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CONTENTS.

THE last report of the Indiana State-House Commissioners, lately received, gives an account of the progress of work on their building to the end of 1879. The commissioners complain that the slow delivery of material, presumably stone, has considerably retarded the work, inasmuch as "it seemed impossible for those furnishing materials to comprehend the necessity for greater exertion," a complaint that is not unfamiliar to the supervisors of public buildings. They add a statement which, without further explanation, is of a kind to excite the envy of other builders, that by adding twenty inches to the height of the basement they have been able to slightly diminish the cost of the building. The whole expenditure to the end of the year has been $182,577, of which nearly one hundred and fifty thousand is for construction, and the rest for salaries and other expenses. The report of the superintendent, submitted with that of the commissioners, seems to indicate an intention to do the work with special care and thoroughness. The architect, by the way, seems to be quite lost sight of; his name not appearing once in the document, and his existence being acknowledged only by the entry of a trifling payment to him among the expenses. The concrete for all the foundations and the stone footings for everything except the dome are in place, according to the superintendent, and the foundation walls carried up to some five feet above the footings. In this work about fifty-four hundred cubic yards of concrete and a hundred and sixty thousand cubic feet of stone have been used.

THE most generally useful part of the report is the tabular statement of experiments tried on the strength of the cements offered for use in the building records, of which we can hardly have too many, provided the experiments are carefully and judiciously made, and which show a commendable desire to know what materials the commissioners are using. The cement used for the stone-work — an Indiana cement, Anchor brand — was tested constantly as it was received, twelve samples being tested from each car, and the average of that accepted being never below fifty pounds per square inch of tensile strength twenty-four hours after mixing. For use in the brick-work tests were made of five brands of slow-setting cements, — the Hudson River Rosendale, Anchor brand, Milwaukee, Arrow brand Rosendale from Buffalo, and Cumberland from Baltimore. The tests show the great irregularity and consequent uncertainty above a moderate limit of strength in the cements used. Thus, the quick-setting cement used in the foundations varies capriciously between fifty and one hundred pounds per inch of tensile strength in the record of some hundreds of experiments, without a preponderance that can be noticed anywhere in the scale. The tables for slow-setting cements record tests of thirty-five samples of each brand, tested for tenacity at intervals of one, two, and three days, and one, two, and three weeks; and for compression, at intervals of one, two, three, and four months. The Rosendale and Milwaukee brands seem to have been least successful under the experiments, and the Cumberland to have come off best.

THE average tensile strength after one week proved, in the order in which we have mentioned them, 107, 141, 87, 76, and 143 pounds per square inch; after two weeks, 122, 172, 119, 150, and 165 pounds; after four weeks, 148, 190, 136, 132, — no samples of the Cumberland cement being tested after two weeks, owing possibly to a deficient supply. The average resistances to crushing, in the same order, were at one month 684, 783, 545, 531, and 1,108 pounds; at two months, 711, 914, 501, 608, and 1,014 pounds; and at four months, 837, 974, 000, 631, and 1,145, the Milwaukee cement not being tested after two months. The cements which gave the lowest averages appeared also the most irregular, in the Rosendale brands varying capriciously from less than six hundred to over twelve hundred pounds in crushing strength, and the Milwaukee showed a nearly equal variation. The stronger cements were the quicker to set, the Cumberland and Anchor brands hardening in eleven and twenty-nine minutes, while the others took upwards of an hour. The experiments on the mortar and brick used did not show themselves so reassuring, we should say. Samples of mortar taken from the building after from two to four months' standing gave a minimum resistance to crushing of 160 pounds per inch, which is not a high strength; while the minimum strength of the bricks accepted is 45,000 per square foot (312½ per square inch), which is about a third that of really good bricks. We may hope such material will be used more cautiously than has been the case in some buildings of which we have heard lately. The uncertainty of tests, except when error is eliminated by a large number of observations, is shown by the record of the Arrow-brand cement, where the experiments indicate a diminishing tenacity in the samples broken after the second week, — a curious result, which must probably be ascribed to the accident of reserving weaker pieces for the later tests.

THE biennial report of the Capitol Commissioners of Iowa tells us that during the two years that have passed since the issue of the last report the walls and pavilions have been finished on the outside, and the whole building been put under roof, excepting the central dome, which is finished up to the top of its stylobate. This state-house, designed, like the Illinois capitol, by the late Mr. Piquenard, has been the object of peculiar care to the legislature of Iowa; which has appropriated a fixed sum out of each year's taxes, and so made clean work financially, as the building has gone on, although the progress has not been rapid. So minutely careful has the legislature been, indeed, in controlling both the design and the work, that at its last session, having ordained that the Capitol should have a large dome in the centre and four smaller domes on the pavilions, it declared that the building of the central dome should not be touched until a special appropriation should be made for it; and this in the face of a strong appeal from the architects, Messrs. Bell & Hackney, for means to finish the dome, on the score both of convenience and of economy. Consequently the commissioners and the architects now have found their building otherwise closed in, but with a large hole in the centre of it, for which they have no authority to provide the proper covering; and the reports of both commissioners and architects contain urgent appeals to the General Assembly, which holds its session this winter, to supply money and authority to cover the deficiency. In view of the inconvenience of this application of the popular theory which makes a legislature a jack-at-all-trades, we think the commissioners are fully justified in admonishing the Assembly that the best thing it can do is to leave the appropriations untrammelled, and allow the construction to go on systematically. It is not surprising that they should clinch their argument by adding that "the commissioners, who for eight years have devoted time, thought, and study to the subject, should be better qualified than any one else to conduct the finish of the building, and decide upon the order in which each of the parts should be finished," though this is perhaps a sweeping claim. Not better, we should say, than the capable architects whom commissioners are assumed to employ, and who give their whole lives to the business, but doubtless better than a popular legislature. We are glad to record that this dome, unlike many that we are acquainted with, is to be solidly built of stone. The spirit of thoroughness has also led the commissioners to have the question of heating and ventilat-

ing made a careful study in advance, and to employ an engineer, Mr. Levi R. Greene, to make a complete scheme, with full drawings for this purpose. The specification, which we have received, provides for all the details of the work with a minuteness and precision which are unusual.

We have received a copy of the Constitution of the Canadian Academy of Arts, which has been lately founded under the patronage, and we believe at the suggestion, of the Governor-General and the Princess Louise. It is modelled in a great degree on the Royal Academy of London, and has for its objects "the encouragement of design as applied to Painting, Sculpture, Architecture, Engraving, and the Industrial Arts," and education therefor by means of a National Gallery, annual exhibitions, and schools of art. There are the usual three grades of members, Academicians, Associates, and Honorary Members. The Academicians are limited to the time-honored number of forty, among whom there shall be not more than ten architects, six designers (a new class in an Academy), and three engravers. The number is to be supplied from the grade of Associates, who are to be men of attainment as Painters, Sculptors, Architects, Engravers, and Designers, and are not to be less than twenty. Both Academicians and Associates must be British subjects, or foreigners who are permanent residents in the Dominion; but there is an order of Foreign Academicians to be chosen at will at the annual meetings. There are also Honorary Members to be chosen among amateurs, who are invited to make an annual contribution and who are headed by the Governor-General himself with a contribution of five hundred dollars. Provision is made for a class of retired Academicians who are to receive pensions. Every Academician is required, as a condition for the receipt of his diploma, to present to the National Gallery a picture or other specimen of his work. The government of the Academy is vested in a council of twelve Academicians serving in rotation; its officers, the president, vice-president, treasurer, and secretary, are nominated by the Governor-General and elected by the Academy, the president and vice-president being chosen for five years, and the secretary and treasurer annually.

Nothing specific is said about the establishment of schools, but provision is made for the appointment of professors of Painting, Sculpture, and Architecture, who are to be Academicians, and for professors of Anatomy and Chemistry, who need not be so, all of whom are to be appointed for five years. There are also to be professors of Ancient History and of Ancient Literature, and an Antiquary, — honorary appointments, apparently, which may be permanent. The Annual Exhibitions are to be held by rotation in the principal cities of the Dominion, of which Ottawa, Halifax, St. John, Quebec, Toronto, and Montreal are specified. The Exhibitions are open to all artists of distinction for paintings, sculpture, architectural and decorative designs, and engravings. But copies except those in enamel are excluded, nor are "needlework, artificial flowers, cut paper, shell-work models in colored ware, or any such performances" admitted. Each Academician or Associate is allowed to exhibit ten pictures together; outside exhibitors are allowed four, and all must be in gilt frames. The first exhibition is appointed to be held early in March at Ottawa, and pictures or other exhibits will be received from February 16 to February 21. The Governor-General offers a bronze medal for the best ornamental design for use in manufacture, the subject being from the Canadian flora. Prizes are also offered for other decorative designs, — a cabinet, a wall-paper, a mediæval sideboard, a book-cover, and a door filled with stained glass. We presume that the establishment of this Academy results directly from the coming to Canada of the Marquis of Lorne and the Princess. No doubt it will be a strong stimulus to the development of art in the Dominion, both by the encouragement of artists and by arousing a public interest in their work. The direct encouragement of decorative art is a departure from the usual habit of academies, as is the large share in the Academy allowed to architects; but both would seem to us peculiarly apposite to the conditions of the Dominion. There will undoubtedly be special effort to make the first exhibition attractive. We should like to believe that it would attract a good showing from artists in the United States, for the sake at once of good fellowship and of the interests of art.

The complex underground piping of our city streets is beginning to show its dangers convincingly. In most city streets there are at least three sets of pipes which are constantly endangering each other, and one or another of which is constantly in need of looking after, — the gas-pipes, water-pipes, and sewers. When we add to these what are found or intended in some of our cities, and what may be common in all before a great while, — a system of steam-pipes and pipes containing telegraph wires, — we have endless opportunity for interference and confusion. Gas explosions in sewers are becoming unpleasantly common. We noticed two of them in our Summary not long ago. The last number of the *Iron Age* described one that occurred recently in a crowded part of New York, at the corner of Sixth Avenue and Forty-second Street. The diagram with which the account is illustrated shows a network of conduits, which might prepare one to expect any disaster. In each thoroughfare are five lines of gas-pipes and a sewer; in Forty-second Street two sewers and two lines of water-pipes, one of those in Forty-second Street being a 48-inch main. On the surface in the Avenue is a horse-railroad track and the double line of the Elevated Railway. All these lines intersect at the crossing; and in the air, spanning the intersection, is the station of the elevated road. The pipes are turned and bored and sagged to avoid each other, and the supports of the elevated road have to be planted as carefully as a man would tread among eggs; sometimes forking above the pipes, sometimes thrusting them aside, to get a footing; for the pipes are spread all across the streets, and there is no placing a line of rails so as to avoid them.

Such a condition of things is as inconvenient as can well be imagined, and full of hazard. The streets of our cities are forever open for the sake of repairs or connection to some of these pipes, to the interruption of traffic; the ground, continually disturbed, is continually settling, with dislocation of the pipes below. The gas-pipes, water-pipes, and sewers are forever breaking, corroding, leaking, mixing their contents, and impregnating the soil, to the discomfort and danger of the citizens. No more extravagant way of doing the thing could be devised. The trouble is that it grew from small beginnings. If an engineer were called upon to provide at once for seven lines of gas and water pipes and a large sewer, to say nothing of steam-pipes and telegraph tubing, which may follow, to be put underground in a busy thoroughfare, full of vehicles, and pervaded by four railroad tracks, we may assume that he would not dream of laying them side by side and burying them up in earth, so that every time that any one had to be visited the street must be blocked and earth and pavement be removed and relaid. He would decide, we may assume, that convenience and economy made it best, once for all, to construct a gallery in which all these conduits could be carried, and where, having been arranged once for all, they could be visited, examined, altered, replaced, tapped, or repaired, without interfering with what went on at the surface of the street, without excavating and filling, repaving and repairing. To such subterranean galleries one city has already come for its most important underground connections, and other cities must, it seems to us, ultimately come.

The cost of these sub-ways is large, but yet it is trifling compared with that of laying out or widening new streets, which are among the things which cities are found willing to do. It would not be so very much beyond that of constructing the large sewers which great cities find necessary. It is probable that the cost of excavating, filling, and paving for the successive lines of pipe, in such a street as we have described, would alone be an equivalent. In the long run the saving would be enormous. It is pretty sure that in the course of a generation every line of pipe under a thoroughfare will be visited, and most of them many times. If we add to the cost that of the constant repairing of damage due to interference, corrosion, and settlement, the loss from undiscovered leakage, the injury to property and health from escape of water, gas, and sewage, the cost and inconvenience of hunting out defects which would be detected at once in exposed pipes, and the intolerable annoyance of having great highways ripped open from month to month and year to year, we may wonder that these things have been endured so long. A good portion of the cost of such sub-ways might, as we have before suggested, be recovered to the city treasuries by a tax upon the gas companies, and others which used them, without oppression, and the rest would soon save itself to the public. Those large cities which are proposing, like New York, to exact a royalty on the franchises which they grant for underground steam-heating will do

well, it seems to us, to consider whether there is not here an opportunity to take the first step in behalf of a system whose necessity is made greater by every line of pipes that is laid; and of which the saving will be the greater, and the cost the less, the sooner it is undertaken.

ELEVATOR SHAFTS. II.

WITH reference to fire protection, the relative value of shafts with closed doors and open elevators with hatches, whether automatic or worked simultaneously from the first story, may be stated thus. A shaft elevator is a continuous flue. Any one door being open, fire may enter and pass up through it. If properly constructed, the flames will pass out harmlessly at the top, but in time will be likely to heat the doors. Any one door being open on an upper floor would allow the flames to spread. Hence a closed shaft is only safe if all the doors are closed. In an open elevator, on the contrary, if provided with proper hatches, one hatch, if closed, will stop the fire on all floors above it. If all are closed the fire will be confined to the floor on which it starts or would have to destroy a number of hatches successively. Hence, according to the doctrine of chances, the open elevator with hatches is the safest.

Open elevators are less expensive than closed shafts. An enclosure not more than six feet high is sufficient to prevent accidents. It may be either of wood-work, wire-work, or a wrought-iron railing. Wire-work in a strong wrought-iron frame forms the best enclosure, as the meshes in it may be small and it does not obstruct light materially. For a freight elevator an enclosure of slats and posts three feet high is often sufficient. Enclosures should be provided on each floor with a door or gate. It is better that they should be automatic or arranged to open only on the floor where the elevator is in use, and to close as soon as it passes. Such doors and gates are now used in many places with good success.

For fire protection all that is essential is a proper system of hatches. The old system of having hatch doors to be opened and closed on each floor successively is useless in the emergency of a sudden alarm of fire when the elevator is in use. It is only valuable in case of a fire occurring after the close of business and supposing that all the hatches have been closed. This presupposes a thoughtfulness and vigilance which are seldom met with. Only two methods of working hatches are effectual in stopping fire in case of a sudden emergency. Either the hatches should be worked automatically by the movement of the elevator, or they should all be connected by such machinery as will enable them to be operated simultaneously from some convenient point of easy access. The former system is the best, as it does not rely upon human vigilance at all. But it presupposes the existence of a good mechanical device, which is unfailing and easy of operation, and not liable to wear out or get out of order. In fact, in its mechanical work it must be fully as good as the machinery for operating the elevator. There are several kinds now in use, some of which are scientifically constructed and fill all the requirements, but many cheap devices have utterly failed. There are also several devices in practical use for operating all the hatches simultaneously from a single point. The essential qualification is ease and rapidity of movement. For they may have to be closed when delay is dangerous to the person closing them. Some have the advantage of closing by the action of fire, by the use of either fusible links or combustible ropes. But fire works with speed and may pass through the hatch before closing it.

The greatest difficulty that has been met in placing hatches of any kind on power elevators has been found in the complicated system of ropes and weights placed in the shaft by elevator makers and the projection of guide posts and safety racks. No elevator machinery, however, is made in which proper modifications cannot be made to allow the use of hatches, and without detriment to the proper working of the elevator. This is a matter which has never been taken into account by the builders of elevators. Another difficulty has been found in getting the hatches properly out of the way when opened on each floor. There are several ingenious devices for accomplishing this.

The material for hatches is another important consideration. The mutual insurance companies which insure mill property require that hatch doors shall be of wood. In this case the wood must be in two thicknesses, or nearly two inches, to afford an effectual barrier to fire, and they thus become very heavy. Iron hatches may be made lighter by using angle-iron frames and filling in the panels with corrugated-iron. In these forms the iron is stiff, and less liable to buckle or warp than heavy iron would be. All mechanical appliances of wood are liable to wear out and are subject to expansion and contraction. Hence they are most likely to get out of order. The best hatch door for all purposes is an iron frame, welded in one piece, with a wooden panel, covered with tin on the under side.

