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A RUMOR comes from Washington that the (joint?) Committee on Public Buildings and Grounds has taken advantage of the recess of Congress to inform itself thoroughly of the condition and needs of the various public buildings now going up in the United States at the expense of the general Government, and means at the next session to propose some legislation which shall ensure that the work on the government buildings shall be carried on after some general system, with direct and exclusive regard to the wants of the Government rather than to the distribution of the public money or the demands of constituencies. The committee could not do the country or the Government a better service. How they are to accomplish this is not suggested, nor is it very easy to divine, though the abuses at which they should aim, and the source of them, are visible enough. The vice of the present procedure is in the manner of fixing the appropriations, — of distributing them, we may say; for it is exactly a case of distribution among claimants. In the first place, the buildings are undertaken not solely with a single eye as to what the public service requires, but more, like the river and harbor improvements, with a view to what Congress can be persuaded to "do for" this or that city. The sum of money appropriated in any one year is proportioned not to the actual needs of the work that is in hand, but to the amount which it is supposed Congress will be willing to assign to the construction account, or to what it is thought the country ought ordinarily to spend in building. The special appropriations are assigned much less according to the wants of the buildings under construction than to the importance of the constituencies for which they were undertaken, or to a simple geographical distribution, or to the influence and clamor of local delegations.

THE natural results are that the buildings are not undertaken in the order of their real importance, nor proportioned in their scale to their real uses so much as to the amount of money which Congress can be persuaded by the different members to assign to their towns; that more buildings are undertaken at once than the country can afford, or than Congress will consent to do justice to in the annual appropriations; and often that the Supervising Architect's office is flooded with more work than can with advantage be attended to in it. The appropriations are doled out annually with reference to giving each building its portion year by year, not to the constructive needs of the individual works. If an individual appropriation looks large to the average congressional eye, it is challenged, and probably cut down, without reference to the particular condition of the work for which it is asked. The sums yearly appropriated for important buildings are seldom large enough to keep the work on them going continuously and rapidly; so that it either languishes, or is interrupted altogether for want of supplies. The bad economy of this procedure is clear. Any thrifty contractor could tell the Government that the way to do large work economically is to put men and money enough on it to carry it through briskly and without interruption, and to undertake no more at once than can be pressed on energet-

ically; that nothing is so costly as to let work drag, or to keep interrupting and resuming it. As a matter of fact, the dribbling distribution of money which is our habit keeps a score or so of buildings hanging on together unfinished year after year, the Government being unable to use any of them, when by concentrating effort on them they might be all finished in equal time, and many of them successively occupied while the others were finishing. Worse than this, the appropriation often gives out before the year ends, and many costly works lie untouched for half the time. So the work drags on endlessly, the buildings deteriorate rapidly during their interruptions, and much of each year's pittance is consumed in preparations for resuming work which should not have been interrupted, or in restoring that which has begun to go to ruin because it has been left half done.

How the present system works can easily be seen by anybody who notices the lingering births of most of our post-offices and custom-houses, the utter want of relation between the limits of expenditure fixed for them beforehand, and their actual cost; or who will consult the reports of the Supervising Architect for two or three successive years, and see by the history of particular buildings how the works are again and again interrupted for lack of the necessary provision from Congress, how the reiterated warnings of this officer that without more sufficient appropriations important works must come to wasteful stoppage are disregarded and verified. The root of the difficulty, of course, is in the facts that Congress, which votes the appropriations, is uninformed on the subject to which they refer, and that in voting them it is moved as much by the exigencies of politics as by the real use of the appropriations. It is, as we said, difficult to divine what legislation can cure these evils, which are, briefly, want of knowledge of the subject, and want of interest, and — not to put too fine a point upon it — want of conscience. Information is accessible to Congress if Congress will take time to acquire it, or will put confidence in those who have it to offer. But if the present Committee on Public Buildings and Grounds makes it a business to learn thoroughly the real needs of the building department and to give advice accordingly, there is no security that Congress will listen to their advice, or that the next committee will follow in their footsteps. The responsible officer, to whom it is natural to look for actual knowledge and good judgment of what should be done for the public buildings, is the Supervising Architect. But even if means were devised by which his voice could make itself felt in the Capitol, it is not likely that in a matter which concerned the distribution of the public moneys he could make it influential in a Congress, as Congresses go, unless he were an efficient politician. If he were an efficient politician, it is almost sure that he would not be a first-rate architect, and then, — good-by to our hope of a satisfactory public architecture. As for the actual conduct of the work that is now in hand, there seem to be two ways of doing better than we do now. One way is to adopt some such plan as that brought forward in the last Congress by the late Mr. Schleicher, of Texas, but crowded out by political business without even getting a hearing, — of setting apart at once a sufficient sum to complete all the buildings that are now in progress, then to finish them without interruption, and with all reasonable speed. This would do away with a good deal of waste, and save much mischievous delay, but it might bring some other difficulties with it; and, at any rate, now that we have lost Mr. Schleicher, there is no likelihood that another will come forward to carry through his project. The other way is, given the amount of money that can be appropriated to the building account, to divide it among such buildings as need it most, because of either their importance or their condition, in such quantities as will allow them to be pushed forward to the best advantage, and let the others wait their turn. If the committee can bring Congress to something like this, they will deserve well of the country, however they may succeed in pleasing individual members or satisfying local demands.

THE President, in his message last Monday, called attention to the Washington Monument, reminding Congress that "the strengthening of the foundation has so far progressed as to insure the entire success of this part of the work," and recommending "that such further appropriation may be made for the

continued prosecution of the work as may be necessary for the completion of this national monument at an early day." All of our countrymen who honor the memory of Washington would be glad to see the monument completed, if it could be completed in a form worthy of its object; and no doubt most of those who could would be willing to give their contributions to that end, if they could take any interest in its design. As it is, that part of our countrymen which takes the matter as it comes, without inquiring into the suitableness of the present design, is perfectly apathetic about it, while it is safe to say that the part which has an intelligent interest in the question of its form is substantially agreed in desiring to be delivered from ever seeing finished the mutilated fragment, which it is now proposed to execute, of a design which, even in its complete form, was unworthy. We can but think that the President is moved to his appeal rather by sympathy with the purpose of the monument than by preference for its proposed form; and with his hearty endeavor to forward the work considerate people will sympathize. But Congress, which assumes to represent the desires of its constituents, should give little support to a project which the people at large look upon with entire indifference, while those who are best qualified to judge of it regard it as a reproach. Can nothing be done to persuade those who have this matter in charge, and those who are expected to vote the money for it, to find out whether the people whose money it is proposed to expend really want the present design carried out, and whether those people who care something and know something about the thing as a matter of art consider it creditable?

THE last few days have been appallingly full of disasters from fires and in buildings. We have the burning of the Opera House in Toronto, Canada, in which the janitor and his family were burned. Then we have a panic in a St. Louis school-house, where a slight fire sent the girls in the upper stories down in such frightened confusion that the railing of the stairs was broken and several of the children were injured, as well as one of the teachers. There was also a panic in a church in Waynesboro, from the breaking down of a bench, coupled with an alarm of fire. The gallery-railing was broken by the pressure of the crowd, and a mass of persons fell over into the mass below. Fifteen or twenty persons were injured. An explosion and consequent fire in the New York Electrotypes Foundry, probably from fumes of benzine set on fire by gas, killed two men. The burning of the horse railroad stable in New York, costing the lives of two firemen and a hundred times as many horses, was a horror of its own kind. Here was a stable, two hundred feet by six hundred, with horses stalled in the second, third, and fourth stories, and a great part of the same stories filled with hay, straw, and fodder. The fire ran through it very quickly, and the hostlers who ventured in to save the horses had to retreat before they could take care of them, leaving two hundred or more to be burned, while the two firemen were killed by the falling walls. It is a strange thing that with such examples continually before them the mass of our people continue to build and plan as recklessly as ever. Considerate owners are gradually improving their methods; architects, and even underwriters, are studying means of security; building laws in our large cities force upon the people, much against the grain, certain small measures of safety; but where the ordinary speculative builder or thrifty owner is left to his own ways, these ways are as bad as ever. We still build theatres and halls which are tinder-boxes and traps; churches where crowded audiences are sent up-stairs, to make room for Sunday-school rooms and parlors and kitchens beneath, and are poured down-stairs together in a huddle to a single exit; factories five or six stories high, full of combustibles or explosives, with a single wooden staircase, and perhaps an open hoistway; stables covering acres of ground, in which great hills of hay are stored in a single mass; school-houses which are like honeycombs full of larvae. Into some school-houses in New York, we are told, eighteen hundred or two thousand scholars are crowded, swarming like bees in a hive, high above the ground. Certainly there is work to do to get the better of all these abuses. In the matter of good city stables one desirable precaution would seem to be to insist at least upon the subdivision by brick walls of the space used for storage of combustible fodder, and upon flooring it with brick at the bottom when it did not reach the ground, which it never does. A check should also be put upon the stalling of horses above the second floor. A bill which was introduced into the legislature of New York last

winter for the protection of animals, and which prohibited keeping them in any injurious or unsafe quarters, might have had some influence in lessening the dangers to horses in city stables if it had not failed to pass, though the limits of safety might have been difficult to construe; but the horses inside are not all that is endangered, and restriction is needed for the sake of the community as well as the animals.

THE will of the late Duke of Brunswick, which attracted so much notice at the time of his death, two or three years ago, and by which he left his whole fortune, amounting to a hundred millions of francs or so, to the city of Geneva, where he had lived out his last years, contained a condition that Geneva should build a handsome mausoleum to his memory. This the city has done with great splendor, and the mausoleum, or monument, in the Place des Alpes, was finished only a month or two ago, at a cost of some three hundred thousand dollars. According to a description of it in the *New York World*, it is modelled upon the famous Scaliger tombs at Verona. It is a hexagonal canopy of Carrara marble, standing on a platform of red granite, and covering a sarcophagus surrounded by an iron grille, the sarcophagus being sculptured in relief with scenes in the history of the house of Brunswick. About it stand six ancestral statues in white marble, and the platform, girt with a balustrade of red granite, is beset with sphinxes, and lions of the same material guard the steps to it. It is covered by a gabled *flèche* or pyramid of red marble, a white marble angel standing in a niche on each of the six faces. This is crowned by a pedestal of white marble, on which is a bronze statue of the duke on horseback, the whole being sixty feet high. The city has also expended one out of the twenty millions of dollars in its legacy in building an opera house, of which M. Garnier, we believe, is the architect. It is built in the manner of the Grand Opera House at Paris, and is behind only that and its rival at Vienna in magnificence. The Canton of Geneva naturally wished to share in this good luck, but the city refused to divide its inheritance, and so, although it has been a custom to remit the cantonal tax of two and one half per cent on legacies left for public uses, the Canton insisted this time on its right to the duty, and the city has had to pay two millions and a half of francs for the privilege of using the remainder. The opera house was to have been opened this season, and was finished a month ago, it is said. Now that all this is done, that the money is spent on the opera house and the mausoleum, and the succession tax is paid, the city is told that the duke's heirs have succeeded in breaking the will, on the ground that the duke, having been interdicted from reigning, and proclaimed by the courts a spendthrift incapable of managing his property, was disqualified from disposing of it by will. Therefore the will is declared void by the tribunal of Brunswick, and the estate may be expected to revert to the duke's natural heirs. The city of Geneva, however, is wealthy as well as thrifty. She has got her opera house, and undoubtedly is able to pay for it, little as she may like to. The succession tax may yet be recovered, and she has at least the satisfaction, such as it is, which not all cities can claim, of having done handsomely in her memorial by a man who tried to do handsomely by her.

