cement should be used before setting takes place. This cement is usually employed for making concrete, by mixing one part of the cement to five parts of slag-shingle. The shingle is made by the slag-shingle machine before described.

The shingle before being used is well wetted, and when the concrete is put into place it is beaten lightly down in a soft state, until the water and cement begin to rise to the top. Two days afterwards it has become sufficiently set to allow of the building boards being taken down, and at the end of the week it will be fairly hard, and will go on hardening for months. It is perfectly hydraulic, and will harden under water. It will be seen by this that it requires longer time to set than Portland cement, and is perhaps not quite so hard; but there is a remarkable toughness, which has surprised all those who have used it, and this toughness makes it valuable for heavy machinery foundations, etc., and when made in proximity to the furnaces, the cost of the cement will not exceed 6*s.* per ton, whilst concrete made of this cement and slag-shingle will cost only 5*s.* 6*d.* per cubic yard.

These prices are absolute figures of cost, that of the concrete being arrived at after having executed many hundreds of cubic yards, both upon the Tees Iron Works, at the new railway station at Middlesbrough and elsewhere. The Slags Works buildings, the walls of which are between 70 and 80 feet high, are built entirely with it, the basement walls being 2½ feet thick.

Whilst the underground walls of the Slag Works were being executed, they were twice immersed through exceedingly high tides, with the result that this part of the building is the hardest of all; and to give an idea of the strength, the author may mention that it was necessary, about eighteen months ago, to cut two openings at different points through the basement walls, 3½ feet wide and 6 feet high. This employed two good workmen, with steel bars and sledge-hammers, at least four days for each doorway.

The author knows of no material, at a similar cost, which can compete with it, and he is satisfied that it has only to be widely known to be more extensively used. Personally, where time can be given, he employs nothing else for all heavy foundations for rolling machinery, for which purposes, as a conglomerate or monolithic mass, it is peculiarly adapted. Slags from the furnaces making Bessemer iron are better adapted to this cement even than those from the Cleveland ores.

Mention has been made of the necessity of keeping the products from slag-sand in a damp state for a length of time after manufacture, in order to give them time to harden, or, in other words, to allow the material to absorb or take up as much water as will chemically combine with the lime, silica, and alumina; but whether this water becomes water of crystallization, or water of hydration, or a combination of both, is not at all certain. The author is, however, strongly impressed with the idea that water in a fixed state, more particularly in a compound state, plays by far a more important part in the setting of cements than is generally supposed; that the presence of water in a chemically combined state forms as much a constituent part of cement as does the lime, silica, and alumna, seems certain from the results of the analysis shown further on. For instance, if Portland cement be heated to a red heat, so as to evaporate the fixed water, the cement loses at once its strength, and becomes rotten. Again, with gypsum, where the water of crystallization amounts to more than one-fifth of its bulk; if this is driven off at a red heat, we have little better than a powder left. And it seems clear that the quicker this crystallization takes place, the quicker is the setting; and, on the contrary, as in the slag cements and the brick, the slower the water is in becoming fixed, the slower is the hardening, thus showing the necessity of keeping them damp during the process.

At the author's request, Messrs. Patterson and Stead have made many analyses, with the object of testing this point. Samples of Portland and Roman cements were mixed with water in the usual way, some specimens being supplied by the cement manufacturers themselves as test pieces from their works, and had consequently been under water for various periods. These were all reduced to powder, and carefully dried by keeping them for several hours at a temperature of 212 degrees Fahr., so as to evaporate every particle of free mechanically mixed water. A very careful determination of the chemically combined water was then made, with the following interesting results: —

Combined Water.

Four days in water.		Six days in water.	
Portland.	Roman.	Portland.	Roman.
5.75 per cent.	5.25 per cent.	6.8 per cent.	6.78 per cent.

Seven days in water.

Portland.	Slag cement.	Slag brick.
7.75 per cent.	10.50 per cent.	5.70 per cent.

From this it seems certain that the hardening follows closely in proportion the quantity of water which becomes chemically combined, and that the slag cement undergoes a similar change to that which takes place in Portland or Roman cements. That other chemical changes take place there seems also to be no doubt, but what these changes are the author leaves to wiser heads than his own; he only wishes to show that with Portland, or Roman, or slag cement — time being left out of the question — the same chemical changes do take place.

Mortar for building purposes is also another material supplied at the Cleveland Slag Works. It is simply made by grinding the slag sand with about six per cent of slaked lime in an ordinary mortar mill, and (if ground fine) makes a far better mortar than is generally employed by builders. Two years ago there was a very large demand for this material in Middlesbrough, but the building trade has so completely come to a standstill, that at the present time not much is being used. There is only one objection made to it; viz., that it sets too quickly. Mortar supplied on the Saturday, left unused, would be worthless on the Monday. As with the other slag products, its remarkable strength and cheapness combined make it much liked by those who, in close proximity to the works, can obtain it freshly made.

One other manufacture from slag is carried on at the Cleveland Slag Works, which, although it does not consume much, is still of interest, viz., artificial stone. It is moulded into chimney-pieces, window-heads and sills, balustrading, wall-coping, and other ornamental work for builders, as well as for paving for footpaths, stables, etc. The stone is composed of two and a half parts of finely-pulverized slag, and two and a half parts of ground fire-brick to one part of Portland cement; the mixture is run into moulds, and sets quickly, the articles being ready for the market in five or six days.

Mr. Frederick Ransome, M. I. C. E., the well-known inventor of the artificial, silicious stone, has recently taken out a patent for mixing the slag-sand in its wet state with chalk, and then burning the whole together in a cement-kiln into clinker, after which he grinds it down in the same way as Portland cement. The results given are most remarkable, exceeding Portland cement in strength by nearly 30 per cent. The experiments are of so recent date that the author has considered it better not to give any further statistics.

A sort of concrete brick has, during the last few years, been made at the Moss Bay Iron Company, Limited, Workington, from hematite Bessemer slag, under the direction of Messrs. Kirk Brothers, Mr. Henry Hobson being the then manager, and, I believe, the originator of the process. These bricks have been made by a process differing entirely from the system adopted by the author at Middlesbrough, and already fully described. The slag employed at Moss Bay is pulverized from the cold, solid slag, under massive edge runners, which crush the material into fine, dusty shingle; it is then lifted by elevators into French burr stones, and ground down as fine as sand. From the stones it passes through a worm conveyor to a brick-press, during which about 25 per cent of common river sand is added, with sufficient water to thoroughly dampen it, without any addition of lime, again showing, in a remarkable degree, the extraordinary setting nature of the slag, after the chemical combination with the water and exposure to the air has taken place. These bricks are taken from the press and placed under the cover for a few days, when they are put out in the open air to harden. The bricks are of excellent shape, gray color, and become exceedingly hard, as will be seen from the specimens exhibited. Large quantities of these bricks have been employed in building the Moss Bay Steel Works, and appear to be standing remarkably well. The cost, however, is very heavy, owing to the difficulty of preparing the slag, and the wear and tear of the machinery; the excessive weight also precluding the sale at any great distance from the works.

The large amount of lime, combined with the silica and alumna in the Bessemer slag, as seen in the analysis already given, quite accounts for the setting properties. With the exception of the bricks used upon the works, the author believes that there has not been any large quantity made, and the machinery has now been standing many months. The process is, however, another proof, in a very interesting way, of the peculiarities of the material. The bricks continue to harden for years, and appear to arrive at a kind of crystalline fracture, which damp greatly accelerates. There is no doubt whatever that if this slag were treated by the process adopted by the author, that bricks in every way superior to the ones just described and, from the nature of the slag, superior, even as a building brick, to those produced at Middlesbrough could be manufatured.

NOTES AND CLIPPINGS.

PROTECTING VIRGIL'S TOMB. — A Neapolitan antiquary has put up an iron railing around Virgil's tomb at Posilippo, near Naples. His first intention was to get school boys everywhere to contribute pennies towards a superb monument over the bard's grave, but this proposition was promptly opposed by the boys of Naples, on the ground that the *Æneid* had caused them so many floggings that they hated its very name and its author's, too.

CLOSING THE STRAITS OF BELLE ISLE. — The scheme for closing up the Straits of Belle Isle is still agitated on the other side of the Canadian border, though with what prospect of being undertaken we do not know. It is thought that if these straits are closed by filling up the channel with rocks blasted in the neighborhood, it will bring about an amelioration of the climate in the country surrounding the gulf of St. Lawrence, by shutting out the arctic current which now pours into the gulf through that passage and annually closes the St. Lawrence to navigation by the low temperature its presence induces. It is suggested that if such a barrier is ever built, one of the first results would be the building of a railroad over it to Newfoundland, and the transformation of St. Johns into an important port for a line of trans-Atlantic steamers, whose passages would be limited to five or six days.

THE GROUND CONTACT OF LIGHTNING-RODS. — In a recent article in the *Journal of Telegraphy* the noted electrician, David Brooks, argues that the subterranean section of a lightning rod "should be enlarged in as great proportion as the earth's specific conducting capacity is less." A half-inch square rod, in his opinion, should have a ground-plate no less than 270 feet square. In lieu of this, there should be a connection with gas and water pipes. He adds that after thirty years' observation he has never known of a case where the occupants were injured when the building was fitted with gas and water pipes. The buildings were sometimes set on fire by the electric fluid passing from the lightning rods or metallic roofs to the gas-pipes, but there was no injury to persons in any part of the building below the higher points to which the pipes extended. His general conclusion is that "gas and water pipe are the best lightning-rods ever erected, because they are electrically in perfect connection with the earth. They should extend to the very top of the building, or be connected by a rod running to that elevation."