The successful working of automatic hatches depends upon the steady and uniform motion of the elevator. If the motion is uniform they can be successfully applied to elevators running one hundred feet per minute. It should be remembered that all automatic hatches are attachments to *floors* and practically form continuations over them; consequently they cannot be applied to enclosed shafts. No automatic hatch has yet been invented which will operate within a vertical shaft. There never is room between the car and the sides of the shaft to contain the hatches and operating machinery.

No automatic hatches should be used as a protection to prevent persons from falling. They should always be enclosed as above stated with guards having gates or doors. This is evident from the fact that either a person stepping on such hatches would be injured in case the car should approach, or if the machinery were not strong enough to throw off the additional weight which it was not intended to carry, it would certainly be permanently disabled.

The safest way to arrange a passenger elevator, say for hotel use, would be to have it pass through a fire-proof waiting room on each floor. The room should have an iron door with spring hinges and an outside window for light. The elevator should have automatic closers and an automatic gate, in a wire enclosure six feet high. The cab should be finished on the outside with panelled sides, having fine wire gauze inserted therein, and should have a light sliding door with wire gauze panel, only to be opened when passengers are to get on or off. The waiting rooms will form an additional safe-guard to prevent fire from spreading on any one floor in case the automatic hatches should not do so. They are also a necessary convenience to people who may be waiting for the elevator.

In conclusion, it may be needless to add that in planning a building the architect should carefully provide for everything connected with the elevators when the plans and specifications are prepared. He should decide at the outset just what he intends to recommend to his client, and not leave such matters for after consideration. Thus all cutting and alterations in the building will be avoided, and it will not be necessary to modify or alter one kind of work in order to provide for another. It is not the object of this paper to suggest anything as to the kind of operating machinery to employ, but it is equally essential that it should be decided early. Architects too often leave the decision or selection of such matters to their clients, or the clients, on the other hand may take them out of the architects' jurisdiction. Either course is unwise. The architect should be a competent judge of what is safe or unsafe in construction or arrangement, and it is hoped that these suggestions may be of some assistance to such as desire to avail themselves of other experiences than their own.

W.

ROMANESQUE ARCHITECTURE.[1] IV.

BUILDINGS of the Primitive Romanesque style are, as I have already said, rare throughout Europe. In England especially we have no surviving buildings of any great size earlier than the introduction of the Norman form of Romanesque in the eleventh century. We have nothing left but a few small and rude fragments, and a very remarkable class of towers which enables us easily to identify the early Romanesque of England with the contemporary work of other lands. Still we have evidence enough to show that both the square pier and the column were used in England, though the few columns that remain, as at Repton and as responds in a good many chancel and belfry arches, are certainly of wonderful rudeness.[2] But though they often affect a good deal of barbaric richness, we find in them no sign of the distinctive features of the Norman style, while many of them do show an uncouth imitation of Roman work. But while in England we have to patch up our case from very small, rude, and mutilated examples, we find scattered here and there over the continent a considerable number of examples of greater size, belonging to various dates up to the middle of the eleventh century. Various buildings showing more or less of the features marking our so-called Saxon style, the pilaster-strips, the baluster-columns, the mid-wall shafts, and the other characteristics of the style, will be found scattered here and there over various parts of Germany, France, Aquitaine, and Burgundy. The general mass of the German examples I put by for the present, as the architecture of Germany has a distinct history of its own. But one German example must be mentioned here as standing at the head of its class. The great gateway of the Abbey of Lorsch — the Lauresheim of the days of Charles and Eginhard — remains almost alone as a work of the days, seemingly of the earliest days, of the great king himself. Of the Lorsch gateway the lower story, with its Corinthian half-columns not yet flattened into pilasters, might almost be called Roman rather than Romanesque; but the upper stage, with its flat pilasters, its unclassical capitals, its straight-sided arches, shows that we have reached a class of buildings of which Deerhurst and Earls Barton are members. But Lorsch stands by itself; among ordinary specimens of the Primitive style, the first place is certainly due to a building in quite another region of the Empire, to the church of Romainmoutier in the present canton of Vaud. Here we have a minster of considerable size, with two clearly marked Primitive dates, belonging, if I rightly remember, to the eighth and ninth centuries, and with a little later Romanesque work to contrast with them. The piers of the original building are rude enough, very massive, but with an evident attempt at the columnar form. It is curious to compare them with the later and not very distant church of Grandson, where we feel almost carried back to Lucca in its thoroughly basilican arcades, where Roman columns have been used up again, and fitted with elaborate capitals, seemingly of the twelfth century. Two other churches of Burgundian Switzerland, on a much smaller scale than Romainmoutier, Saint Sulpice in Vaud and Saint Peter in Wallis,

[1] See pages 28, 37, 45, *ante*.

[2] Sompting in Sussex, St. Benet's at Cambridge, and Earl Odda's Church at Deerhurst supply some of the best examples. The Cambridge example is doubtless much earlier than the other two. The use of columns in England in the seventh century is witnessed by Eddius, the biographer of Wilfrith, who speaks (Vita Wilf. 17) of his church at Ripon as "basilica polito lapide a fundamentis in terra usque ad summum aedificata, variis columnis et porticibus suffulta."

are also useful as supplying the contrasts between earlier and later Romanesque. The *Basse-Œuvre* at Beauvais, that is the nave of the cathedral of the tenth century, the Temple of Saint John at Poitiers, the church of Saint Aventin in the Pyrenees in the modern department of Haute Garonne, the crypt under the apse of the Abbey of Pleinpied in Berri, some parts of the Abbey of Brantôme in Perigord, all supply studies of Primitive Romanesque, in different varieties and of different dates. And at the end of our list, putting to shame even Romainmoutier at the beginning, comes the original and still perfect shell, but slightly masked by a recasting of the twelfth century, of the "micele mynster æt Rémys," the mighty Abbey of Saint Remigius, the church hallowed by the Roman Pontiff in the presence alike of the Cæsar of the mainland and of ambassadors from the Basileus of the island Empire.[1] The church where a son of Ælfgar was buried, and on whose massive pillars Gyrth looked while they were still in their freshness, has advanced many degrees beyond the work of Benedict Biscop at Jarrow and Monkswearmouth, but it still belongs to the same great class; it shows no sign of the distinctive features of the later local styles; it still belongs to the days when a common form of art, such as it was, prevailed throughout the West.

But it is the towers which give us the best evidence for the unity of the architectural style of all Western Christendom up to the eleventh century. The "Saxon" towers of England, the tall, square, hard, unbuttressed towers, with the mid-wall shafts of their windows, their rude enrichment of square strips and long-and-short work, are familiar to every student of such matters. Sixteen years ago I was surprised and delighted to come upon a group of towers of essentially the same character in the heart of the Pyrenees, gathering round that striking minster of Saint Aventin of which I have already spoken. In later journeys I came across towers of essentially the same kind in the great Burgundian Abbey of Saint Maurice[2] and in the great Swabian Abbey of Schaffhausen.[3] So close a likeness in such distant spots could hardly be the result of accident; it could hardly be the result of copying from one another. Earls Barton and Saint Aventin were not likely to seek their models at Schaffhausen, and Schaffhausen was still less likely to seek its models either at Earls Barton or at Saint Aventin. But all roads lead alike to and from Rome, and I felt convinced that the key to the likeness was to be found in all being derived from a common Italian source. The likeness among the various forms of Romanesque architecture answers to the likeness among the various dialects of the Romance speech, and it is to be accounted for in the same way. As I carried my researches further, I found towers of the same type in every part of Germany which I visited, at Dortmund and at Bremen, at Coblenz and at Würzburg. I found the banks of the Main and the Alpine pass from Innsbrück to Trent set thick with them. Once south of the Alps there was no longer any doubt about the matter. The smaller and ruder examples of Italian towers are identical with those in our own land. There are towers at Verona and at Lincoln which might change places, without either seeming to be in a strange land. If Schaffhausen and Saint Maurice seemed like glorified forms of our own rude "Saxon" towers, the great Saint Zeno seemed like a glorified form of Schaffhausen and Saint Maurice. The matter seems absolutely beyond doubt. Up to the eleventh century, no less than in the seventh, men went on building "*juxta Romanorum morem.*" They followed Roman models, not only by some vague tradition, but by a conscious imitation of the buildings, whether of the Eternal City itself or of the hardly less renowned cities of Lombardy and Tuscany.

The little that I have to say of the buildings of Germany will find its best place at this point. It seems to me that, while in other countries the Primitive or Italian mode of building was actually displaced by new developments of art, in Germany the Primitive style of Romanesque went on, improved but not displaced, through the eleventh and twelfth centuries, till all Romanesque everywhere began to give way to Gothic. The German churches of the twelfth century show us, in a greatly improved form, many features which in England or Gaul we should unhesitatingly assign to a date not later than the eleventh. The difference, small as it is, between the earlier and the later Romanesque of Germany may well be studied in the churches of Soest, — that strange, shrunken-up Westphalian Hanse town, — especially in the two great churches of Saint Peter and Saint Patroclus. At the other end of the kingdom, the Great Minster at Zürich of the twelfth century does not differ essentially from the work at Schaffhausen of the eleventh. The work is rather more finished and rather more enriched, and that is all. Here, as at Mainz and Dortmund, and in countless other German churches, the massive square pier prevails, and it seems to me that one of the changes which mark the later German style is that the square pier now became dominant, and drove the column, for the most part, into quite secondary positions. In the two great Romanesque churches of Hildesheim, Saint Michael and Saint Godehard, we find, as in many Italian buildings, the square pier and the column alternating or intermingled. The capitals are of various strange forms, but what is most to be noticed is that they retain the Ravenna stilt, which appears also, perhaps in a less marked form, in the elegant chapel of Bishop Meinwerk at Paderborn.[4] The alteration of the square pier and the column, but without any of the eccentricities of Hildesheim, appears in the Church of Saint Burchard at Würzburg, a building of the eleventh century of distinctly Primitive style. But the use of the column by itself seems in Germany to be confined to quite small buildings, such as the thoroughly basilican Church of Saint James at Bamberg, or in the two castle chapels one over the other at Nürnberg, utterly contrasted as the two are in the proportions of the columns employed. The massive round piers, columnar or *quasi* columnar, with which we are so familiar in England, seem never to have been used in Germany at any time. With regard to the towers, the belfry-windows of the twelfth century supply a remarkable study of the way in which the Primitive coupled window with mid-wall shafts gradually changed in some cases, during the latter half of the twelfth century, into something more like the ordinary belfry-windows of our Norman, while in other cases the hardly modified Primitive belfry-window went on to the end of the twelfth century, perhaps even into the thirteenth. Here and there we find German buildings late in the twelfth century, or even early in the thirteenth, like the palace at Gelnhausen and some parts of the cathedral at Trier, which are still purely Romanesque, but which rival the richest and lightest buildings of the later Italian Romanesque. But, as a rule, much of the Primitive feeling hangs about German Romanesque down to the time when it finally gave way to Gothic. The towers especially, tall, square, unbuttressed, with their shallow pilasters and arcades, keep on Primitive forms through the whole of the Romanesque period, and even hand it on to many examples of the earlier German Gothic. That wonderful grouping of the many towers of the German churches which goes on through the whole Romanesque age, and which gradually dies out with the development of Gothic, is a purely national feature which has nothing the least like it either in Gaul, in England, or in Italy. And the churches themselves, the great minsters even more than the smaller ones, in their comparative plainness, their lack of artistic composition in the main arcades, the general squareness and hardness of detail, the use of the double splay in the windows, all seem to belong to an earlier stage of art than the contemporary buildings of England and France.

[1] See Norman Conquest, ii. 111, 456, 2d ed. The consecration was in 1049, at the very end of our period, when the later Romanesque was already coming in. But the work must have been begun many years before.

[2] The present tower was built, partly out of Roman materials, by King Rudolf of Burgundy in 1014.

[3] The tower and the whole church are of a piece. I feel sure that the date is 1040, but I cannot at the moment lay my hand on any authority.

[4] The date is 1003.

FURNACES AND FURNACE MATERIALS.[5]

The advantages claimed for the soapstone furnace are that it is absolutely impermeable to gases;[6] uniformity of heat is easily maintained; the amount of soapstone forming the radiating surface of a single furnace (from two to six tons) furnishes such a reservoir of heat that sudden changes of temperature in the house are impossible; great durability, tightness of joints, owing to the slight change of the parts by expansion and contraction under changes of temperature, and the similarity of these changes to those of the cements used in the joints; and complete and even combustion of the fuel, owing to the slow heat-conducting power of soapstone and to a special arrangement within the furnace for supplying warmed air to the fire. A soapstone furnace tested for five years by the writer, in a house built by him at the West End of Boston, has proved itself a safe, pleasant, and (after the first cost) economical heater.

The disadvantage of the soapstone furnace is that the large amount of radiating surface required involves considerable expense and occupies somewhat more space than an ordinary iron furnace.

A leakage of gas, then, in hot-air furnaces may result, first, from porosity of the material; second, from looseness of the joints; or, third, from cracks at the feed and ash-pit doors. The first and second difficulties may be obviated by using wrought-iron, terra-cotta, or soapstone. The third may be to a certain extent, though not absolutely, avoided by adopting the ground and bevelled joints used in the Reynolds "Air-Tight" furnace.

Where a cast-iron furnace is already set, or where it is inconvenient to adopt either of the two courses recommended, the furnace should be so run that there is a constant inward pressure from without. The pressure may be easily measured by attaching to the highest part of the heating surface a manometer, as already described. In fact no drum furnace is complete without this attachment. The manometer may consist of two simple quarter-inch glass tubes one foot long each, united at the bottom by a bend or by a rubber tube, half filled with water, and attached to the furnace by a brass tube screwed into the drum. The whole need not cost over seventy-five cents, not including the labor of attaching it to the furnace.

To insure a constant inward pressure it will be necessary to keep the temperature of the smoke-flue quite high, and, unless some principle like that illustrated by Fig. 129 be adopted, a great loss of heat will be sustained. The principle, under a modified form, varying with the circumstances, as will hereafter be described, may be applied to any furnace.

Though the escape of gases may be due largely to the permeability of the materials, yet imperfect joints form a source of leakage equally, if not more, important. As above remarked in describing the experiments on the permeability of cast-iron, a small amount of the mercury passed through the iron under the feeblest pressure.

[5] This paper by the writer of the Open Fire-Place articles will be incorporated with those articles in their separate form.

[6] A piece of soapstone tested with other substances by the writer under a moderate pressure proved impermeable to air.

Only a fraction of an atmospheric pressure was necessary to drive it through the largest pores, and in the experiment of Professor Gibbs no pressure at all was used above that of the mercury in the vessel itself tested. The holes were too small to be visible to the naked eye and would, therefore, escape detection under the ocular examination of the inspector. Yet with the aid of a microscope many could be seen, and would consequently allow water to work through under a pressure of a few millimeters head, or sufficient to overcome its attraction. This proved, by experiment, to be the fact. In the case of gases, friction would only retard their movement, while attraction might prevent altogether the passage of liquids.

As the only certain cure for escape of gas through the pores of the material is to discard porous materials altogether, so the only cure for escape through joints would be to discard joints altogether. This being impossible, the next best thing is to choose a furnace in which the number of joints is at a minimun, and to run the furnace in such a manner that the outward pressure shall always be at a minimum. Whether or not this may be done without loss of heat will hereafter be seen. Furnace makers will claim that the peculiar kind of cement they use, or their peculiar method of hammering the joints, will prevent leakage and stand fire. The writer visited a furnace advertised by the makers to be absolutely gas-tight. The joints were numerous. In some joints cast-iron was connected with wrought. Pipes of cast-iron were set into wrought-iron plates — an arrangement the reverse of that used in the Dunklee furnace. To this the writer particularly objected, and inquired of the makers if they could warrant the furnace to stand test at these points. The method of working these joints was, they claimed, *peculiar*. No cement was used, and so great was the care bestowed on each joint that leakage was a sheer impossibility. A fine new furnace was exhibited to show the excellence of the workmanship. The writer still objected until challenged by the makers to give proof of any of the numerous furnaces put up by the company having ever leaked gas. Without taking the time to visit any or all of the five hundred or more gentlemen whose letters of recommendation adorned the descriptive circular of the firm, the writer expressed himself satisfied if the fine new sample furnace then on exhibition would itself stand the test. With the assurance that he was at liberty to make any reasonable test he pleased, he ordered the furnace to be turned over and water poured into all the joints. To the complete astonishment of the proprietors and of the careful workmen standing around, the water which was poured in poured out again through nearly every one of the score of careful joints, until the furnace seemed to dissolve, and float away in its own tears.