A CORRESPONDENT, whose letter we print in another column, complains reasonably that a drawing of a building which he furnished as an illustration for our paper has been copied without acknowledgment and without his permission, and circulated among the building trades on an advertising card issued by a manufacturing firm. He appeals to us to know whether the copyright of this journal is not a protection against piracy to those who contribute to our illustrations. The question has not been brought forward before: now that it is presented we are glad to take an opportunity of giving our testimony as publicly as possible. We do not doubt that the firm which has copied this design has done so without reflection and without realizing that to do this is to violate the rights of the owner and to infringe upon our copyright; and we presume that upon our representation of the rights of the case the card will no longer be circulated, unless by permission of the author of the design. Our copyright bars the unauthorized reproduction of any of the designs which are published for the first time in these pages. Our rights in this respect may be enforced in the courts; their maintenance is a due protection to architects who entrust their designs to us for a specific use, and do not expect to see them appropriated by other persons without payment and even with-

out acknowledgment. Fortunately we have never been obliged to appeal to the law for the defence of our prerogative, and we hope never to see any necessity for doing so. We have often been applied to for permission to reproduce this or that design which we have published, and we have in such cases referred the request to the authors of the designs. The friends who send us their drawings for publication may rest assured that they do not thereby sacrifice their means of protection against spoliation.

SANITARY SUGGESTIONS.¹

THE health of any building is dependent upon free and moving pure air, outside and inside its walls; anything which interferes with this first condition of health is injurious. And it follows that in towns, where land is dear, and a large number of persons are crowded on a given area, better ventilation and circulation of air may be obtained by placing dwellings in stories, one above the other, and leaving spaces between the buildings, than by placing them in one-storied buildings, which would be too close together to allow of circulation of air round the building.

The next step in knowledge of sanitary construction is to learn how to obtain pure air in a building. What is pure air? What are the impurities which make the air of a town so different from the fresh air of the country? The volume of sulphuric acid from coal thrown up by our fires into London air is enormous. A cubic yard of London air has been found to contain 19 grains of sulphurous acid. The street dust and mud are full of ammonia from horse-dung. The gases from the sewers pour into the town air.

Our civilization compels us to live in houses, and to maintain a temperature different from that out-of-doors. What are the conditions as to change under which we exist out-of-doors? The movement of the air is stated in the Registrar-General's reports to be about 12 miles an hour on an average, or rather more than 17 feet per second. It will rarely be much below 6 feet per second. Imagine a frame of about the height and width of a human body, measuring about 6 feet by 1½, or nine square feet. Multiplying this by the velocity of movement of the air at 6 feet a second, it will appear that in one second 54 cubic feet, in one minute 3,240 cubic feet, in one hour 196,400 cubic feet of air would flow over one person in the open.

In a room the conditions are very different. In barracks, in a temperate climate, 600 cubic feet is the space allotted by regulation to each soldier; and when in hospital from 1,000 to 2,500 cubic feet to each patient. If it were desired to supply in a room a volume of fresh air comparable with that supplied out-of-doors, it would be necessary to change the air of the room from once to five times in every minute, but this would be a practical impossibility; and, even if it were possible, would entail conditions very disagreeable to the occupants.

Hence, to maintain the comfort and temperature we desire in-doors, we sacrifice purity of air. Therefore, however impure the outer air is, that of our houses is less pure; and it may be accepted as an axiom that by the best ventilating arrangements we can only get air of a certain standard of impurity, and that any ventilating arrangements are only makeshifts to assist in remedying the evils to which we are exposed from the necessity of obtaining an atmosphere in our houses different in temperature from that of the outer air.

On the other hand, why should we not do our best to obtain as pure air as we can? It has been recently shown that the soot and many deleterious matters from smoke may be easily removed by passing the smoke through spray on its way to the chimney. This would remove much impurity from town air; but until such a system of purifying town air is adopted, we can improve the air in our houses by removing the suspended matter from the inflowing air by filtration. Moreover, these suspended matters exist in much smaller quantities at an altitude: at 100 feet they are greatly diminished, at 300 feet the air is comparatively pure. In Paris the air for the Legislative Assembly is drawn down from a height of 180 feet, so as to be taken from a point above many of the impurities of the town atmosphere. That is a reasonable and sensible arrangement, and might be usefully adopted in public buildings in towns. In the Houses of Parliament, the so-called fresh air is taken from courtyards on the street level, from which horse traffic is not excluded.

The maintenance of the standard of purity, or rather impurity, in a building, depends on ventilating arrangements. Ventilation chiefly depends on the laws which govern the movement of air, its dilatation by heat or contraction by cold; or, if ventilation is effected by pumps and fans, then upon the laws of the motion of air in channels, the friction they entail, and similar questions. Therefore all these are matters for careful study. But when we apply the study to practice, other considerations occur. We are told by theory that a room containing an air space of 1,000 cubic feet, occupied by one individual, would require to be supplied with 3,000 cubic feet per hour in order to maintain it in a proper condition of purity and humidity. But in our temperate climate, a careful practical examination of the condition of barrack-rooms and

hospitals, judged of by the test of smell, showed that the arrangements which appear to provide for a volume of air much less in amount than that obtained by calculation will keep the room in a fair condition. These results have pointed to about 1,200 cubic feet of air admitted per man per hour in barrack-rooms occupied by persons in health. This need not be set down to errors in calculation or in theory.

There are many data which cannot be brought into the theoretical calculation. For instance, the carbonic acid disappears in a newly plastered or lime-washed room, and could be recovered from the lime; therefore a newly cleaned, lime-whited room will present different conditions from a long-occupied, dirty room. Washing with quicklime destroys fungi in dirty walls; the same effect is produced by sulphurous acid fumigation. Air has the same property, especially dry air; and hence, opening windows, turning down beds, and all such measures, act directly on the subsequent state of the air. Therefore an enormous effect is produced on all the elements of the above calculation if the windows of a room are kept open for several hours a day instead of being closed. Besides this, the conditions under which the air flows in and out of a room are so varied. The walls and ceiling themselves allow of a considerable passage of air. The ceiling affords a ready instance of porosity. An old ceiling, it will be observed, is blackened where the plaster has nothing over it to check the passage of air, whilst under the joists, where the air has not passed so freely, it is less black. On breaking the plaster it will be found that its blackness has arisen from its having acted like a filter, and retained the smoky particles, while the air passed through. Ill-fitting doors and windows allow of the passage of a considerable quantity of air. In a temperate climate, where the changes of temperature of the outer air are rapid and considerable, these means of producing the outflow from and the inflow of air into a confined space are in constant operation. A sleeping-room is very warm when occupied at night, a rapid fall of temperature outside occurs, and at once a considerable movement of air takes place.

It may be summed up that, whatever the cubic space, the air in a confined space occupied by living beings may be assumed to attain a permanent degree of purity, or rather impurity, theoretically dependent upon the rate at which emanations are given out by the breathing and other exhalations of the occupants, and upon the rate at which fresh air is admitted, and that therefore the same supply of air will equally well ventilate any space, but the larger the cubic space, the longer it will be before the air in it attains its permanent condition of impurity. Moreover, the larger the cubic space the more easily will the supply of fresh air be brought in without altering the temperature, and without causing injurious drafts. One of the chief difficulties of ventilation arises from the drafts occasioned thereby. Every one approves of ventilation in theory, but practically no one likes to perceive any movement of air.

These conditions point to the care which should be exercised in the form of rooms, the positions of windows, doors, fireplaces, and other matters. We should study how the currents of air move in a room; what is the effect of the form of the room on the circulation of these currents of air. For instance, a lofty room with the tops of windows some distance below the ceiling, and without outlets for air at the ceiling level, becomes dangerous unless a constant circulation of air goes on, because the heated air, loaded with impurities, ascends, stagnates in the space near the ceiling, cools, and falls down, and remixes with the air in the lower part of the room, and thus increases its impurity.

These effects are modified by anything which causes circulation of the air. The open fireplace creates circulation of air in a room, with closed doors and windows. The air is drawn along the floor towards the grate; it is then warmed by the heat which pervades all objects near the fire, and part is carried up the chimney with the smoke, whilst the remainder, partly in consequence of the warmth it has acquired from the fire, and partly owing to the impetus created in its movement towards the fire, flows upwards towards the ceiling near the chimney breast. It passes along the ceiling, and as it cools in its progress towards the opposite wall, descends to the floor, to be again drawn towards the fireplace.

Thus the open fire, whilst continually removing a certain quantity of air from the room, which must be replaced by fresh air, causes an efficient circulation of the air remaining in the room. Moreover, a room warmed by an open fire is pleasanter than a room warmed by hot-water pipes. A warm body radiates heat to a colder body near to it. The heat rays from a flame or from incandescent matter pass through the air without heating it; they warm the solid bodies upon which they impinge, and these warm the air.

Where the source of heat in a room consists of hot-water pipes, or low-pressure steam-pipes, the air is first warmed, and imparts its heat to the walls. The air is thus warmer than the walls. When a room is warmed by an open fire, on the other hand, the warming is effected by the radiant heat from the fire, which passes through the air without sensibly warming it; the radiant heat warms the walls and furniture, and these impart their heat to the air. Therefore the walls in this case are warmer than the air. Consequently, in two rooms, one warmed by an open fire, and the other by hot-water pipes, and with air at the same temperature in both rooms, the walls in the room heated by hot-water pipes would be some degrees colder than the air in the room, and therefore colder than the walls of a

¹ From the address by Captain Douglas Galton, at the Sanitary Congress, Croydon, England.

room heated by an open fire; and these colder walls would therefore abstract heat from the occupants by radiation more rapidly than would be the case in the room heated by an open fire. And to bring the walls in the room heated with hot-water pipes to the same temperature as the walls in the rooms heated by the open fire would require the air of the room to be heated to a degree beyond that necessary for comfort, and therefore to a greater amount than is desirable. Moreover, warmed air contains less oxygen than cooler air, and as sick persons are more sensitive to such influences than persons in health, these may be the reasons why, in hospital wards, the warming by means of an open fire has always been preferred to warming by hot-air or hot-water pipes.

With complicated buildings, such as theatres, legislative assemblies, prisons, etc., the problems of ventilation are more difficult and intricate, but are all based on the same principles of the movement of air.

Another group of questions relating to sanitary construction are: What are the best materials for the house, and the best distribution of those materials? How can the less pure air from the ground be prevented from entering the house through the basement? What is the effect of the porosity of materials on the health of the inmates of a house? What is the law which regulates the loss of heat through walls and windows, skylights and roofs? For instance, if we assume that the loss of heat through a wall 9 inches — *i. e.*, one brick — thick, with a temperature inside the room 2° above that outside, would be one unit for a given area of surface of wall, the loss of heat through a wall built of two half bricks — *i. e.*, 4½ inches — on each side of a central air space, would be two thirds of the loss of the solid wall. Similarly the loss of heat through a double window would be about three fifths of that through a single window. The laws which govern these questions are as complicated as those which govern the strength of materials, or the flow of water, and they form the alphabet of sanitary building.

