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An exhibition of a somewhat unusual kind is to be seen in Boston. Last year Mr. Ruskin exhibited in London a large collection of drawings by Turner, with some of his own which were intended to illustrate them. Professor Norton, of Harvard College, thinking that the illustration of Mr. Ruskin's own work was a sufficient object in itself, and that it would be found interesting and useful on this side of the water, has induced Mr. Ruskin to send here a selection of his drawings, to which he has added some which were in his own possession, so that there are a hundred or more of them now on view in that city. They are arranged in chronological order, following out an idea of their author, who had said in the notes he printed for those which were in the English exhibition: "I have amused and humiliated myself by arranging a little autobiography of drawings from childhood until now; out of which it appeared to me that some useful points might be made evident respecting the science of particular methods or the danger of particular errors." Some parts of the autobiography, particularly the opening chapters, the visitor would perhaps be willing to dispense with, or at least to relegate to the obituary of which he will hope to be long spared the reading. But he will find the collection one of great interest. The drawings include a variety of subjects rendered by a variety of methods. Among them, as may be supposed, architectural subjects are prominent; there are also landscapes, studies of still life, of plants, and flowers. Some are simple pencil drawings, hardly more than outline, others studies in color or chiaroscuro with the brush. Persons who have got their conceptions of Mr. Ruskin's work only from occasional passages in his writings, or from the elaborate engravings published with them, are likely to be astonished at the extreme freedom of many of these drawings, at the regardlessness, some may think the recklessness, with which many characteristics of their subjects are passed over in the care for the particular characteristics which were the author's immediate object. Most observers will be struck with the abrupt change which came over Mr. Ruskin's manner at the time when he was at work on Modern Painters, — when he apparently first passed from under the influence of Prout to that of Turner, and then went on to develop his own native manner. Mr. Norton has printed by way of a catalogue such parts of Mr. Ruskin's notes on his drawings before exhibited as apply to these, with such additions as seemed to him apposite. It would be a pity if these drawings could not be shown elsewhere than in Boston, — for the sake of the many readers who are interested by Mr. Ruskin's published works as well as for their own interest as artistic studies. We may have an opportunity to say more of them.

The fate of the Main Exhibition Building at Philadelphia, which is in the hands of the Permanent Exhibition Company, still hangs undecided. The license granted the company by the Park Commission three years ago to maintain the building for an international exhibition of industrial products contained a provision that the Commission might terminate the lease if the undertaking was not duly carried out. It was a reasonable provision; for to preserve the building at all was a considerable sacrifice of the park, one which had not been intended, and was only to be justified by putting it to some use

which should be an actual public benefit, and which could not be provided for elsewhere. Last summer the Park Commission, finding that the serious business of the company languished, and that their exhibition, so far from justifying its claim to the building, had faded into the background and was overshadowed by a variety of rather trivial amusements which had been introduced to attract the public, that the building was not kept in proper repair, nor the grounds about in good order, notified the exhibition company that their license must terminate with next year, according to the original condition. Against this the company protested vigorously, and the directors having bestirred themselves in an effort to excite public interest, secure subscriptions, and put the exhibition on a substantial footing, an enormous petition was got up and a strong pressure was brought to bear to induce the commissioners to recall their notice, and give the exhibition another chance.

The commissioners yielded so far as to notify the company that whenever they are "assured of a compliance with these provisions [of the license] by the company, and satisfied of the company's ability to conduct the enterprise in the manner promised, they will favorably consider the application of the company for a revocation of the notice, and for permission to reinstate the lease with all its provisions." "With all its provisions," however, seems to be a stumbling-block to the company, which relucts at putting itself again under security. Within a few days the directors have accordingly sent to the Park Commission an address which has the look of an *ultimatum*, wherein, after reciting the difficulties with which their undertaking has labored from the start, they repeat the objection which they had before raised, that to have the danger of a revocation of their license hanging over them makes success impossible. "It is obvious," say the directors, "that it would be impracticable for the directors of this company to obtain the pecuniary assistance which would be necessary to make it what they would like to make it in all respects, so long as that summary power of removal exists and the order of removal stands." They therefore wish a greater assurance of permanence than their present license gives, and declare that "if the proposed change is not made, the only course open for the company is to comply promptly with your order of removal by closing the exhibition and disposing of the building occupied by it, as soon as possible within the time limited by the license." In the mean time the case of the exhibition is made harder by the discovery, which the Park Commission has made through analysis, that the drainage from the main building, as it is at present used, is assisting to seriously contaminate the little stream that flows into the Schuylkill through the Lansdowne valley just above the Fairmount Water-Works, which supply the city.

We omitted to notice, when it was first announced by telegraph, the death of Mr. John Adams Jackson, sculptor, which occurred a month ago in Pracchia, in Italy, a little town in the Apennines, at the summit of the railway between Florence and Bologna, where he had gone for his health. Mr. Jackson was the last, we believe, of the little group of older American sculptors who made their home in Florence, only Powers and Hunt having preceded him there. He was born in Bath, Maine, in 1825. He first studied art in Boston, where, in his earlier days, he practised drawing portraits in crayon. Later, he went to Paris to study the figure in Suisse's famous *atelier*, and then to Italy, where he began as a sculptor in Florence, after working from the life in the academies of that city and of Siena. His bust of Miss Adelaide Phillips, the singer, made in Florence in 1853, first brought him notice. He returned soon afterwards to the United States, and established himself in New York, where he executed a number of portrait busts, among them those of Buchanan Read, for the Union League of Philadelphia; of George S. Hillard, for the New York Historical Society; of Judge Mason, and Dr. Lyman Beecher. In 1860, having received a commission for a bronze statue of Dr. Kane from the Kane Monument Association, he went back to Florence, where he fixed himself, and where thenceforth, except for occasional visits of a year or two to this country, he kept his residence.

The most of Mr. Jackson's works were portrait busts, of which he left more than a hundred, it is said. He had a marked faculty for catching likenesses, and his likenesses were of a kind

that made his works popular, so that many replicas of them are to be found. He also executed a variety of ideal figures, medallions, and reliefs; of these, too, many were repeated. Among them are statues of Autumn, Cupid Stringing his Bow, Cupid on a Swan, Hylas, the Culprit Fay, Titania and Nick Bottom (a bronze group), busts personifying Peace and Dawn, and a medallion called The Morning Glory, which has been many times copied. Of more important works, he executed in 1862 a marble group of Eve and the Dead Abel for Mr. Morehead, of Philadelphia, that added much to his reputation. In 1867, during a visit to New York, he modelled a group and several single figures, which were to be cast in bronze for the Gate House of the Reservoir in Central Park. These sculptures, we believe, have not yet been cast. Musidora, a subject from Thomson's Seasons, exhibited in Vienna in 1873, and afterwards in New York, won high praise. The sculpture in bronze for the soldier's monument in Lynn, built in 1874, was also Mr. Jackson's work. A spirited group in marble, called Pastorello, representing a shepherd boy of the Abruzzi playing with a goat, belongs to Mr. Nevins, of New York. His last important work, never finished, as we understand, was a second Eve and Abel, differently treated from the first, on which he had been busy a year or more, and which he looked upon as his *capo d'opera*. Mr. Jackson's works were marked by cleverness of pose, a good anatomical knowledge, a certain grace of attitude and of form, and a pleasant play of fancy, more than by power of imagination or of expression, we should say; nevertheless, the Eve and Abel has been warmly praised for its expressive pathos. His kindly companionship and genial manner will be remembered by all who had his acquaintance, and will lend a meaning to the story of a writer in the *Chicago Times*, who went to his studio after his death, and was met by his old assistant, saying, with tears in his eyes, "*Il buonissimo Signor Jackson è morto.*"

A QUESTION of some importance in regard to the liability of a city for its sewers has just been decided in Philadelphia by a referee. The inhabitants of one part of the city had some time ago petitioned the city to convert the Cohocksak Creek, which drained their quarter, into a sewer. This had been done; but one day there came a rain so heavy that the sewer, though it had served for all ordinary contingencies, proved quite inadequate to carry off the water, which backed up and overflowed the property of the abutters, doing considerable damage. Thereupon several suits for damages were brought against the city, on the ground that it was liable for not having provided a sufficient sewer. These suits were by common agreement referred to a referee, Mr. W. Wynne Wistar, and we find in the *Philadelphia North American* an account of the decision which he has rendered. He holds that, since no defect appeared in the construction of the sewer, the damage, being due only to its small capacity, is to be attributed to an error of judgment in providing for ordinary, but not for extraordinary emergencies. "For an error of judgment," the referee decides, as a matter of law, "a municipality cannot be held liable." Therefore the suits are dismissed.