The way in which an escape of gases in furnaces may be caused by the pressure of the wind is very clearly expressed by Dr. Lincoln.[1] But it must be borne in mind that the wind is not the only cause of reversed pressure. Dr. Lincoln says: "In the case of hot-air furnaces it is very desirable to make the seams actually impervious to gas. This cannot be done with the ordinary materials, — cast-iron, putty, and red-lead. The unequal contraction and dilatation of the pieces of casting inevitably crack the putty or cement, a matter of small moment provided we were sure of a constant atmospheric pressure inward. But we cannot be sure that such a pressure will continue under all circumstances; and the manner in which the direction of the pressure may be reversed is easy to understand. For the iron wall of the furnace represents a diaphragm between two boxes, from each of which a powerful current ascends. One of these boxes is the stove itself, discharging into the chimney; the other is the hot-air box or reservoir, discharging through pipes, registers, halls, and stairways, — all of which taken together may form a kind of rival chimney drawing upon the hot-air box with a force nearly or quite equal to that of the actual chimney. Then the direction of the wind may be such as to favor the exit of air from the box by the duct intended to admit it, and if, under these circumstances, a puff of wind strikes the chimney unfavorably it is not strange if the pressure should be for the time reversed, and gas escape into the box. In point of fact this not rarely happens in furnaces of cast-iron. A suitable material for avoiding this exists in wrought-iron, which can be made perfectly tight by overlapping, riveting, and hammering the edges. Stone furnaces can be made tight also." The furnace room should be ventilated to carry off accidental leakages or puffs of gas when the feed-door is opened. The cold-air box should be made of brick or stone and made perfectly tight, with a clean-out door favorably placed, and the fresh air should be taken from a spot where it is most likely to be pure. It is best to take it from an enclosed spot as little affected by winds as possible. If no such chamber exists, or can conveniently be made, it should be taken in separate ducts from both windward and leeward sides of the house, and proper regulating valves supplied in the ducts, to be operated, if possible, from the parlor or sitting-room by means of wires and cranks. Strictly speaking the fresh-air box should be large enough to supply all the flues, allowing one sixth for expansion after heating, so that the longer hot-air flues shall not draw air from the shorter ones, as sometimes happens.

The amount of water evaporated in a furnace to give the air the desired moisture depends upon individual taste and temperament, upon locality and climate, and cannot be definitely specified. The supply should, however, be automatic. The ball-cock used should be of a kind least liable to get out of order, and should be protected from dust.

It is worth while here to remark, as a consideration of some little importance in finishing a house, and one frequently overlooked by owners and architects, that the evaporating pan should be emptied and the water-pipe temporarily plugged up on the furnace side while the inside finish of kiln-dried stock is being put on. Otherwise the evaporating water will rapidly reënter the wood before it is in place, cracks will result as the house grows old, and the advantages of kiln-drying will be partially nullified.

[1] The Atmosphere, by D. F. Lincoln, M. D., in Buck's Hygiene and Public Health.

FIRE-PROOF BUILDING IN VIENNA.

IT has been said that it is impossible to make a building absolutely fire-proof, but I think the Viennese come as near making buildings fire-proof as possible. I will cite some instances to show this: While living in Vienna I and my family went out of town to spend Sunday, and on our return we found that a fire had destroyed completely the first story of the building in which we lived, but our own apartments were in no wise injured. In another instance the inhabitants of the lower story of a building were not at all disturbed at a fire that occurred on the roof. The roof was entirely destroyed, but they kept about their usual occupation during the fire, inasmuch as the burning of their roof was of no very special interest to them. In Vienna the roof is not a part of the building at all; it is simply an appendage. The building ends in the ceiling below, and there is as much space as six inches left open between the top of the wall and the bottom of the roof, the latter being set on stones resting at intervals on the walls. The upper ceiling is a flat plank roof covered with ashes or sand, so that if the outer roof burns off, the coals and ashes fall on top of this sand and do no harm. There are no dwelling-rooms in the attic, and it communicates with the house by an iron door with iron casing, which is always kept locked. Next, as to floors: In the smaller buildings where timber floors are used the spaces between the timbers are filled with ashes or sand and then the plaster is attached underneath to a wire gauze, thus making a solid floor, which it is almost impossible to burn. There are no air-spaces left through which the fire can travel.

In the more important buildings, however, iron I-beams are used and brick arches are constructed between them, the upper side of the arch being covered with small beams, which, however, rest only on I-beams; and on these small beams the parquetry floor is laid, and underneath the arch is the frescoing; thus making a very handsome appearance. As to the walls: These are, for small buildings, never less than eighteen inches thick, and in large buildings the thickness varies from three to ten feet, the walls of the first story being thickest, and the thickness diminishing as we ascend. I read from the building laws of the city of Vienna as follows: —

(1.) When the position of a building is such as to make it desirable, as a precaution against fire, the ground floor must be vaulted. In the attic and in the first story, when the ground floor is not vaulted, the floors must be massive (as described), and a layer of dry mortar, sand, or other incombustible matter must separate the beams from the planking.

(2.) Stables and hay lofts must have a fire-proof ceiling.

(3.) Rooms for storing fuel must be, in general, located in the cellar, and built of masonry. When they are in sheds of but one story they must, in addition, have a fire-proof roof.

(4.) In every building fire-proof stairways must communicate from the attic to the cellar, and with every dwelling, by means of fire-proof passages. (This implies that the vestibule should also be fire-proof; and it is, in fact, invariably vaulted, and has a flooring of stone or béton.) In buildings of great extent there must be several such stairways, sufficient to enable all persons dwelling in them to pass readily out of doors.

(5.) When a stairway is lighted by means of a skylight, the frame of the latter must be constructed entirely of iron, and rest, on all sides, on masonry rising above the roof.

(6.) All stairways and passages connected with them must have a fire-proof railing.

(7.) Wood-work must be removed from the interior surface of all flues by a thickness of at least six inches of masonry. The masonry of the chimneys must be plastered on the exterior, from the pavement of the attic to the highest point of the roof.

(8.) Each story shall be provided with at least one separate flue, passing without communication with any other to its exit at the roof. Where the beams of the floor rest upon the walls containing flues, an earthen pipe shall be inserted into the latter, having for its length at least the thickness of the whole floor, and for its thickness at least one inch. Every flue must have, at its commencement in the lower story, and also in the attic, a side opening, closed by two iron doors, closely shutting, and provided with a lock. Where several flues lie side by side they shall be closed still further by an iron bar and padlock, extending over the openings of all. All wood-work in the vicinity of these doors must be covered with sheet-iron.

(9.) All roofs must be covered with tiles, slate, metal, or some other fire-proof material. The wood-work of the roof must at no point be nearer than six inches to the pavement of the attic. Iron roof-frames must rest upon masonry alone; wooden cornices are forbidden.

(10.) The attic roof must be covered with tiles, cement, or other fire-proof material. An iron door, hung in an iron frame, must communicate alone from the main stairway with the attic. At least once in every ninety feet of its length the attic must be subdivided by a brick wall running across its width and rising nine inches above the roof. (This is generally covered above with zinc.) The compartments ensuing shall communicate with each other only by means of iron doors hung in iron frames. No dwelling-rooms are permitted in the attics of buildings.

(11.) Every house shall be provided with a wall at least six inches thick, separating it from its neighbor, — for the two houses thus ensues a wall of twelve inches.

The thickness of walls must be regulated by the weight they have to support and the material of which they are composed; also by the height of the stories and the construction of the floors and ceilings.

The following rules are to be observed: —

(*a.*) The principal outer walls, as well as all interior walls, at the point where they contain flues, must be at least eighteen inches thick. The principal walls of the upper story must be at least two feet thick if the depth of the rooms is more than twenty feet. The main walls may have the same thickness in two successive stories. In buildings of three stories the main walls must, at the ground, be at least two feet thick; in buildings of four stories at least two and one half feet thick. Those portions of the main wall which do not support floors can be made eighteen inches thick for all stories.

(*b.*) Where the ceilings are vaulted and rest on iron girders, in case the latter are not more than twenty feet long, the walls supporting them need only be eighteen inches thick for all stories; where they are of greater length the walls must be two feet thick.

(*c.*) The foundation walls must, in all cases, be six inches thicker than those of the lower story.

(*d.*) In light walls, the walls must be in all cases eighteen inches thick where they support ceilings, or bound rooms used for dwelling purposes. In other cases they need be only twelve inches thick.

(*e.*) Walls supporting massive floorings of half or whole trees (as described) must be two feet thick, and the trees must rest for six inches at their ends upon the same.

In Vienna these laws are fully carried out, and the Viennese hardly suffer from fire. — *Mr. H. A. Hill before the Society of Arts.*

THE ILLUSTRATIONS.

MERCHANTS' NATIONAL BANK BUILDING, BOSTON, MASS. MESSRS. G. J. F. BRYANT AND GEORGE SNELL, ARCHITECTS, BOSTON.

Originally a Greek temple with two columns *in antis*, on State Street, and built in 1824 as a branch of the United States Bank, by Solomon Willard, architect. Remodelled and the original rotunda or banking room of the temple altered into square rooms, and its height subdivided into two complete stories, by Cornelius Coolidge in 1836. Widened by the purchase of estates of the New England Life and Trust Company and Peter C. Brooks, in 1842, including rebuilding of these two estates with a Greek granite façade in pilasters and entablature, on Exchange Street, by Isaiah Rogers, architect, said building being incorporated as part of the original bank building. Widened for the additional length of the original bank estate by the purchase of the Columbian Bank estate, in 1856, of Peter C. Brooks, cornering on State and Exchange Streets, including an entire rebuilding of said estate three stories high (above the street levels), and an upright attic or fourth story, embracing also the addition of a third and fourth story over the entire area of the Merchants' Bank property, the latter story being faced with an upright mansard roof, fronting Wilson's Lane (since widened as Devonshire Street) and Exchange Street, said roof being uniform in level with the upright attic above named. The purchase of the Columbian Bank estate in 1856, and its rebuilding, together with the addition of a fourth story to the whole of the original property, resulted in facing the whole of the State Street side and a portion of the Exchange Street side with the present façades in granite. In this condition the whole estate, including all its purchases, remained until the partial destruction of the edifice by the fire of September 17, 1878, when the directors of the bank took into consideration the propriety of a general remodelling and improving of the property, in connection with the repairs consequent upon the fire injuries, resulting in an increased height to the building of one story of offices, enclosed within a wrought-iron mansard roof, and the changing of the exterior of the fourth or roof story from slating to granite façades, on Devonshire and Exchange Streets, thus completing, in connection with the granite attic story before referred to, the three frontages of the estate on State, Devonshire, and Exchange Streets, wholly of granite, surmounted by the wrought-iron roof, enclosing the new story of offices.

Within the building, the remodelling embraces a complete refinishing of the banking rooms of the first and second story (National Exchange Bank and Merchants' National Bank), including the construction of a dome in Neo-Grec style in the centre of the length of the latter apartment, reaching from the ceiling proper of the room through the third, fourth, and fifth stories and terminating immediately beneath the new iron roof in an elliptical skylight. The above remodelling further embraces a complete renewal of finish of most of the offices of the respective stories and as well the rebuilding of the principal staircases in the central hall of the building.

The architects and superintendents of the improvements made in 1856 were Messrs. Gridley J. F. Bryant and George Snell, the latter gentleman being the architect of the exterior, the former the architect of the interior.

The recent improvements of the property since the fire of September 17, 1878, have been made under the direction of Mr. Bryant, including the planning of the entire new interior and embracing, as part thereof, the new dome. The exterior design of the new roof is by Mr. Snell, the superintendence of its erection being in charge of Mr. Bryant.

DESIGN FOR A DWELLING-HOUSE AT LAWRENCE, MASS., BY MR. W. C. RICHARDSON.

ST. MARK'S CHURCH, ISLIP, L. I. MR. R. M. HUNT, ARCHITECT, NEW YORK, N. Y.

CORRESPONDENCE.

AMERICAN DECORATIVE ART AND ARTIST DECORATORS.

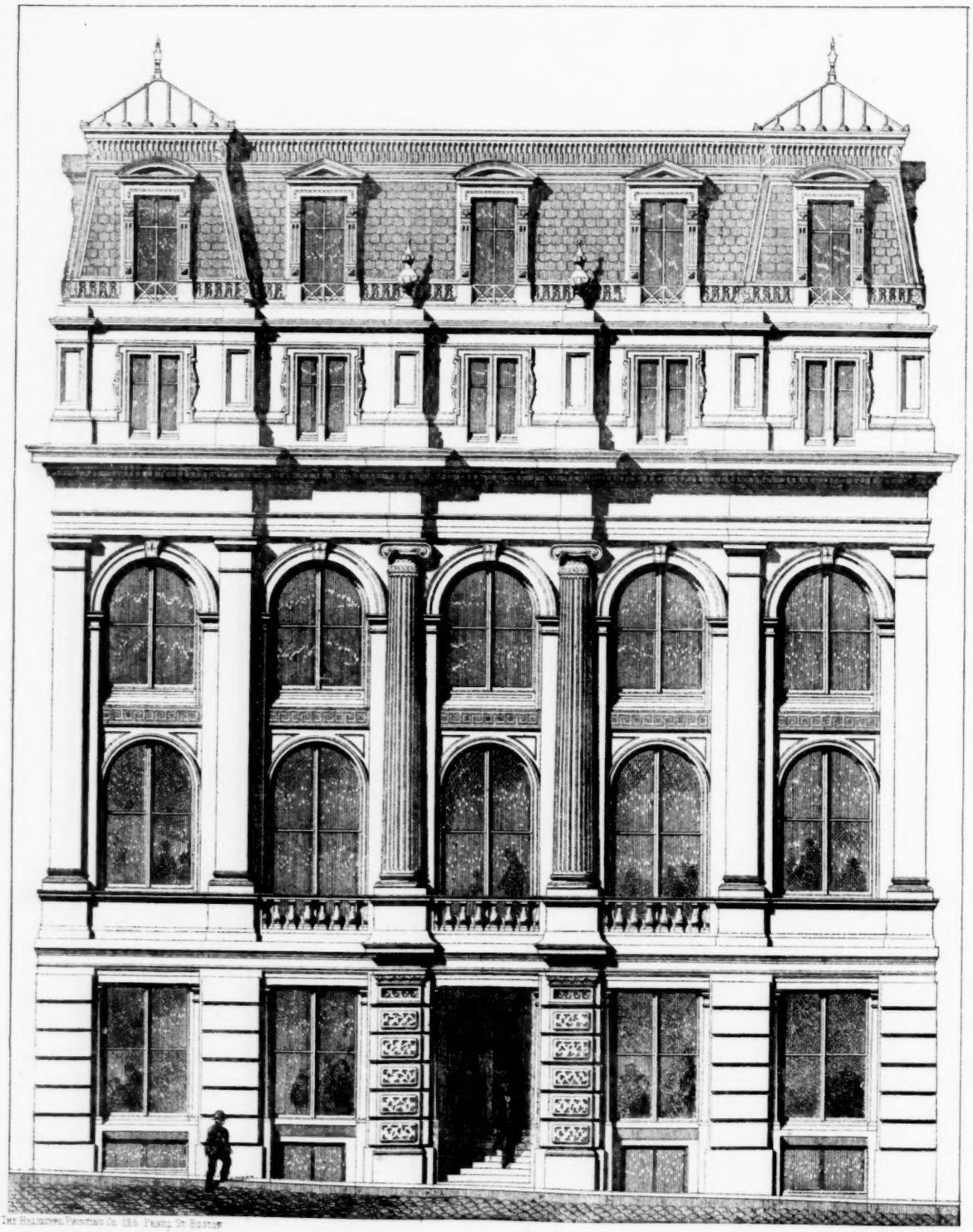
New York.

The familiar saying that "straws show which way the wind blows" shall serve for a text in calling attention to tendencies becoming every day more and more marked; we refer to the increased interest shown by modern painters, both here and abroad, in purely decorative work, and also to the facilities offered them by their patrons, which alone enables them to carry their ideas into effect. Certainly the architectural profession has every reason to rejoice in the prospect of such mutual help and coöperation between the two kindred arts as these straws of tendency would seem to promise us. The architects can do a great deal to foster this new movement, and it would show not only a narrowness of sympathy which it would be hard to pardon, but an utter blindness to their own interests, did they not meet the decorative artists at least half way. There does not seem to be the least danger that the painter will encroach upon the architect's legitimate field, whilst on the other hand he will give to the architect's work an additional beauty not otherwise attainable.

Confining ourselves to American artists entirely, we will go over a few of the names that have become prominently associated with decorative work within the last few years.