Whilst, however, I have limited myself to speaking of a theoretical knowledge, it is of essential importance that the sanitary architect, builder, or engineer should have also practical technical knowledge of the subject. He should know what constitutes a good material and good workmanship. One instance of the sanitary importance of the quality of materials will suffice here. Dust and impurities adhere less to glass of a good quality than to glass of a bad quality, because the surface of the latter becomes rough much more rapidly than the surface of glass of good quality.

THE ILLUSTRATIONS.

UNITARIAN CHURCH AT AUGUSTA, ME. MESSRS. SILLOWAY & COBB, ARCHITECTS, BOSTON, MASS.

The contractor's price for building this church, now nearly completed, was \$4,500. Pews, gas fixtures, carpets, cathedral glass, in lead filled sashes, pulpit work, and decorating make the whole cost \$7,000.

HOUSE AT SOUTH ADAMS, MASS. REMODELLED BY MR. W. M. WOOLLETT, ARCHITECT, ALBANY, N. Y.

The original house was built about 1800, and as far as possible the alterations correspond in style and detail with the original. Some of the carved work is very good, notably the Ionic capitals of the columns on either side of the front door.

DETAILS OF THE HOWARD BUILDING, BOSTON, MASS. MR. CARL FEHMER, ARCHITECT, BOSTON.

This drawing is one of the series that was prepared by members of the Portfolio Club.

CATHEDRALS OF MAYENCE AND SPIRES.

These cuts, which we introduce as illustrations of our correspondent's letter from Mayence, which is printed in another column, are reproduced from Seemann's *Kunsthistorische Bilderbogen*.

ENTRANCE HALL AND ELEVATOR-CAR, VAUGHAN BUILDING, PROVIDENCE, R. I. MESSRS. WALKER & GOULD, ARCHITECTS, PROVIDENCE.

This entrance hall is finished in ash, the floor is of tile, and the candelabra surmounting the newel is of polished brass. The principal finish of the car is ash, with mouldings, beads, and turned work of cherry, and panels and cove of white holly, decorated in oil paint. The seat, which occupies one side of the car, is upholstered in russet leather. On the side of the car, back of the seat, is a large mirror, while on the opposite side is a plate-glass directory of the building.

CORRESPONDENCE.

THE CATHEDRALS OF MAYENCE, WORMS, AND SPIRES.

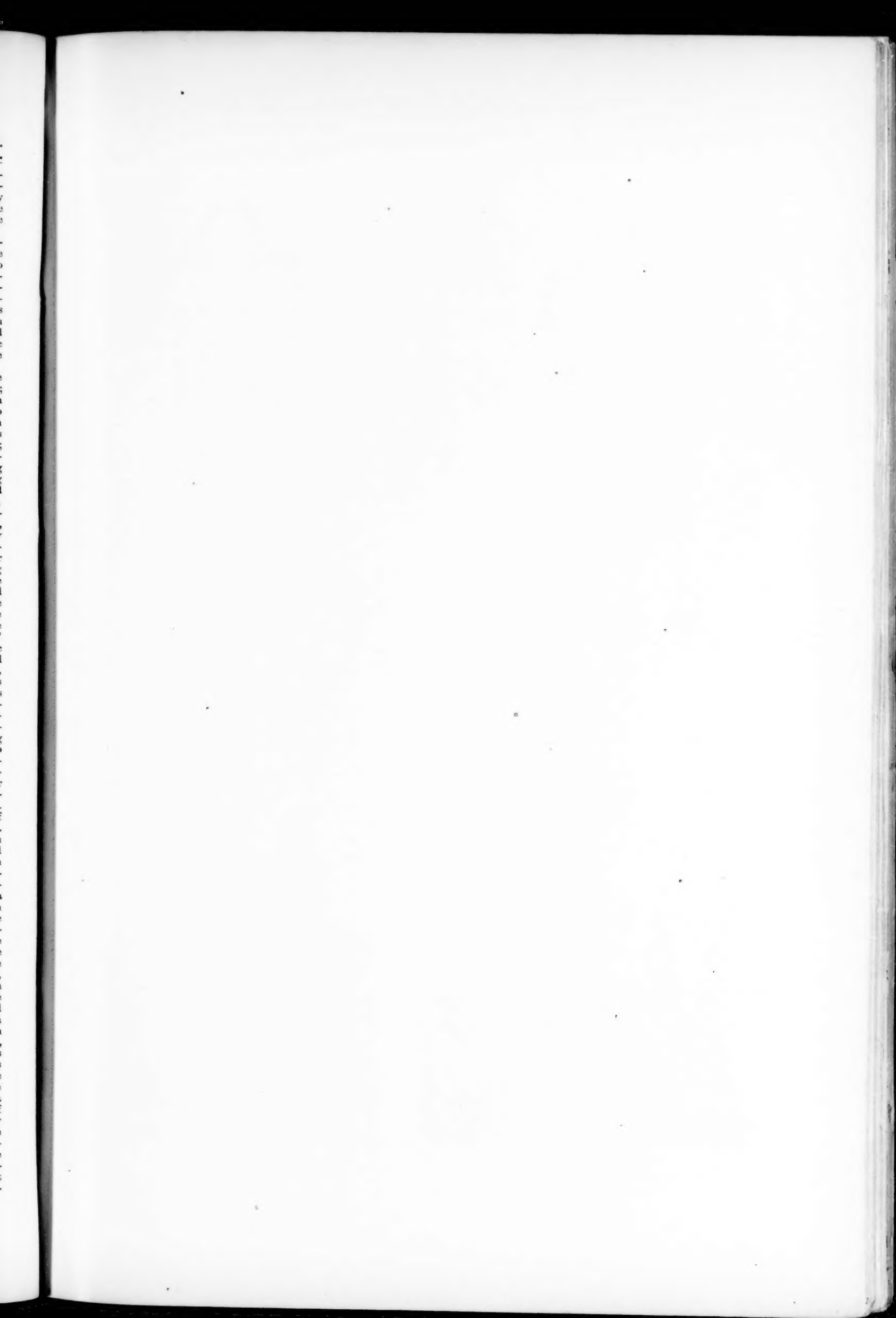
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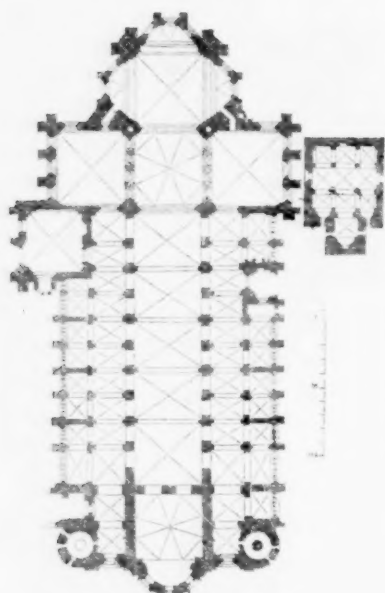
IN my letter from Cologne I spoke with enthusiasm of its Romanesque churches. Ascending the Rhine from that city, one finds a counter-current of architecture which widens as the river banks narrow, until the accumulated power of the style expands and culminates in the three great Rhenish cathedrals of Mayence, Worms, and Spire. On leaving Cologne the flat banks of the Rhine are without interest until the towers of the Cathedral of Bonn are seen. This is a fine old building of the eleventh and thirteenth

centuries. At the junction of the Gothic nave with the fine polygonal-ended Romanesque transepts rises an octagonal tower, surmounted by an immense wooden steeple. The choir is exceptionally deep, and its circular apse is flanked by large square towers. The interior has nothing of special interest except that here again the fine effect of raising the altar high in the apse is noticeable.

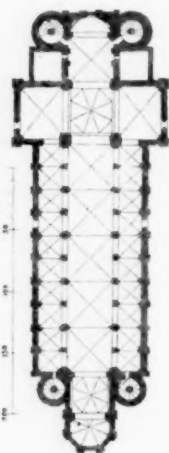
From this point the banks of the river begin to justify their romantic reputation. Ivied walls and terraced gardens recall the Lake of Como; but it is curious to mark the influence of the English, who for many years have frequented this part of the Rhine, in the cottages and villas, many of which have an unmistakable English trimness. Then comes Coblenz, upon whose costly stone forts the modern engineer may look with a smile across to the distant heights whose simple and formidable earthworks may replace them. From here the river winds between the hills, vine-clad or wooded, and crowned with ruined towers. We have no time for these romantic donjons and turrets, for we should push on and give all the time we can to Mayence, an important objective point for the architect.

Mayence, with a population of 36,000, lies on the left side of the Rhine, here crossed by a long carriage bridge, upon iron pontoons; these, by the by, have rudders, and can be serviceable boats in time of inundation or war. Modern streets have somewhat cut up the town, but it still retains the comfortable quaintness of its olden time, which is a fitting frame for the magnificent cathedral. This huge pile at first sight seems of brick, so bright a red is its tint; but it has a rosy softness which belongs only to stone. On approaching it the stranger will probably be fairly puzzled. Coming up from the river he sees before him a semicircular apse terminating the nave at its junction with transepts, buttressed by slender round towers. Over the crossing rises a fine octagonal lantern, with lofty, steep-pitched roof. This has just been rebuilt, — I do not say restored, because it replaces a high Gothic lantern, with domical roof, which it may be supposed was going to ruin; this only would justify so great a change, although the new octagon is fine and well in keeping with the simple Romanesque apse. This being the apse or rear of the building, the visitor pushes on to see its front, and threading his way through the buildings which encumber the sides of the church, emerges, to his surprise, under a much larger transept, and sees a magnificent choir, with triple apses and towers, and over the crossing a great lantern tower. For a moment he may believe he has come upon another church; but a glimpse of the nave and the first lantern explains the disposition of this huge "double-ender." This disposition of a lantern and choir at each end is a characteristic of the great Rhenish churches, and though theoretically it would seem to divide the interest and injure the unity of the design, where, as in this case, the choir and lantern greatly predominate in mass and richness, no confusion can exist, and the composition groups finely about the great lantern tower. Thus did the Germans develop the Roman basilica from the Ravenna type into a great Christian and commemorative monument, for the smaller choir was intended as a tomb chapel, with a crypt below; and could anything be grander than a tomb thus placed, looking down the long nave to the greater choir beyond! The principal choir dates from the beginning of the thirteenth century, and shows something of the angular Gothic influence; for the bold semicircular apses of the earlier style are substituted ones of three sides of an octagon, the only important example in Germany of a triapsidal polygonal arrangement. These apses have on each face under the corbel-table an arcade of three double bays, and beneath this a range of engaged colonettes. Below, in striking opposition, is a single round-arched window in the thick wall, which is further strengthened at the angles by solid buttresses. The apses, with their slender flanking towers, form one of the most beautiful compositions I have ever seen. The transepts are simpler, but elegant, with a rich series of orders and archivolts filling the jambs of the windows, and it certainly forms a very happy transition between the more florid choir and the stern simplicity of the nave. The transitions from the earliest end, whose varied silhouette of lantern, apse, and flanking towers forms an imposing façade, without ornament, to the almost unbroken wall of the severe nave, then to the more elegant transept, and at last to the sumptuous choir, with its rich, arcaded apses, are striking, and the crescendo is superb. Successive generations, each in its own style, unconsciously worked to a most perfect artistic conclusion, and teach us, in our own more homogeneous designs, to adjust our means, be they ever so simple, so that an imposing front, a solemn nave, and richer transepts will give to any ornamentation concentrated upon the choir an extraordinary value. The great central tower which binds the whole composition together does so by its imposing mass, for its architecture is incongruous. Upon two Romanesque stories is placed a higher Gothic one, above this are two more stories in deep retreat, and the whole crowned by a florid Renaissance stone roof and finial. The small towers flanking the choir are capped with Renaissance domes, also, which give to these parts a certain rococo look. The chief defect in the design is the want of portals, which, as in many Rhenish churches, were never properly provided or emphasized. This lack of portals, or porches, is the more remarkable in that these features are one of the finest characteristics of the Romanesque in other countries. The actual entrance is in a corner of the transept, and much of the true effect of the interior is at first missed on entering; but such fine proportions cannot fail to be appreciated from any point of view. The nave is magnif-

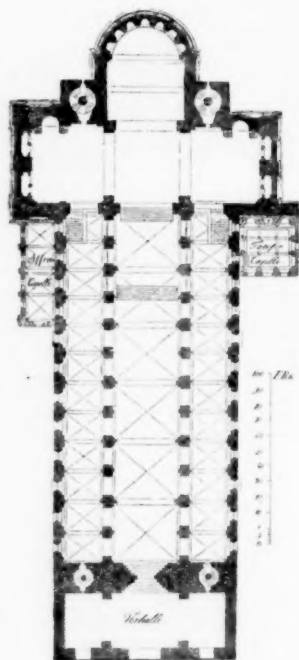




MAYENCE



WORMS



SPIRES.