THE PARIS OBELISK. — M. Feuardent says, that when the obelisk now in Paris arrived in that city, all antiquarians and architects agreed that it ought to be erected in the middle of the Cour du Vieux Louvre. King Louis Philippe opposed this suggestion, as he desired to reserve the place for a statue of the Duc d'Orleans. For some reason the obelisk was very stupidly erected on the Place de la Concorde, where it is seen to very poor advantage, its proportions being apparently reduced by its surroundings. The Orleans statue was set up in the court-yard of the Louvre, as Louis Philippe had directed, but it did not give satisfaction, and during the reign of Napolean III, it was removed to make way for a statue of Francis I. This statue was made by the sculptor Clesinger, and was soon condemned as a very poor work of art. Even the *gamins* could see that, and they derisively called it the statue of Sire De Framboisi, (old Father Raspberry.) This comment on the ridiculous statue made it odious, and it was finally removed. The Paris monolith has recently had a narrow escape from destruction. During the preparations for the late French national holiday, an immense flag-staff, which had been erected near the obelisk, broke at its base, and fell to the ground. It was enormously heavy, and in falling demolished the railing about the obelisk, which would also have been seriously injured if the pole had fallen in a slightly different direction. — *New York Times.*

TESTING IRON ROOF-TRUSSES. — At the Edgemore iron works recently, an extraordinary test of the strength of an iron structure was made, which will attract the attention of engineers, architects and contractors generally throughout the country, on account of its value as a scientific experiment seldom made. The test was applied to a portion of the iron roof of a market-house for the city of Georgetown, Demarara. When Mr. Nathaniel McKay of Philadelphia was negotiating with the authorities of that British Colony, he was brought into competition with several prominent English builders, and he secured the contract for the building at a higher price than the English offers, solely on the superior arrangement and architectural effect of the plans he submitted. His competitors alleged that Mr. McKay's plans were deficient in strength, and he had inserted in his contract a clause to the effect that the roof-trusses should be tested, under the supervision of competent engineers, by an actual load of twenty-five pounds per square foot. Mr. Charles H. Latrobe, the consulting engineer for the city of Baltimore was engaged to supervise the test. There were also present, Mr. Volmar, of Baltimore, Mr. George Sellers, superintendent of the Edgemore works, Mr. McKay, and Mr. W. M. Levering, representing Wilson Brothers & Co., of Philadelphia, who designed the building, and from whose plans it was being constructed. Two Fink trusses, each having a total span of fifty-five feet one inch between centre of end pins, were erected side by side in the yard of the works, in the position which they will occupy in the building, and were properly braced to each other. They were then loaded with 133,000 pounds of iron properly distributed, which represented the test load of 25 pounds per square foot as required by the contract. The great weight caused the ends of the trusses to sink in the ground, sufficient bearing surface on the soft earth not having been provided, and the panels of the trusses were therefore thrown out of plumb. Notwithstanding this unlooked for disadvantage, the deflection in the centre was only one half inch, and not the slightest weakness was discovered in any of the parts, so that the test was eminently satisfactory to all parties interested. Photographic views have been taken of the trusses with the load on them, to accompany the testing engineer's report, and show to the Mayor and town council of Demarara that the test was honestly made. The iron-work of the market-house is now being loaded on a vessel at Edgemore for transportation to Demarara.

COAL-TAR COLORS. — The extent to which the manufacture of coal-tar colors is now carried is shown by the statistics of labor and production at one of the principal coal-tar color works in Germany. There are employed over 1,000 workmen, in addition to forty overlookers and branch managers, twenty-five chemists, one engineer, and thirty clerks and accountants. The yearly consumption of coal amounts to 17,000,000 kilogrammes; anthracen, 825,000 kilogrammess; naptha and benzol, 950,000; chromate of potash, 280,000; caustic soda, 1,245,000; sulphuric acid, 2,250,000; muriatic acid, 4,050,000; nitric acid, 850,000; alcohol 94,500, and sundry chemicals, 3,500,000.

LACUSTRINE RELIC IN IRELAND. — Lake dwellings have been discovered in Kilnamaddy Bog in Fermanagh, in the north of Ireland, by Mr. Thomas Plunkett. After removing the peat to a depth of about four feet the side of a wooden hut was brought to light, and on making further excavations the remains of another and more perfect hut were found at a distance of 17 yards from the first. According to one archæologist they were originally built within an excavation, and the bog stuff was afterwards heaped against the sides as a support. But as the sides of the huts were supported by huge oak logs, some of them being about 6 feet in circumference, which were piled up regularly, it seems more reasonable to suppose that the huts were constructed in an earlier time than the bog formation, and upon an island in a lake. Mr. Plunkett also found, in the course of his excavations, the stool or stump of a huge pine tree above the level of the flooring of the huts, having in its rootlets portions of charcoal and other refuse of a "kitchen-midden," proving that its growth was subsequent to the formation of the dwellings.

HOW MUCH AIR AND GAS FORM AN EXPLOSIVE MIXTURE. — According to the report in the *Times* it was stated by Mr. Foster, the chemist at the inquiry respecting the death of the men who were killed by the gas explosion, that "the *maximum* admixture to make an explosion would be one part of gas to eight parts of air, and this would compose the admixture which exploded on Monday the 5th, while one part of gas to seven parts of air would make a less explosive mixture." It is not to be supposed that all chemists would agree with Mr. Foster in these proportions. The ratio between air and gas to form an explosive mixture is more generally supposed to be one in ten. The subject was investigated at great length before a Committee of the House of Commons in 1867, when the Metropolitan Board of Works introduced their Subways Bill. Some of the first chemists and gas-engineers were examined. Dr. Frankland in his evidence said that one part of gas to ten of atmospheric air constitutes the most explosive compound, the lowest mixture which it is possible to explode being 6.6 per cent of gas. The mixture ceases to be explosive and becomes combustible when in the proportion of one to four, or four and a half, according to the quality of the gas. Mr. Forster, the mining engineer, who was opposed to the bill, stated that he found from experience that the most explosive mixture was about eight or nine volumes of air to one of gas, but in another part of his evidence the proportion is said to be one to seven or eight. Mr. H. E. Jones, the gas engineer, considered that from ten to twelve would be most destructive, but Mr. R. Jones said that there would be nothing dangerous up to one in five, it would be dangerous at one in nine, and very dangerous at one in ten. Mr. Bramwell, who made experiments of every proportion, was of opinion, that about ten per cent is the maximum of explosiveness, bu. if it amounted to twenty per cent an explosion would no longer take place. When the gas becomes a fourth part of the air the possibility of explosion ceases. It will be seen from the foregoing that the weight of evidence is in favor of the opinion that the maximum admixture must be one in ten instead of one in eight.—*The Architect.*

ST. GEORGE'S CHAPEL, WINDSOR. — This Royal chapel at Windsor, which Edward IV began on the site of an older building, Henry VII continued, and many subsequent kings have contributed to adorn, is one of the finest existing specimens of the "perpendicular" English architecture. The walls are covered with a delicate panelling of Gothic work and the ribs of the columns grow over the roof in rich and effective tracery, adorned with the many-hued escutcheons of the Knights of the Garter who were installed here. In the vault beneath lie the cruel and splendid Edward IV and his Queen, Elizabeth Woodville; the hapless Henry VI, Henry VIII, and Lady Jane Seymour, by whose side he asked to be laid; Charles I, George III, and Queen Charlotte; George IV and his daughter, the Princess Charlotte; Queen Victoria's father, the Duke of Kent, and her uncle, the Duke of York; William IV and Queen Adelaide. The kings lie in crimson velvet coffins, all the others in purple velvet. The altar of the chapel is rich with splendid gold vessels, contributed by Knights of the Garter, though they cannot compare with those of which it was despoiled by the Parliament in 1643 when King Edward's surcoat of velvet, pearls, and gold was carried off. The choir is the most noteworthy part of the building. Here are the stalls of the Knights of the Garter, elaborately carved in black oak and covered by canopies of the richest tabernacle work supported by slender pillars. On the pedestal is represented the history of the Saviour, and on the front the legend of St. George, while on the outside of the upper seat is cut in old Saxon characters the Twentieth Psalm in Latin. On the canopies are placed the mantles, helmets, coats, and swords of the Knights Companions, and above them are hung their emblazoned banners. Of these the most notable after that of the ex-Emperor Napoleon III, and the newest, hangs just above the last stall on the right or sovereign side of the chapel. The motto is "*Forti nihil difficile*," while beneath is the inscription, "*Du tres noble et puissant Seigneur Benjamin, Comte de Beaconsfield, Vicomte Hughenden de Hughenden.*" Behind the chapel the cloisters and canon's houses; in front of it the curious, bright little houses of the Poor Knights. The canons are church dignitaries, however, nowadays, and the Poor Knights retired officers; and the Chapel of the Order of the Garter is the State Chapel of the Royal family, where all great ceremonials, marriages, and christenings take place. So it has been for nearly six centuries, and so it will be, according to all human probability, for centuries more. — *Philadelphia Telegraph.*

BUILDING INTELLIGENCE.

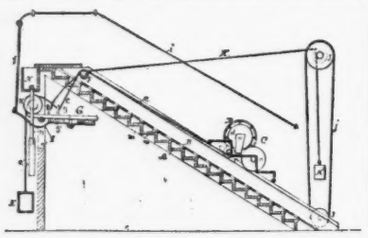
[Reported for The American Architect and Building News].