THE decision of a referee naturally does not carry the weight, as a precedent, of that of a court, but it will stand till it is overruled, and in the mean time may be accepted as an indication of the tendency of the common law in a matter which is not, we presume, provided for by statute, and which, therefore, would be subject to the same laws in all our cities. Then follow certain inferences and questions which are of general interest. The sewer in question took the place, it seems, of a natural water-course, and it was probably easy to make the mistake of not allowing escape sufficient for an extraordinary and therefore unexpected flood. In this case there was no choice but to admit the water to the sewer after it was built, whatever the consequences, and the only remedy is to build a new sewer. But it is the habit in all our sewered cities to admit the street wash into sewers which are built for drainage merely; in sudden and extreme rainfalls these are liable to be gorged, and to set back the flow in private drains that empty into the lower parts of them. Damage is often suffered from this cause, and one may ask whether, where it is found to occur, a city cannot be held to exclude the street wash from its sewer, or be made to pay for the injury. If an error of judgment has been found to cause damages, is there no defence if it is repeated, or no way to enforce its correction when it is made manifest? The law as laid down by the referee is very sweeping. Though an individual

is held responsible for the consequences of his mistakes, a municipality is not. The only thing, then, for which a city is liable in its constructions is faulty workmanship, one may conclude,—for the rule is obviously not confined to sewers. It would seem to follow that if a bridge tumbled in, or a city building fell down, through faulty design or lack of sufficient material, the city was not liable: if the trouble was bad mortar or weak castings the city might have to pay for damage done. Faults of planning are errors of judgment; apparently only faults of workmanship are left to be classed as punishable errors. It strikes us that "errors of judgment" is a pretty elastic term, and might be made to cover most of the obnoxious things that towns may chance to do. It is difficult to draw the line between permissible stupidity and culpable ignorance; or perhaps no such line is to be drawn, and nothing is left open to redress but wilful malice and proven fraud. With the means of redress is taken away the only opportunity which is commonly open to enforce the abatement of an injury. There is no doubt that the blundering action of municipal authority often does great injury to individuals. If municipalities are not liable for their blunders, the individual who suffers from them is in a bad way unless he can right himself with the two-edged sword of politics. We do not presume to criticise the legal decision of the referee, but we think inconvenience is visible in its consequences.

THE RECOLLECTIONS OF SIR GILBERT SCOTT.¹ I.

SIR GILBERT SCOTT, dying in the thick of the battle, has left behind him, besides the countless monuments of his conscientious and skilful practice, the written record of a splendid career in the singularly interesting volume of reminiscences which appeared some months ago, and of which we are thus tardily to give some account.

Every professional career is interesting to the men who are fighting out the battle of life on the same line. What do lawyers, doctors, or ministers, what do merchants, or mechanics, or tradesmen, talk about, when they meet, with such interest as the current history of their fellows? A noble sympathy, a generous rivalry, a mean jealousy, all add zest to this interest, and make it universal and keen. Perhaps it is nowhere keener than among architects, whose calling occupies so indefinite a place among the industries of civilized life; whose lives are commonly so plentifully seasoned with the emotions and vicissitudes which appeal most strongly to the sympathy of their fellows, and are least dreamed of by the world at large; whose successes are often so brilliant, and whose failures are so blank and disheartening.

A professional life like that of Scott, including almost every variety of experience to which an architect is subject, especially when set down by his own hand, and when the story is told, as in this case, with frankness and unreserve, furnishes a body of *mémoires pour servir* which can hardly be too highly prized.

Ten or twelve years ago we were all reading the memoirs of Sir Charles Barry, the first architect of the century who had risen to deserved eminence, and whose biography, although not written by himself, contained much of the history of English architecture for a generation at the period when it was emerging from the ignoble condition in which it had been sunk for near two hundred years. Barry was sixteen years older than Scott, and although the latter in his reminiscences alludes to him in one place as "my dear friend, Sir Charles Barry," this is almost the only mention of him in the book, and it nowhere appears that there was any professional intimacy between them. The two men were, we should think, of very different temperament, and as different in their lines of practice; yet there was much likeness in their lives. Both were full of enthusiasm for their profession, and of energy and untiring industry in the practice of it; both rose by their own exertions from a humble origin to the head of their profession; both experienced in their successes the tyranny of the men who wielded the power of the Government, and the meaner jealousy of their less successful brethren; both were rewarded by the Queen with the honor of knighthood; and to both, when their work was done, was granted the supreme recognition,—consolation to every British heart for all the stings and arrows of life,—a grave in Westminster Abbey.

Of Scott, as of Barry, it may be said that his rapid rise into a large practice at an early age was made comparatively easy to a man of his earnestness and power of work by the badness of the work which the other architects were turning out. When he began to build, about the year 1835, being then twenty-four years old, Barry had already established his reputation in London by the Travellers' Club House, Bridgewater House, and the Reform Club, and sundry large mansions in the country. The prevailing style in London, however, found expression in Regent Street, the Bank of England, the National Gallery, and buildings of that class. In the country churches were beginning to be built in the Gothic style, but a Gothic so feeble and characterless as to be almost worse than the mongrel classic which it displaced. Scott's boyhood was passed in

¹ Personal and Professional Recollections by the late Sir George Gilbert Scott, R. A. Edited by his son, G. Gilbert Scott, F. S. A., &c., &c. London. 1879.

a little country village, where his father was "perpetual curate." His grandfather, Thomas Scott, was the author of the well-known commentaries on the Bible, and lived in a neighboring parish. The boy's relations with parish notables of various sorts were thus somewhat wide-spread and influential, a circumstance which stood him in good stead at his entrance into professional life. The strong love for picturesque architecture, which led him to pass much of his leisure (of which, being one of a large family, with no schools near, he had plenty) among the old churches and houses within rambling distance of his village, resulted naturally in his being put, at the age of fifteen, through a course of mathematical and architectural study, under the superintendence of an uncle who was a man of leisure and had the knowledge of an amateur. A year or two later he was sent to London, and entered at the office of one Mr. Edmeston, of whom we are told that he was more of a poet than an architect, and that the feelings of awe and veneration which his young pupil had properly entertained for his master were rudely dispelled on the first morning after his arrival, when Mr. Edmeston invited the boy to take a walk with him and see some of his works, which were found to consist of "a few second-rate brick houses, with cemented porticoes of two ungainly columns each." Scott had been feeding himself for years on the remains of old English Gothic, and the revulsion was severe. His master informed him that "the cost of Gothic architecture was so great as to be nearly prohibitory; that he had tried it once at a Dissenting chapel he had built at Leytonstone, and the mere cementing of the exterior had amounted to a sum which he named with evident dismay." It seems, nevertheless, that though the atmosphere of the office was not the most inspiring, yet Scott contrived to get pretty well grounded, during his stay there, in both the principles and the practice of architecture. He taught himself perspective out of a book in a fortnight so thoroughly that he never again had to refer to any book on the subject. His master had a good architectural library, of which in his evenings Scott availed himself fully. In his summer holidays he devoted himself to measuring and sketching among his beloved Gothic buildings in the country, making in the evenings, on his return to the office, elaborate tinted drawings of what he had measured; concerning all which labor "Mr. Edmeston wrote seriously to my father, warning him that I was employing my leisure hours on matters which could never by any possibility be of any practical use to me."

At the end of his four years with Mr. Edmeston, he placed himself, by the advice of a surveyor, with a firm of London builders, engaged in extensive works, to whom he rendered such service as he could, in return for the freedom of their workshops and of the buildings on which they were engaged. One of the partners of this firm, known later as Sir Morton Peto, was in after life of much assistance to him. He was not long with these builders, but he says with emphasis, "It is impossible for me to exaggerate the advantage of this arrangement in giving me an insight into every description of practical work."

After this he was for two years an assistant to his friend Mr. Roberts, who had just obtained the appointment of architect to the new Fishmongers' Hall, and who occasionally made him clerk of the works at one and another of his buildings. By the time this engagement was at an end he had begun to think it time to get into practice. A singular opportunity occurred just at this time which launched him at once on an extensive line of practice. The new Poor Law Act had just come into operation, under which neighboring parishes joined together, under boards of guardians, to provide and maintain union workhouses. All over the kingdom, then, there sprang up a sudden crop of these buildings. The chief commissioner employed one Mr. Kempthorne, a friend of Scott's, to prepare some normal designs for the proposed workhouses. Kempthorne, knowing that Scott was desiring to commence practice, wrote to him, saying that offices adjacent to his own were vacant, and if he chose to take them he could employ his leisure in assisting him in his workhouse drawings. Scott accepted the proposal and went to work. A few weeks later came the news of his father's sudden death, leaving his mother with nine children, of whom five were younger than himself. It became necessary for him to put himself at once in the way of earning a livelihood. "The two steps I took were, first, to write a sort of circular to every influential friend of my father's I could think of, informing them that I had commenced practice, and begging their patronage; and, secondly, to quit Kempthorne, and to use my interest to obtain the appointment of architect to the union workhouses in the district where my father had been known. Both steps were happily attended with success. Several friends placed small works in my hands, and I succeeded by a strenuous canvass of every guardian in obtaining appointments to four unions in our immediate district."

He had thus plunged at once into the work of his life, and from this moment knew little of leisure or rest. The years which succeeded seem, as he says, "an era of turmoil, of violent activity and exertion. For weeks I almost lived on horseback, canvassing newly formed unions. Then alternated periods of close, hard work in my little office at Carlton Chambers, with coach journeys, chiefly by night, followed by meetings of guardians, searching out of materials, and hurrying from union to union, often riding across unknown bits of country after dark, sudden sweet peeps in at my poor mother's new home, . . . with flying visits to Gawcett and elsewhere, as occasion served."