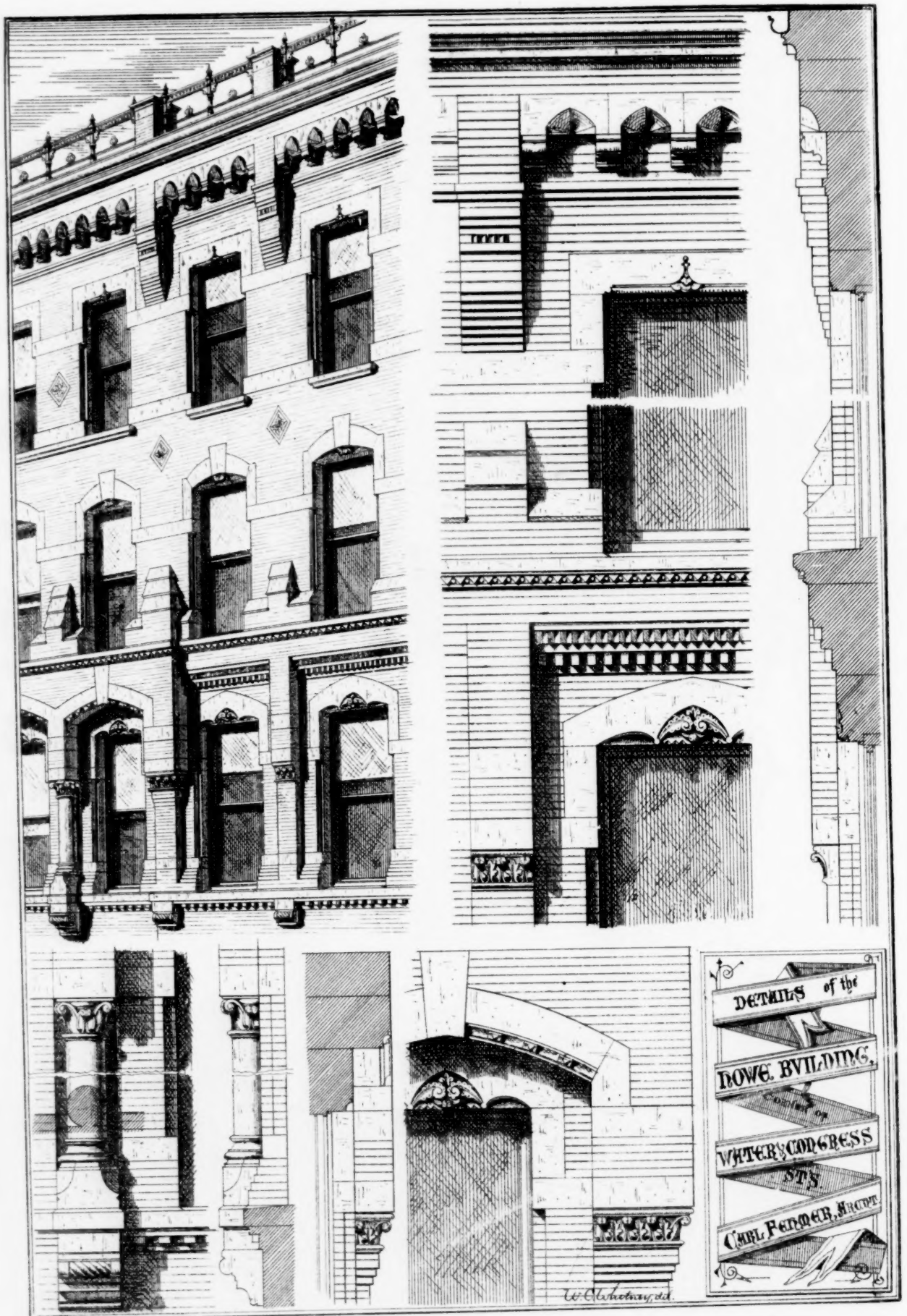


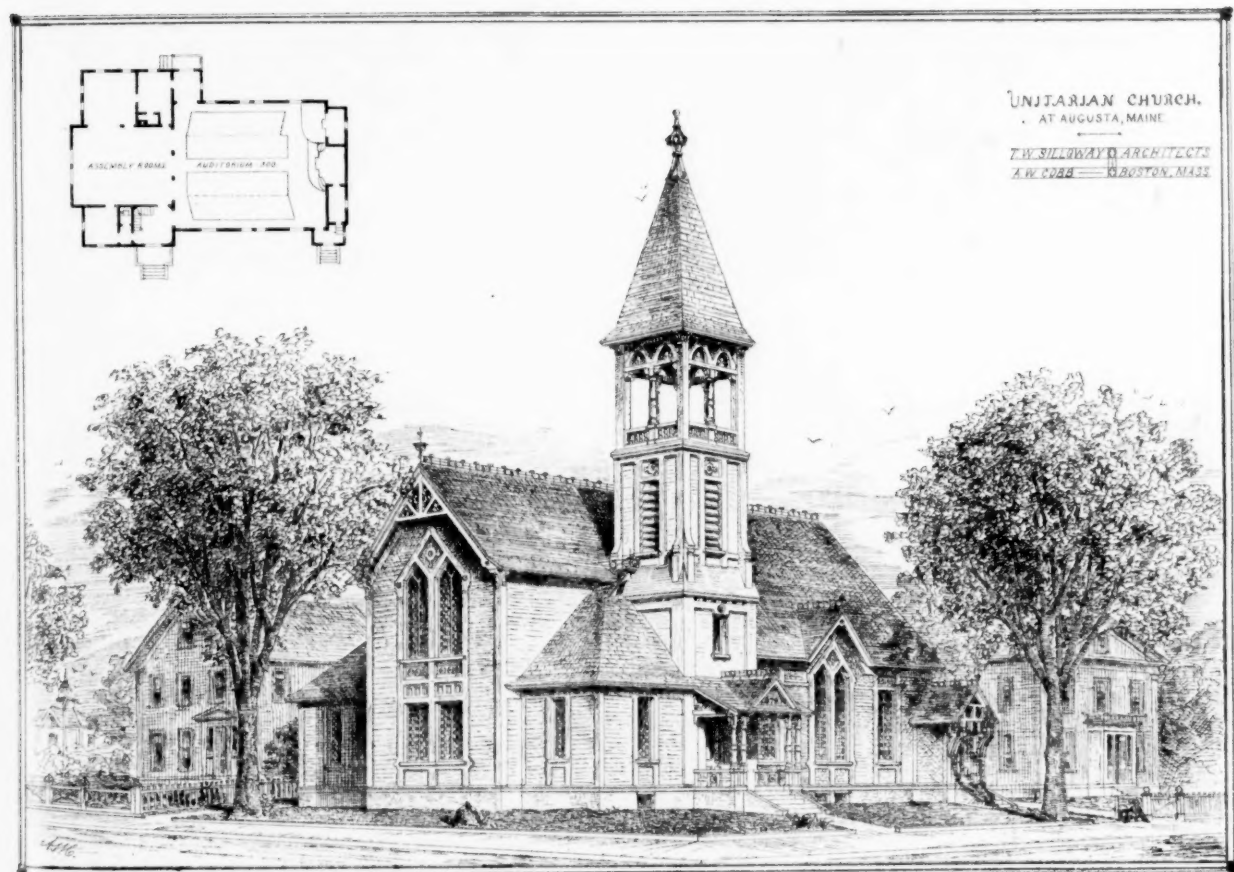
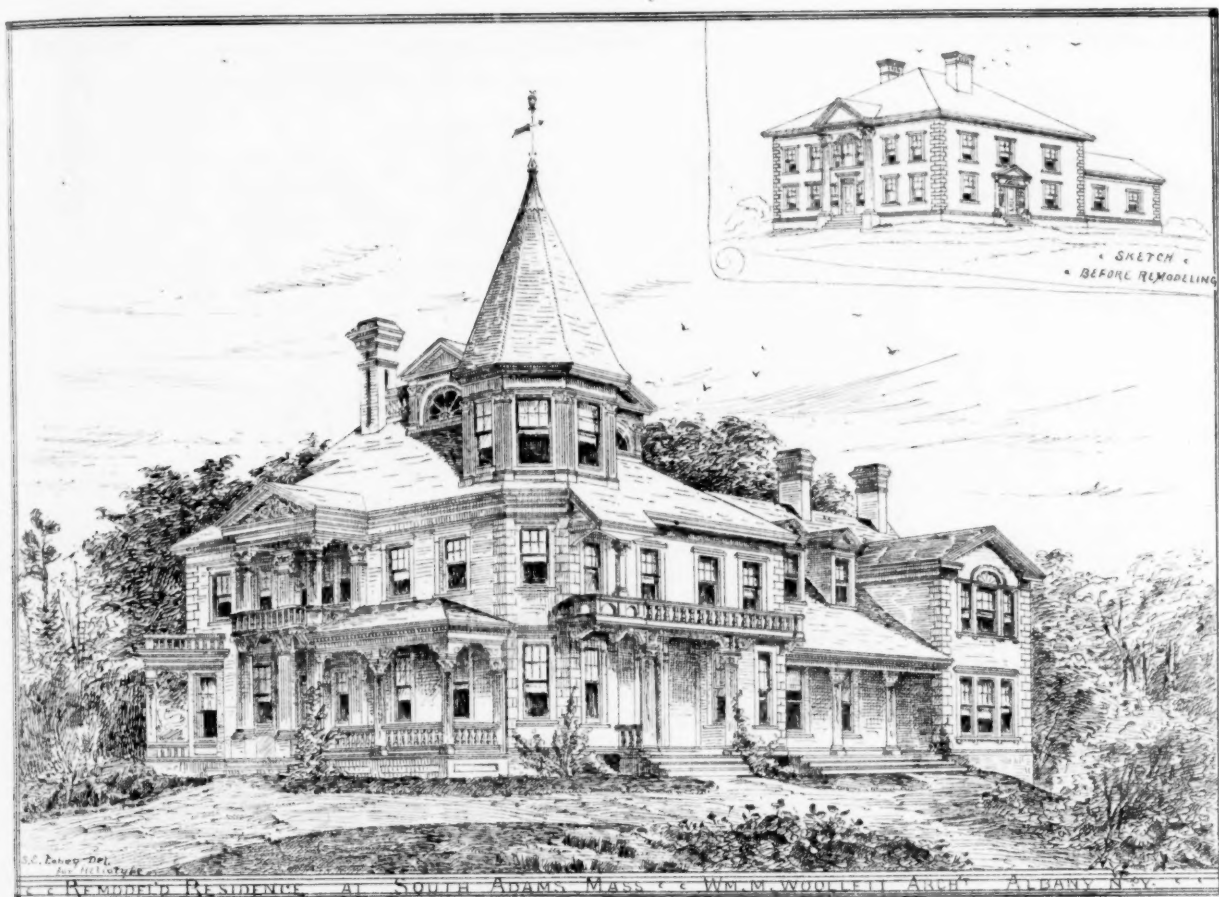
CATHEDRAL AT MAYENCE.