[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.]

227,459. Stairway-Elevator. — John I. Tay, Oakland, Cal. This invention can be applied to straight or winding stairs. At one side of the staircase is arranged a pair of rubber-covered rails, over which travels a car, composed of three steps supported upon two pairs of wheels, the lower pair being enough larger in diameter to keep the floor of the car level. The weight of the car is counterbalanced by the weight E, the lineal difference between the length of its hoist and the length of the run of the stairs being harmonized by carrying the rope *e'*, by which the weight E is suspended, around a smaller drum than the one around which the rope *e* attached to the car passes, both drums revolving on one and the same axis. The rope *e* attached to the car passes first over a friction-roller, F,



at the top of the stairs, then through an eye-bolt, *g*, in the weighted brake-block G, in such a manner that any strain on *e* raises G, and thus removing the pressure from the drum H, allows this to revolve; the rope *e* then passes over the large part of the drum H, as mentioned. The pressure of the brake G can be regulated by sliding the weights, so that the weight of a child on the car cannot affect the brake, while that of a grown person will start the car. The action of the brake can be controlled from the car by the agency of the cord *i*, which extends from top to bottom of the staircase, always within reach from the car. A person at the top of the staircase in need of the car can summon it by pushing down the rod I', which lifts the brake and allows the now unresisted counterbalance weight E to descend, and in so doing to draw up the car. If the car be at the top, and the would-be passenger at the bottom, it can be summoned by pulling upon the endless rope *j*, which winds up the rope K, and lifts the brake, allowing the car to descend by force of gravitation. Attached to the car on either side are large hand-wheels, by which, with the aid of properly adjusted friction-rollers, the car can be rolled either upstairs or down, in case brake or counterbalance should get out of order.

230,387. Automatic Elevator-Gate. — George Ackerman, Cincinnati, Ohio.

230,389. Fire-Place. — James Adair, Aleppo Township, Pittsburg P. O., Alleghany County, Penn.

230,390. The same.

230,396. Eaves-Trough. — L. S. Bonbrak, Waynesburg, Ohio.

230,400. Vise and Shears Combined. — Ephraim Brown, Lowell, Mass.

230,403. Combined Portable Wash-Stand and Bath-Tub. — Walter S. Carpenter, Wilkesbarre, Pa.

230,404. Machine for Holding up Ceiling-Paper. — Alfred Clemons, Buffalo, N. Y.

230,408. Sash-Cord Guide. — Douglas H. Duer, Baltimore, Md.

230,416. Curtain-Fixture. — Jas. Hinton, Leicester, England.

230,420. Combined Calipers and Scriber. — Manuel W. Kahle, Duke Centre, Penn.

230,421. Calipers and Centering Device. — Manuel W. Kahle, Duke Centre, Penn.

230,422. Door-Check. — Samuel D. Kelly, Somerville, Mass.

230,425. Shingler's Bracket. — Charles E. Langmaid, Stoneham, Mass.

230,434. Sash-Fastener. — John Payne, New Hamburg, Ontario, Canada.

230,440. Carpenter's Gauge-Tool. — Jeremiah Russell, Portland, Me.

230,453. Bath-Closet. — Charles De Voe Watkins, New York, N. Y.

230,459. Fire-Escape Ladder. — Frederick A. Baker, Brooklyn, N. Y.

230,476. Window-Sash Stop and Fastener. — John H. Green, Freeport, Ohio.

230,479. Terra-Cotta Kiln. — Alfred Hall, Perth Amboy, N. J.

230,483. Chimney-Cap. — Chauncey H. L'Amoureux, New York, N. Y.

230,491. Hinge. — Perry A. Peer, Comstock, Mich.

230,496. Blind-Fastener. — Charles L. Rainhart, Catskill, N. Y.

230,511. Window-Blind. — Johann W. R. Vogdt, Potsdam, Prussia, Germany.

230,514. Safety Governor for Elevator, etc. — Aretus A. Wilder, Detroit, Mich.

230,555. Fire-Escape. — Robert W. H. Kopp, Washington, D. C.

230,579. Sand-Trap. — James T. Sell, Cambridgeport, Mass.

230,589. Electric Gas-Lighting Apparatus. — Jacob P. Tirrell, Somerville, Mass.

230,590. Electric Gas-Lighting Apparatus. — Jacob Tirrell, Somerville, Mass.

230,595. Wrench. — George H. Warren, Tama City, Iowa.

9,318. Covering for Steam and Hot-Air Pipes. (Reissue). — Andrew B. Battelle, Bellaire, Ohio.

SUMMARY OF THE WEEK.

Baltimore.

Building Permits. — The following building permits have been issued since the last report: —

Geo. Small, 5 three-st'y brick buildings, cor. Fayette and Holliday Sts.

Isabelle Brown, 4 two-st'y brick buildings, Broadway, near Thames St.

Daniel Enn, five-st'y brick building, Granby St., east of Falls.

Marcus Leiblich, three-st'y brick building, on Eutaw St., between Madison and Biddle Sts.

Wm. Diven, 9 three-st'y brick buildings, Gilmor St., near Baker St.

Wm. Diven, 12 two-st'y brick buildings, Vincent St., near Baker St.

Mary Brown, three-st'y brick building, on Frederick Road, near city limits.

Factory Alteration. — Messrs. Wilson & Perry, manufacturers of straw goods, are making an extensive improvement and addition to the present factory, on Lexington St., near Liberty, to be four stories high, 22' 6" x 77', fronting on Liberty St.; cost, $10,000; Mr. John S. Hogg, contractor.

Chamber of Commerce. — The work of demolishing the old buildings on the site of the new Chamber of Commerce building is nearly completed, and as soon as completed, the erection of the new building will be commenced.

Monthly Report. — During the month of July, 157 permits have been issued for new buildings, making for the year, up to date, 980, against 880 for the same time last year.

Boston.

Building Permits. — *Brick.* — *Market St.*, near B. & A. R. R., for Boston & Albany Railroad, 1 banking institution, 32' x 42'; Geo. Wentworth, builder.

Wood. — *East Sixth St.*, near I St., for Moses Coleman & Son, 3 dwells., 18' x 32', two stories; Wm. F. Eaton, builder.

Enfield St., near Rockview St., for Maria H. Davis, 1 dwell., 36' x 48' 8", two stories; John D. Wester, builder.

Unnamed St., off Pleasant St., for Ezra H. Baker, 1 dwell., 33' x 35'; Edward McKechnie, builder.

Unnamed St., off Pleasant St., for Ezra H. Baker, 1 dwell., 19' x 48'; McNeil Bros., builders.

Mulberry Pl., near Dudley St., for Robert W. Williams, 1 dwell., 26' x 28'; Merritt & Valile, builders.

Brooklyn.

Building Permits. — *Livingston St.*, cor. Red Hook Lane, 1 four-st'y brick dwell., 21' x 42' x 6' 4" x 42'; cost, $2,500; owner and builder, H. D. Southard, 126 Livingston St.; architect, W. A. Southard.

Marcy Ave., No. 34, 1 three-st'y brick dwell., 20' x 40'; owner, Henry Ranken; architect and builder, C. L. Johnson.

McKibbin St., 1 three-st'y frame tenement, 25' x 56'; owner, Jacob Storz, 45 McKibbin St.; architect, Th. Engelhardt; builder, H. Loeffler.

Rutledge St., 1 two-st'y brick store and dwell., 19' x 20', and 1 two-st'y brick stable, 18' x 20', owner, Henry Borchen, on premises; architect, W. H. Gaylor; builder, R. B. Ferguson.

Hooper St., 2 three-st'y brown-stone dwells.; owner, Wm. Mathias; architect, W. H. Gaylor; builder, James Haughen.

Manhattan Ave., 1 three-st'y brick store and dwell., 25' x 50'; owner, Peter Meserole, 590 Lorimer St.; architect, Frederick Weber; builder, Stephen M. Randall.

Grand St., No. 118, 1 three-st'y brick store and dwell., 25' x 75' x 19' x 75'; owner, Henry W. Caddin, Jr., 66 South Second St.; architect, Garret Layton; mason, B. Mills; carpenters, John and Garret Layton.

Ewen St., No. 113, 1 three-st'y frame store and tenement, 24' 3" x 55'; owner, Ludwig Levy, on premises; architect, Th. Engelhardt; builders, U. Maurer & Son, and M. Metzen.

Kent Ave., Nos. 368 *and* 370, 1 one-st'y brick temperance hall, 50' x 99'; cost, $7,000; owner, Father Mathew, No. 7; architect, Thos. Handlon; builder, Robert Ford.

Woodbine St., 1 three-st'y frame dwell., 20' x 36' x 25' x 36'; cost, $2,850; owner, J. B. Wear, 75 Woodbine St.; builders, M. Ryon and Robert Wright.

Stuyvesant Ave., 3 two-st'y brown-stone dwells., 16' 8' x 42'; cost, $4,500 each; owner, James P. Miller, 289 Yates Ave.

Alterations. — *John St.*, 3 buildings; 1 raised two stories, and 1 one-story; also 3 three-st'y brick extensions; cost, $4,000; owners, S. V. & W. Scudder, 22 Cedar St., New York; architect, —— Dixon; builder, S. Rippengale.

Columbia Heights, Nos. 151 *and* 150, raised two stories; owner, E. R. Squilb; architect, H. Dudley; builders, P. Castner and Wm. Butler.

South Third St., No. 82, two-st'y brick extension, 22' x 11' 6"; owner, M. Rehbein; builders, Marinus & Gill.