For the first few years his practice seems to have been pretty much

confined to the union workhouses. Almost at the outset he had invited an acquaintance of long standing, of whose ability he had had ample experience, to come and assist him with his working drawings. This connection soon ripened into a partnership, and Scott & Moffatt grew to be a familiar sound in the ears of Poor Law guardians and many others over half the counties of England. Scott can hardly say too much of his partner's energy, enterprise, intelligence, and ability. "The effect of the new arrangement was magical," he says. "He followed up union-hunting into Devonshire and Cornwall with almost uniform success, and my poor little quartette of works around my old home soon became as nothing when compared with the engagements which flowed in upon us as partners. Moffatt's own exertions were almost superhuman, and when I recollect that no railways came to his help I feel perfectly amazed to think of what he effected."

Here is an amusing account of the competitions for the unions, which "were conducted on principles peculiar to themselves. They were open in every sense, and each of the competitors was at liberty to take any step he thought proper. They used first to go down and call on the clerk, the chairman, and any of the guardians who were supposed to have any ideas of their own; and after the designs were sent in no harm was thought of repeating those calls as often as the competitors pleased, and advocating the merits, each man of his own arrangement. On the day on which the designs were to be examined, the competitors were usually waiting in the ante-room, and were called in one by one to give personal explanations, and the decision was often announced then and there to the assembled candidates. Moffatt was most successful in this kind of fighting, having an instinctive perception of which men to aim at pleasing and of how to meet their views, and to address himself successfully to their peculiar temperaments. The pains he took with the arrangements were enormous, communicating constantly with the most experienced governors of workhouses, and gathering ideas wherever he went. He was always on the move. We went every week to Peele's Coffee-house to see the country papers and to find advertisements of pending competitions. Moffatt ran down to the place to get up information. On his return we set to work with violence to make the design and to prepare the competition drawings, often working all night as well as all day. He would then start off by the mail, travel all night, meet the board of guardians, and perhaps win the competition, and return during the next night to set to work on another design. I have known him travel four nights running, and to work hard through the intervening days. . . . He was the best arranger of a plan, the hardest worker, and the best hand at advocating the merits of what he had to propose I ever met with."

Of the abrupt dissolution of this partnership at the end of ten years of almost unexampled success a curious account is given, which does not present Mr. Scott in an altogether attractive light, though it is to be presumed that something is withheld which would furnish some justification of what seems from his own story to have been an unwarrantable harshness, not unmixed with cowardice. "A constantly increasing desire," he says, "had grown up in my mind to terminate my partnership with Mr. Moffatt. My wife was most anxious upon the subject, and was constantly pressing it upon my attention; but my courage failed me, and I could not muster pluck enough to broach it. At length Mrs. Scott took the bull by the horns. She drove to the office while I was out of town, asked to see Mr. Moffatt privately, and told him that I had made up my mind to dissolve our partnership. He was tremendously astounded, but behaved well, and the ice thus broken, I followed up the matter vigorously. This was during the latter part of the year 1845, and at the close of the year an agreement was entered into dissolving our partnership then and there *de facto*, but taking one year as a year of transition, and delaying the actual dissolution till the close of that year. Though Mr. Moffatt occasionally kicked hard at this, I must do him the justice to say that he behaved fairly and straightforwardly throughout."

Scott competed for his first church in 1838, when he had been in practice three years, and got it. "This was at Lincoln, and I cannot say anything in its favor, excepting that it was better than many then erected. Church architecture was then, perhaps, at its lowest level. . . . Unfortunately everything I did at that time fell into the wholesale form, and before I had time to discover the defects of my first design its general form and its radical errors were repeated in no less than six other churches, which followed in such rapid succession as to leave no time for improvement, all being planned, I fancy, in 1839, or early in the succeeding year."

His practice steadily widened. The Memorial Cross at Oxford, the Church of St. Giles, the Orphan Asylum at Wandsworth, the Jail at Reading, were among the successful competitions of the ten years of his early partnership with Moffatt. Shortly before this partnership was dissolved occurred the famous competition for the Church of St. Nicholas at Hamburg, in which Scott bore away the palm from Germans and French alike, by the award of Zwirner, to whom the decision was after much delay referred. Scott seems to have fully realized before entering this competition that it was a critical point in his career, and he prepared himself for it by a month of travel through Belgium and Germany, in order to make himself familiar with the Gothic of those regions, hitherto nearly or quite unknown to him. Singularly enough this was his first visit to the Continent, and though of necessity a very hasty one, he seems to have got great pleasure as well as advantage from it. He was in

much perplexity at Cologne as to whether he should make his church Romanesque or Gothic, and thinks if he had known at that time that the German Gothic was but an offshoot from the French, he might have made his design round-arched. As it was, however, he adopted thirteenth-century Gothic, made his first sketch of a design on the steamer between Hamburg and London, and set vigorously to work on the drawings as soon as he got home, — as indeed was sufficiently necessary, for he had but a month of time remaining before they were to be sent in. Mr. Sreet made many of the best drawings, "coming out now for the first time to my observation, in the prominent way which has since characterized him."

The effect of these drawings in Hamburg when the designs were exhibited is represented to have been "perfectly electrical." The press of that city broke forth into paeans of grateful and admiring praise, poetical and otherwise. One writer declared the design to be pervaded by the spirit of Erwin von Steinbach. Another (but this was a poet) was sure that an angel clothed in light must have hovered around the *wack'rer Meister* as he was working out his thought, etc. Ground was broken for the church in October, 1845, and the corner-stone was laid a year later with great pomp. Scott was violently attacked in the *Eccelesiologist*, which must have been a British newspaper of immense respectability, but was not Roman Catholic, as might be charitably supposed, for furnishing designs for a Lutheran church. One might imagine this an easy thing to bear; but our architect, instead of laughing at such incredible foolishness, took it *au grand sérieux*, and wrote a solemn reply, which fills twelve pages of this book, but which the virtuous newspaper consistently refused to print.

THE ILLUSTRATIONS.

ALTERNATIVE DESIGNS FOR A CITY HOUSE, NEW YORK, N. Y.
MR. BRUCE PRICE, ARCHITECT, NEW YORK.

As shown by the appended plans the house is to cover an ordinary twenty-five foot city lot.



SMITH ACADEMY, ST. LOUIS, MO. MR. T. C. YOUNG, ARCHITECT,
ST. LOUIS.

The school for which this building is now in course of construction, at the corner of Nineteenth Street and Washington Avenue, is connected with Washington University. The building will cost \$40,000.

LIGHTNING CONDUCTORS.

A CASE of injury to a church by lightning has lately been reported in the papers, which very conveniently illustrates our remark that one conductor applied to the tower is of no avail to protect the whole building. A church near Shrewsbury was lately struck by lightning during divine service, and the narrative informs us that "strangely enough," the high square tower and its conductor were quite undamaged, but that the lightning came through the roof of the choir, passing down by the organ pipes, and seriously injured five members of the congregation who were in the chancel, and who were "badly burnt and had their feet cut by the electric fluid." The roof of the chancel was much injured.

Now let us inquire into the cause of this not uncommon kind of occurrence, and see why the conductor on the tower could not defend the chancel, and what ought to have been done by the architect who erected the conductor so as to provide against such a casualty.

We must begin by reminding our readers that elevated points on the earth's surface exert no attractive power on the lightning. The