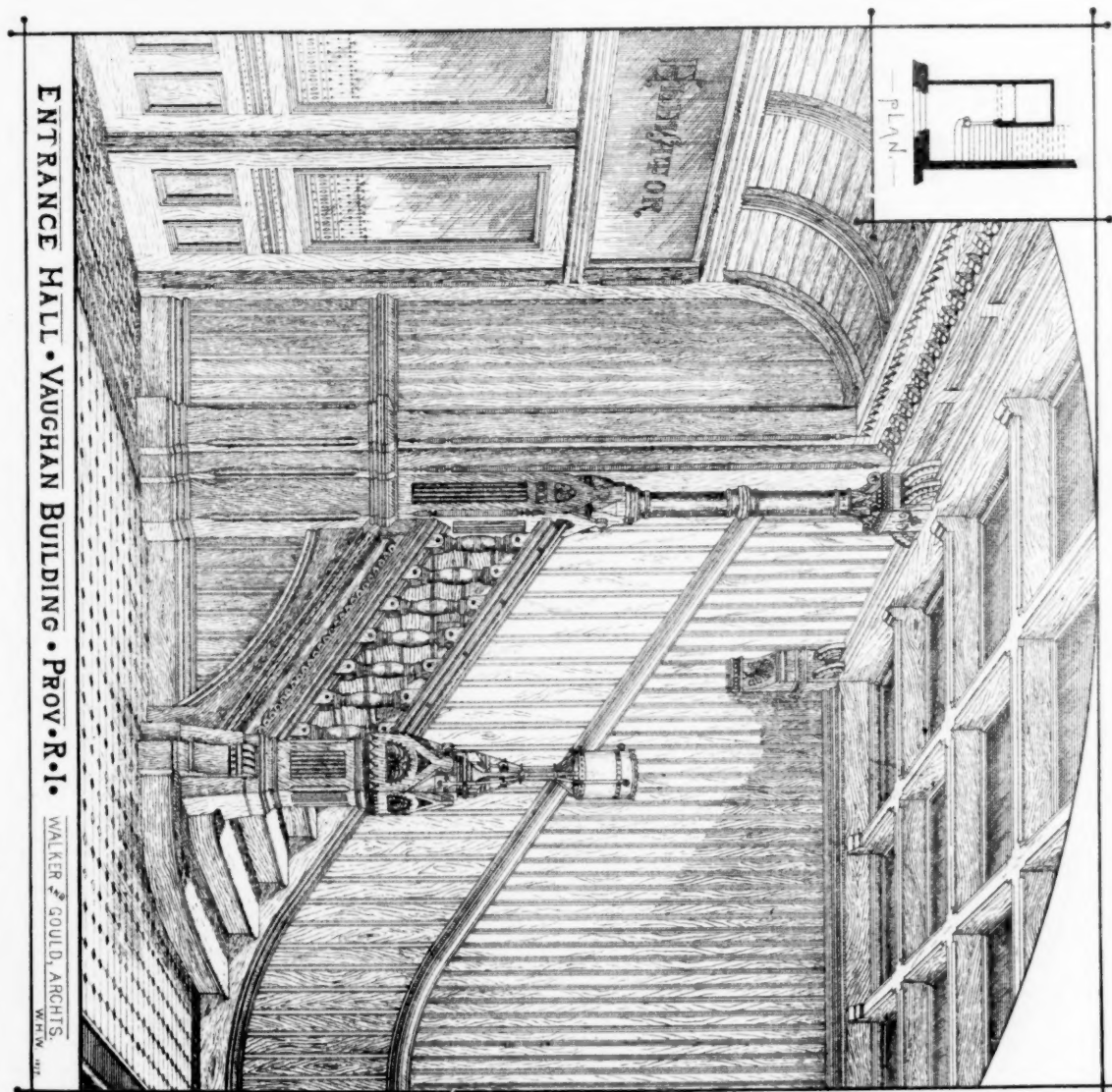
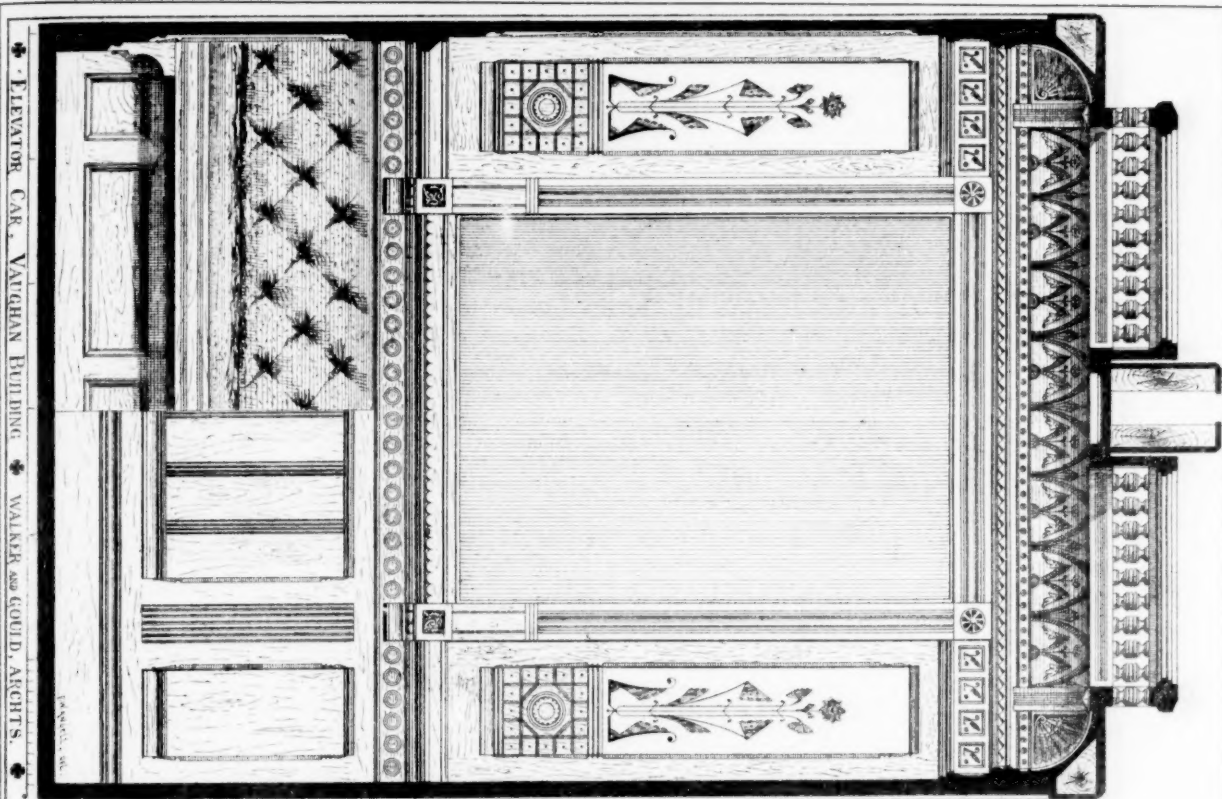


CATHEDRAL AT SPIRES.









icent. A bold vault, with a touch of the Gothic influence, spans it, and includes between the round pilasters of each bay of vaulting two of the square piers and arches of the aisles. The lines of the aisle arches are carried up on the nave wall, and enclosed by a second shallow arch, and within these spaces are painted figure compositions. The richly-stained, ruddy stone walls are reduced to a soft, warm tint by the vigorous reds and yellows of the archivolts and string courses; but these are only narrow lines of color which lead the eye down to the transepts and choir, whose vaults, as well as the interior of the lantern, have lately been splendidly colored. The surfaces generally have greenish tints in patterns. The great pendentives of the octagon have a stony, blue ground; the constructive lines generally red, varied with yellow. The decoration, in scheme and detail, is very fine, perhaps the most successful effort recently made to decorate a great building. The name of Herr Laske was given me as that of the architect who has had charge of the works on the cathedral; but I could find out little about him. Whoever designed this decoration must be a man of first-class ability. Against the piers of the nave is a wonderfully complete series of tomb monuments to archbishops of Mayence. They date from the simple black marble slabs of the eleventh century down through the various styles which culminated in the most elaborate lace-like carving of the Gothic, while the chapels and transepts have an equally complete series of the Renaissance. The dimensions of the cathedral are variously given. The German authority, seeming to me the most probable, gives one hundred and seventy-four yards long by fifty-eight broad across the transept. The aisles are simple and narrow compared with the nave, which is very spacious and lofty. Whatever may be the actual dimensions, the interior, from its proportions and simplicity, undoubtedly appears larger and more impressive than even its really great dimensions lead one to expect.

A short distance south of Mayence lies the ancient town of Worms, which was nearly destroyed in 1689; the great cathedral, however, escaped. Whereas Mayence Cathedral, begun in the tenth century, underwent modifications from the twelfth to the fifteenth century, that of Worms, begun in 1110, was completed and remains in the original Romanesque style. It is smaller than the Mayence example, being one hundred and forty-one yards long, twenty-nine wide, and measures forty across the transepts. It is a basilica, with double apses and octagonal lanterns and transepts at one end; this, and the fact that at the same end the circular apse of the interior has a square outer wall, makes it difficult to recognize in the composition which is the principal choir. At either end are two handsome round towers, an octagon covers the transept crossing, and a smaller one rises between the two towers of the opposite end. Unfortunately the larger lantern is low, and no higher than the other, so the composition does not group well, as either end asserts itself with nearly equal importance; in this respect it is inferior to Mayence, though externally the nave is the finer of the two, with large windows in the clerestory and aisles. The details also are purer and better than those of Mayence. Its entrances are in the sides of the nave, a characteristic of the Rhenish architecture, even when double choirs do not occupy the two end façades.