Chicago.

Chance for Masons and Laborers. — The Master Masons' and Builders' Association invites bricklayers and laborers to Chicago, guaranteeing steady work and good pay.

Building Permits. — H. Franz, two-st'y brick dwell., 22' x 44', Superior St., cor. Lincoln; cost, $2,000.

Lambert Tree, three-st'y brick store and dwell., 20' x 71', Calhoun Pl.; cost, $4,500.

M. Novlich, two-st'y brick store and dwell., 25' x 68', 269 Blue Island Ave.; cost, $5,000.

George Chacksfield, two-st'y brick dwell., 22' x 39', 7 Peoria St.; cost, $3,000.

S. E. Weeden, two-st'y brick dwell., 22' x 52', Wisconsin St., near Franklin; cost, $5,000.

George S. Bullock, three-st'y brick store and dwell., 25' x 65', 181 Halsted St.; cost, $4,000.

C. Sheer, six-st'y brick malt-house, 52' x 125', 26 to 32 Larrabee St.; cost, $8,000.

E. Gale, 3 two-st'y brick dwells., 68' x 57', Green St., cor. Congress; cost, $8,000.

James Griffin, two-st'y brick dwell., 24' x 36', Twenty-Sixth St., near Emerald Ave.; cost, $2,700.

R. Brown, two-st'y brick dwell., 23' x 54', 116 South Hoyne St.; cost, $3,000.

St. Paul's Catholic church, brick basement, 25' x 101', Hoyne Ave., near Ambrose St.; cost not stated.

John Kronenberger, two-st'y brick store and dwell., 27' x 54', Halsted St., cor. Clay; cost, $3,600.

F. Novak, two-st'y brick dwell., 24' x 76', 568 Center Ave.; cost, $4,500.

Franz Braz, two-st'y brick dwell., 21' x 56', Nineteenth St., near Throop; cost, $2,400.

V. Fravonicik, two-st'y brick dwell., 25' x 52', May St., cor. Eighteenth; cost, $2,800.

Heide & Lotholz, 2 three-st'y brick dwells., 57½' x 56', 186 to 190 Indiana St; cost, $10,000.

Patrick Ryan, three-st'y brick store and dwell., 25' x 80', 3501 State St.; cost, $8,000.

John Kiman, three-st'y brick dwell., 50' x 60', 328 Franklin St.; cost, $9,000.

S. Peterson, 2 two-st'y brick dwells., 45' x 36', 51 and 53 Erie St.; cost, $2,800.

New York.

Building Permits. — *Grand Boulevard*, cor. One Hundred and Eighth St., 1 two-st'y brick store and dwell., 25' 7" x 72' 3"; cost, $16,000; owner, Austin Hall, 24 East Sixtieth St.; architects, Thom & Wilson; mason, Samuel Lowden.

One Hundred and Twenty-Sixth St., 2 three-st'y and attic brick dwells., 20' x 40'; cost, each, $4,250; agent, H. Bastide, One Hundred and Twenty-Sixth St., near Eighth Ave.; architects, D. & J. Jardine; mason, Isaac A. Hopper; carpenters, Haden & Winans.

Madison Ave., 1 three-st'y brick (brown-stone front) dwell., 23' 7" x 50'; cost, $15,000; owner and builder, Isaac E. Wright, 158 East One Hundred and Twenty-Eighth St.; architect, J. H. Valentine.

Fifty-Seventh St., cor. Ninth Ave., 1 seven-st'y brick apartment-house (with stores on first floor) 50' x 115'; cost, $115,000; owner, Wm. E. Stewart; architect, Theo. Geo. Smith.

Fifty-Seventh St., 1 seven-st'y brick apartment-house, 20' x 65'; cost, $20,000; same owner and architect as last.

Fifty-Seventh St., 1 seven-st'y brick apartment-house, 30' x 91'; cost, $48,000; same owner and architect as last.

Eighty-Third St., 1 five-st'y brick (brown-stone front) apartment-house, 31' x 88' 2"; cost, $20,000; owner, C. Kruse; architect, Wm. Kuhles.

West Forty-Fifth St., No. 625, 1 two-st'y brick valve and boiler-house, 26' 8" x 41' 8"; cost, $4,000; owner, Municipal Gas Light Co., foot of West Forty-Fourth St.; builders, Moran & Armstrong.

Division St., No. 82, 1 five-st'y brick tenement and store; cost, $9,000; owner, H. Wilson, 173 Thompson St.; architect, Frederick Jenth.

Division St., No. 84, 1 five-st'y brick tenement and store; cost, $7,000; same owner and architect as last.

One Hundred and Eighty-Eighth St., 1 three-st'y brick building, 42' x 98' (Institute for Deaf Mutes); cost, $28,000; owners, St. Joseph's Institute for Deaf Mutes, Fordham; architect, L. J. O'Connor; carpenter, John Kirby.

Little Twelfth St., 1 three-st'y brick storage-house, 40' x 51' 8"; cost, $5,000; owner, C. D. Shute, No. 35 Ninth Ave.; architect, C. F. Ridder, Jr.; builders, Steele & Costigan.

One Hundred and Thirty-Fourth St., 1 two-st'y frame dwell., 20' x 40'; cost, $3,000; owner, John Dixon, 64 Carmine St.; builder, Jno. Knox.

West Fifty-Sixth St., No. 371, 1 five-st'y brick (brown-stone front) apartment-house, 25' x 81' 6"; cost, $26,000; owner, C. W. Doherty, 211 West Forty-Sixth St.; architect, James Stroud; mason, Samuel Lowden; builder, Jethro Washburn.

Alterations. — *West Forty-Second St., No.* 329, an additional story; cost, $3,500; owner, Rev. Charles McCready; builder, James E. Callahan.

Sixth Ave., cor. Forty-Eighth St., new store front; cost, $2,500; owner, John Slater; architect, James Stroud; builders, James Hamel & Son.

West Fifty-Eighth St., No. 26, two-st'y brick extension; cost, $5,000; owner, Mr. Chaffe; architect, B. Muldoon; builder, B. McKinney.

First Ave., No. 458, two additional stories; cost, $3,000; owner, Carl H. Schultz; masons, Jackson & Johnston.

Third Ave., cor. Seventieth St., four-st'y brick extension, 20' x 20'; cost, $4,000; owner, J. L. Macauley; builder, M. Delmage.

Mulberry St., Nos. 136 *and* 136½, a six-st'y brick extension, 25' x 80'; cost, $9,000; owner, Gustave L. Yaeger; architect, Wm. Graul; builder, Richard Deeves.

Seventh Ave., cor. Fifty-Fourth St., one-st'y brick chapel and Sunday-school, new roof to be put on, front wall rebuilt, and internal alteration; cost, $7,000; owner, Collegiate Dutch Church; architect, W. Wheeler Smith; mason, James T. Stevenson; carpenter, Abraham Hopkins.

Union Sq., cor. Fifteenth St., internal alterations; cost, $3,000; owner, Bank of the Metropolis; architect, W. Wheeler Smith; masons, Andruss & Bro.; carpenters, J. C. Hoe & Co.

Broadway, Nos. 549 *and* 551, a passenger elevator to be constructed from first to top floor; cost, $5,000; owner, W. H. Sibley; carpenter, James Garland.

Sixth Ave., Nos. 604 *and* 606, three-st'y brick extension, 30' 2" x 25'; cost, $3,600; owner, Mrs. Berls; architect, Anthony Pfund.

The Building Department. — Our list of projected buildings this week is curtailed, from the fact of the Bureau of Building having been transferred to the Fire Department. The papers of the late Depart-

ment were handed over to the Fire Commissioners on the 31st ult., and the employees discharged. Mr. Wm. P. Esterbrook was to have taken charge of the Department on Monday, but failed to do so, as he did not feel disposed to accept the position. At the solicitation of his friends he reconsidered his determination, and on Tuesday accepted the position, and immediately, in conjunction with the Fire Commissioners, commenced the work of organization and work of the Department. We understand that the delay in allowing permits will only be of few days' duration, and that it is expected that everything will be in working order by the first of next week.

STORE. — The A. T. Stewart Estate will build, on Broadway, opposite Waverley Place, on the site of the old church, which for several years has been used as a theatre, a first-class store, from designs of Mr. Harris, architect, who has also prepared designs for an Episcopal residence, in connection with the cathedral at Garden City.

DWELLINGS. — Messrs. D. & J. Jardine have drawn plans for seven brown-stone front residences, to be built on Sixty-Fourth St.

BUILDING MATERIALS. — Prices show no material change since our last. The brick market, however, has reached a figure not compensating for manufacture, and there is a strong probability that, by September 1, manufacturers will either stop production or get better prices. In addition to this, the boatmen are prepared to organize, to demand higher freights; so that the present low figures are not likely to prevail.

Philadelphia.

FACTORY. — Colladay & Co. are to build a silk factory on the site of the old Variety Theatre, on Seventh St.

SUNDAY-SCHOOL BUILDING. — The corner-stone for a branch Sunday-school building was laid July 25, under the auspices of the German Reformed Salem congregation, on Ireland st. The building will be 32′ x 55′, two stories in height, and will cost about $4,000.

Providence, R. I.

SCHOOL-HOUSE. — The city of Providence is now building a new school-house on Peace St., from plans drawn by Walter J. Paine, architect. The contract is taken by James Russell, at $6,500.

STABLE. — Mr. Frank Carpenter is building a stable on Congdon St.; work is being done by the day, by Messrs. Carpenter & Childs.