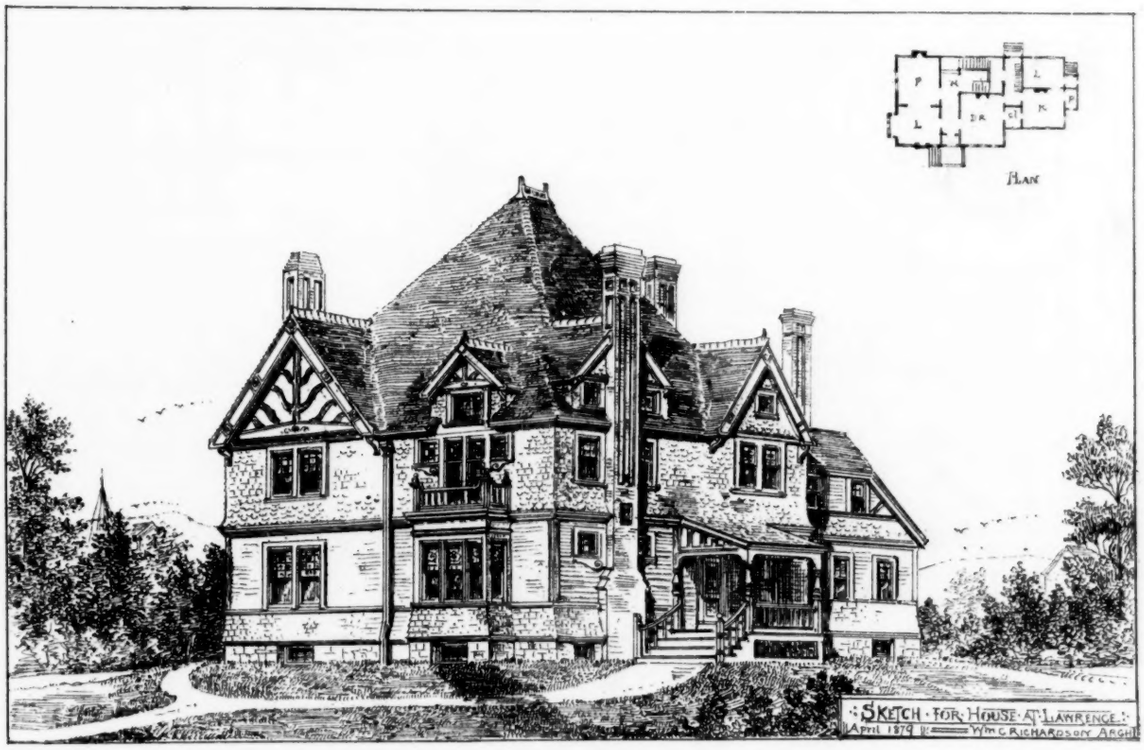
Mr. La Farge's work in Trinity Church, Boston, and in St. Thomas's, New York, has already become familiar to every one at all interested in such matters, so that we will pass them with a bare mention. Mr. La Farge, a few years ago, designed and superintended the execution of some of the stained-glass windows in the Memorial Hall, at Cambridge, and, encouraged by his successes in that direction, he is now devoting a great deal of his time to stained-glass work. He has now workmen in his employ, not only to carry out his designs as regards the cutting and leading of the glass, but, going a step back of that, in making the glass, that he may get just the tones and qualities that he desires. Some of the windows he has recently completed are remarkably beautiful; as rich and full in coloring as any of the old cathedral windows. They are free and original in their conception, and the treatment is, in all respects, appropriate to the materials employed and calculated to set off the peculiar and individual qualities of these materials to the best advantage. We feel tempted, in trying to describe the mellow effects of these windows, to resort to musical terms and call them symphonies and nocturnes, feeling that we cannot better express the effect they produced upon us, and yet hesitating to do so on account of the absurd misuse of similar terms as applied to oil paintings.

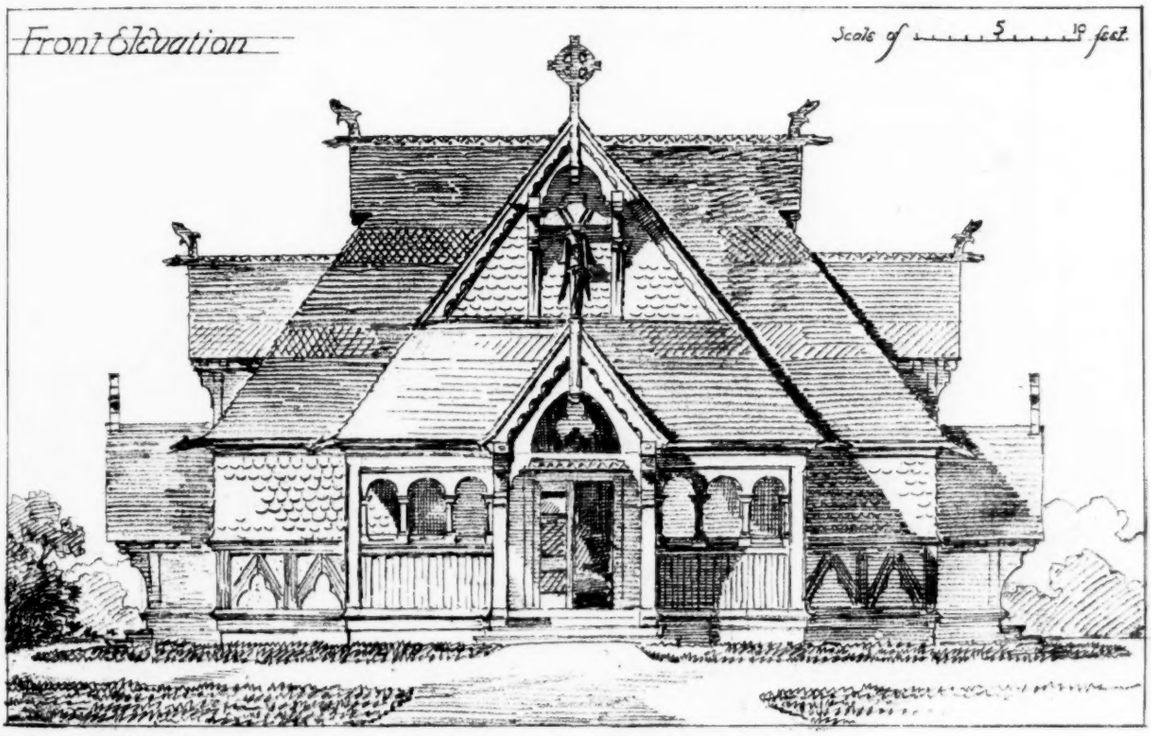
The late William Hunt's work, in the Capitol at Albany, has been fully discussed and described before. We will merely make mention of it, therefore, as being one of the pioneer works in the new field, with a few words of heartfelt regret at the great loss art has sustained in the death of William Hunt. Mr. Samuel Colman has recently been engaged in superintending the execution of some *portières*, from his own designs, in the work-rooms of the Society of Decorative Art, and the success he has achieved is unquestioned and will, we hope, encourage him to continue his efforts. He has succeeded in producing entirely original effects, without any of the affectation of oddity or misplaced quaintness that is so common, and, moreover, the entire treatment is made appropriate to the materials used and to the destination of the articles, and is thus, in the best sense, decorative. His success will open a wide field to the many needleworkers who, not having his power of originating new methods and designs, still have the technical skill necessary to carry out the ideas suggested to them by others. Mr. Colman is, therefore, doing excellent educational work, and at the same time achieving a personal success. Mr. Louis C. Tiffany is now devoting himself to the decorative art in a wider field, undertaking interior decoration in all its different branches, with a success that shows the value to him of his intimate knowledge of the East and of Japanese work. In the same field we would mention also Mr. Lockwood Deforest and Mr. H. M. Lawrence, both of whom have done excellent work already. A new accession, to us in America at least, although his decorative work is known in Rome, in Paris, and in London, is Mr. Charles Caryl Coleman, whose studio is in Rome, but who is in



FACADE OF MERCHANTS BANK BOSTON

SCALE OF 1/4 INCH = 1 FEET. GEORGE SNELL ARCHT.





THE HELIOTYPE PRINTING CO. 196 PEARL ST. BOSTON

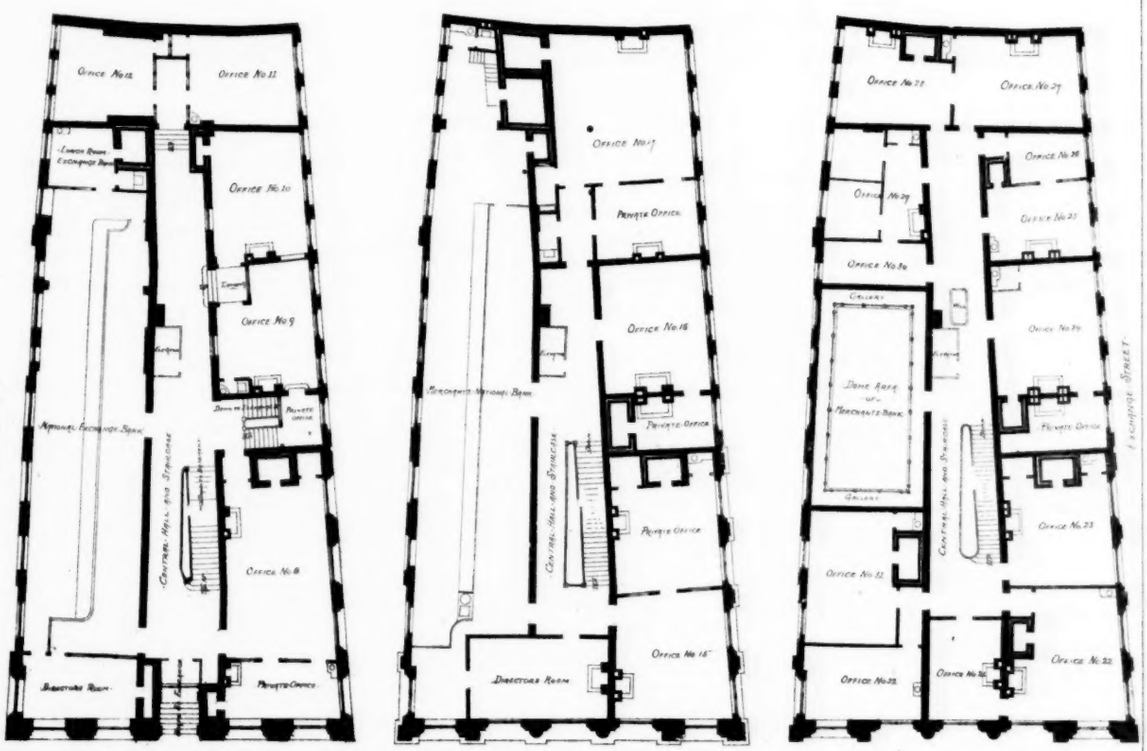
ST. MARK'S CHURCH, ISLIP, L.I.
RICHARD M. HUNT ARCH'T.
NEW YORK.

VERTICAL LONGITUDINAL SECTION OF MERCHANTS NATIONAL BANK BUILDING.

GRIBLEY J.F. BRYANT. ARCHITECT.

MERCHANTS NATIONAL BANK BUILDING

SCALE 1/8" = 1'-0"



FIRST FLOOR. BOSTON JAN'Y 1. 1880 SECOND FLOOR. GRIBLEY J.F. BRYANT ARCH'T THIRD FLOOR.

THE HELIOTYPE PRINTING CO. 126 PEARL ST. BOSTON.

New York on a short visit, and who has opened a temporary studio where a few of his decorative panels can be seen. In a very different scale of color from any of the artists we have mentioned above, his work is full of charming qualities, light and fresh in color as a May morning, carefully studied in arrangement, and of finished and extremely skilful execution; his panels (painted on canvas) are extremely pleasing; two in particular, destined to be placed in a double door, sliding on the face of the wall, are wonderfully well treated. In the one a bronze vessel; in the other a richly colored Majolica jar, made to hold a branch of light, graceful blossoms which stretches across the panel from top to bottom, the background in either case is a rich stuff — it is quite useless to attempt the description, for after all the charm lies not so much in what is done as in the manner in which it is done, the bright crisp scale of color and the skilful drawing and painting.

On the whole we feel that there is every reason to look forward to a brilliant future for all the many branches of decorative work; from the work at the Capitol at Albany down to matters of purely homely interest everything seems to feel the vivifying influence of true artistic thought and insight.

There are many croakers abroad who say that all this æsthetic house-decorating mania is nothing but a passing fashion, that people will tire of it as they tired of the French styles, so called, of twenty years ago, and of the Eastlake constructiveness of more recent date. But we believe that the present development is but in its infancy, and that it is based more nearly on true principles and is more in accord with our modern wants and cravings than any art "fashion" since the Renaissance, and that those who are creating it are in "dead earnest." There is, of course, both here and in England, an immense amount of meretricious work palmed off upon the public, and both here and there a large portion of the public lays itself open to ridicule by a superficial pretension to being "æsthetic;" but then, twenty years ago at least fifty per cent of this same public was absolutely apathetic on matters of taste. The direction and development of artistic thought was in the hands of a relatively small clique of artists and patrons. No wonder that the hundreds and thousands of persons upon whom the idea that it is "good form" to have taste are superficial and indiscriminate, and open to ridicule. There seems to us to be more hope in the fact that the public to whom an artist can appeal is so much larger, than there is discouragement in the fact that the public is still in its infancy as regards matters of æsthetic choice. B. W.

THE CONSOLIDATION OF THE SOUTH PASS JETTIES.

JUNE 17, 1875, the Mississippi jetties were begun. Their projector, Captain James B. Eads, was at that time comparatively unknown outside the profession of engineering, though his brilliant record as a government naval constructor during the war of the rebellion, and afterwards as builder of the great steel bridge at St. Louis, had already placed him well up on the ladder of professional fame. To-day he is known by his work, by perhaps a majority of the news-reading public.

By steady, hard, concentrated work and untiring energy, and in spite of many obstacles thrown in his way, not only by nature but by members of the profession, he has succeeded in producing even better results at the jetties than he claimed to be possible. As simple channel-makers the jetties may be considered as complete, but their consolidation, so as to guarantee their stability and economic maintenance, is an additional problem that Mr. Max E. Schmidt, C. E., presented, in the form of a carefully prepared paper, at the eleventh annual convention of the American Society of Civil Engineers, June 17, 1879. As he puts it, "strength being superlatively the original aim in the construction of sea works, *continuous* strength must be the essential for their permanency." Willow mattresses, loaded with stone, were used as the basis of the jetties, and it is to keep these from being displaced, or from leaking badly, and to prevent undermining and overflowing, that the consolidation is undertaken. McAdam-stone and gravel are used to fill interstices and prevent leakage. Rip-rap stone paving on the top of the mattress work and just above average flood-tide completes the work for the first eight thousand feet seaward on the east jetty, and nine thousand feet on the west jetty. The remainder of the distance to the outer extremity, on both sides, is being consolidated by the same arrangement of McAdam and gravel, with great blocks of concrete whose bases rest at average flood-tide level. The size and cross-section of this superstructure varies according to the location, being much heavier at the lowest end than farther up the river. Besides the concrete the lower six hundred feet are still further strengthened on the sea side by additional willow mattresses one hundred feet wide and two feet thick, over which a sloping crib-work of palmetto piles is laid, and the whole is kept in place by filling compartments between the piles with large stone. The river side is strengthened in the same manner without the willow mattresses; the palmetto crib being placed on top of the rip-rap. Large rock covers the crib-work and connects the same with the concrete. This work protects the concrete work from any directly injurious action from either sea or river. At the outside extremities of the two jetties pier heads are to be built at right angles to the axis, and in the form of a T-head.

The settlement and compression of the work differ greatly on different sections, — the former varying with the consistency of the bottom and the depredations of worms, the latter being probably nearly a constant quantity. Near the lower end, sixteen tiers of mattresses have been sunk, representing twenty-six and three quarters feet, of which eighteen and three quarters feet are below the original bottom of the bar. The depredations of the teredo are not such as to cause particular alarm, for there seems to be no special reason for believing that any portions of the willow, other than what are directly exposed to the salt water, are injured by them.

Some two years ago numerous large stones, varying in weight from one to two tons each, were placed at the centres of the jetties, near their lower ends, but as they were lifted from their position and rolled over the jetty by the waves during a gale, it was determined that something more massive than quarried stone must be resorted to. Plans, therefore, were made, providing for blocks of cement concrete varying in weight from twenty-five tons to seventy-two tons each, their proportions and dimensions being so chosen as to give great stability, and render it impossible to upset them. The works at the Sulina mouth of the Danube, and at Port Said, the terminus of the Suez Canal, are being consolidated in this manner, but the largest blocks of concrete, of which record is made, seem to be those at Cherbourg, weighing forty-four tons. At South Pass a railroad track is laid on each jetty, furnished with a locomotive, and a dump car holding about two cubic yards, to facilitate matters, and the concrete is mixed by steam power.