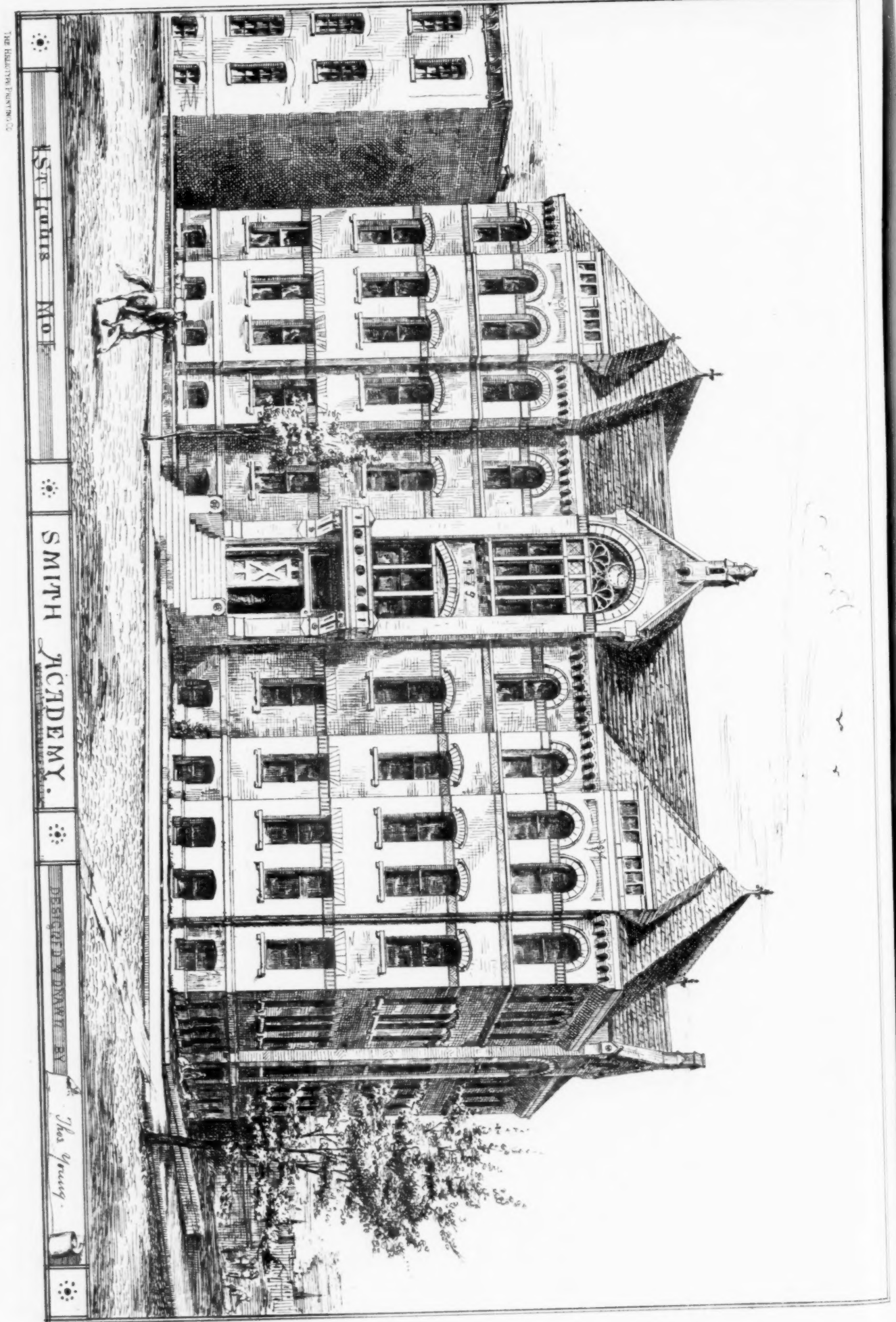
attractive forces tending to bring together the positive and negative electricities, as we described in our first paper, are exerted between two extensive planes, namely, those of the cloud and of the earth under it, and consequently the exact line in which the flash takes place will depend upon a variety of circumstances; so that, although the highest point of a building may form a passage for the shock, it is not the only one, and is by no means the cause of the discharge, which would take place, sooner or later, between the ground and the cloud, even if the building were absent. We may say that there are three causes in general, not to mention other local and particular circumstances, which will often induce the lightning to strike a less elevated, in preference to a more elevated, portion of a building. First of all, there is what we may call the "bellying" of the cloud, or protuberance of its lower surface, whereby it may happen that this portion may be in reality nearer to some low part of a building than any other part of the cloud is to the more elevated tower, and consequently the flash will occur between the cloud and the low structure. Then again, in the second place, we must remember that thunder-clouds are often driven past by the wind, and that ragged portions of cloud are thus drifted along frequently at a very small elevation above the earth, so that flashes will strike out in this way, horizontally against the sides of the building. And, in the third place, bifurcation, and even trifurcation, will sometimes occur; by which means, while one portion of the flash will strike the higher parts, another portion will dart off to a lower section of the building.

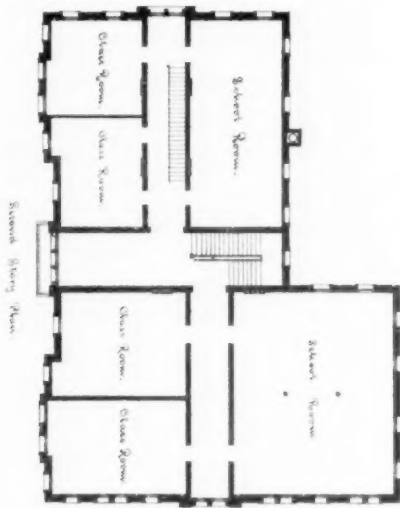
There is, therefore, no difficulty in understanding how the chance of a church may be struck by lightning, even when the tower is efficiently protected itself by a good conductor. For the fact is, that what is called the "radius of protection" of a conductor is by no means extensive. Arago and De la Rive agree in considering that a conductor can only defend from injury a circular space around it, whose radius is twice its height, measured from the point of the building from which it rises. And even this rule is far from being absolute, for it will vary with the form of the rod, as well as with the nature of the building, to say nothing of the differing circumstances of each storm.

What is, then, our remedy? How are we to conduct a building so as to render it secure in every part? This question has been admirably worked out by Professor Clerk Maxwell, who begins by proving that a space is absolutely defended from lightning which is covered in with a conducting substance; so that, for instance, a man in complete armor is perfectly secure in a thunder-storm, and so is a powder-magazine if the building is wholly sheathed with sheet-copper. No matter if the building contain metallic structures, such as engines, etc., provided they are entirely within it. But if any conductor, such as a telegraph wire, or a water-pipe, enters such a building from without, the "potential," or electrical condition of this conductor may be different from that of the building, and it must, therefore, be connected with the conducting shell. In practice, of course, it would be quite impossible thus to cover the entire surface of a large structure, such as a church, with copper. So Professor Clerk Maxwell goes on next to prove that this is by no means necessary in order to prevent any sensible effect if it were struck by lightning. It is quite sufficient to enclose the building with a network of conductors. And this may be conveniently effected practically in three ways: First, by taking care, if the structure has many salient points and angles, such as turrets and pinnacles, that each and every one of these is furnished with a good vertical conductor, of such a height that its "area of protection" may overlap those of other conductors near it; secondly, by forming a metallic skeleton of the building, — or, in other words, by laying copper rods along every edge, horizontal and vertical, and connecting these all with one another and with the main conductors; or thirdly, and which is most to the purpose in ordinary cases, by arranging so that all metallic masses, such as lead roofs, water-spouts, iron girders, and so forth, shall have connection with one another and with the various conductors erected on the building. It is, therefore, by no means a difficult matter for an architect who understands his business to render a church, say, secure by following one or all these methods, according to circumstances. Let him, for example, erect several main conductors, — one down the chief tower, if it is a cruciform church, and one down the east end of the chancel, and a third down the west end of the nave; and let him connect with these all the masses of metal outside the building, taking care (in case there are not enough of them to form a tolerably close network) to supply their place by copper rods along the edges. No ordinary thunder-storm could then injure the church. It is, in fact, due to an unconscious observance of these rules that American houses are notoriously free from injury by lightning, although storms are frequent in the United States, for the houses are commonly covered with metal roofs, connected by tin or copper gutters and shoots with the ground. The only unprotected parts are the chimneys, which are easily secured by short lightning rods soldered into the roof.

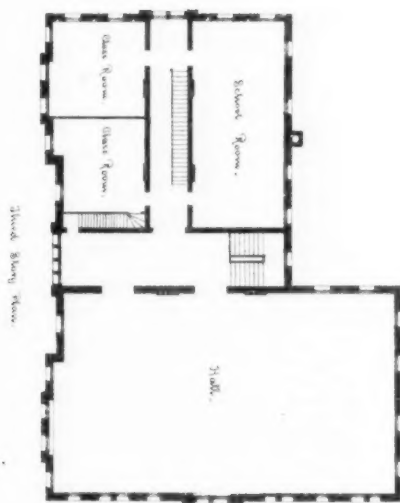
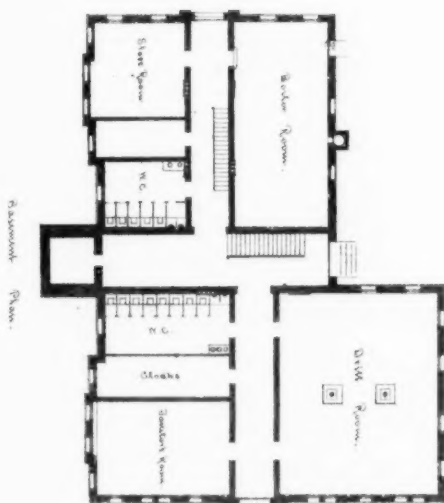
Again, some special parts of a building may happen not unfrequently to be so formed or situated as to be peculiarly obnoxious to injury. Projecting cornices, for example, may be better secured against lateral strokes if they are defended by a horizontal and projecting conductor, — provided, of course, that this is well connected with other conducting rods. Nor is it altogether useless to have one or two horizontal rods proceeding thus from the main conductor itself, at right angles to its length, and several feet below its pointed summit.