ALTERATIONS. — Mr. D. G. Martin is making extensive alterations to his house, corner of Knight St. and Broadway, from plans by Messrs. Stone and Carpenter.

St. Louis.

BUILDING PERMITS. — Forty-three permits have been issued since our last report, of which five are for frame structures of slight importance. Of the rest, those worth $2,500 or over are as follows: —

OWNERS NAME.	USE.	STR'S	R'MS.	COST.
Jno. Loudermann,	Stores & R'ms.	3	—	$7,000
Wm. Mulhall,	Dwell.	2	14	7,000
L. Varana,	Dwell.	2	10	3,000
A. Harig,	Dwell.	2	9	4,000
A. Harig,	Dwell.	2	9	4,000
C. Schornbach,	Dwell.	2	12	3,500
Great Western Glass W'ks,	Glass Works	—	—	3,000
E. Sanders,	Soda Factory	2	4	3,900
P. Loire,	Dwell.	2	6	3,000
Mrs. F. Degenhart,	Dwell.	2	12	5,400
E. J. Stamen,	Dwell.	2	6	3,600
St. Louis Gas Co.,	Office	—	—	6,000
Washington University,	Gymnasium	1	2	5,000

SCARCITY of MECHANICS. — There is now, as there has been most of the season, a great scarcity of skilled labor in the building trades. One contractor kept a standing advertisement in three city papers at one time, for ten carpenters, without success. Brick-layers, plasterers and painters complain, also, of lack of skilled labor.

General Notes.

ATLANTA, GA. — The contract for work on the new court-house has been let at $86,500; Messrs. Parkins & Bruce, architects.

BROCKTON, MASS. — At the corner of Main and Ward Sts. a large brick and iron building, 73′ 8″ x 230′, is to be built. The portion under contract, 73′ x 110′, is three stories high, to be arranged for stores in the first story, offices in the second, and Masonic halls, etc. in the third story. The Main St. front will be iron. The rear building, fronting on Ward St., and separated from the front building by a brick wall, will contain a theatre seating 1,500 persons. The proscenium arch will be 36 ft. wide. The estimated cost of both buildings is $80,000. Mr. Daniel S. Howard and others are the owners, and Mr. John A. Fox, of Boston, the architect.

BROOKVILLE, IND. — Dr. E. H. Sabin, whose sanitarium, at Charlestown, Ind., was recently burned, has been here, looking for a location to erect a new sanitarium.

BRECKENRIDGE, COL. — A bank-building is being built by W. W. Goodrich, Denver, Col.; cost, $5,000; also, six houses, cost, $4,000.

BRIDGEFORD, CONN. — Wheeler Beers is putting up a double brick house, 40′ x 45′; cost, 6,500; J. D. Brown, architect; J. Rutherford, builder.

The chairman of the School Board, J. S. Hanover, Esq., will receive bids until August 2, for mason, carpenter, plumbing and heating work for new High School, 125 feet square, three stories and basement.

BRISTOL, CONN. — Miles S. Peck is building a frame house, by the day, costing $7,000; R. W. Hill, of Waterbury, architect.

CAMBRIDGE, MASS. — The additions to the Museum of Comparative Zoology, building from plans of G. R. & R. G. Shaw, architects, of Boston, are nearly completed, and will cost from $40,000 to $50,000. Messrs. Rumery and Maxwell, masons; David Perkins, carpenter. The additions measure 80′ x 110′.

CANTON, OHIO. — The Union Station for the Connotton Valley and Connotton Northern Railroads is to be built from plans of W. Whitney Lewis, architect, of Boston. It is to be a brick building, 40′ x 200′, and will cost about $25,000.

DENVER, COL. — Mr. W. W. Goodrich, architect, has the following work on hand: for Geo. J. Washburn, a brick house, cost, $20,000, and a stone house, cost, $30,000; for R. E. Washburn, a house, cost, $3,000; for E. T. Varian, a house, cost, $2,500; for A. Goodrich, a house, cost, $4,000; for R. E. Foote, a house, cost, $6,000; for G. E. Snider, a house, cost, $6,000; for E. R. Cowan, a house, cost, $9,000; also a chapel for the United Brethren, cost, $5,000.

Messrs. Edbrooke & Burnham, architects, of Chicago, are building the grand hotel and opera-house for Lieut.-Gov. H. A. W. Tabor; cost, $200,000.

Emmet Anthony, architect, has completed plans for a three-story store, for Clarence J. Clark; the front of brick, finish of iron and white sandstone; cost, $25,000; contract awarded to Robert L. James.

A three-st'y store is being built for Leonard Alkire; front in ornamental brickwork, red and black bricks; cost, $23,000; contract awarded to Kelly & Fisher.

A dwelling-house is being built for Dr. Whitehead; cost, $5,000.

DETROIT, MICH. — Mr. A. C. Varney has the following work in hand: two-story brick house for F. Rollshoven, on Congress St., cost, $5,000; two-story brick house for C. W. Tineball, on Lafayette Ave., cost, $7,500; two-story brick house for Dr. Merwin, cor. Alexandrine Ave. and Second St., cost, with barn, $9,000; cottage for F. D. Vorlee, cost, $3,300; two stores, 40′ x 50′, for Mr. Bressler, cost, $4,000.

The Society of the Westminster Presbyterian church has adopted the plans of Messrs. Lloyd & Pearce. The building, which will seat 864 persons, will cost about $30,000.

DES MOINES, IO. — B. J. Bartlett, architect, is preparing plans for Mr. Elsworth's residence on Twelfth St., to cost $3,000; constructed of frame — "Queen Anne" — style.

W. L. Mott is building a frame grain-house on Ninth St., 22′ x 80′; cost, $1,200.

Plans for the "Callanan Female Seminary" are out; Wm. Hackney, architect; to cost $12,000.

The Ninth St. Methodist Society, of Des Moines, contemplates building a church, to cost about $35,000.

FITCHBURG, MASS. — Mr. Wm. H. Vose is building a frame residence on Main St., in Queen Anne style, 71′ x 33′; cost, $6,000.

Mr. Seth Lowe is building a frame house, costing $4,000.

Mr. I. C. Wright is building a frame tenement-house, costing $4,000; Henry M. Francis, architect.

GROVE HALL, BOSTON, MASS. — A house and stable are being built for Mr. Conant. Plans by Mr. H. W. Hartwell, architect, of Boston; cost, about $10,000.

GOSHEN, IND. — Houses are now building for W. A. McAllister, corner of Sixth and Market Sts., and for C. C. Latta, corner of Seventh and Washington Sts.

GREELEY, COL. — W. W. Goodrich, Denver, Col., is building a store; cost, $4,000.

HAVERHILL, MASS. — Mr. Hazen M. Chase is building a first-class dwelling-house, for his own residence, on Mt. Washington, one of our western wards; cost, $7,000; Mr. Geo. M. Harding, of Boston, is the architect.

HOMEWOOD, PA. — Mr. A. Peebles, of Pittsburgh, Pa., is the architect of a house for Geo. Westinghouse.

HARRISONVILLE, R. I. — Mr. Wm. Tinkham is building a cottage, from plans furnished by Messrs. Walker & Gould, of Providence; work is being done by the day, by Mr. E. F. Keech, of this place.

LANCASTER, MASS. — Plans by Cabot & Chandler, architects, of Boston, have been accepted for a memorial chapel to be added to the Unitarian church; cost, about $10,000.

MONTROSE, PENN. — A. T. Cope, Esq, of Philadelphia, has under way a cottage on his farm for the manager, and will shortly commence putting up a summer residence for himself. Plans for both are prepared by Palisser, Palisser & Co., architects.

MOOSUP, CONN. — Messrs. Hill & Andrews are building a stone mill, 40′ x 87′; cost $20,000; E. M. Andrews, of this place, architect and builder.

NAUGATUCK, CT. — R. M. Smith is building a frame house, costing $4,000, on Hillside Ave.

Mr. Oscar Warner is building a frame cottage on the same street; costing $2,500.

The Tuttle & Whittemore Co. is building an office, 50′ x 50′, of brick.

Thos. Gerrety is building a frame house, costing $3,000.

R. W. Hill, architect for the above.

NORTH ATTLEBORO, MASS. — Mr. H. F. Barrows is having a small gardener's cottage built near his residence, from plans by Walker & Gould, of Providence, R. I.; carpenter's work, Messrs. Jones & Brodie.

Messrs. Walker & Gould, of Providence, are the architects of the new building now being erected for Mr. H. N. Daggett, at Falls Village; Mr. Lucius Dean does the work, by the day.

OTTAWA, O. — The La Salle County Board of Supervisors has elected a committee of nine to investigate the matter of building a new court-house at this place.

PITTSBURGH, PA. — A. Peebles, architect, has in hand the following work: —

Store, for Mr. J. Horne, on Wood St., 54′ x 130′, five stories.

Store, for Mr. C. H. Riggs, Market St., 15′ x 80′, fronting on two streets, three stories.

Law chambers, for Hay & Guthrie, on Diamond St., 30′ x 120′, three stories, finished basement.

House, for John R. McEwen, on Fifth Ave. extension, two stories and French roof.

House, for Chas. Arbuthnot, two stories and attic, containing fifteen rooms.

RIVER FALLS, WIS. — The new public school-house is building, from designs of Edbrooke & Burnham, architects, Chicago, Ill.; cost, $12,000.

SEWICKLEY, PA. — Mr. A. Peebles, of Pittsburgh, Pa., is the architect of the M. E. church and chapel; cost, $30,000.