The composition of the concrete is approximately as follows: forty per cent broken stone; sixteen per cent clean gravel; twenty-eight per cent sand; sixteen per cent cement.

The broken stone, or McAdam, is hand broken, and small enough to pass through a three-inch ring. The gravel is brought from Prophet's Island, near Baton Rouge, La., some two hundred and fifty miles, and the particles are from one thirtieth of an inch to two and one half inches in diameter. The sand, excavated from the islands in Mississippi Sound, near the mouth of Pearl River, Miss., is moderately coarse (one fortieth per cent diameter), and a sharp-grained, white, or pale yellow material. Saylor's American Portland Cement (slow-setting) is used to make the bond, over five thousand barrels of three hundred and eighty pounds each having been used up to June, 1879. The cement seems to give good satisfaction, for Captain Eads says: "The careful tests which have been made with it by the resident engineer, Mr. Corthell, and his assistants, justify me in saying that I believe it to be fully equal to the best English brands." It may be said that these tests, five hundred and eighty-three in number, give an average tensile strength of two hundred and seventy-eight and three tenths pounds, as against three hundred and fifty-five pounds, Liverpool corporation test, for the best English Portland Cement. The ingredients are mixed with fresh water, in quantity equal to about ten and one half per cent of the volume of the dry material.

The moulds in which the concrete is formed are made of thin flooring, held in place by stanchions, the whole being wedged and dovetailed so as to stand temporarily without nails. The moulds are pushed close to the finished blocks above, so as to have joints as small as possible. After the removal of the moulds, irregular places and holes are plastered by the masons.

Apparently the blocks settle within the first ten days of their construction and then remain nearly stationary for an indefinite period. Whether there may be any considerable settlement in the future it is too early now to tell, but thus far an average of from four tenths to eighty six-hundredths of a foot will represent the subsidence due to the weight of the superimposed concrete blocks. B.

W. M. HUNT'S INFLUENCE ON PAINTING.

IT is not surprising that some of the enthusiastic young artists who have recently imported foreign styles from the ateliers of Paris and Munich into American art should be fanatic on the question of *technique*. They have a mission to perform, they are teaching us the importance of technical knowledge in art, and all such men must be more or less fanatics; but while they are indispensable to the art of the future, their admirers are not obliged to be fanatical as well; dogmatism has no place in such questions, and they should remember that mastery in style is simply a means, and not an end, — in skilful hands a weapon, but not the deed for which the weapon was made, — while styles that are to give immortality to our artists will not be borrowed, but indigenous. This period of our art, so far as painting is concerned, began several years before its drift was strongly perceptible, quietly and unostentatiously. Some fifteen years ago the Boston correspondents of the New York press began to allude to the art school and work of Mr. William M. Hunt. He had already been for some time a rising power, and was until his recent untimely death the most considerable individuality in contemporary American art. At the same time his career most thoroughly illustrates the truth of the foregoing reflections. Mr. Hunt has been an influence among us, not so much because of the originality of his art as on account of the force of his personal character, which, in a city where personality has a charm unusual in the United States, conveyed the impression of genius, and gave weight to whatever he said and did, and collected around him a circle of admirers who were bound in tacit league to fight his battles, too often with a zeal that was liable to be unjust in the consideration of other artists and schools.

Another reason for the remarkable influence Mr. Hunt has ex-

erted is owing to the fact that when the hour had arrived for a new period in our art, the first step in that direction was taken by him. We refer to the question of *technique*. Whether consciously or not, Mr. Hunt seems to have been the first to make the deliberate attempt to import foreign methods into our art. Not that he was the first of our painters to study abroad and to imitate foreign styles, for, from the time of West to our day, many of our artists have done the same. But their power has been less, or they have soon emancipated themselves from foreign influence, and formed styles of their own, or the time was not yet ripe for so distinct a recognition in this country of the importance of technical excellence. Mr. Hunt had the good fortune to introduce here the methods of one of the greatest masters of modern times, Jean François Millet. The superb style of that artist Mr. Hunt could reproduce for us, as he did, in numerous excellent portraits and compositions, and repeat some of his maxims; but the soul of the art of Millet cannot be imitated here until men as originally great as he are born among us. Still, we undoubtedly owe a debt of gratitude to Mr. Hunt for starting a movement of such importance in America, even if style be only a means to an end, although what an indispensable means!

The conditions for the success of Mr. Hunt's undertaking could have been found nowhere else in America at that time so well as in Boston. Compact, strongly swayed by the *esprit de corps* of cliques, intensely self-appreciative, and until quite lately homogeneous in population, this city has always loyally stood up for the opinions of the heroes it adopts. Therefore we say no better place could have been found in America wherein to start a new æsthetic movement.

Mr. Hunt's influence has been apparent in two ways, of which one has been to gather around him a flock of enthusiastic admirers, who have faithfully imitated the style of Millet at second hand, as suggested through the works of their leader. They have thus played an imporant part; and if none of them have been geniuses, — for genius rarely condescends to imitate, especially at second hand, but is bound to assert itself in original creations, — they have at least done good service in publishing the gospel of style. Mr. Hunt's influence has been also evident in stimulating a crowd of art students to cross the Atlantic to study the *technique* of modern European art in its strongholds. We think we are not mistaken in attributing one of the most noticeable phenomena of our contemporary art to his example and his precepts.

But if Boston was the place in which the new era could best make a beginning, we must frankly admit that in New York — more cosmopolitan and catholic in its views on all questions than Boston — this period of our art seems destined to find a more congenial field for its growth and development. Until the advent of Mr. Duveneck from Munich, and the active efforts exerted to gain for his paintings the recognition of the leaders of the Boston art-circles, it was nearly impossible for any but modern French art, or the imitation of it, to gain a foothold in certain circles of that city, while in New York we see the graduates of the studios of Paris and London, Munich and Rome, finding ample scope for their methods, and actually working together for the establishment of art schools and exhibitions that should give expression to their respective views. If too intolerant of the good work our artists have formerly produced, they have at least enjoyed and practised a certain degree of charity towards each other which can afford to be enlarged as they become surer of their ground. Intolerance in the consideration of art questions is the most common of all the forms of that evil, while it is never more offensive, when one considers the infinite number of truths in nature that may be and are to be revealed by art, and the fact that it is only as artists see and interpret those truths in their own way that they can possibly add anything of really permanent value to the intellectual progress and happiness of mankind. — *S. G. W. Benjamin in the American Art Review.*

THE FALL OF THE TAY BRIDGE.

The first point ascertained by the discovery by the divers of a part of the wreck of the train is, that the bridge did not fall before the moment when the train was upon the portion that fell. If so, the idea of an independent destruction of the bridge by the gale, and of the leap of the engine and train into the chasm, must be definitely abandoned. Next, it is in evidence that the train was proceeding at a foot pace of three miles or thereabouts per hour. The theory of a violent concussion of the engine against the girder must, therefore, be given up. It would be too much to declare it impossible for the train to have left the rails (provided as they were with guards) at that speed; but it is extremely improbable that such was the case. We have thus to regard the girders that gave way as supporting a slowly moving weight of some 80 or 100 tons, distributed over about the length of one span of the bridge. As far as the weight is concerned, this would have added to the stability of the bridge, unless so considerable an amount of oscillation had been set up as would have passed the limit of safety were the bridge unloaded. We are thus led to regard the bad effect of the train on the bridge as mainly limited to the addition of a surface of some 2,000 to 2,500 feet to the resisting area of one or two girders at a time.

The actual shock caused to either unloaded or loaded girder by the fury of the storm is less easy to estimate. A pressure of fifty-five pounds per square foot is said, in Knight's Encyclopædia of Engineering, to have been actually registered at Glasgow Observatory. But the measurement of pressure is one thing, and the exceptional fury of a pulsating gust up a funnel like that afforded by a river valley is another. We will not attempt at the moment to estimate the maximum pressure. But we shall probably be within the mark in taking a minimum force of forty-five pounds per square foot. The area exposed by the girders is given at 7,615 superficial feet. But as this is not plain surface, but iron net-work or lattice, a large deduction must be made from that sum. On the other hand, the wind that rushed through one interval might strike another bar of the girder. If we allow one third of the exposed area to be resisting surface, we shall have again in round numbers 2,500 superficial feet. On this estimate the presence of the train on the bridge just about doubled the resistance offered to the wind; or, in other words, halved the resisting power of the bridge. And the lateral force to which a girder, or an equivalent length out of two continuous girders, was exposed, was more than 100 tons, acting as laterally displacing pressure. Keeping still to round figures, which it will be easy to correct if necessary, we find that the train had arrived at a point between the fourth and fifth piers when the collapse occurred. This is shown by the position of the wreck. The width of the piers was twenty-seven feet, and the width between the centres of the iron columns which stood on them was of course less. The height from the water to the rails is given at ninety-two feet, and above this was the thickness of the roadway and the depth of the girder. It follows that the effect of the force of the wind to tip the structure sideways was resisted by only three elements of stability. Of these one was the continuity of the girder; one was the weight of the bridge; the third was the disposition made to tie down the superstructure to the earth, so as to check a disposition to tip over.

The value of the first of these elements may hereafter be calculated; the second may be taken at under 400 tons for the span of bridge and train. The resistance would be exactly balanced by such a force as we have above estimated, — namely, a lateral pressure of 100 tons, acting with a leverage of four to one, directed to pull up the windward columns supporting the girder, the base of the leeward columns acting as a fulcrum. In this case the stability of the bridge would have depended solely on the continuity of the side girders, and on the provision for holding down the girders to the earth. This latter provision, however, seems to have been omitted. It may, of course, prove that such was not the case; but no mention is made of holding-down bolts. Had an iron plate been built at the bottom of each cylinder, with bolts of adequate diameter keyed below it, and brought up through the concrete and masonry, to tie the superstructure and prevent a sidelong tipping over on its narrow base, the bridge in all probability would have been safe. Now we are told that "the sixth pier had been neatly cut across as by a knife, only a small piece of the lower portion of the iron columns remained on the masonry, which had been started, and showed cracks in several places." "The fifth pier showed signs of a terrific wrench; the top coping-stone was literally cracked and torn to pieces. The iron columns lay like so many matches." Here, then, we see the point of yielding. The "clean cut" on the sixth pier must have been due to the "way" on the yielding girder by the time the motion reached that spot, the splintered work on the fifth pier betraying the struggle where the structure first yielded. Thus the point of yielding was the attachment of the iron-work to the piers — strong and substantial, no doubt, if regarded as intended to resist weight and vibration, but, so far as the accounts go, not secured in such a manner to the bottom of the masonry as to bind all together in one homogeneous structure and offer an adequate resistance to lateral displacement. —*Pall Mall Gazette.*

PAINTING AND STUCCO IN ANCIENT ROME.

The discovery of the Augustan house on the Tiber shore revives the old interest that was felt in Pompeian pictures, and the delight we all of us took twenty years ago in the painted tombs on the Via Latina when they were discovered, and we saw for the first time mural decorations far superior to the Pompeian pictures and *stucchi* ornaments. It sharpens our curiosity about ancient artists and their mode of work. We are eager to read every author who writes about them, and there is an exquisite gratification caused by modern artistic representations of incidents in ancient art lives when painted, as Scifoni paints, with skill, feeling, and accurate archæological knowledge. Some of the *'freschi* are already mounted in frames and hung in the old plant-house of the Orto Botanico, Trastevere, where is to be established the Tiber Museum. When the *stucchi* are mounted on their curved plaster backgrounds they will also be placed in this Tiber Museum.

The museum will be thrown open to the public, it is hoped, this season. But the work of putting the pieces together is very tedious, and may occupy the whole winter. It is a strange old place, those cloisters. There are marble fragments in the court-yard that have come from every quarter of Rome. Under the cloisters and in the surrounding rooms busy, skilful workmen are sorting from the great heaps of precious *'freschi* and *stucchi* the bits they need to reconstruct the ruined decorations. Nothing is repaired; nothing added. You will see when they are exposed to view only that which was left in the ancient house of its former splendor. On one of the cloister walls is a marble inscription which tells us that where Hadrian, the

Roman Emperor, built a temple to Venus, there Alessandro Torlonia, a Roman prince, raised an altar to the Holy Mother of Christ Jesus. The temple and altar are alike gone. The *'freschi* have been covered with a varnish of wax and turpentine which preserves them and also freshens the color. These pictures seem to have been painted upon some one local color. The foundation was first covered with a smooth red, black, or white ground. The figures or scenes were then painted upon this foundation. You can see where the colors of the pictures have fallen off, the red, white, or black of the foundation existing, polished and unfaded. Pliny and other writers tell us how ancient paintings were executed, but all they say fails to make moderns comprehend the processes.

The *stucchi* which I described imperfectly last year I have examined more closely, and have been able to see some details of their workmanship. They were not cast and put on as modern decorations of the kind are done, but modelled on the ceiling surface. The designs were first traced on the hard ground. Where some of the stucco has fallen away you can see the bold, free lines of the first original design. The pictures, or figures, were then modelled on. The stucco that was used, it was supposed by some learned in the matter, was composed of marble dust and calcelime, but this is not certain. Judging from the work on these ceilings of the Tiber house, also the exquisite work on the painted tower of the Via Latina, the skilful ancient *stucchi* artists must have handled their material as freely as painters do their liquid colors, and used their modelling tools like painter's brushes. You can see the touches of the tools in many of the figures. There is the fine feeling of the bas-relief in all the work, — that feeling in sculptural art so little understood in modern work.

There is no color in the *stucchi* of the Tiber house. On one of the painted tombs in the Via Latina are pictures united with *stucchi* and colored background, but not so in the Tiber house. They are pure white on a white ground. These curved ceilings were very low; not more than two metres and a half high, a little over the height of a man. The rich vivid colors of the walls rose up to the ceiling frieze. There were no windows, and the light that came through the doors must have thrown deliciously soft reflections of mingled hues upon the delicately modelled bas-reliefs of the ceiling. They represent various subjects: religious ceremonies, nymphs decorating hermes — on which are sylvan gods — with garlands, or lighting flames on altars. Then there are exquisite arabesques, so graceful that we wish Raphael and Giovanni da Udine could have seen them. There are crisp, firmly modelled flowers, fertile and original, as we see on the Renaissance marbles, and out of the calyxes arise warriors, winged griffins with Jupiter heads, and winged victories. It is impossible to repeat the varied fancies of these decorations, where the modelling tool seemed to play like a pencil or a brush on the surface. I picked up a piece of plaster on which was a beautiful square or rosette formed of a lotus flower and cigali. On each lotus petal was a grasshopper with extended wings. Some *stucchi*-workers are making a bath-room at the Quirinal Palace, for Queen Margherita, with *stucchi* decorations copied from these of the Tiber house, but they are cast, of course, not modelled. — *Rome Correspondent of Boston Daily Advertiser.*

THE UNCERTAINTY OF INSURANCE.

EIGHTY-THREE New York companies, tabulated by the Superintendent of Insurance of New York, disclose the following facts: That their expenses had been fifty per cent of their premiums, and their losses seventy per cent. There is no such thing as any insurance that is not mutual, and there cannot be in the nature of things. What is it on which each man depends who takes a policy of insurance in a stock company? He depends upon the aggregate premiums for his indemnity and upon the maintenance of the capital, which is merely a guarantee, standing in the place of those obligations of what are called mutual companies. Now the whole business, credit, traffic, and standing of this country depend upon the integrity of insurance, and upon its being maintained fully, amply, creditably, and rightly, paying the indemnity, which is what the assured seek when they pay their premiums; therefore, in place of the absence of any direct relation between the insurance companies of the land and the architects and builders of the land, there should have existed the very closest relations, the closest supervision of the construction, use, and occupation of every building. Now, why does it not exist, and why is it not in the power of the able presidents and executive officers of the stock insurance companies — and there are many such — to bring it into existence? I think I find the reason where it might least be expected, in the special supervision by the States of the contract of insurance. Now, the effect of that is, perhaps, very remote and subtle, but the authority of the State being its guaranty, it is generally thought that any company doing business within its borders is fit to take risks. Now, a great many of those companies that are thus authorized are not fit, and a great many agents and officers representing those companies are not competent; they are utterly incompetent, seeking more for the large commissions that are paid than for any adequate standard of safety. I hold that the first step to remedy this enormous loss which affects us is for the State to take its hand off, and then it will be possible for the managers of the strong and competent insurance companies to impose the same conditions and to make it for the common interest of the assured that they should impose the same conditions that the presidents of the mutual companies are able to impose upon their members, by simply advising them to construct their factories in such a way, to protect their factories in such a way, under the penalty that if you don't do it we will not insure you. — *Mr. Atkinson before the Society of Arts.*

HYDRANTS IN THE HOUSE-TOPS.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Dear Sir, — There are three suggestions in your paper of February 7 that I think would not have been made had the relation of the architect and underwriter been as close as it should be.