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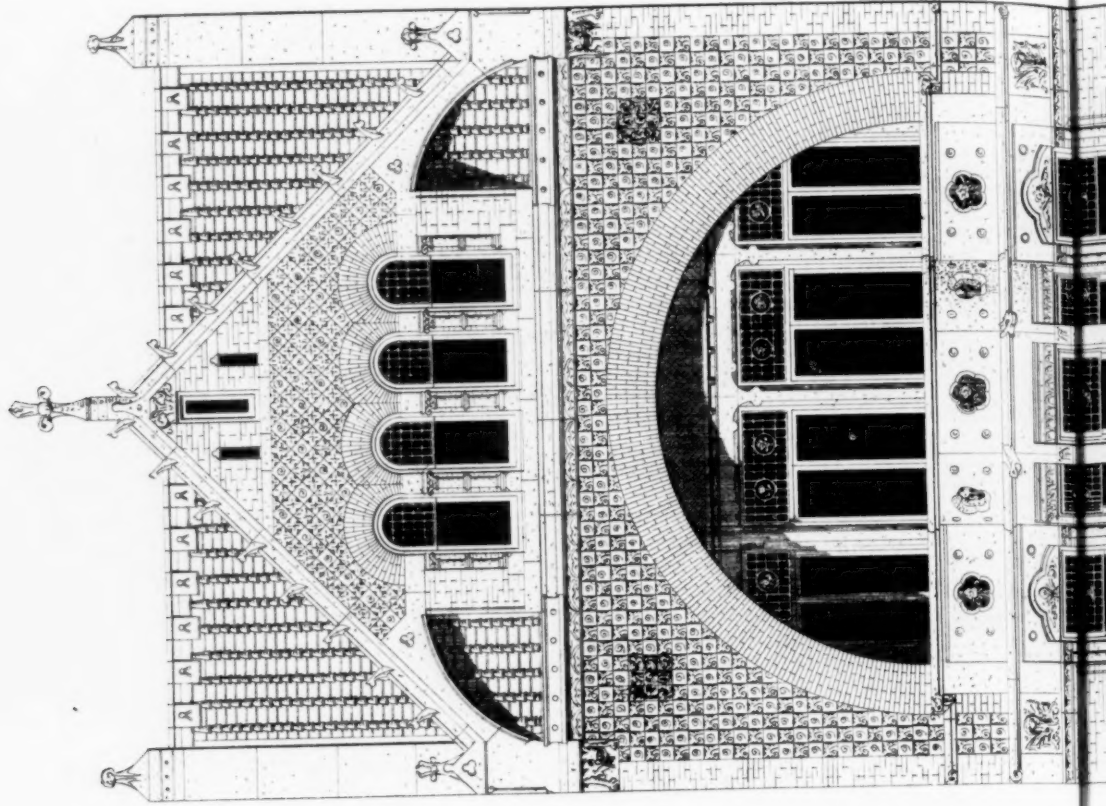
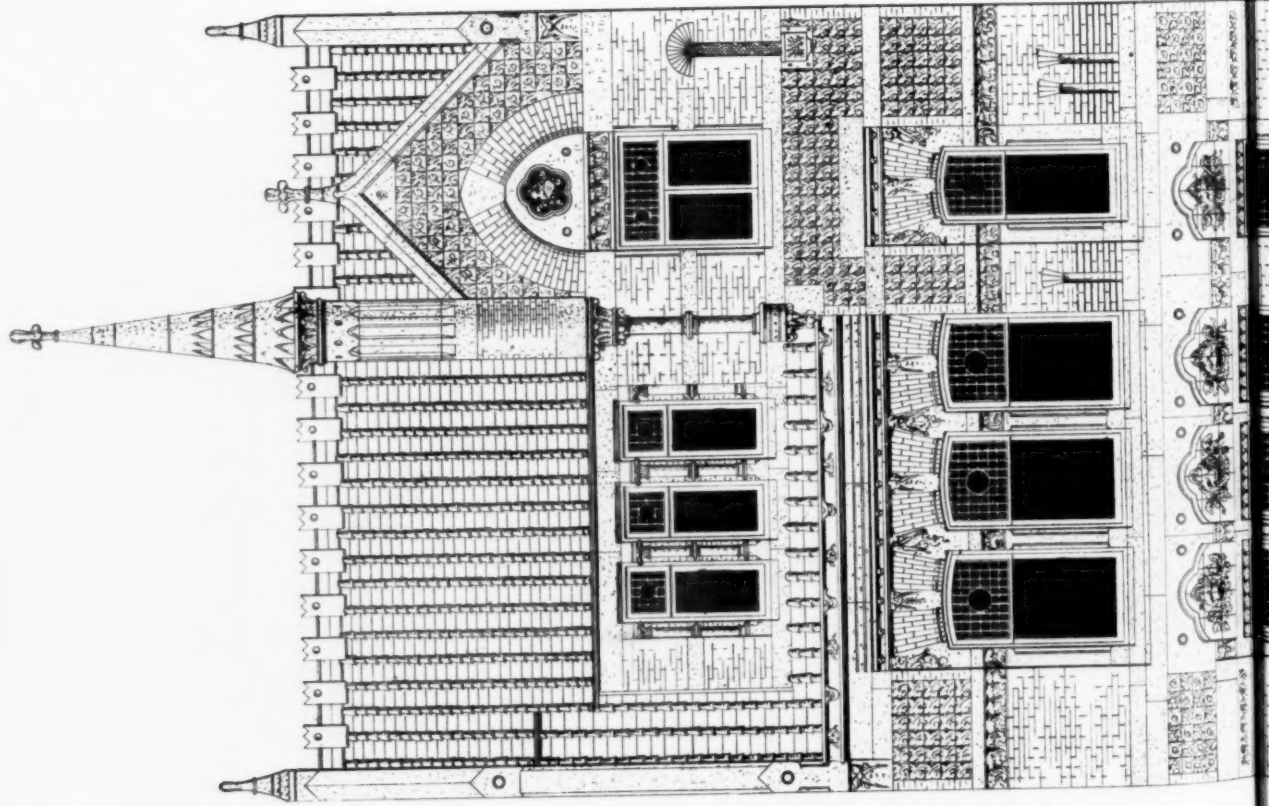


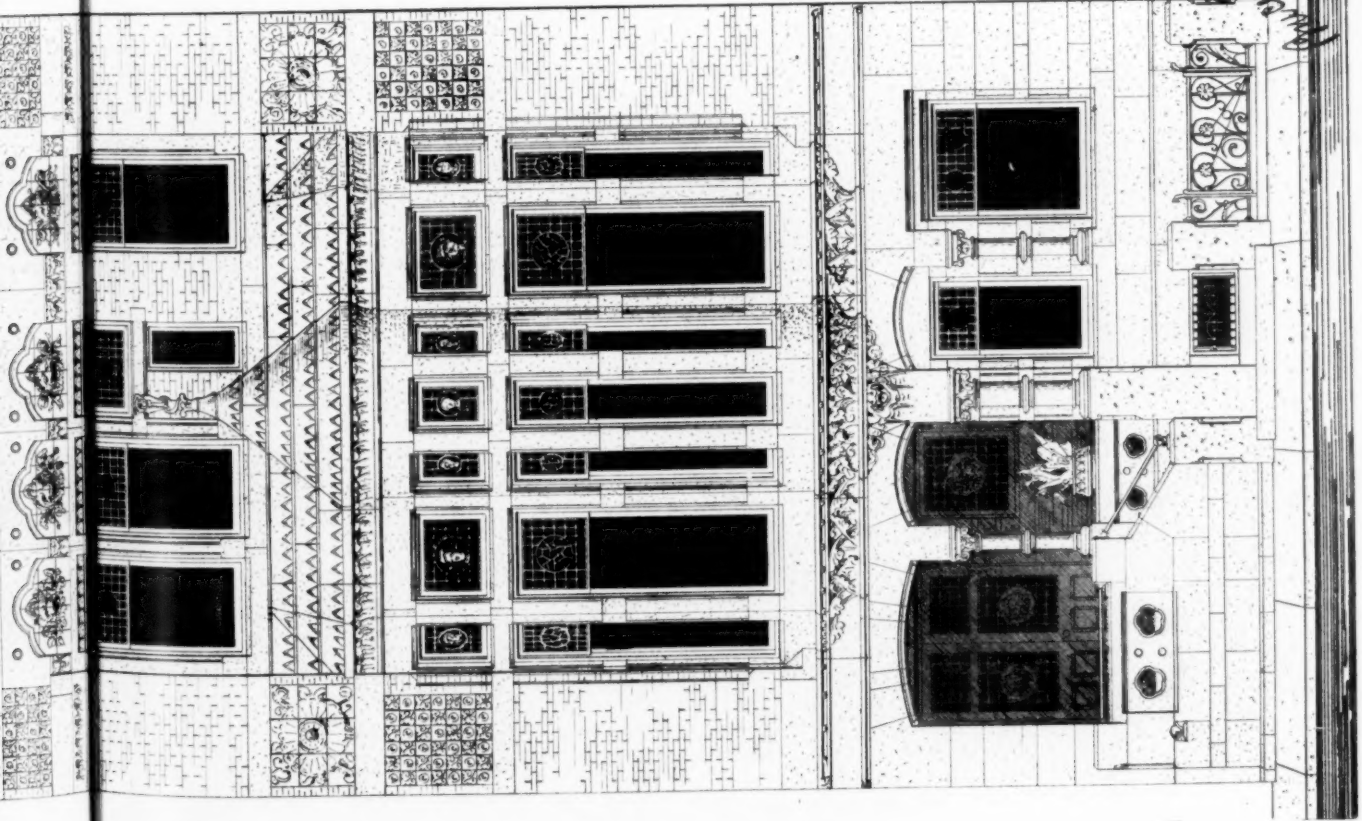


Smith Academy.
St. Louis Mo.