ROCKFORD, ILL. — Rockford capitalists are talking up schemes for building an opera-house.

SYRACUSE, N. Y. — The corner-stone of the Onondaga County Clerk's office will be laid, with Masonic ceremonies, August 11.

SHARON, CONN. — Mr. Charles E. Cassell, architect, Baltimore Md., has just completed, for a New York gentleman, a set of drawings for a country house near Sharon, Litchfield County, Conn. The design is similar to that of a French or Belgian chateau. The exterior is to be of white marble, and the interior finished in oak. It will cost $30,000.

TOLEDO, O. — A block of seven stores is to be built for V. H. Ketcham, Esq., by Mr. N. B. Bacon, architect; cost, $20,000.

WATERBURY, CT. — Dr. E. W. McDonald is building a brick residence, with brown-stone finish, on East Main St., costing $7,000; P. W. Hill, of this place, architect.

John Ryan is building a frame dwelling on North Main St., costing $6,000, from plans by R. W. Hill.

H. C. Griggs is remodelling his brick residence, at an expense of $3,000.

WESTON, MASS. — A large building, comprising stables, coachman's house, boiler-house, gymnasium, bowling-alleys, etc., is building for Francis Blake, Esq. The building is about 100 ft. square, with court-yard, and will cost $20,000; Messrs. Cabot & Chandler, of Boston, are the architects.

WOODBURY, CONN. — Walter S. Curtis is building a frame house, costing $10,000, from plans by R. W. Hill, Waterbury, Ct.

WORCESTER, MASS. — Mr. J. B. Woodworth is building a brick and stone house for E. H. Stark, on Oread St.; cost, $15,000.

WALTHAM, MASS. — The corner-stone of the new Universalist church was laid July 16. The church will, it is expected, cost about $10,000, and will probably be ready for occupancy about September 15.

Industrial.

BROOKLYN, N. Y. — Buchanan & Lyall are building a large brick mill on Carroll St., being an extension of their Planet Mills.

Fowler, Crampton & Co. are rebuilding their extensive linseed oil factory on Furman St., which was destroyed by fire about a year ago.

CHESTER, PENN. — The building which was occupied by Daniel Lee as a cotton mill, and which was burned February 19, 1878, is to be replaced by a stone building, 104′ x 58′, two stories high, to be built of stone, with brick finish, by Messrs. S. N. Baldwin & Samuel Pugh, builders, from drawings (with alterations) prepared by Messrs. Robt. Wetherill & Co., architects, to be used by Daniel Lees & Co., as a woollen and cotton mill; also a brick and stone building, about 47′ x 47′, containing a boiler-room, picker-room, dye-house, etc.

HOLYOKE, MASS. — The Holyoke Water Power Company is arranging for three large buildings, to be occupied permanently by additions to the present interest.

L. P. Bosworth, Holyoke, has 425 men at work for him, making brick, building, quarrying stone, etc. He has contracted to build the Holyoke Water Power Company's new mills, and will begin them as soon as he can accumulate brick enough

HUNTSVILLE, ALA. — An ice factory is being built here.

JACKSONVILLE, FLA. — A cotton factory, to cost about $350,000, is projected. The location has been chosen and the capitalists interested are at the North, selecting machinery and making preliminary arrangements to begin work.

PROVIDENCE, R. I. — Mr. Thos. Cosgrove is about to build a brick building on Page St., to be used for manufacturing purposes.

A four-st'y brick and stone building, to be used for manufacturing purposes, is now in process of erection on Point and Eddy Sts., from plans by James C. Bucklin & Son, architect; Nathan B. Horton does the masons' work, and Messrs. French, Mackenzie & Co. have the contract for the carpenter work.

PAWTUCKET, R. I. — F. H. Richmond & Co. are about to make an addition to their paper-mill; mason, N. D. Horton; carpenters, French, Mackenzie & Co.; architects, Walker & Gould, of Providence, R. I.

SHELTON, CONN. — Wilkinson Bros. & Co. are building a pulp-mill, 225′ x 60′, three stories, of brick.

WOODHAVEN, L. I. — Lalance & Grosjean Manufacturing Company are building an important addition to their large manufacturing establishment at Woodhaven, near Brooklyn.

WATERBURY, CONN. — White & Wells are building a paper box factory, of brick, four stories, 50′ x 70′; cost, $9,000; R. W. Hill, architect.

The Farrell Foundry & Machine Co. are making an addition to their brick foundry, costing $2,000.

Carrington & Co. are building a frame factory, 31′ x 80′, and a wing, 26′ x 50′, two stories high; Albert M. West, of this place, architect.

Bids and Contracts.

DES MOINES, IO. — New Methodist Church contracts were let as follows: brick and stone work to Mr. S. A. Robertson, carpenter work to F. S. Whiting. Total cost, $29,000, Wm. Forster's plans being the basis of contract.

GARRETTSVILLE, O. — Bids were opened, July 16, for building a new Primary school-house here. The contract was awarded to Captain P. B. Carpenter, of Conneautville, Pa., at $5,239.

HOLYOKE, MASS. — The Sutherland Falls Marble Company, of Vermont, have the contract for building marble for Wm. Ruddy's block.

NEW YORK, N. Y. — The Clayton Steam-Pump and Air Compressor Works have obtained the contract for the balance of Air Compressors required by the Hudson River Tunnel Company.

SOUTH BEACH, STATEN ISLAND, N. Y. — A New York builder, named Donnelly, has been awarded the contract for the building of Mr. Ackerwitch's house, which will cost $56,000.

TORONTO, CAN. — The contract for the stone-work on the new Canada Life Building, to be erected on the corner of James and King Sts., has been awarded to Messrs. Brown & Love, of Toronto. The building will measure 50′ x 150′, and will be four stories high.

Publishers' Department.

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PREPARED PAINTS.

We desire to especially call the attention of architects and builders to the paints manufactured by Messrs. Wadsworth, Martinez and Longman, 207 Pearl Street, New York. They have issued the following circular:

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207 PEARL STREET, N. Y.

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We sell our Paints with this understanding, viz.:

Any building that is not satisfactory when painted with our Prepared Paints, we will repaint at our expense with such White Lead or other Paints as the property owner may select.

This agreement will be promptly fulfilled upon notice from the Dealer that our Paints have not given satisfaction. Very respectfully,

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This speaks for itself, and we advise parties desiring paint for either interior or exterior work, to send for their price-lists and circulars, with testimonials, etc.

WHAT A HOUSE-PAINTER SAYS OF THE AMERICAN ARCHITECT.

A book notice in one of these numbers saves me the price of a nearly worthless book. So much for honest journalism, which certainly ought to include truthful criticism. When I began to read the *American Architect,* I was not at all sure that it had any merely utilitarian value to a village house-painter; but I can already justify its expense to my wife, who (bless her temporally and eternally) long ago, for her children's sake, renounced everything that, costing anything, is merely beautiful.

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Showing the condition of the Company on the First day of
JULY, 1880.

CASH CAPITAL, ...	$3,000,000.00
Reserve for Re-Insurance,	1,856,954.00
Reserve for Unpaid Losses,	166,391.83
Net Surplus, ...	1,366,888.06
CASH ASSETS, . .	$6,390,233.89

SUMMARY OF ASSETS
Held in the United States available for the PAYMENT of LOSSES by FIRE and for the protection of Policy Holders of FIRE INSURANCE:

Cash in Banks, ...	$ 329,682.45
Bonds and Mortgages, being first lien on real estate (worth $4,144,950)	1,852,928.00
United States Stocks (market value)	2,724,500.00
Bank Stocks and Railroad Stocks (market value)	339,576.25
State and Municipal Bonds (market value)	191,350.00
Loans on Stocks, payable on demand (market value $806,896.49) .	652,250.00
Interest due on July 1st, 1880, .	83,310.47
Balance in hands of Agents, . .	142,103.68
Real Estate, ...	66,103.16
Premiums due and uncollected on Policies issued at this office,	8,429.88
Total, ...	$6,390,233.89