The third of the great Rhenish churches is at Spire. I have been rarely more impressed than I was by this noble building. As the train, after several hours of flat, monotonous scenery, stopped at the little station of Spire, I suddenly caught sight of the immense pile, above the trees, and I shall not soon forget that first glimpse of the arcaded apse, flanking square towers, great transepts, octagons, and immense nave, all surrounded with a beautiful arcade under the eaves. The effect of these vast walls, of a soft red tinge towards sunset, was overwhelming. The great church stands in a small park at the beginning of the single street of the little town, whose modest houses seem to be dwindling and shrinking away. The end towards the street has a magnificent porch or narthex the whole width of the nave and aisles. It was rebuilt by Hübsch in 1854-8, supplying amply the want of porches which exist in its two great rivals at Mayence and Worms. This vestibule, or Hall of the Emperors, as it is called, contains the statues of the eight emperors buried in the crypt, beginning with that of Conrad II., who founded the cathedral in 1030. The other dates of the building are undecided; but the building was finished before Gothic influence in any way weakened its majestic solidity, and Mr. Fergusson cites it as the finest example in Europe of a building conceived in a truly Doric spirit. The massive walls are perfectly plain throughout their width and height up to the dark shadows of the arcade beneath the roof. The great transepts are square, with huge buttresses at the angles. Solid square towers fill the angle between transepts and choir, and the great octagon is covered with a domical roof; these, with the circular apse, form a superb group. At the other end of the vast nave are similar square towers in the angles of the porch, which being the height nearly of the nave, and with the same projection as the aisles, appears from the sides like transepts. Over the central compartment of the vestibule is a second and smaller octagon. The façade of this end, as rebuilt by Hübsch, is of elegant design, but has been too much modelled upon the black and white architecture of the north of Italy, and is more pretty than this "Doric" style allows. The carving of capitals in this new porch is remarkably fine. So grand a vestibule is a severe trial for the nave, but the latter is equal to any test, and opens magnificently under its lofty round vaults. It looks as large as

Mayence, although the same authority above quoted gives its length as one hundred and forty-seven yards, width across the transepts sixty, with a breadth of nave between the piers of fifteen. Its height is one hundred and five feet. It is probably the fine proportions of the nave, which is of extraordinary width and height, magnified by its bold simplicity, which gives such exceptional grandeur to this interior. The aisles are also admirably proportioned. In short, I know of no church whose simple proportions, without aid from optical tricks, are more grandly effective. The transepts project twice the width of the aisles, and are, as well as the short choir, raised ten or twelve feet high above the nave. As the choir, with its apse, has little more depth than the transept, they form together a splendid hall, reached by a flight of steps the whole width of the nave. Near the transept in the aisles steps lead down to the crypt, whose size, extending beneath the transepts and choir, and colossal piers and vaults render it the most imposing crypt I have ever seen. The interior was entirely decorated in 1845-54 by Schwarzmann, or under his direction, and Schrandolph painted the thirty-two principal figure compositions. To my mind it is an entire failure. The noble walls are enveloped in a cold gray tone, like a chilly mist, and the warm ruddy stone hidden beneath a coating of gray plaster. What a contrast with Mayence, where a few lines of strong color upon the bare stone walls give the richest effect; whereas here the most elaborate decoration looks poor and cold. There is no system; and a complication of patterns, added to a want of strongly accentuating bands of color, produces a weak, uncertain effect. The figure compositions are as timid in color. The nave vaults are a pale blue, with brown ribs picked out with red, those of the aisles yellowish, with similar ribs; the prevailing tone of the walls is greenish gray, often with lilac and pinkish patterns. The dome of the large lantern, however, is fine; it has a solemn range of figures covering the lower half of the gilt vault, but its bold simplicity only brings out the weak elaboration of the other decorations. The sacristy has vaults of brick laid without cement, and the clean, dark joints produce a pretty effect. Although Heidelberg, but an hour or so from here by rail, is crowded by tourists, few ever think of coming to see this splendid building. Mayence, being a comfortable stopping-place on the Rhine, is better known, but few who visit this region ever visit or hear of Worms.

The Germans, incited by their glorious political achievements, now boldly lay claim to supremacy in all directions. The present fashion for mediævalism has tempted them to claim the invention of Gothic architecture, — than which nothing can be more preposterous, in view of historical evidence and that of their buildings themselves, which betray a style applied by architects who, precisely because the initial development did not come from Germany, never fairly understood an architecture indigenous to France and England. The perverseness of this claim is the more striking in that they undervalue the noble architecture which, by their own native efforts, had already attained monumental qualities never yet surpassed, and which only needed time for the development of its great resources to give them a truly national style, perhaps unrivalled in any land. When we see how experiment after experiment was necessary for the perfect development of the Gothic, as for every mature style, the imagination is fired by the thought of what might have been attained with these Rhenish monuments as a *point de départ*, — for these three great cathedrals were built, it should be remembered, about the same time, and after only a few experiments. The question for us is, whether a style of such solid grandeur, however capable of development in the Middle Ages, when time and labor were almost unchallenged factors in building, can find favor in a century of cheap and rapid construction. There is one consideration, however, which will certainly recommend it to our serious attention ere long. Our generation recognizes the advantages of painted decoration over the more slow and costly work of sculptors, and it is on the broad wall-surfaces of this style that the painter will find his best opportunity. The experimental spirit now awakened in all countries will sooner or later certainly seize upon this style, and, as far as recent designs show, Germany may see her quick-witted rivals across the Rhine, convinced that the Golden Age of the Gothic is passed, return to and appropriate as their national style that very architecture from which they lured the Germans five centuries ago. Recent competitions seem to indicate this. In that for the construction of a Protestant cathedral in Berlin about twelve years ago, the designs, even when domical and classic in plan, were chiefly Gothic, while the designs submitted in 1874 for the great church of Le Sacré Cœur, in Paris, were nearly invariably Romanesque. I am astonished to find, however, how little French architects have drawn material from the Rhenish Romanesque, since they have studied so thoroughly the kindred style in the south of France; but this may be accounted for by their general indifference to all art outside of their own country and Italy, and to the fact that in no works on architecture are the churches on the Rhine adequately represented. A more complete knowledge of the latter would certainly give a great impetus to their present efforts. The best books on this architecture are by Geier and Görz, Rosengarten, and Boisserée's *Nieder Rhein*; but the two former give small illustrations, and the latter is confined to Cologne and its neighborhood. Hübsch, in his *Altchristliche Bauwerke* gives the Cathedral of Spire on a large, or rather coarse, scale, and in a German student publication there are outline drawings, on a large enough scale, of these churches; but it may be said that this Rhenish architecture

has never yet been fairly illustrated. Magnificent as are Cologne and Strasburg, they are only variations of a cathedral type scattered all over Europe, and if pressed for time on the Rhine, I should urge the lover of architecture to sacrifice them rather than the true Rhenish architecture, which is unique.

R.

HOMES FOR WORKING PEOPLE.

HOW THEY ARE BEING CONSTRUCTED IN ENGLAND.

A MODEL home for working people is described in a letter to the *Spectator* (London). The plan has been designed and executed by John Ellis, at Seacombe, Cheshire. The cottages are built in detached hexagonal blocks, each house forming one segment of the hexagon, having a separate entrance. A central shaft containing flues for each house secures economy of heat and fuel, and affords an equable temperature throughout the several rooms. Mr. Ellis utilizes this centralization of heat in providing an ingenious but simple method of ventilation, the continuous current of the main shaft carrying off the vitiated air and making smoky rooms an impossibility. Fresh, warmed air is admitted from a flue in the chimney-breast, which prevents draughts as well as the smoke nuisance. The cottages are two stories high; the ground floor contains the living-room and scullery; the first and second floors each provide one large or two small bed-rooms. The shape of the rooms may be objected to, but this is in a great measure overcome by placing cupboards at the angles next to the fireplace or central shaft, so that the want of symmetry is hardly noticed. Mr. Ellis maintains that, by arranging these blocks face to face, with a proper interval for front garden and roadway, he is able to economize building area while providing more breathing space to each house than can be offered by building a similar class of houses in rows, in the ordinary way. By dispensing with the obnoxious back yard and passage, with their litter, dirt, and bad smells, extra room is gained in front for the garden. In construction, the expenses of numerous chimney stacks, lead flushings, and outside walls are greatly lessened. At a rent of 6s. per week, covering water and all other rates, the dock laborer or common sailor of Liverpool and Birkenhead finds himself provided with a clean, healthy, cheerful home.

COMMEMORATIVE MONUMENTS IN WASHINGTON.

THE erection of a monument to the late General George H. Thomas by the Army of the Cumberland, in this city, early in November, will prove a valuable addition to the art attractions of Washington. The first statue erected in this city was the colossal marble monument of Washington now standing in the East Park of the Capitol. This was ordered in 1832 by Congress for the rotunda of the Capitol, and was designed by Horatio Greenough of Massachusetts. It was made in Florence, Italy, and occupied eight years in its completion. It weighs twelve tons, and its total cost, including the sculptor's work, freight, removal, and attendant expenses, was \$44,000. It was found to be so entirely out of proportion to the interior of the Capitol that it was removed to the East Park, where it now stands in solitary grandeur. It bears the famous legend, "First in war, first in peace, and first in the hearts of his countrymen." It also has the following inscription: "This statue is for a great example of liberty, nor without liberty would this example endure."

The next monument erected was the bronze one of General Andrew Jackson, in Lafayette Square, by Clark Mills, which was unveiled on the 8th of January, 1853, Stephen A. Douglas delivering the oration. Five years previous to this date the Jackson Monument Association, composed of admirers of the general, collected about \$12,000 for the purpose of procuring this testimonial. Congress, in addition, appropriated a number of brass guns and mortars for its construction, besides voting the money for the marble pedestal. By a further appropriation of \$20,000, in 1853, Congress bought the statue and made it the property of the United States. Its total cost was \$50,000.

Shortly after the erection of this figure, Congress ordered the erection of a monument to Washington, costing \$50,000. It was placed in the circle at the intersection of Twenty-third Street and Pennsylvania and New Hampshire Avenues, where it has become a landmark. Congress gave the metal used in its construction, and Clark Mills was the sculptor.

Scott Square, at the intersection of Massachusetts and Rhode Island Avenues and Seventeenth Street, takes its name from the equestrian statue of General Winfield Scott, which was erected in 1874, seven years after it was ordered by Congress. The metal used in its casting was cannon, trophies of the general's valor in Mexico, given by Congress. It weighs 12,000 pounds and cost \$20,000.

In Rawlins Square, on New York Avenue, northwest, stands a heroic bronze statue of General John A. Rawlins. This was ordered by Congress in 1872, and erected two years later. It was executed by J. Bailey, of Pennsylvania. It cost \$10,000, is eight feet high, and weighs 14,000 pounds.

The Lincoln statue, in the park of that name, on East Capitol Street, was built by funds contributed by the negroes declared free by the Emancipation Proclamation, under the lead of James Y. Yeatman, of St. Louis, the amount subscribed being \$17,000. Thomas Ball designed the monument, and Miller, of Munich, executed the casting. It is twelve feet high.

The bronze equestrian statue of General McPherson stands in the square of that name, on Vermont Avenue, between I, K, and Fifteenth Streets. This monument was erected by the Society of the Army of the Tennessee, and was unveiled October 18, 1876, General John A. Logan being the orator. Congress appropriated the cannon for its construction, and its cost was \$23,500. It is 14 feet high.

General Nathanael Greene, of Revolutionary fame, has been commemorated in a statue erected upon Stanton Square, Capitol Hill, at the junction of Massachusetts and Maryland Avenues. It was ordered by Congress in 1876, and placed in position a year or two later. The commission was for \$50,000, which included the pedestal, the latter being furnished by the artist.