1st. In your editorial comments upon the suggested plan of roof-pipes and hydrants, you suggest a doubt whether water will pass freely through a cold iron pipe.

There is no room for doubt upon this point, as there is ample experience upon it.

2d. You suggest a difficulty in keeping the apparatus in order.

One hour an acre, once a month, would suffice, in the estimation of competent experts.

3d. Your correspondent, whose article on elevators is otherwise excellent, adheres to the theory of heavy, cumbrous, and useless *iron* doors.

Elevator shafts, as now commonly constructed, are nothing but flues of the most dangerous sort, and give evidence of the complete mastery that has been obtained in the art of combustible construction. There is not one known to the undersigned that could not be made substantially safe at a very small cost, but, in prescribing the right method, iron doors would be carefully avoided. E. A.

[That water will flow continuously through a cold iron pipe, when a circulation is once established, we know. We should think, however, that there must be a limit to the distance to which water could be injected into an empty circuit of very cold iron pipes, of small diameter, without being caught by the frost; and, of course, exposed pipes could not be kept full of water where there was no circulation. Running water freezes with difficulty, but it freezes. Even a waterfall in very cold weather gets covered with a sheet of ice. A full iron pipe at zero would probably soon have a lining of ice. In a long pipe of only four inches diameter there would be danger that this lining would get thick enough to seriously diminish the bore, and lessen the flow. We have no idea what the practical limit would be; but should say that in a long and complicated circuit with turns, branches, gates, and dead ends, the danger of choking was to be taken into consideration. It would be easy to send water through a rod of such piping, but probably not through a mile. Somewhere between we should expect to find a limit. If E. A. knows of examples which are decisive in this respect it would be interesting to hear of them. As for the supervision, of course it would be practicable; the only danger is of neglecting it, which certainly is not necessary. As we said before, we should be glad to see the scheme tried. — EDS. AMERICAN ARCHITECT.]

PUBLICATIONS RECEIVED.

ILLUSTRATIONS OF THE HISTORY OF ART. Part IV. The Industrial Arts among the Oriental Nations and the Nations of Europe, from the Middle Ages down to Modern Times. 42 plates. Boston: L. Prang & Co. 1879. Price $1.75.

NOTES AND CLIPPINGS.

LOSS BY FIRE IN NEW YORK. — Fire Marshal Sheldon reports that the 1,541 fires of 1879 in New York destroyed property valued at $5,671,580. The annual fire loss of the United States is presumed to average nearly $100,000,000, so that the metropolis bears more than one twentieth of the nation's entire fire loss for the year. In the face of these statistics architects complain that real estate owners will not pay for fire-proof construction and there are very few buildings being erected with any safeguards. The blame is generally thrown on the insurance companies' rates, but owners should take into serious consideration that the $900,280 loss on buildings burned in 1879 and the $4,771,300 on the contents of those buildings is so much wasted wealth, and that it is their duty to do what lies in their power to prevent such serious drawbacks to the prosperity of the city.

COAL OIL AT FIRES. — Chief Engineer Sexton, of the St. Louis Fire Department, being asked by a newspaper reporter of that city what he considered the chief causes of fire, replied: "As for the fellows who set their places on fire to get the insurance, we can't prevent it; all we can do is to squelch the blaze when it is lighted; but I'm paralyzed on coal oil. I am more afraid of it than powder; it is more dangerous to life and property. No kind of inflammable oil is safe. Places have caught on fire by gas, but it has been through intention or carelessness. I would go back to star candles before I would use any of the oils, I don't care what name they call 'em. They are the fireman's fear. If people had seen the suffering of dead women and children, victims of coal oil, that I 've seen, they 'd drop it. It 's a misfortune that it was ever discovered or brought into use for illuminating or heating purposes." He also stated that the records of the fires in St. Louis show that in that single city some thirty-two fires have been caused by coal or other oils during the present year.

Driven Wells. — The *Fireman's Journal* gives the following account of a set of driven wells that have proved very efficient in supplementing the regular water supply in Manchester, Iowa. "A pit four and one half feet deep was dug in the form of a cross having equal arms, each arm extending eight feet from the common centre. At the centre was put down one pipe and at the extremity of each arm another, making five in all, the outer ones being eight feet from the centre. The terminations of the pipes, or points, were two inches in diameter, with two hundred and fifty holes in each. The average depth to which the points were driven was twenty-one feet below the bottom of the pit. The five pipes are brought together at the centre, discharging through a pipe of the same size as the suction of the steamer. At the first trial some little delay was experienced, owing to the difficulty of making the connections air-tight, but this defect was soon remedied and a full stream of water was thrown through one thousand feet of hose. The wind was blowing a gale at the time and the draught in the furnace was so great that water could not be kept in the boiler, so the trial was abandoned after about twenty minutes' playing. The question remained whether the supply was exhaustible, but this was subsequently determined in the negative by a test of two hours' duration, the water coming as copiously at the end of the trial as at the beginning."

The Elephantano Cave. — The island of Elephantano is nearly a mile long, thickly covered with forest trees, principally palms and tamarinds. The appearance of the island is singular, having two peaks, each several hundred feet high. The cave is located in the valley between the peaks, nearly half way up the hill, being about a half mile from the landing. Formerly the traveller was carried from the boat to the shore by the natives, the water being very shallow near the island, but now there is a little pier, on which we landed and walked to the shore. A cut-stone stairway leads up the hill to the Temple. The stairs are a stupendous work, and the steps are well worn by the feet of the millions of pilgrims and worshippers at these celebrated Cave Temples. The front of the Temple is open now, but there are indications that there was an entrance in which there may have been solid doors; but the early descriptions of this Temple are silent upon the subject. The place, with the surrounding scenery, is truly romantic. The magnificent tropical trees and brilliant wild vines all contribute to form a scene of peculiar interest. The Temple is about twenty feet high, and, being all open, is as light as day, and every part can be seen without the aid of artificial light. The great room in this Temple is one hundred and thirty-three feet by one hundred and thirty. There are several apartments, but all communicate with each other. The rocky roof is sustained by immense fluted pillars with ornamental capitals, that somewhat resemble poppy plants, of many designs, and all hewn out of the solid stone. The principal piece of statuary is the Trimurti, or Trinity, which stands opposite the principal entrance. These colossal figures stand twelve feet high, and are at once grand and imposing. The three heads are supposed to represent the Hindoo Trinity. The most prominent head represents Brahma, the Creator of all things. The features are pleasing and calm, with an indication of serene repose. Vishnu, upon one side, has a mild and benignant expression. The figure has been injured and sadly mutilated. In one hand there is a lotus blossom. On the other side there stands Shiva, with an expression so fierce, showing teeth so threatening, that he well represents the Destroyer. Shiva holds in one hand a cobra with expanded hood, and waiting for a chance to strike the blow that is sure to carry death to the victims. It was a sculptor of rare merit that designed and executed these heads in this hard rock. They are quite unlike, but you cannot fail to discover the design of the sculptor in making these figures. The same figures are repeated in different parts of these strange temples, and are so similar that you cannot fail to see the symbol, but none of the other statues are so impressive as the Trinity. There are smaller rooms in this temple, the columns and walls of which have very curious sculptures. These curious figures have received adoration for many centuries, and until quite recently a large number of pilgrims and worshippers came hither to make their offerings, and to worship. While some of the figures in this Cave Temple are well executed and may claim merit as works of art, yet many of the statues here are, to say the least, crude symbols, and so very inferior that I cannot understand how any one could have worshipped them, but they did. There is a stone, or statue, which is symbolic of the Lingam, which is the most ancient of all the Hindoo symbols. This one in past years was of very great repute, and considered quite efficacious as a cure for barrenness. — *The American Antiquarian.*

Buried Oak Timber. — In deepening a river in the neighborhood of Norrköping, says the *Timber Trades Journal*, in order to make it accessible for ships of heavier draught, among several objects of interest brought up from the bottom, eight oak trees were found at a depth of seven feet under the old bottom. The bark was almost decayed, and when it was taken off the wood was found to be hard and black, resembling ebony. The trees are supposed to have been lying in the earth 900 years. The trees have been sold to a firm of joiners, who intend using them for cabinet work.

Telegraph Wires and Fire Insurance. — The Chicago insurance companies are talking about increasing the rates on buildings that are surrounded by telegraph wires.

The Pergamos Marbles. — The latest attractions in Berlin are the Pergamos marbles, which, by a piece of finesse worthy of the *Tartuffe* of nations, have just been brought from Asia Minor, and deposited in the museum under the care of Professor Curtis. A Prussian engineer, it appears, found traces of sculpture in certain old walls near Pergamos, which the Turks had plastered with mud and lime. He informed his Government of the fact, and they, after due investigation, purchased the walls for about £2,000. A gun-boat was then quietly sent to bring the works of art which they contained to a German port, while the world was wondering why Germany should appear in the East to intimidate the Turks with a vessel of war. The most remarkable part of the collection are sculptures in relief representing a battle of the gods, and which it is supposed formed part of a gigantic altar. Owing to the fact that the Turks utilized these marbles under a covering of plaster, they are in excellent preservation. — *The Examiner.*

Ancient Flemish Churches. — In the old Flemish town of Oudenard stands an edifice remarkable for its style and its antiquity, — the Church of Notre Dame de Pamele. An inscription mentions the date of the commencement of the building, the 4th Ides of March, 1234, and the name of the architect, Arnoulphe de Binche. It was completed in 1838. The church of Pamele, the most unique of its kind in Belgium, is most interesting for the study of the early period of Gothic art. Built in the form of a Latin cross, it is 155 feet long and 56 feet wide, and of equal height under the central nave. The transept is 100 feet long. At the intersection of the arms of the cross rises an octagonal tower, with a pyramidal roof. The choir, with a pentagonal apse, is surrounded with numerous bays, and a triforium of majestic simplicity completes this gem of architecture on the eastern side. The transepts, and especially the nave, although constructed at nearly the same period as the choir, are less graceful, but they have similar grandeur on the whole. Notre Dame de Pamele, so interesting on many accounts, has suffered great injuries. Time and the Scheldt, close to it, had exercised their ravages on it. Already a century ago it was considered in so bad a state that its restoration was looked upon as useless or even impossible. Then it was daubed over inside with plaster, its beautiful columns were transformed into hideous square pillars, its pointed windows changed into circular ones, and an enormous cornice destroyed the light, elevated aspect of the building; the triforium and the windows were partially stopped up, the roof modified, and whitewash appeared everywhere. In short, the monument so throughly lost its original character that Schays was deceived, and took the pillars and circular windows of the choir for authentic. At present, opinion is changed, and the restoration and consolidation of the church is not considered impossible, and the work has been going on for a year with great activity. It has been confided to M. Van Asshe, who understands restoration in its true sense. Full of respect for the work of his predecessor of the thirteenth century, he is endeavoring to re-establish it such as it left the hands of Arnoulphe de Binche. The choir has already resumed its primitive aspect, and the rest of the church is progressing rapidly in the same direction. — *Exchange.*

Mines in Prussia. — The estimated receipts for the produce of the coal, metallic, and salt mines belonging to the Prussian Government for the next fiscal year are, as appears from a recent debate, 48,198,148 marks, or rather more than $12,000,000. Considerable complaint was made by some members in the recent debate at the fact that the salt mines, on which 4,500,000 marks, or $1,125,000, had been expended during the past ten years, produced this year only the miserable sum of 98,000 marks, or $24,500, the capitalized value of the salt mines being estimated at $3,750,000. In reference to the upper Silesian coal mines, it was stated that women were still largely employed there, the number at the last enumeration being about 5,500, most of whom were young Polish women and girls.

Tillamook Rock Lighthouse. — The *Oregonian* gives some new items regarding this enterprise, so long deemed impracticable. It says: Tillamook rises from the ocean one and one eighth miles from the mainland, twenty miles south of the Columbia River, which is the harbor nearest it, and therefore practically twenty miles from land. Its height is about 100 feet above the water line, from whence it tapers slightly, terminating in a crest about 130 feet across. It was proposed to cut down this rock to a point where it is wide enough to form the base of the proposed building; and determined that the success or failure of this preliminary effort would establish the practicability of the project or prove the reverse. The terrific dashing of the waves against the rock renders landing alongside impossible, and it was only under the most favorable conditions of weather and at imminent peril that a man bearing a small line was enabled to reach it. This small line drew a larger, and this one still a larger, which, being secured, formed a swinging connection for a netting in which men, supplies, tools, etc. were landed from a tender. Then men, under the foremanship of Mr. Ballyntine of this city, have been at work for several weeks, and besides having accomplished a goodly part of the object of their labors have demonstrated that men can live in comfort on the rock, and that Colonel Gillespie's plans are practicable. The lighthouse which will be erected will be of the first-class order and manned by a keeper and three assistants. The rules under which these persons must be selected demand that they be masters of mechanical trades, the special qualifications of each differing from the others. Attached to the light will be a "siren," or steam fog trumpet of the latest and largest style. The station will be visited frequently by a tender with supplies, though during boisterous weather it will be impossible to communicate with it excepting by signals. The establishment will be completed, if no special misfortune occurs, by the first of December next year.

A Russian Ice House. — A house of ice, similar to that which was built in the Empress Anne's reign, is about to be constructed in the Zoölogical Garden at Moscow. The managers of that establishment have found among its archives some valuable details as to the mode of building which was adopted on the former occasion, and they will be adhered to in the present instance. The first edifice was raised between the Admiralty and the Winter Palace at St. Petersburg, in 1740, and was formed throughout — walls, roof, windows, decorations, alike — of ice. The blocks were cut in a square shape and their surfaces sprinkled with water, which, when the cubes were placed in juxtaposition, froze in the interstices and bound the whole into one compact and solid mass. At the entrance of the structure was a large gallery filled with statues. The pilasters on the exterior were fashioned to imitate green marbles. The antechamber possessed four windows and the other rooms five each, while on the sills stood vases filled with flowers made of ice, shrub-like plants covered with birds of the same material standing at the corners. Clock cases, chairs, tables, wardrobes, utensils, candelabras, beds, were all of ice. — *Exchange.*

Maps of Paris. — The reproduction of the old maps of Paris, beginning from a very early epoch, is now being proceeded with by direction of the municipal authorities. These fac-similes are being effected by means of the most perfect processes of photographic engraving, and the collection is likely to prove most interesting as well from an artistic as from a historical point of view. Among the maps to be copied figures that called the "Plan de Tapisserie," which was worked by ladies of the court.

BUILDING INTELLIGENCE.

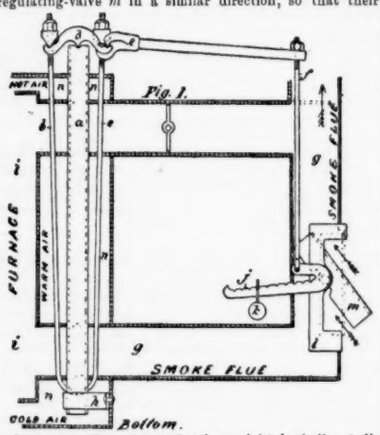
[Reported for the American Architect and Building News.

[Although a large portion of the building intelligence is provided by their regular correspondents, the editor 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.]