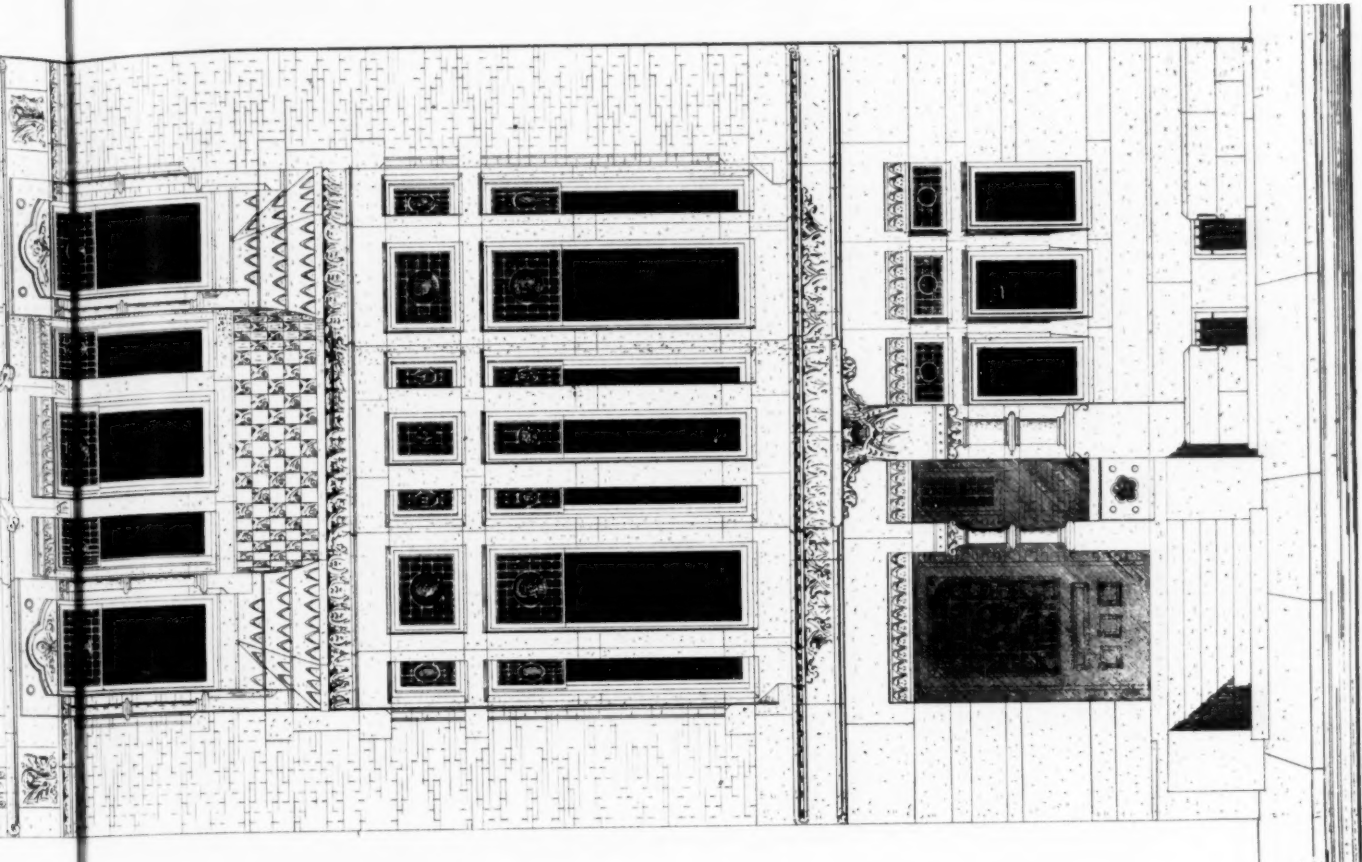


Wm. K. Fox





Handwritten note:
 New design - 1890



THE HALLS OF THE CITY OF LONDON

— ALTERNATIVE DESIGN FOR A CITY HOUSE —
 MR BRUCE PRICE ARCHT

NOVEL

More chimneys is found as more often d approach suffered which down in some but not damage hot air wets or west si

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Moreover, it will generally happen that one face of a tall spire or chimney conducts the lightning better than the other sides, and this is found to be usually that which looks to the southwest, because, as most of our storms and rain come from that quarter, such face is often damper at all times, and is, at any rate, soonest wetted by the approaching storm. The effect of this was well seen in the injuries suffered in 1836 by the spire of St. Michael's Church, near Cork, which had no conductor. The southwest face was literally rent all down in a straight line, the stones and cramps being hurled out to some distance. The rain had made this the line of least resistance, but not of sufficient conductivity to carry off the discharge without damage. So likewise in the case of a tall chimney or flue, where the hot air and ascending smoke form a conducting pillar and the rain wets one side more than others, place your conductor on the southwest side of the structure in preference to the other sides.

Such being the general conclusions at which modern science has arrived as to the theory and application of lightning conductors, let us, before quitting the subject, notice briefly one or two points which may be of interest to the practical reader.

There is no doubt, we think, that every large house in the country, and not merely extensive buildings, such as churches, factories, etc., should be furnished with a good system of lightning conductors, for all edifices are at any time liable to be struck. But we cannot too much insist upon the fact, that unless such conductors form a network over the building in the way which we have described, they are comparatively valueless; while, unless they have also a good connection with the ground, they are even worse than useless, — nay, highly dangerous. We have heard of a gentleman, lately retired from business, and who, having built for himself a large suburban villa residence, consented to his architect's advice to have his house conducted. This was done, and to all appearance very effectually; for not only were conductors erected on all the chimney-stacks, but these were fully connected with the water-pipes, and all of them joined to one main conductor, descending vertically from the highest point of the whole building. And yet, as it turned out, this house was a most dangerous one to live in in a thunder-storm! The gentleman was asked one day by a scientific friend where the main conductor entered the earth, as no sign of it was visible below a certain point. He did not know, and, in fact, had never inquired; but on examination, it was found that this chief conductor, with which all the others were connected, entered a cupboard in the drawing-room, and there stopped, hanging suspended above the floor, near the fire-place, at a distance of a yard or so from the ground! So that, as a matter of fact, and through the ignorance or carelessness of the architect, this gentleman had been actually sitting day after day in his easy-chair, close to this unfinished conductor, and in exactly the same kind of situation during thundery weather as if a loaded gun were pointed at him, ready to go off at the slightest action! So very important is the communication of the conductor with the earth.

We have already adverted to the action which is exerted by pointed conductors in silently tapping the thunder-cloud and depriving it of a portion of its electricity, whereby the number and violence of the strokes is materially diminished. Our readers are also doubtless aware that the formation of hail is intimately connected with the presence of a large quantity of free electricity in the atmosphere. If then, as Arago has shown, we were able, by the erection of pointed conductors on buildings all over the country, combined with the similar influence exerted by tall trees and forests, to withdraw a large portion of the electricity thus silently from the clouds, the hail would either not be formed at all, or would remain in its rudimentary state, so that all that was precipitated would be a harmless, extremely minute hail or sleet. Can any one, he says, doubt the great benefit which agriculture — to say nothing of green-houses and conservatories, and such-like glass structures — would receive from the disappearance of hail-storms? All that would be necessary would be that persons in all parts of the country, instead of insuring crops and so forth against hail in the usual insurance offices, should combine together to spend their money rather in erecting as many lightning conductors as possible on their houses, barns, and ricks, and so mutually benefit each other and the country at large. But until such an experiment has been tried on a large scale, we can hardly judge of the results; and we must be content, therefore, merely to suggest the subject and to leave it, on Arago's authority, for consideration by all who are interested in the matter, either as a theoretical possibility or as a mere impracticable scheme, which may, perhaps, some time or other, be more fully developed, when, possibly, compulsory lightning conductors may rank with compulsory drainage and water-supply. — *Building World*.

THE GREAT QUARRIES OF MISSOURI.