The marble statue of Lincoln, in front of the city-hall, is the work of Lot Flannery. Its cost was defrayed by patriotic citizens. Flannery was a self-taught sculptor, who combined energy and enthusiasm with a slight modicum of genius. Among the proposed statues, other than that of General Thomas, is one yet to be erected to Admiral Farragut, in Farragut Square, on Connecticut Avenue, between I, K, and Seventeenth Streets. The monument is to be of colossal height, of bronze, for which Congress appropriated \$20,000 in April, 1872. Vinnie Ream, the sculptor, has completed the plaster cast, and will soon mould it in bronze. — *Washington Post*.

LEAD PAINTS IN THE ENGLISH CLIMATE.

TRUE cleanliness is a matter of minutiae, and admits of no subterfuge. If dirt can find a crack, a ledge, or an absorbent surface which cannot be reached by the ordinary method of cleansing, there dirt will accumulate; and where dirt is there will disease be also.

To avoid the possibility of dirt finding shelter in our domestic habitations, what must be done? Carry out, says the scientific sanitarian, the minutiae of cleanliness by insisting upon an almost microscopic inspection, and use every valid means to maintain the large surfaces of the walls and ceilings as free as possible from injurious matters which may be absorbed or given out.

If we are to look to our neighbors for painstaking cleanliness, we must go to Holland, for example, where it is popularly believed that no gastronomic injury would ensue from dining directly off the flooring boards or tiles. Beyond the delightful duty of scrubbing everything which is not painted, the Dutchman and his wife find no such esoteric and sanitary delight as in painting everything which cannot be scrubbed or rubbed bright. And the Dutchman is right. No layer upon layer of paper hangings, with brown, gray, or green arsenical dust to slowly poison the more susceptible of the family. No sham plaster walls, porous to sewer-gas and corrupted with putrefied paste, can be allowed. If we have lath and plaster, let it be painted; and if we cannot have wainscot or mahogany kept brilliant by continual cleanly friction and polish, let us have a clean painted wooden surface, as artistic in tint and in the disposal of the colors and decoration as taste and means will afford; but, to carry out a determined war against dirt and disease, let us have paint. These are no longer notions peculiar to the Dutch. They are sanitary axioms which we cannot afford to ignore.

But there is another side to the proposal "to paint and believe in paint." As I observed in the commencement of this paper, sometimes the very means taken to keep our dwellings clean add to the real dirt. So it is with paint, for there be paints and paints; some leave little to be desired, from a hygienic point of view; others, as I shall show, are injurious to health, and even deadly in their own direct effects.

In July, 1873, I was instructed to investigate the causes which brought about, I believe, some of the severest cases of lead poisoning ever made public. I found at Devonport Dockyard twenty-four cases had occurred among the shipwrights working there, dating between May 3d and the 30th of June. There were sixty-four painters employed, and on the average, about four cases of lead-poisoning per annum were reported among these men, or at the rate of eight per cent of those engaged in laying on the white-lead paint. When the space to be painted was confined and ill-ventilated, the symptoms produced were such as Dr. Thomas Brown, R. N., described in his report, which, by the permission of the Director-General of the Medical Department of the Navy, I am able to quote. "After a few weeks' work, a pasty, lustreless look appeared upon their faces. There was a sense of great depression and weakness together with headache and loss of appetite. A metallic taste was sometimes complained of, and a blue line was observed upon the margin of the gums. It was only after persevering for some weeks that the graver symptoms were produced, and the men, becoming wholly incapacitated, sought medical advice."

But it was among the shipwrights that the symptoms appeared in a still more aggravated form. These men were employed in cleaning off Day's cement, together with the paint and red lead. All the symptoms previously enumerated were presented, but in a more intense degree, attended with greater depression, and in every case epigastric tormina was described as a dull, heavy pain, giving the sensation of the bowels being drawn toward the spine. Cramps in the muscles of the extremities were common and of great severity, but it was observed with surprise that there were no cases of paralysis. The most stringent precautions have since been taken; perfect clean-

liness of the skin and frequent washing of the working clothes were insisted on. A chemical respirator was recommended to be worn while at work, and sulphuric acid drinks were always to be kept in readiness. No precautions, however, prevent the use of white or red lead paints being exceedingly injurious, both to the painters and to those who inhabit rooms in which the paint has not perfectly dried.

Now comes the important question, How long a time must elapse before white lead paints can be considered so perfectly dried as to be absolutely free from diffusing their injurious influences?

I will reply that it depends upon circumstances over which we have frequently no control. I state this feelingly, as in my house, a few doors from Grosvenor Square, London, the whole staircase from top to bottom has paint upon it which is not dry now, although it was laid on Easter last while I was at Brighton.

The slightest greasy deposit upon the old paint will prevent white lead paints from ever really drying, and while a skin of comparatively hard paint cheats the superficial observer, there is a continual exosmosis of volatile poisons being given off. The truth is not revealed until a general tone of depression and lowered vitality throughout the house arrests the attention of observers on the lookout for such causes and effects. Or, perchance, the spirit of cleanliness, that handmaiden to the goddess Hygeia, insists upon an early cleansing of the paint all over the house; with the unsuspected result of detaching the false skin of the new paint, and leaving the greasy undercoat which no length of exposure will ever dry.

It is no exaggeration to assert that very little paint containing white lead as its basis becomes so hard and dry within months of its application as to preclude the possibility of poisonous matters being given off.

I have had distinct proof that the injury accruing from the diffusion of lead in the air exists to an extent far surpassing the well-known poisonous influence of minute quantities of lead in drinking-water. I have, therefore, always recommended the substitution of zinc white for white lead, for the all-important reason that it is harmless. Many reasons, however, tend to limit the use of the ordinary zinc white (oxide of zinc), the weightiest of which are that it does not possess the body of white lead, will not cover so much surface, and is, therefore, not so economical either in labor or in cost. Several coats of zinc oxide are required to equal the opacity of white lead, and in mixing with other colors a much larger quantity of zinc oxide must be used.

I have lately had brought before me a new preparation of zinc which is stated to have overcome all these defects. As I have carefully investigated its properties, I am happy to find that we have at length obtained an antiseptic white zinc paint which is free from the objections raised against zinc oxide. I find the oxy-sulphide of zinc pigment, invented by Mr. Thomas Griffiths, of Liverpool, to be a very curious instance of the fulfilment of the demands of sanitary science. We insisted that we must have a non-poisonous white as the basis of the oil paints used in our dwellings. Zinc oxide was proposed, and, I believe, large fortunes have been made out of its manufacture, notwithstanding the drawbacks. The economies of labor and expense must, however, be included in the demands of sanitation, or the use of the best and most harmless of pigments is certain to be evaded. The fiat of the trade is issued against it, and it becomes doubly dear and difficult to insure its use.

Oxy-sulphide of zinc is then brought forward, as dense as white lead and as opaque, its covering qualities even exceeding the lead paint; and, as it does not change color like white lead, and is as cheap, all things considered, we may welcome another powerful auxiliary, which, while innocent of itself, will help us immensely in our campaign against dirt and disease. — *H. C. Bartlett in the Sanitary Register.*

THE HYPAETHRAL QUESTION.

CAMBRIDGE, November 24, 1879.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Dear Sir, — In the postscript to his letter on the Hypaethral Question in the last number of your journal, Mr. Thomas Davidson, referring to my communication in your issue of August 30, in which I "invoked in favor of Mr. Clarke's essay the authority of Dr. Reber, of Munich," says: "What Dr. Reber's unsupported authority is worth may be judged from the single circumstance, very germane to the present question, that in his *Kunstgeschichte des Alterthums* (Leipzig, 1871), which Professor Norton considers 'the best existing concise history of ancient art,' he treats with sarcasm and contempt the well-established fact of the curvature of the horizontal lines in Greek temples. (See the criticism of Koumanoudhis in the *Ἀρχαιολογικὴ Ἐφημερίς*, 1874, page 481.)"

Mr. Davidson's assertion is, I regret to say, so completely at variance with the truth, that I can only suppose him to have been misled by reliance upon the paper of Mr. Koumanoudhis to which he refers (and which I have not seen), and not to have taken the precaution to consult Reber's own pages. There is no foundation whatever for the charge that Dr. Reber "treats with sarcasm and contempt the well-established fact of the curvature of the horizontal lines in Greek temples." On the contrary, he gives a clear account of the discovery and of the nature of the curvature, and discusses the practical and æsthetic motives for this refinement of construction. (See his *Kunstgeschichte des Alterthums*, 1871, pages 206-208.)

In his *Geschichte der Baukunst im Alterthum*, Leipzig, 1866, in treating of the same question, Reber took the position that as yet there was not conclusive evidence that the curvature was a designed result of the original construction. He did not question the *existence* of the curvature, but argued that its *origin* was not positively determined.

In his *Kunstgeschichte*, five years later, he says, "The supposition of the originality (*ursprünglichkeit*) of the curvatures, which the author felt obliged to question some years since, becomes better and better established (*mehr und mehr für sich gewinnt*)."

It appears plain that Mr. Davidson has permitted himself to make positive and incorrect statements concerning the opinions of Dr. Reber.

Faithfully yours,

C. E. NORTON.

THE OPEN FIRE-PLACE.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Dear Sir, — I have read the article in the *Metal Worker*, to which you refer me.

The only remark made in it which would be of interest to your readers is, though contradictory in itself, still liable to mislead, and therefore calls for a reply.

The critic objects to my statement that when the surfaces of iron furnaces become red-hot they may decompose the air itself, and says: "Air, by passing over a red-hot stove, is not decomposed. A small amount of oxygen might, when the iron was perfectly clean, be absorbed by it." The result of this absorption is oxide of iron. The oxygen of the air unites with the iron, and we have a separation of the two gases mechanically mixed in the air. Here is, therefore, at once a contradiction. But as iron rust is not an acid gas injurious to the health, and is not the substance to which I referred, the remarks in regard to it are irrelevant. The critic is evidently ignorant of the fact, now well known to science, that the oxygen of the air combines at high temperatures with the carbon of the iron, forming carbonic oxide, which is a gas injurious to the health. (See the *Comptes Rendus* of the French Academy of Sciences, May 3, 1869, report of the commission appointed to investigate the matter.)

The report shows that carbonic oxide is produced (1) by the direct action of the air upon the carbon in the iron heated to redness; (2) by the decomposition of the carbonic acid in the air by its contact with the metal heated to redness.

Henry Watts, in his *Dictionary of Chemistry*, page 331, says: "When cast-iron is heated to redness in the air the carbon it contains is first oxidized, and the metal rendered more or less malleable, then a crust of magnetic oxide is formed at the surface, and gradually increases in thickness, as in the case of malleable iron."

Bernan, in his treatise on Warming and Ventilation, page 205, says: "When the stove, as is frequently the case, gets red-hot, it may decompose the air itself."

Joly, in his *Traité du Chauffage et de la Ventilation*, page 162, says: "D'après les discussions qui sont consignées dans les comptes rendus de l'Académie des Sciences, en date du 3 mai 1869, il serait prouvé que les poêles en métal portés au rouge peuvent donner lieu à une formation d'oxyde de carbone, gaz éminemment toxique, et que cette formation peut provenir: (1) De la perméabilité de la fonte par la gaz qui passerait de l'intérieur du foyer à l'extérieur; (2) de l'action de l'oxygène de l'air sur le carbone de la fonte; (3) de la décomposition de l'acide carbonique de l'air par son contact avec le métal; (4) de l'influence de l'acide carbonique formé par la respiration, ou par les poussières et les miasmes organiques en suspension dans l'air. Voilà pour les données récentes de la théorie."