221,487. FURNACE-REGULATOR. — Charles H. White, Malden, Mass. The combustion chamber of the furnace is represented by the space marked *i*. The smoke-flue is marked *g*. The air-heating chamber, with cold air admitted at the base, is marked *n n n n*. In this air-heating space is a vertical iron flue, *a*, which, when heated, expands less than brass. This flue has its lower part in the base of the air-space *n*, where it comes in contact with and is surrounded by the cold air, near its entrance into the furnace. The upper end extends entirely up through the column of air, and has its upper portion in the hot air at the top. On the top of *a* is formed a seat for the fulcrum of the lever *d*. This lever *d* has a seat on each end, one for the fulcrum of the lever *e*, the other for the fulcrum attached to the part *b* of rod or rods *b c*. The lever *e* has another seat bearing the fulcrum or knife-edge attached to part *c* of the rod or rods *b*'*c*. The rods *b c* are in one piece, as shown, forming a loop at the lower end. They take hold of the cold-air flue *a* near the bottom in the cold-air space, and both are supported by the stand *h*. A rod, *f*, takes hold of the long arm of the lever *e*, and is connected to the short arm of the graduated lever *j*, both arms of which extend from the pivot of the regulating-valve *m* in a similar direction, so that their



weight, as well as the graduating-weight *k*, shall act directly to turn the valve *m* when permitted by the expansion of the rods *b c*, which allows the lever *e* to droop. Great advantage is gained by attaching *j* directly to the valve, so that its action is immediate and not through other connections. The valve *m* is partly cylindrical, by which means its pivots are brought toward the middle of the smoke-flue, and its upper portion made to fall across and nearly close the passage in the smoke-flue with a small movement of the valve, the curved form always insuring the proper opening or passage-way to carry off the gas. The lower end, at the same time, gives advantageous form to the lower inlet of air. The lever *j* is graduated and carries an adjustable weight, *k*. The valve *m* has a peculiar action in admitting air to the smoke-flue to check the draught, so checking the combustion and reducing the heat. It not only admits by its upper end a flow of air to supply the draught in the usual way, but also furnishes by the action of its lower end a supply of air back of the check part of the valve, so as to counteract a certain tendency which even the inflowing air has to draw other air and products of combustion through the partly-closed opening or passage in the smoke-pipe, whereby a most perfect action is secured. Another peculiarity is that the bearings which support the pivots of the valve *m* are attached outside of the smoke-flue or entirely out of the way of the corroding action of the acids and other products of combustion. The operation is somewhat as follows: The flue *a* stands in the air-space, and must, of course, become warm enough to produce an upward current of air within it, while at the same time it is prevented from becoming much heated by the cool current within, taken directly from the cold air at the bottom. Its lower end, also, is constantly surrounded with cold air. For these reasons it becomes an excellent differential expansion member to combine with brass rods. The rods *b c* are of brass, and extend with *a* through the entire column of air, the cold at bottom, the intermediate, and the hot air at top. As the air in *n* gets heated, the excess of expansion in the double rod *b c* over that of the chimney *a* will permit the long arm of *e* to droop, and allow the weight *k* and the arm *j* to fall and open *m* in a degree proportionate, first, to the temperature of the hot air, and, secondly, modified proportionately to the intensity of the cold in the cold air acting on the lower parts of the differential expansion agents *b c* and *a*. The double current is therefore admitted by the valve *m*, proportionately checking the draught, and consequently the combustion, and modifying the heat. As the heat is lessened below the degree required, and for the maintenance of which the weight *k* has been adjusted upon *j*, the rods *b c* contract faster than *a*, and close, or partially close *m*.

223,973. INSIDE BLIND. — John M. Abbott, Tama City, Io.

223,984. FIRE-EXTINGUISHER. — Heinrich Böhie, Spandau, Prussia, German Empire.

223,985. DOOR-HANGER. — Thomas H. Bottomley, Capac, Mich.

224,006. TOOL-POST FOR TURNING LATHES. — Giles S. Fales, New Bedford, Mass.

224,015. MACHINE FOR PRESSING AND MOULDING CLAY INTO TILES AND OTHER ARTICLES. — Israel Hogeland, Indianapolis, Ind.

224,020. STEP-LADDER. — Melvin N. Lovell, Erie, Penn.

224,021. WINDOW SHUTTER AND OPERATING DEVICE. — William H. Lotz, Chicago, Ill.

224,029. WEDGE FOR AXE AND TOOL HANDLES. — George P. Morrill, Canterbury, N. H.

224,040. LATCH. — Augustus B. Prouty, Worcester, Mass.

224,060. ELECTRIC BURGLAR ALARM. — William L. Voelker, Morton, Penn.

224,078. EMERY CLOTH. — Franklin Copeland, Boston, Mass.

224,092. DOOR-CHECK. — Nelson Kidney, Dunkirk, O.

224,106. DOVETAILING MACHINE. — Gustavus W. Parker, Brunswick, Me.

224,110. PORTABLE WINDOW SCAFFOLD. — John Skidmore, Chicago, Ill.

224,125. SIGNAL FOR WATER-CLOSETS. — Delos R. Baker, Cincinnati, O.

224,129. FIREPLACE. — John H. Beard, Providence, Ky.

224,131. STEAM RADIATOR. — George W. Blake, New York, N. Y.

224,150. STONE-TURNING LATHE. — Lucius B. Clogston, Fair Haven, Vt.

224,154. CHIMNEY-TOP AND VENTILATOR. — George W. Demond and Louis Demond, Brooklyn, N. Y.

224,156. DIE FOR FORMING DOUBLE-TWIST GIMLETS. — Amos H. Dense and James S. Dense, Chester, Conn.

224,173. FIRE-PROOF BUILDING. — Joseph Gilbert, Philadelphia, Penn.

224,182. APPARATUS FOR MAKING WELLS. — James W. Hammett, Willow Island, W. Va.

224,213. OPERATING HATCHWAY DOORS. — George W. Mouldin, St. Louis, Mo.

224,228. MANUFACTURE OF SHEET-METAL TUBING. — David A. Ritchie, Chelsea, Mass.

224,244. FASTENING FOR TOOL-HANDLES. — A. E. Tangen, Bismarck, Dak.

224,251. ELASTIC RUBBER TOOL HOLDER OR HANDLE. — Abel D. Tyler, Brockton, Mass.

9,064. METAL-WORKER'S TOOL. — (*Reissue.*) Spencer G. Wilcox, Weedsport, N. Y.

SUMMARY OF THE WEEK.

Baltimore.

BUILDING PERMITS. — The following building permits have been issued since our last report: —

C. W. Bornman, three-st'y brick building, on Decker St.

A. J. Bond, 2 three-st'y frame buildings, 230 and 232 Argyle Ave.

C. F. Richter, 7 three-st'y brick buildings, cor. Townsend and Cary Sts.

Messrs. Broderick & Bro., four-st'y brick warehouse, on Pratt St., near Green St.

Mrs. A. E. Nedwell, two-st'y brick building, on Charles St., bet. Saratoga and Pleasant Sts.

Herman Leer, three-st'y building, cor. Park and Marion Sts.

Henry Becker, three-st'y brick building, on Gay St.

John L. Stieff, three-st'y brick building, on Baltimore St., bet. Green and Pine Sts.

WAREHOUSES. — Mr. E. F. Baldwin, architect, is preparing drawings for two new warehouses on Sharp Street, for John King, Jr., Esq. The front on Sharp Street will be 60 feet 3 inches, and on alley in rear 47 feet 10 inches, and the depth 216 feet 7 inches. The front on Sharp Street will be of pressed brick, with Cheat River stone finish, excepting the first story, which will be of iron.

Mr. Jackson C. Gott, architect, has just completed drawings for a new warehouse to be built on Howard Street, between Lombard and German, for Messrs. Johnston Brothers, bankers, to be known as the Johnston Building. It will have a front of 60 feet on Howard Street, and will be five stories high, with iron front. The contract has not yet been awarded.

ELEVATOR. — The preliminary arrangements for the building of the new B. & O. R. R. elevator are being made, and it will soon be under way.

FREIGHT DEPOT. — The new freight depot now building at the foot of Patapsco Street, by Messrs Adams & Brother, for the Philadelphia, Wilmington & Baltimore Railroad Company, will soon be finished. The wharf is 70 by 300 feet, and supports the freight depot, which is 60 by 300 feet.

DWELLING. — The contract for a new dwelling-house to be built on the corner of Calvert and Chase Streets, was awarded to Mr. John Brown. The building is to be 22 feet front on Calvert Street, and 79 feet on Chase Street, three stories high. Messrs. Wyatt & Sperry are the architects.

SCHOOL-HOUSE. — The committee of Primary School No. 7 has asked for an appropriation of $15,000.

Boston.

BUILDING PERMITS. — Since our last report the building permits granted are as follows: —

Brick. — 53 *and* 55 *South St.*, for Wm. H. Allen, 1 store, 27′ x 32′; five stories; J. P. Neal, builder; Bradlee & Winslow, architects.

57 *South St.*, for A. L. White, 1 store, 33′ by 103′; five stories; J. P. Neal, builder; Bradlee & Winslow, architects.

59 *South St.*, for Alex. Moseley, 1 store, 27′ x 104′; five stories; J. P. Neal, builder; Bradlee & Winslow, architects.

Wood. — *Conant St.*, Ward 23, for Wm. Hardcastle, 1 dwell., 22′ x 33′; three stories; S. Rantin, builder.

North Beacon St., Ward 25, for G. W. Hollis, 1 ice-house, 30′ x 150′; J. Berry, builder.

Lamartine St., Ward 23, for J. A. Framptor, 1 morocco factory, 20′ x 34′; J. Luippold, builder.

The season is opening 10 per cent better than last year.

FRENCH WINDOW GLASS. — The late rise in prices abroad and the large demand here have stiffened prices very much. Discounts depend on sizes and quantities wanted, and may be generally quoted at 40 to 50 per cent. Stocks are good here and generally well assorted.

POLISHED PLATE GLASS. — The imported plate is in good stock here at present. Prices are rising rapidly abroad, but still remain here at about 50 to 50 and 10 per cent discounts from tariff.

RAILROAD DEPOT. — It is said that the directors of the Boston & Albany Railroad will build a more substantial and costly passenger station than they first proposed, though they have not decided finally upon any plan.

Brooklyn.

BUILDING PERMITS. — *Kent Ave.*, cor. Kosciusko St., 1 three-st'y brick store and tenement, 24′ x 50′; owner, Charles Fasnau, Skillman St; carpenter, Edward Van Voorhis; mason, Patrick Kernan.

Grand St., 1 one-st'y brick glass factory, 50′ x 70′; owners, J. M. & William Brookfield.

Prospect Place, 3 three-st'y frame dwells., 16′ 8″ x 45′; owner and builder, Wm. H. Cousens.

Tompkins Ave., cor. Putnam Ave., 1 two-sty brown-stone dwell., 20′ x 40′; owner and carpenter, Daniel B. Norris, 417 Putnam Ave.

Kent Ave., 1 two-st'y brick factory, 81′ 3″ x 30′ 6″; owner, William Schroeder, 78 Morton St.; architect, A. Herbert; mason, V. Bruchhauser; carpenter, Andrew Scheld.

Clay St., 1 three-st'y frame tenement, 25′ x 38′; owner and carpenter, James Mullin, 112 Clay St.; architect, James Mulhaul; mason, Samuel Beamish.

Ainslie St., No. 109, 1 two-st'y frame dwell., 20′ x 34′; owner and carpenter, R. B. Ferguson, 250 Hewes St.; architect, W. H. Gaylor; masons, Smith & Bisson.

Wyckoff St., 3 three-st'y brown-stone tenements, 20′ x 45′; owner, George W. Brown, 728 Fulton St.; mason, Levi Brown; carpenter, C. E. Cozzens.

Nassau St., cor. Adams St., 1 four-st'y brick store and tenement, 25′ x 54′; owner, Mrs. M. A. E. F. Demarest, 4 Watts St., New York; architect, S. Bennett; builders, W. & T. Lamb and Jenkins & Gillies.

Bushwick Ave., cor. Cornelia St., 4 three-and-one-half-st'y brown-stone dwells., 16′ 8″ x 45′; owner, Thomas Morgan, 53 Bleecker St., New York; architect, T. F. Houghton.

ALTERATION. — *Charles Place, Nos.* 6 *and* 8, three-st'y frame extension, 25′ x 40′, tin roof; cost, $2,500; owner, Thos. Lyon, on premises; builder, Wm. Horring.

ASYLUM — The Home for Incurables is building under the charge of Mr. C. C. Buck, architect; cost, $33,000.

HOUSE. — Mr. C. C. Buck, architect, is building a detached house which will cost $45,000.

Buffalo.

STORE. — Mr. Argus is to put up a brick building on the corner of Hamilton and Niagara Streets; three stories high, 75 by 29 feet; cost, $5,000; Jno. Druar, contractor; F. C. Bate, architect, Cleveland, O.

Chicago.

BUILDING PERMITS. — During January the Building Department issued 196 permits, covering 87 permanent improvements. In 1879, in January, the department issued 55 permits, covering 23 permanent structures. Last week the department issued 55 permits, for structures costing $75,200. The following are some of the more important ones: —

Clark St., No. 214, vault for building belonging to the Peck Estate; cost $10,000.

Indiana St., No. 264, two-st'y livery stable and dwell., for Joseph Hawk; cost, $2,000.

Dayton St., two-st'y dwell., for Scott & Gage; cost, $5,400.

Canal, near Mather St., four-st'y manufactory for E. H. Stark; cost, $20,000.

Illinois, near Dearborn Ave., two-st'y shop, for M. Brund; cost, $4,000.

Superior St., No. 158, three-st'y dwell., for Caroline Harth; cost, $4,500.

Sholto St., No. 25, two-st'y dwell., for Hannah Martin; cost, $2,000.

Ashland Ave., near Thirty-third St.; two-st'y store and dwell.; cost, 2,900.

Wesson St., No. 104, two-st'y dwell., for A. Anderson; cost, $2,400.

Fulton St., No. 867, two-st'y dwell., for A. E. Gould; cost, $2,000.

OPERA-HOUSE. — It is rumored that Manager J. H. McVicker has been approached by Eastern capitalists, who have already guaranteed him $100,000, if he will interest himself in the formation of a company for the erection of a grand opera-house in Chicago.

Cincinnati.

BUILDING PERMITS. — The following building permits have been issued during the month of January: —

Taylor & Faulkner, two-st'y frame; cost, $1,500.
A. Saunders, three-st'y brick; cost, $1,200.
Jas Dalton, two-st'y brick; cost, $2,000.
B. McCormick, two-st'y brick; cost, $3,200.
Krymer & Bro., five-st'y brick; cost, $7,500.
W. Schumaker, one-st'y brick; cost, $600.
F. W. Handy, three-st'y brick; cost, $3,000.
H. E. Clover, two-st'y frame; cost, $2,900.
H. J. Reedy, two-st'y brick; cost, $800.
Thos. Emery's Sons, 4 three-st'y brick; cost, $10,000.
Thos. Emery's Sons, 4 three-st'y brick; cost, $10,000.
T. Moorman, four-st'y brick; cost, $6,000.
D. DeCamt, six-st'y brick; cost, $12,000.
J. T. Williams, one-st'y frame; cost, $900.
L. Grover, two-st'y brick; cost, $3,000.
H. Wendel, three-st'y brick; cost, $4,000.
M. Douglas, two-st'y brick; cost, $1,000.
B. Manning, three-st'y brick; cost, $2,600.
J. Jones, three-st'y brick; cost, $6,000.
Twenty-six permits for repairs; cost, $5,475.
Total permits, 45; total cost, $83,675.

HOUSES. — Mr. George W. Rapp, architect, has in charge at present the following work: —

Dwelling-house for J. Lammert on Mount Auburn; eight rooms; brick; cost, $5,000.

For Wm. Strunk, a frame dwelling on Walnut Hills; 10 rooms; cost, $6,600; J. W. Cotteral & Son, builders.

Frame house for Dawson Blakemore; cost, $7,000; Woodburn Avenue.

For Dr. C. D. Palmer, a stone-front on Seventh Street, opposite Smith Street, 32 by 80 feet; two-and-a-half stories high; cost, $7,000.

For Edwin Stevens, on May and Crown Streets, brick house; cost, $5,000.

For Patrick Britt, a stone-front on Eighth Street, near Elm, cost, $7,000.

For Gustave Lowenstein, a stone-front on Ninth Street, near John Street; three stories; cost, $7,000.

For H. H. Hoffman, four one-story frames on Front Street; three rooms each.

Mr. J. W. McLaughlin, architect, has prepared plans for a limestone dwelling for T. P. Mitchell, to be built in Avondale; cost, about $12,000.

J. F. Mills has started six new houses on Walnut Hills, eight rooms each; cost, $17,000.

Frank W. Handy will build six half-timbered houses on Mount Auburn, from designs of Mr. McLaughlin. The first story stone; above will be wood and cement; cost, about $20,000.

Railroad Depot. — The plans and specifications of the new depot to be built by the P., C. & St. L. Railroad Company, at the corner of Pearl and Butler Streets, are completed, but have not as yet been adopted by the Philadelphia authorities.

Cleveland.

Foundry. — Myers, Osborn & Co. are making extensive alterations and additions to their foundry; brick; cost, about $6,500; Jno. T. Watterson, contractor.

Car-Wheel Foundry. — Maher & Brayton are building an extensive foundry on the flats, corner C., C., C. & I. Railway and Carter Street; frame; cost, about $22,000; Jno. T. Watterson, contractor.

Depot. — The A. & G. W. Railway and the Valley Railway are to build a union depot in or near the old canal basin. The probable cost will be from $30,000 to $50,000. Work will be commenced as soon as the Valley Railway brings its track into the city.

Armory. — The armory is nearly enclosed, and will be dedicated May 30.

Indianapolis.

Church. — The trustees of the First German Church of Evangelical Association of North America have purchased lots 1 and 2 of outlot 58, southeast corner of New York and East Streets, for $5,000, for the purpose of building a church, and will build a brick church there as soon as the funds on hand will warrant it.