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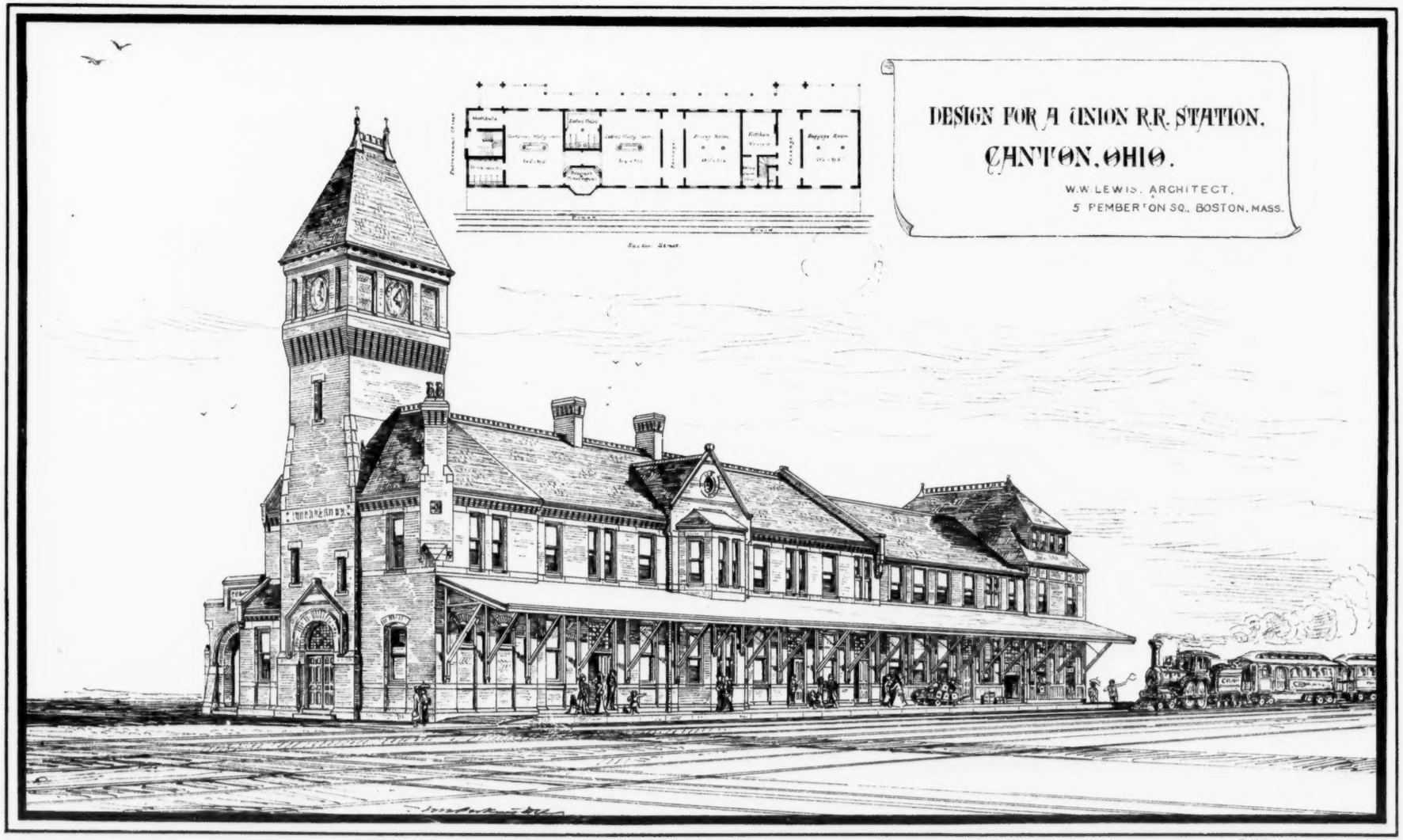

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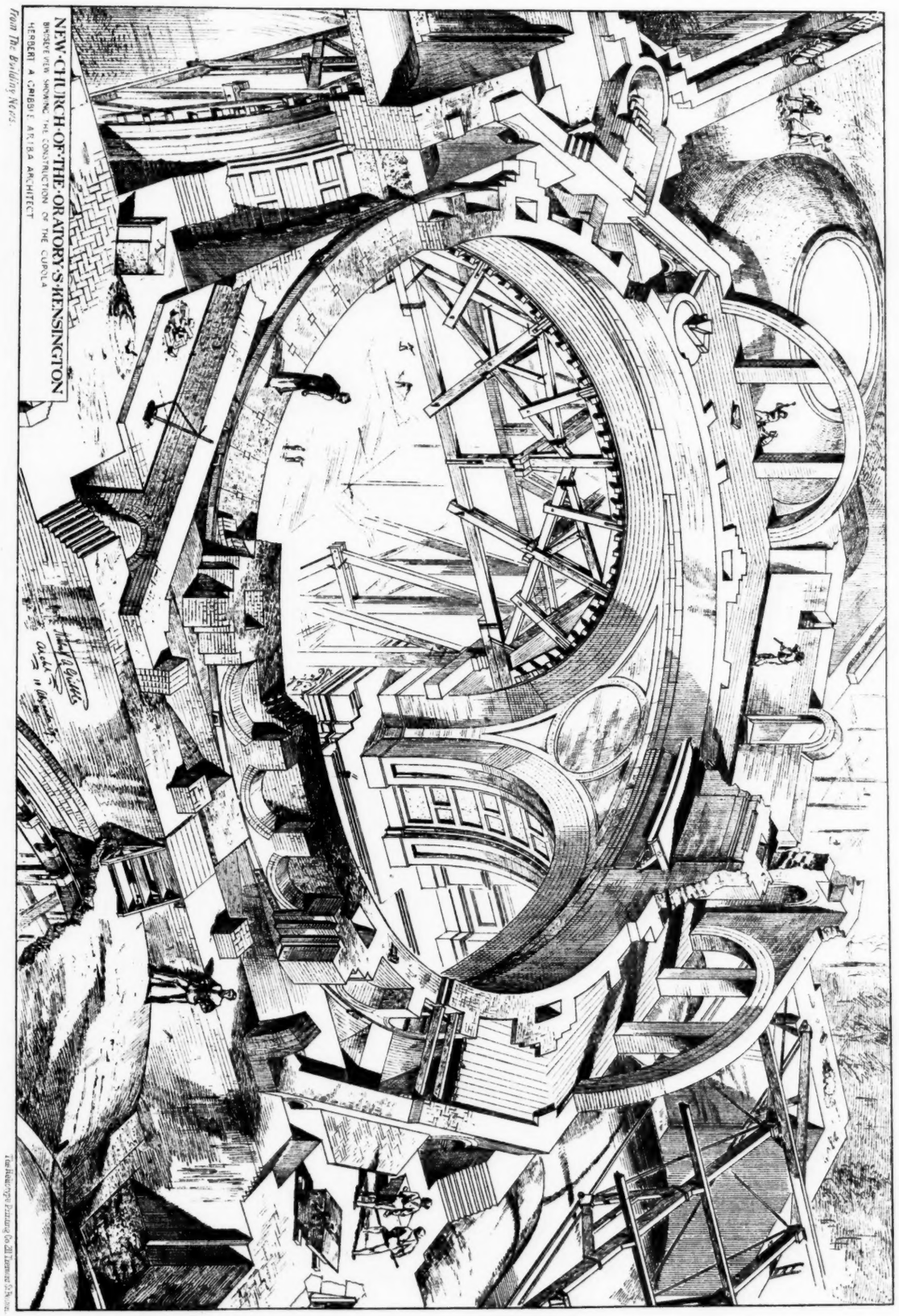
INTERIOR VIEW SHOWING THE CONSTRUCTION OF THE CUPOLA

HERBERT A GIBBS F.R.I.B.A. ARCHITECT

From The Building News.



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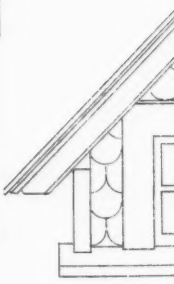
Side Elevation.

Ground Plan.

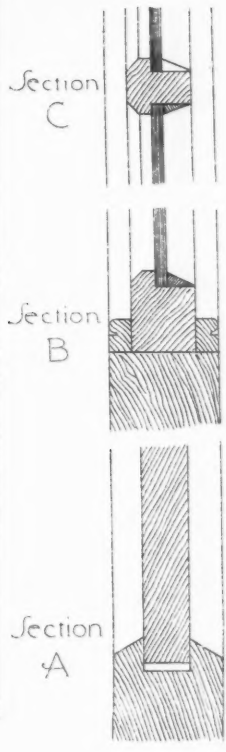
Fi

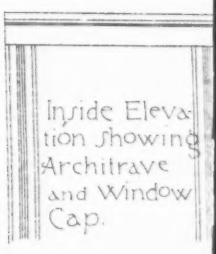
Detail
South

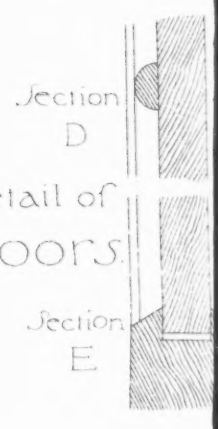


Perspective View.

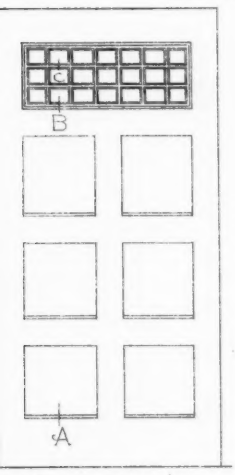
D'A GRECO. DEL.



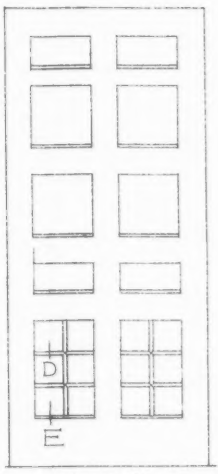




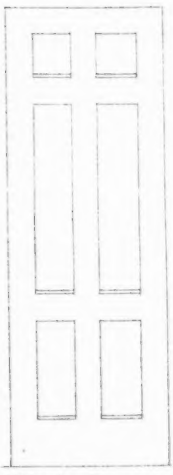
Outside Doors.



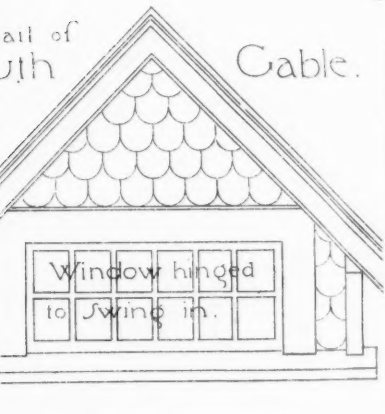
Front Door.