THESE rich quarries consist of (1) granite, — red and gray; (2) marble, — pink, yellow, brown, buff, red, black, clouded, mottled, and spotted; (3) alabaster, — handsomely translucent, consisting of all colors from that of brightest champagne to the darkest coffee or Malaga wine shade; (4) freestone, — white, gray, blue, buff, and brown. The granites are in southeast Missouri, and are found in the several counties of Madison, Perry, Cape Girardeau, Bollinger, Iron, Wayne, Reynolds, Carter, Scott, Butler, and Ripley. The marbles occur in most of the same counties, and in some

ten or fifteen others off to the west and northwest in the long and wide-rolling Ozark chain. The alabasters are seen in the vast labyrinthine caves of the mountains which are cut down by the Merrimac, the St. Francis, the Current, the White, and the Osage rivers, and by their numerous beautiful affluents. These caves are of remarkable size and of scientific interest. Some of them along the Merrimac are miles in extent and ramify in all directions, with lofty roofs and broad, open vaults where thousands of tons of richly-colored alabaster can be quarried and whence they can be easily shipped to the St. Louis and San Francisco Railroad, within a few miles, by which the markets of the world can be reached at cheap freights and in quick time. The distances from the localities where the almost numberless alabaster caves exist are, say, three to eight miles by good wagon roads, then by rail fifty to one hundred miles to St. Louis, and here taking barges and flatboats for the Lower Mississippi, or these drawn by steamtugs to the heads of navigation on 10,000 miles of waters in some twelve or fifteen States of the central parts of the Union. These are facts that establish the value and importance of these store-houses of architectural treasures and materials for the decorative arts. Slabs and large blocks in obelisks, tombs, mantels, table-tops, and vases have been quarried out, shaped, carved, and polished up. These new sources will supply an alabaster in America which will be found to rival and even excel many of the beautiful marbles of Italy, Spain, and Egypt. The most costly carvings of clock-frames, lamp-stands, boudoir ornaments, vases, and furniture coverings and in-layings are made from the Carrara white marbles and the pure alabasters of the Mediterranean countries which have been known and used for probably more than three thousand years. Alabaster is a condition of lime-rock in which the carbonates and sulphates of lime come into existence by what may be called geologically a secondary growth. Alabasters, or most of them, proceed either from changes wrought upon subterranean stratifications of limestone by earthquake movements and upheavals, or from slow and gradual accretions in the natural caves, that is, by watery solutions of lime flowing from the upper strata of mountains into hidden passages below, and there solidifying into new rock-masses. Thus it is seen that Aragonite, found first in Aragon, Spain, is formed, which is a species of crystalline and fibrous alabaster; also stalactites, the pendants and aqueous drippings of caverns, and stalagmites, their obverse representatives, rising from the floors of the same caverns, are all of them varieties of alabaster. In the Missouri caves the thicknesses of these formations are immense, probably varying from twenty to two hundred feet. They are compact, and of uniform fineness of texture, of agreeable diversities in color and shade, have good bedding, parting, and cleavage for quarrying, and the masses all show smooth, broad faces for polishing. In Crawford, Franklin, Washington, and other counties are large alabaster caves which have been explored by visitors for many miles. The aggregate lengths of the windings of some of these caves are known to be as much as three to five or seven miles, and the extremes of some have as yet never been reached. It is believed that they connect, and that their long arms extend to and ramify with other caves whose mouths are visible in the surrounding regions.

The freestones of Missouri have been a great dependence for the best buildings in St. Louis and other prominent cities of the Mississippi Valley. Large quarries have been working for forty years past at Warrensburg, on the Missouri River. These and all the freestones of Missouri are variably silicious or calcareous, as localities change, or as necessities of choice require either one or the other kind. They have every pleasant color, from white through the different hues of yellow, buff, gray, green, pink, blue, and brown. The strata are of great thickness, ranging often from fifty to two hundred and fifty feet, and the natural beddings or layers are from one foot to ten feet or more in thickness. Many large blocks are constantly being taken out and shipped to extensive buildings in various parts of the West, which frequently measure from two hundred to four hundred and fifty cubic feet. These freestones work well under the several labors of quarrying, dressing, chiselling, and smoothing. They make fine mouldings, capitals, columns, obelisks, or broad tables; they are used for architectural statuary, and can be also worked into small statuettes.

Although this rock is so uniformly excellent in every quality, and its superabundance and accessibility recommend it to general adoption, nevertheless skill and judgment are especially required for the determination of places to open up quarries and plans for testing the enduring qualities of the rock they contain. It was a fatal mistake, for instance, that was made some years ago in undertaking to build a new capitol at Columbus, Ohio. Lime-rock had been selected with apparently proper care. It was shaped, dressed, and duly laid in the walls, and the costly building was rapidly advancing when winter frosts arrested its further progress. In the spring following the greater part of the masonry was nothing more than a mass of shale! The testing of building materials, a precaution of the highest importance, is too often neglected in our country. Some architects and builders, indeed, take no account of it.

The freestones of Missouri are very generally excellent. Some, like these of Warrensburg, require very careful scrutiny to avoid quarries that contain disintegrating strata. In some prominent buildings of St. Louis, where it has been used, and in some principal parts of the structures, this freestone has not endured because it is too aluminous and argillaceous, and not silicious and calcareous,

as it should be. The latter two ingredients should be nearly or quite pure, with no admixture of other elements.

The red granite of southeast Missouri, which is really a sienite, with a coarse, granular texture, is one of the handsomest building stones in America. It is comparable to the red granite of Peterboro, Scotland, of which, in numerous cemeteries of the Atlantic cities, and also in some near our interior towns, there are seen large and costly mausoleums and very lofty obelisks. This is imported at heavy outlay, and during the past twenty-five years, on account of its rarity and the great beauty of finish which it takes, wealthy families have preferred it for their sepulchres. The red sienite is believed to be practically imperishable. "Cleopatra's Needles" — the principal one said to be eighty-six feet high, and consisting simply of one stone, and decorated by numerous hieroglyphs — are represented to be of a variety of red sienitic granite.

The St. Louis, Iron Mountain & Southern Railway, operating for the past fifteen years, traverses the whole granite belt of Missouri, beginning at about one hundred miles southwest by south from St. Louis, and continuing thence on the same course for the distance of two hundred miles or more, to and even beyond the State boundary of Arkansas. The width of the belt varies from forty to one hundred and twenty miles. In respect to its geology and mineralogy, it is one of the most interesting fields in the United States, awaiting exploration and development. ††

TESTS FOR PORTLAND CEMENT.

In treating of "matrices" Mr. Henry Reid, whose recently published treatise we have lately received, makes some observations upon the characteristics and properties of first-class Portland cement which may be of interest to some of our readers. He observes first, as regards weight, that it should not be less than 112 pounds per straked imperial or Winchester bushel; second, as to strength, measured by its tensile capacity of resistance to accurate vertical tension, it should not be less than 300 pounds per square inch; third, texture or fineness of powder should be as nearly as possible equivalent to 2,500 atoms to a square inch, or, in other words, a sieve of that gauge (50 square) should not reject more than 10 per cent of the cement when gently shaken by the hand, and it should feel roughish to the touch; fourth, as regards hydraulicity, it should possess a capacity of resisting the solvent action of water during at least six days' immersion, and when taken out it should not exhibit crack or fracture of any kind; fifth, as to color, the true color resembles the best quality of the well-known Portland building stone, namely, a grayish blue or steel-gray; sixth, as to setting, when mixed neat with a proper quantity of water it will set in from one to six hours, according to its weight and density; seventh, chemical analysis, a good average cement, capable of passing the preceding tests, would produce within a moderate divergence of range the following analysis: —

Lime	60.05
Magnesia	1.17
Alumina	10.84
Silica	24.31
Alkalies	1.54

Mr. Reid shows that imperfect blending of the raw ingredients, or insufficient calcination, is often a cause of inferior products. This carbonate of lime, if used in excess, produces a hard and dark clinker, difficult to reduce to a powder, and rough to the touch. The lime also becomes hydrated and swells, and endangers the mass. Excess of silica or alumina causes a brown dusting clinker easily ground into a soft powder, but incapable of attaining hardness. The presence of carbonic acid has an injurious tendency. A good Portland cement is intermediate between the over-limed and the over-clayed cement. For the manufacture of concrete, Portland cement is superior to the other two cementing agents, the blue lias and the Roman cement, and Mr. Reid observes, where it can be obtained without heavy charges for carriage, it may be regarded as being cheaper than the commonest hydraulic limes.

The author refers to General Gillmore and other American authorities on cement, but the most interesting investigations are those recorded by Mr. Maclay as to the relative effects of different temperatures on the tensile strength of Portland cement. Mr. Maclay refers to a large number of barrels of Portland cement that were guaranteed by the manufacturer to exceed in tensile strength 250 pounds per square inch. The cement, when tested, was found to be less than 200 pounds per square inch. It was found, on inquiry, where the fault in testing lay. "The room where the testing was carried on was heated by a stove, the temperature during the day ranging from 60° to 70°, but at night it sometimes fell below 40°. The gauged cement, after immersion in the water, was thus subjected to a very low temperature." All the cement was retested, the water in which the briquettes were kept being then maintained at a uniform temperature of 60° day and night. It was found that 1,370 barrels, first tested 185 pounds per square inch, when retested gave 317 pounds per square inch; that 1,373 tested first at 192 pounds gave 285 pounds, and the same number of barrels first tested 236 gave, on retesting, 289 pounds. These experiments conclusively point to the fact that temperature has a decided influence, and that when the temperature of the water is raised the tensile strength is increased. — *Building News*.

BELL-FOUNDING.