House — Mr. C. A. Wallingford, architect, is building a house for Mr. A. M. Hyde; cost, $3,000.

Packing House. — Kingan & Co., pork-packers, are building a brick building near their pork-house. It will be two stories high, with carpenters' and tinners' shops above, and stable below, costing $5,000.

New York.

Building Permits. — *One Hundred and Twenty-seventh St.*, 1 one-and-one-half-st'y brick ice-house, 52′ 8″ x 110′; cost, $20,000; owner, David Yuengling, cor. One Hundred and Twenty-eighth St., and Tenth Ave.; architect, Anthony Pfund.

Seventeenth St., No 438 *W.*, 1 two-st'y brick wheelwright shop, 25′ 1″ x 91′; cost, $4,000; owners, Saidler & Co., 441 W. Seventh St.; architect, Alexander M. McKean; carpenter, John L. Hamilton.

Fifty-sixth St., 3 four-st'y brick (brown-stone front) dwells., 17′ x 55′; cost, each, $14,000; owner, Henry Greer, 87 E Fifty-sixth St.; architects, D. & J. Jardine; mason, Samuel Lowden; carpenter, John Geagan.

Sixty-sixth St., 2 four-st'y brick (brown-stone front) dwells., one 22′ x 62′, and one 19′ x 62′; cost, respectively, $25,000 and $22,000; owner, C. W. Luyster, 359 W. Fifty-second St.; architect, James E. Ware; masons, Sinclair & Wills.

Thirty-eighth St., Nos. 418 *to* 426 *W.*, brewery, 50′ x 28′, fermenting-house, 48′ x 70′, cooper's shop, 79′ x 22′, office, etc., 22′ x 40′; all of brick; total cost, $50,000; owner, William Brown, 49 Broadway; architects, Lederle & Co.

Broadway, No. 368, 1 five-st'y brick store, 25′ x 150′; cost, $40,000; owners, Trustees of C. L. Wolfe, 3 Mercer St.; architect, John B. Snook.

Forty-ninth St., 1 three-st'y brick car stables; 325′ x 93′ 5″; cost, $60,000; owners, Eight Ave. Railroad Co., Fiftieth St. and Eighth Ave.; architect, John Correja.

Clinton St., No. 17, rear, 1 four-st'y brick workshop, 25′ x 26′; cost, $3,700; owner, D. Zimmermann, 13 Clinton St.; mason, John Fish.

Sixty-sixth St., 2 four-st'y brick (brown-stone front) dwells., one 25′ x 62′, and one 22′ x 62′; cost, severally, $27,000 and $24,000; owner, C. W. Luyster, 359 W. Fifty-second St.; architect, James E. Ware.

Avenue A, Nos. 165 *to* 171, 4 five-st'y brick tenements, with stores on first floors, 23′ 8″ x 76′; cost, each, $11,000; owner, Louis Rollwagen; architect, William José.

Canal St., No. 334, 1 five-st'y brick store, 25′ 10″ x 116′ 10″; cost, $32,000; attorney, Wm. Mitchell, 60 W. Ninth St.; architect, William E. Bloodgood; mason, Freeman Bloodgood; carpenters, Charles E. Hadden & Bro.

Mulberry St., Nos. 136 *and* 136½, 1 five-st'y brick factory, 50′ x 88′; cost, $16,000; owner, G. L. Yaeger, 69 Wooster St; architect, William Graul.

Forty-sixth St., 1 four-st'y brick (brown-stone front) dwell., 25′ x 60′; cost, $38,000; owner and builder, James C. Lynd, 50 West Fifty-fourth St.; architects, Wilson & Carter.

Seventh St., No 29, 1 five-st'y brick apartment-house, 26′ x 65′; cost, $11,000; owner, Isaak Horchster, 50 St. Mark's Place; architect, Jobst Hoffman.

Third Ave., No. 395, 1 five-st'y brick store and tenement, 24′ 4″ x 57′ 6″; cost, $10,000; owner, Edward Ward; architect, Wm. José.

Fifty-first St., Nos. 112 *and* 114 *E.*, 1 two-st'y brick stable, 46′ 6″ x 29′ 6″; cost, $3,000; owners, F. & M. Schaefer Brewing Co., on the premises; architect, Wm. José.

Sixty-sixth St., 2 four-st'y brick (brown-stone front) dwells., 28′ x 62′ and 25′ x 62′; cost, $32,000 and $30,000; owner, C. W. Luyster, 359 West Fifty-second St.; architect, James E. Ware; builders, Sinclair & Wills.

Lexington Ave., cor One Hundred and Seventh St., 1 three-st'y brick (brown-stone front) dwell., 17′ 7″ x 45′; cost, $9,000; owner, Ann E. Davis, One Hundred and Fifty-eighth St. and Kingsbridge Road; architect, J. H. Valentine; builder, John B. Davis.

Lexington Ave., 5 three-st'y brick (brown-stone front) dwells, each 16′ 8″ x 45′; cost, each, $8,500; owner, Ann E. Davis, One Hundred and Fifty-eighth St. and Kingsbridge Road; architect, J. H. Valentine; builder, John B. Davis.

Seventy-second St., 6 four-st'y brick apartment-houses, each 28′ x 62′, with extension 15′ x 15′; cost, $13,000 each; owner, James Fee, 210 East Sixty-second St.; architect, J. H. Valentine.

Fifty-seventh St., 1 five-st'y brick apartment house, 25′ x 61′, with extension 16′ x 20′; cost, $20,000; owner, Edward C. Coggeshall, 158 East One Hundred and Fifth St.; architect, Geo. B. Pelham.

One Hundred and Seventeenth St., 3 three-st'y and basement brick apartment-houses, each 16′ 8″ x 50′, and extension 10′ x 15′; each, $6,000; owner, A. M. Jenny, 313 East One Hundred and Fourth St.; architect, J. H. Valentine; builder, Mr. Handwerk.

Addition. — An addition to the store of Messrs. Ehrich Brothers, on Twenty-fourth Street, near Eighth Avenue, is to be made. Mr. H. J. Hardenberg is the architect.

Alterations. — *Forty-ninth St.*, two-st'y brick workshop, 30′ x 10′ 5″, damage by fire to be repaired; cost, $2,500; owners and builders, Eighth Ave. R. R. Co.; architect, John Correja.

Exchange Place, Nos. 20, 22, *and* 24, four-st'y brick office building, roof to be raised 10′, new front on Exchange Place, and internal alterations; cost, $20,000; owner, Royal Phelps, 24 Exchange Place; architect, Thos. R. Jackson.

Broadway, Nos. 156 *and* 158, four-st'y brick office building, two stories to be added and an elevator to be constructed in court; cost, $20,000; owners, Estate of D. Henry Haight; architect, S. D. Hatch.

Rivington St., No. 114, cor. Essex St.; six-st'y brick furniture warerooms, new store front and internal alterations; cost, $1,300; owners, Estate of Charles Eversly; carpenter, Edward Smith; masons, Lyons & Bunn.

Canal St., No. 272, four-st'y brick store, internal alterations; cost, $1,500; owners, Isaacs & Samuels; architect, Theodore J. Bier; mason, —— Dunn; carpenter, John B. Doyle.

Washington St., No. 430, two-st'y brick store, to have two stories added and new store front; cost, $1,000; owners and builders, Fletcher, Harrison & Co., 266 and 267 West St.

Greenwich Ave., Nos. 97 *and* 99, two-st'y brick building, to be altered internally; cost, $2,500; owner, J. Sharpe; carpenter, J. H. Brown; mason, Linus Scudder.

Avenue A, No. 231, four-st'y store and tenement, front wall to be taken down and rebuilt; cost, $1,500; owner, George Kiefer, 231 Avenue A; architect, Jobst Hoffman.

William St., cor. Pine St.; six-st'y brick office building, internal alterations; cost, $2,500; attorneys, Iselin & Warner, on the premises; architects, Potter & Robertson; builders, Lyons & Bunn.

Mulberry St., No. 301, three-st'y and attic brick office and dwell., full story to be made of attic; cost, $1,000; owner, Richard A. Storrs, Comptroller's Office; builder, Victor Seaman.

The building No. 4 Front Street is to be remodelled by the New York Elevated Railroad at an estimated cost of $12,000.

Apartment-House — On the corner of Eighty-sixth Street and First Avenue an apartment-house, 25 by 86 feet, is to be built by Mr. Blankenstein.

Brick. — There has been a great deal of interest felt this week on the floor of the "Mechanics" Exchange in regard to the rise in the price of building materials, and the consequent effects on building operations. There seems to be a general feeling that the price of brick, $10.50 per M, will not be maintained, and even if it were, the rise in rents would allow of buildings being erected, which would yield a fair rental.

Insurance Building. — It is reported that the Liverpool and London and Globe Insurance Company will invite competitive designs for a fire-proof building to be erected by them this spring.

Houses. — On Third Avenue seven houses are to be built, from designs of Mr. Valentine.

Library. — The Mercantile Library project is likely to be delayed, as no arrangements have yet been made for the disposal of their present lease.

Tenement-House. — On Thirty-first Street, near Seventh Avenue, a tenement-house of brick, with stone and terra-cotta finish, is to be built, from designs of Mr. James Stroud.

Philadelphia.

Brewery. — Mr. H. J. Swartzman, of New York, has prepared designs for Lauber's new brewery.

Chapel — There will soon be built, at the rear of the Tabernacle Baptist Church, Eighteenth and Chestnut Streets, a chapel of brick and stone, 35 by 80 feet; cost, $15,000; D. S. Gendell, architect.

Warehouse. — On Filbert Street, above Eighth, Messrs. Yarnall & Cooper, John K. Yarnall, architects and builders, are building, for Hood, Boubright & Co., a large warehouse. This building, 72 feet 6 inches by 114 feet, will be six stories in height, built of pressed brick and stone, and buff and black bricks.

Elevated Railroad. — Workmen are busily engaged in tearing down old buildings, of which about seventy-five have already been taken down. Piers are now being built in the river and on both sides, for the construction of the iron bridge to run across the river at Filbert Street.

Stores. — At 50 North Eighth Street a store is being built, 20 by 100 feet, three stories in height; cost, between $3,000 and $4,000; John S. Andrews, architect.

By the same architect, alteration of store 1126 and 1128, Chestnut Street; cost, about $5,000.

Thomas Little is altering the stores of Partridge & Richardson, 17 and 19 North Eighth Street; cost, about $5,000.

Alterations at stores 730 and 732 Chestnut Street, for Geo. A. Castor & Co.

St. Louis.

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

Owners.	Use.	Stories.	Rooms.	Cost.
J. W. Kauffman.	Mill.	3	3	$2,500
A. Berkheet.	Dwelling.	2	12	2,900
Mrs. L. Williamson.	Dwelling.	3	12	8,000
A. Zilla.	Dwelling.	3	4	10,000

Washington.

Market-House. — Mr. Talbot's House Bill to provide for building a market-house has been referred to the Committee for the District of Columbia.

Public Buildings.

Danville, Va. — Mr. McKenzie's bill to provide $60,000 for building a court house in this place has passed the House of Representatives.

Denver, Col. — The House Committee on Public Buildings and Grounds has recommended an appropriation of $200,000 for a public building.

Green Bay, Mich. — Mr. Bouck has introduced a bill in the House recommending the building of a light-house at the entrance of Green Bay and Sturgeon Bay Canal.

Lancaster, Penn. — Mr. Smith's bill to provide for purchasing a site for a new post-office and revenue-office building has been referred to the Committee on Public Buildings and Grounds.

Minneapolis, Minn. — An appropriation of $100,000 has been recommended by the House Committee of Public Buildings and Grounds.

Oxford, Miss. — The Committee on Public Buildings and Grounds has before it Mr. Harris's bill to provide for building a court-house and post-office.

Paducah, Ky. — The House Committee on Public Buildings and Grounds has recommended an appropriation of $100,000 for a public building.

Peoria, Ill. — Mr. Boyd's bill to provide for building a public building in this city has been referred to the Committee on Public Buildings and Grounds.

Quincy, Ill. — The House Committee on Public Buildings and Grounds has recommended an appropriation of $150,000 for a public building in this city.

General Notes.

Alexandria, Minn. — Douglas County is going to build a jail, at a cost not to exceed $6,000.

Allegheny, Penn. — The new depot of the West Pennsylvania Railroad Company, on Federal Street, will be built by Hoover, Hughes & Co., of Tyrone. The building will have a 40 feet front on Federal Street and extend 70 feet back, the north side being 100 feet from the track. It will have two stories and an attic.

Anderson, Ind. — Messrs. B. V. Enos & Son, architects, of Indianapolis, are building a store for Robinson & Lovette; cost, $15,000.

Mr. C. A. Wallingford, architect, is building houses for M. Eckhouse and N. J. Osgood, costing respectively $6,000 and $20,000.

Birmingham, Conn. — The Naugatuck and Derby Railroad Companies are to build a new union depot here.

Blue Hill, Me. — Colonel Wm. H. Darling is preparing to build two blocks, one of which will be occupied as a bank.

Claremont, N. H. — Improvements to the amount of $25,000 in the Sugar River paper-mill at this place are thought of.

Fairmount, Ill. — The Board of Fire Commissioners has recommended building a $5,000 engine-house.

Fergus Falls, Minn. — The Fergus Falls *Journal* says: The firm of J. Q. Adams & Co., St. Paul, is now building a grain house at this place, just east of the steam elevator.

Fort Dodge, Io. — The Presbyterian Society has $7,800 pledged toward building a $10,000 church.

Plans for a Catholic church, to cost about $30,000, have also been perfected.

Frankfort, Ky. — The estimated cost of a proposed extension of the penitentiary is $229,726, but if convict labor is used $40,000 will be saved.

Lafayette, Ind. — The Commissioners of Tippecanoe County have invited plans and specifications from architects for a court-house costing in the neighborhood of a quarter of a million dollars. The plans are to be examined at the regular March term of the board.

Long Branch, N. J. — Mr. R. J. Dobbins is about to make another fine improvement here. The Atlantic Hotel is to receive important alterations and the front of the building is to be lengthened about fifty feet.

Louisville, Ky. — Sebastian Krebs, a two-story brick dwell., Chestnut Street, between Hancock and Clay; cost, $1,000.

Millville, Mass. — In the spring the Lawrence Felting Company is to build a boiler-house of stone, 40 by 30 feet, and a stone picker-house, one story high, 50 by 35 feet; also, a mill 60 by 40 feet, two stories high.

Morristown, Ind. — Mr. J. H. Stem, of Indianapolis, is the architect of the new church.

Osterville, Mass. — A $6,000 cottage is to be built here for Mrs. E. B. Chase, of Providence.

Selma, Ala. — A wing of one of the hotels is to be converted into an opera-house.

Shelbyville, Ind. — The members of the Methodist Church have at last decided to remodel the church at a cost of about $10,000. The work will be commenced in a short time.

St. Paul, Minn. — E. McKinney intends to build a first-class carriage repository on Wabasha Street, adjoining the Odd Fellows' Block.

Mr. Richards Gordon and Commodore Davidson will probably build two large stores on the vacant lots on Third Street, opposite the Merchants' Hotel.

Commodore Davidson also expects to put up an immense structure on the northwest corner of Fifth and Wabasha Streets.

Wapakoneta, O. — Messrs. Herbst & Brother are building a carriage factory on Auglaize Street.

Watertown, Mass. — A country house of wood is about to be built for Mr. A. O. Davidson. Mr. Henry Hartwell, of Boston, is the architect. The contract is just let to H. W. McCurdy for $10,000.

Bids and Contracts.

Baltimore, Md. — Mrs. E. G. Smyser, of the Variety Iron Works, has been awarded the contract for the iron-work of the Ward Building, on the northeast corner of Charles and Baltimore Streets.

Cooperstown, N. Y. — The contract for the new court-house has been awarded to S. R. Barnes and McCabe Brothers, for $24,995. The bid of B. Patrick, of Herkimer, was $25,000.

Holyoke, Mass. — Messrs. D. H. & J. C. Newton have taken the contract for building a paper mill for the Hosford Paper Company. The buildings comprise an engine room 122 by 40 feet, two stories; bleaching and rag rooms, 146 by 36 feet, three stories; machine room, 137 by 33 feet, two stories; finishing room, 98 by 36 feet, three stories. Work has begun. The drawings are made by D. H. & A. B. Tower, architects, who have in hand the plans for three mills to be built the coming season.

Minneapolis, Minn. — The contract for the stone-work on the new Westminster Church has been let to Messrs. Downs & Baxter, of this city, at $24,900 for all the stone-work above the basement.

North Adams, Mass. — John M. Galvin, of Boston, has the contract for arching the central shaft of the tunnel, putting in air-chambers for ventilation, and excavating for a telegraph office, his bid being about $17,000.