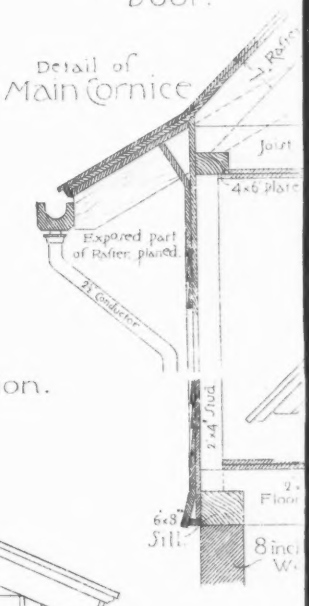
Living Room. Door.

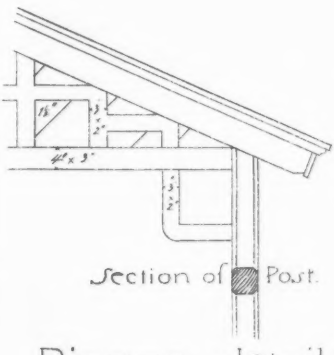


Wash Room. Door.

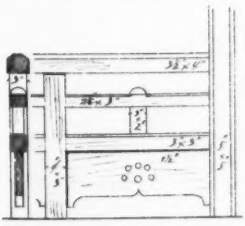


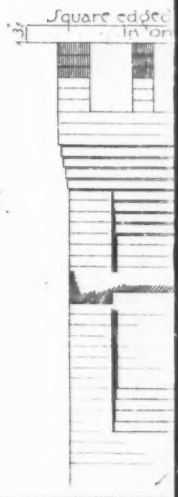
Section.





Piazza details.





House at A

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Section C

Section B

Section A

Inside Elevation showing Architrave and Window Cap.

Section D

Detail of Doors.

Section E

Section of Window Cap.

Lath & Plaster

Under-boarding

Clapboards.

Architrave.

Detail of Window Frame.

Casing.

Front Elevation.

Doors.

Wash Room. Door.

Detail of Main Cornice.

Rafter.

Joist. 2"x8"

4"x6" Plate.

Exposed part of Rafter, planed.

3" Conductor

Section.

Window behind framing. (hinged.)

Detail of East Gable.

Elevation of Stairs.

2"x4" Stud.

2"x10" Floor Joists.

6"x8" Sill.

8 inch Brick Wall

Square edged Blue Stone Cap in one piece.

Lower Shingles. 2d Story.

Shingles under Eaves.

Section of Post.

Piazza details.

Detail of Chimney Top.

Detail of Cresting

Plan.

Two of A, a
B, to each
where shown
below.)

B

Round.

Balu

SCAL

1 2

For Larger D

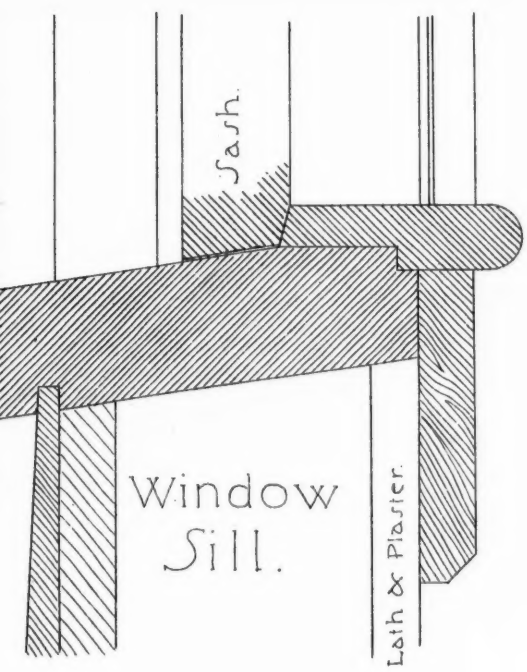
1 2

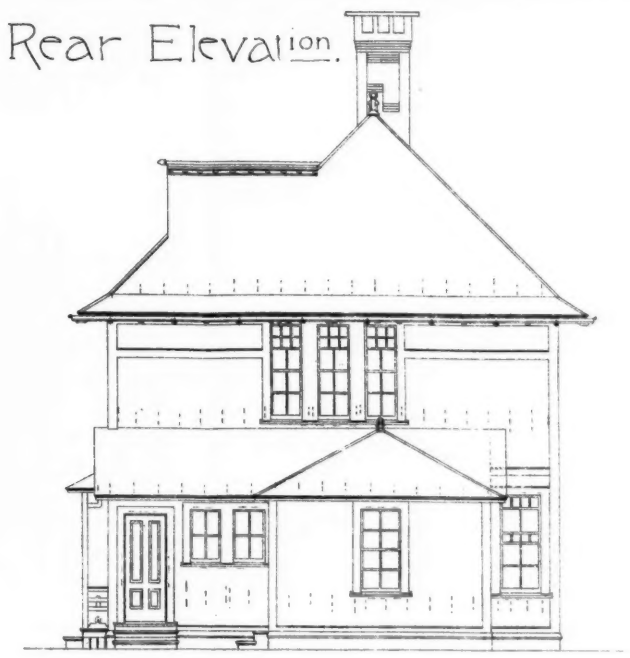
For Smaller

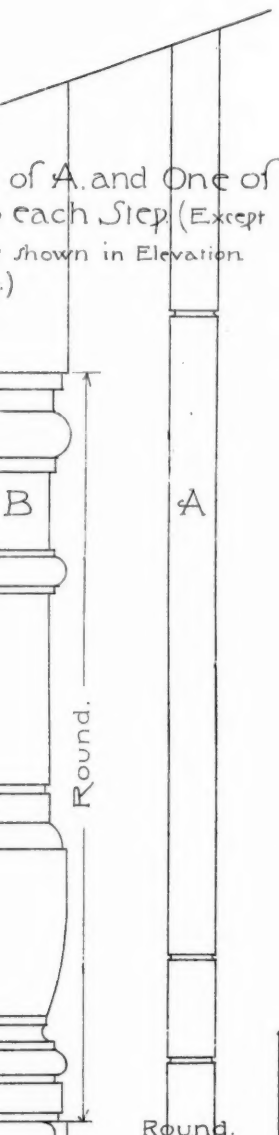
5 1

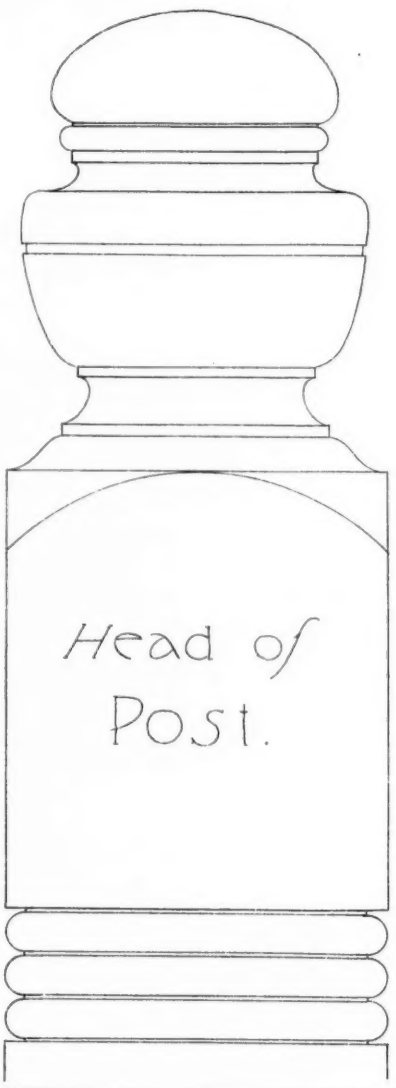
For Plans & El

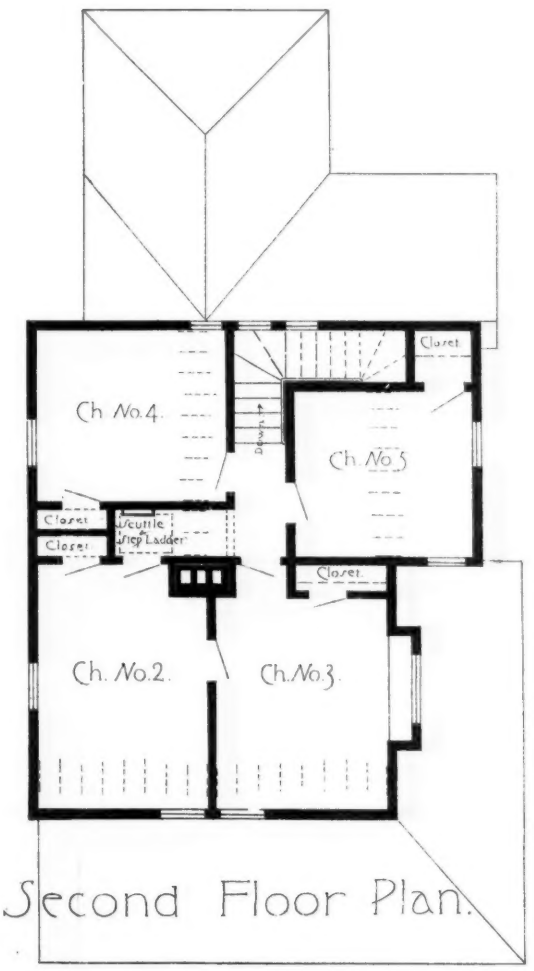
House at Manchester. N.H. ✳ Mr. John A. Fox.
BOSTON.











SCALE
2 3 4 inches.
Larger Details.
2 3 4 Feet.
Smaller Details.
5 10 15 Feet.
ns & Elevations.

FOX, Arch't.
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