See also Ure's *Dictionary of Arts, Manufactures, and Mines*, and Wagner's *Jahresbericht*, vol. xiv., page 55, where iron is shown to be permeable to hydrogen gas even when cold: "L. Cailliet überzeugte sich, dass das Eisen, nicht nur wie Deville und Troost nachgewiesen, im stark erhitzten Zustande, sondern auch bei gewöhnlicher Temperatur von Wasserstoffgas durchdrungen werde."

I prefer to take the testimony of the French Academy of Sciences, of Tremy, Payen, St. Clair, Deville, General Morin, of Henry Watts, Bernan, Tomlinson, and numerous other scientists of note who might be quoted, to say nothing of careful experiments made in corroboration by myself, to the unsupported and self-contradictory statements of the *Metal Worker*.

The critic would have found his other questions to be sufficiently answered further on in the article he criticises, had he only waited patiently for its completion.

Respectfully yours,

J. PICKERING PUTNAM.

A QUESTION OF COPYRIGHT.

NEW YORK, November 25, 1879.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Dear Sir, — If you will compare the enclosed circular with the illustration of Mr. Dorman's house, published in the *American Architect*, Vol. VI., No. 196, you will see that it is a literal copy of our design.

We write to you, therefore, to inquire what protection we have from such piracies in future; whether you would be willing to prosecute such tradesmen (as your paper is copyrighted)? Or if you would not be willing to start a "black list" of "pirates," with the name of this firm at the head?

We do not object to the publication of our designs in your paper, as we presume your readers to be of too respectable a class to copy outright; but when we find tradesmen spreading our design broadcast over the land (by mail), we decidedly object to the matter, and therefore look to you for protection.

Yours truly,

SEE & BERG.

[Our reply to one of our correspondents' questions will be found in the last paragraph of this week's Summary. As we feel assured that the offence was committed in ignorance of the real impropriety of the act, we do not think it will be necessary to crucify the offender at the head of a "black list." — Eds. AMERICAN ARCHITECT.]

NOTES OF EXPERIENCE AND INEXPERIENCE.

39. THE BLUE COPYING PROCESS. — I have been using the "blue copying process," and like it very well; but I saw some prints that were born the other day. Can you give me the *modus operandi* for making them?

S. E. TODD, JR.

[Will some of our readers who have used this process give our contributor the information he needs?]

NOTES AND CLIPPINGS.

NOTES FROM THE PRESIDENT'S MESSAGE. — *The New State Building.* This department was enabled during the past year to find temporary though crowded accommodations, and a safe depository for a portion of its records, in the completed east wing of the building designed for the State, War, and Navy Departments. The construction of the north wing of the building, intended for the use of the War Department, is being carried forward with all possible dispatch, and the work should receive from Congress such liberal appropriations as will secure its speedy completion. — *Egypt's Ancient Obelisk.* The action of the Egyptian Government in presenting to the city of New York one of the ancient obelisks which possess such historical interest is highly appreciated as a generous mark of international regard. If prosperity should attend the enterprise of its transportation across the Atlantic, its erection in a conspicuous position in the chief commercial city of the nation will soon be accomplished. — *The National Library.* The library gathered at the Capitol still remains unprovided with any suitable accommodations for its rapidly increasing stores. The magnitude and importance of the collection, increased as it is by the deposits made under the law of copyright, by domestic and foreign exchanges, and by the scientific library of the Smithsonian Institution, call for building accommodations which shall be at once adequate and fire-proof. The location of such a public building, which should provide for the pressing necessities of the present, and for the vast increase of the nation's books in the future, is a matter which addresses itself to the discretion of Congress. It is earnestly recommended as a measure which should unite all suffrages, and which should no longer be delayed. — *The Washington Monument.* The joint commission created by the act of Congress of August 2, 1876, for the purpose of supervising and directing the completion of the Washington National Monument, of which commission the President is a member, has given careful attention to this subject, and already the strengthening of the foundation has so far progressed as to insure the entire success of this part of the work. A massive layer of masonry has been introduced below the original foundation, widening the base, increasing the stability of the structure, and rendering it possible to carry the shaft to completion. It is earnestly recommended that such further appropriations be made for the continued prosecution of the work as may be necessary for the completion of this national monument at an early day.

BUILDING ACCIDENT. — The front and back walls, with the roof, of the new Baptist church, on James Street, Hamilton, Ont., fell in this week. Loss, \$40,000.

HOW THE DOME OF THE UNITED STATES CAPITOL ESCAPED DESTRUCTION. — A Sunday newspaper publishes the following: —

"In order to lend especial brilliancy to the scene in the rotunda of the Capitol on Thursday night, when the ball of the Society of the Army of the Cumberland was given, every gas jet in and around the immense space was put into requisition. Something like one thousand, therefore, were lighted that had not been used during the preceding eleven years. All at once, at about eleven o'clock, while the gayety was at its height, all the gas in the upper lofts of the rotunda went out instantly. There was considerable commotion among the guests, while the officials of the building rushed around to repair the accident. It was supposed that the 1,300 jets in use, which had so mysteriously ceased burning, might be pouring out a great volume of gas, which might at any time explode. At this critical juncture the Capitol electrician, Mr. Rogers, quickly mounted to the top of the interior and turned off the stop-cock of every burner. Almost miraculously, however, a valve in the supply-pipe had acted automatically, not only thus shutting off the flow of gas, but holding it back also. Had not this been the case, and if Mr. Rogers had not been at hand, there would have been an explosion that night which would have brought down the entire dome of the Capitol in huge fragments upon the heads of the assembled hundreds, among whom were the President and Cabinet officers."

Persons who attended the ball had no knowledge that the gas supply failed at any time.

ROMAN VILLA AT WALDORF, GERMANY. — Excavations at Waldorf, in Germany, have brought to light the remains of a Roman villa, with a frontage of two hundred feet. They lie near the site of an extinct volcano, and although the mosaics and wall painting which adorned the palace have been found in a very shattered and fragmentary state, the existence of the large villa alone confirms the opinion that the volcanoes of the Rhine at the time of the Roman occupation had long ceased to be dangerous.

THE EMPRESS EUGÉNIE AS THE GODDESS OF THE REPUBLIC. — An amusing discovery has just been made at the town-halls of several French villages of plaster busts of the Republic, which are nothing else than former busts of the Empress Eugénie, slightly altered by the addition of a bundle of corn-ears in the hair, and a Phrygian cap or some other republican attribute. It seems that an enterprising firm of plaster-casts merchants, having purchased at a discount, shortly after the 4th of September, 1870, all the effigies of the ex-empress which were on the market, have, by making these judicious alterations, succeeded in disposing of their wares with considerable profit.

MICHAEL MUNKACSY'S GREAT PICTURE. — Milton Dictating Paradise Lost to his Daughters has arrived from Munich, its last place of exhibition, at its future home, the Lenox Library in New York city. It was bought, it will be remembered, in June, 1878, at Paris, by Mr. Robert Lenox Kennedy, for presentation to the above institution. The price paid was some 100,000f. (\$20,000). Mr. Munkacsy received for it, when it formed part of the Universal Exposition of 1878, a grand gold medal of honor, the cross of officer of the Legion of Honor, and the universal praise of the French and other foreign critics. Since then it has been exhibited at Berlin, Vienna, Buda-Pesth, London, everywhere attracting great attention, and finally at the recent Munich International Art Exhibition, where the painter received one of the eleven first-class medals for painting.

EVAPORATING PANS ON STOVES. — An almost universal practice in winter is to place on the stove a pan of water, with a view to purify the air by absorbing the carbonic acid contained in it. Dr. Polli, of Milan, who has long been engaged in investigations on this subject, is wholly opposed to this system. According to him, the water does not absorb carbonic acid, but, on the contrary, adds to it by the decomposition of the carbonate of lime contained in all drinkable water in greater or less proportions. The white incrustations found on the sides of the vessels are, in fact, formed by the deposit of sub-carbonates and sulphates of lime, produced by the evaporation of the water, and the principal part of the carbonic acid having been given off to the surrounding atmosphere. M. Polli proposes instead to place on the stove pans containing quicklime, which after a few days augments in volume and is transformed into carbonate of lime by absorbing the carbonic acid in the air. By this means the atmosphere is constantly purified, but at the same time is rendered very dry. To obviate this inconvenience, vessels containing water may be placed about the room in positions where they are not subject to the immediate action of the fire, and they will give off by their evaporation sufficient humidity to render the air agreeable without adding to the quantity of carbonic acid already present. — *London Times.*

PRESERVATION OF WOOD. — The improved French method of preserving wood by the application of lime is found to work well. The plan is to pile the planks in a tank, and to put over all a layer of quicklime, which is gradually slacked with water. Timber for mines requires about a week to be thoroughly impregnated, and other wood more or less time, according to its thickness. The material acquires remarkable consistence and hardness, it is stated, on being subjected to this simple process, and the assertion is made that it will never rot. Beech wood prepared in this way for hammers and other tools for iron-work is found to acquire the hardness of oak without parting with any of its well-known elasticity or toughness, and it also lasts longer.

DISCOVERY OF AN "OLD MASTER." — An artist of St. Omer, says *La Chronique des Arts*, in travelling about the neighborhood of Arras, noticed that, beneath the coats of whitewash which covered the ceiling of an exceedingly primitive privy of the house where he was lodging, there appeared traces of color. Scraping away a little of the whitewash he soon made certain that the ceiling was formed by an old painted panel. It was not hard to persuade the proprietors to sell the ceiling, and the artist had the good fortune to find that the panel, when carefully cleaned, revealed a painting of Christ at the foot of the cross which dated from the sixteenth century. The name of the master does not transpire.

THEATRE FIRES. — Almost all the theatres in the leading cities have been burned down at some time or other. In London alone, 56 actual theatre fires, and an unknown number of alarms, have taken place. A laborious compiler has discovered that the average life of a theatre is only 22½ years. Thirteen theatres per year have been destroyed in 30 years, a majority in the middle of the week. Of 252 burnt, 5 happened before opening, 70 in the first 5 years after opening, 38 in from 6 to 10 years after opening, 45 in from 11 to 20 years after opening, 27 in from 21 to 30 years after opening, 12 in from 31 to 40 years after opening, 20 in from 41 to 50 years after opening, 17 in from 51 to 60 years after opening, 7 in from 61 to 80 years after opening, 8 in from 81 to 100 years after opening, 3 upwards of 100 years after opening. — *Exchange.*

A CLEVER PHOTOGRAPHER. — A photographer at Scarborough, England, who died lately, was famous in the business for the shrewd way in which he induced persons to order portraits in oil, when they had intended only to sit for card photographs. Selecting the most pleasing of two or three negatives which had been taken, it was handed into a distinct department, fitted up for rapidly producing transparencies. A transparency obtained, it was placed in a magic lantern kept ready, and a life-size image was thrown on the screen. The photographer had, in the mean time, invited the sitter into a gallery of life-size portraits, well painted in oil, and handsomely framed. These, of course, elicited admiration, and eventually he led his visitor into the room where a fine portrait of himself was presented life-size on the screen. The effect, as all photographers know, is very striking, and fully admits of a little eloquent talk on its fitness for painting.

BUILDING IN PARIS. — House building has been more active in Paris this year than has been known since the Franco-Prussian war. The number of new houses is 658, comprising 2,615 stories. Rents, nevertheless, keep up at the figure reached last year in consequence of the Exhibition.