THE *Ipswich* (England) *Journal*, in describing a peal cast for Weybread church, refers as follows to some innovations in fixing bells: —

The old timber framework was removed, and has been superseded by a framework entirely new, and composed, with the exception of the bell-wheels and rope-pulleys, of iron. The clumsy, ponderous oak beams, which form the bell pits, and which are generally to be seen in churches, are supplanted by a strong iron framework, much lighter and more simple looking. The frame is based upon two iron girders, and the smaller bells are hung above the larger ones. The girders support iron strains, which in their turn support the stocks on which the small bells are suspended, and on the lower flange of the girders rest similar but shorter strains, which support the larger bells, hung beneath the others. The girders are braced together with tie-rods, and cross-pieces so firmly hold the whole framework together that it is perfectly rigid, and none of the motion noticeable in the ringing of bells in the old wood framework is to be seen. The framework is entirely new to the majority of people, but in that respect it is not unique, for there is at present another iron framework in existence. But what makes it unique is the fact that the whole of it, with the exception of the stocks, is composed of wrought-iron, whilst the other frame mentioned is of cast-iron. With all the advantages of the new frame, its cost is no greater than the old ones. The bells themselves differ from others in several respects. The founders had, by careful study of the best old bell-founders of the country, nearly succeeded in casting a maiden peal (bells which come from the foundry and need no trimming to bring them to the right tone are called maidens), but numbers 2 and 4, the last ones cast, were, by an error, made just a trifle flat. The amount which these two bells were out of tone was so slight that it was contemplated to put them up as they were, but they were sharpened to the proper tone, and the peal, therefore, has four maiden bells. The method of attaching the bells to the stocks is quite new. Instead of the canons generally used, let into a heavy block of wood which forms the stock, there is a mushroom-shaped top which is extended into the stay, and fastened there by a bolt, and when the bell is up for ringing the stay rests on a swing slider which it can press a few inches on either side when resting on it, and in that manner the bell is supported when up, and this, also, is entirely new. The stock is a great improvement. In the place of the great wooden blocks to be seen in other churches, a cast-iron bar is used, and instead of embedding the top of the bell in it, as is done with large bells with wooden stays, the stock is curved in greater or lesser degree, according to the size of the bell. The great feature of the bells, however, is the clapper, which is constructed in such a manner that, after striking the bell, the clapper does not remain on the side of the bell. This has been attempted before, but the plan having been tried by means of springs it has failed. The plan adopted by the Redenhall Company is a simple one. The shank of the clapper is a hollow tube which slides on an iron arm. The shank slides on the arm for about three eighths of an inch, and the centrifugal force of the bell's swinging throws the clapper out to the end of the arm, and it thus strikes the bell; the shank then falls by its own gravitation back to the other end of the arm, and then the clapper rests on a cross-piece at the top of the bell, and the striking part of the clapper is about an eighth of an inch from the side. The clapper is made of a softer metal than the bell, and this, besides improving the tone, prevents the clapper from wearing away the side of the bell; but the clapper, which is easily repaired, wears by its action. This attempt is undoubtedly the most successful that has been made to keep the clapper from resting on the side of the bell. Instead of swinging with gudgeons on bearings, as is usually the case, the ends of the stocks of these bells serve as gudgeons, and work on friction wheels or roller bearings. Another feature of these bells is that by striking the bells in the waist each one gives its note in major 3.

THE POMPEIIAN CENTENNIAL EXCAVATIONS.

THE opening ceremonial ended, a bell rang to summon people to the excavations. In different parts of the ninth region ten chambers were to be opened and their contents revealed, and there was an eager rush from all points. It is impossible to describe the intense expectation on every face as the first picks struck the ground, or the scene around each place to be excavated. Crowds were pressing round every opening. People were perched all along the tops of the broken walls, to the imminent peril of their limbs, and groups were thickly gathered along the higher unexcavated level, and on every other point of vantage. Each room to be excavated had been cleared of the upper falling-in, leaving about four feet to be removed. The indications given by the preparatory work in one of the larger rooms having been particularly favorable, I took my station there, and witnessed in the course of three hours, as the various objects peeped forth from the scorie one by one and were taken up, such a revelation as I shall never forget. For the first five minutes there was a breathless silence as the men worked; then, as the scorie fell away, part of a green object became visible. In a moment the workmen's hands had cleared the space around it, and amid deafening cheers a small bronze horse, nine inches in length, was held aloft. Then a large amphora appeared; then two bronze vases,

one with handles; then a large iron key, and as each in turn was lifted high for all to see, "*Bene, bene!*" burst in a chorus of hearty satisfaction from the people. A list, with the briefest description, of the things which then followed in rapid succession would fill a column. There were at least a dozen bronze vases of different shapes, sizes, and uses, with and without handles, and in one a number of bronze coins oxidized together; and many other coins were found at intervals during the excavation. There were many handsome bronze fibulae, several bronze bracelets, a number of rings, many terra-cotta vases, tazze, and amphorae, and a remarkable number of little terra-cotta water-cups for bird-cages, various kitchen utensils, a spit, forks and knives of iron, a bronze bottle, a number of little bronze bells, a dagger with ivory handle, a knife with ivory handle, a bronze caserole, and a terra-cotta money-box. After these and many more objects, of which trayful after trayful was carried away, had been taken out, a mass of black material appeared, which, falling to pieces, proved on examination to be beans; then a quantity of millet and hemp seeds, with considerable remains of the sacks which had contained them, the carbonized wood of grain-bins and of a barrel with iron hoops, and great masses of the beams of the upper floor, sufficiently solid, but entirely carbonized like charcoal. Among these remains a splendid bronze candelabrum was come upon, but its tall, slender, fluted stem was broken. In short, from noon till three o'clock a continued succession of objects was revealed, almost more rapidly than I could note them down. The mere names and briefest memoranda filled sixteen pages in a large note-book. Some of the rooms revealed nothing, others a few bronze and terra-cotta vessels; but in one room a skeleton was found, and in the smallest chamber opened four were discovered huddled together. — *London Times*.

A PREHISTORIC EXCAVATION.

LATELY a gentleman by the name of Shassern, living about eight miles southeast of here, in that section of country long known as Chimney Pierre Hills (the name was derived from an ancient pier or pillar of stone, now demolished, about fifteen feet high, shaped like a chimney, with a sunken square in the base, as though cut out for a fireplace, and supposed by many to be a relic of those wonderful prehistoric people, the mound-builders), came to the city and detailed the wonderful discovery of a cavern cut in the solid rock, which, if as represented, will take its place among the most remarkable and wonderful of archaeological discoveries.

The account of the discovery as given by Mr. Shassern is, in substance, as follows: Early yesterday morning he started out in search of a sheep which had strayed from his flock. Following along a little path through the hazels skirting the foot of the immense bald table of rock known as Chimney Pierre, he heard the faint bleating of a sheep, apparently from behind a great standing splinter torn from the mass until a broad fissure parted the two. Thinking his animal had become entangled in this fissure, he sought to steal around the fragment next to a precipitous bluff, when he lost his footing and fell over some fifteen feet, alighting upon a smooth, flat stone concealed in a dense mass of undergrowth. To his intense alarm the stone began to sink beneath the surface, and before he could recover from his fall he found himself in the midst of a vestibule cut out of the solid rock, the walls of which were adorned with the most vividly-colored paintings of men and animals. The ceiling, which was dome-shaped and about eleven feet above the floor, was adorned with the figure of a giant-sized man in the act of placing fagots in what appeared to be designed to represent the sun. Upon the sides were painted in black and brown colors the figures of animals he says he never saw even pictured — huge tusked and trunked beasts, like elephants, with masses of shaggy hair falling about their heads and shoulders; great cat-like beasts striped like tigers, and with tusks protruding from their mouths. In the midst of this throng of wild beasts, upon a yellow background, is delineated the form of a man, seated in some kind of a vehicle, much like — from Mr. Shassern's description — an ancient Roman chariot. The whole of these paintings bear inscriptions which could not be read. On one façade of this prehistoric temple (for such it must have been), this artist of antiquity had depicted birds and fowls, curious and gorgeous, score after score of them, says Mr. Shassern, none of which he could recognize as now common in this country. The colors he describes as peculiarly charming and bright. — *Cincinnati Commercial*.

THE MEDIEVAL ARCHITECT IN FICTION.

WE have not read an English novel called "The Ambassador Extraordinary," but we have been amused, as doubtless our readers will be, at certain extracts from it which we find in the English building journals. They chiefly concern one Master Georgius Oldhausen, a conspicuous character in the book, an architect who, with a rather diverting exaggeration, typifies the impracticable whims of the ultra mediæval architect of our day. We quote a few passages, the first describing the architect's own lodging-room, which he had labored to convert into a thirteenth century hall.

"The ceiling he has long ago adorned with beams and panels of deal skilfully stained to imitate old oak, the steam from a tea-kettle having been made to play over the work as an artistic finish, to remove the natural sheen of the modern but indispensable varnish. The windows, also, Mas-

ter Georgius has filled partly with the bottoms of bottles and partly with painted glass in small quarries, from his own designs, representing King Arthur and the Knights of the Table Round. The walls he has hung with ancient tapestries, of no great pictorial merit and of doubtful delicacy, but of indisputable authenticity. The floor boards he has stained and varnished like the beams of the ceiling, putting up the cracks carefully beforehand. The fireplace he has ornamented with a massive chimney-piece of oak, accommodating a dog-stove and irons, unfortunately new, but in excellent keeping with the rest. Of the furniture we need say nothing except that it is very old.

"But one thing which, more than all else, has troubled the mind of this ingenious architect at last, is the fact that the fire, in order to be an authentic fire of the period to which he pretends to belong, ought to burn in the midst of the floor, and not in a hole in the party-wall. To his intense disgust, however, the freehold landlord of the house objects to this, for the vulgar and entirely unartistic reason that it would burn the house down. For some similar reason the surveyor to the insurance office — actually an architect and F. S. A. — objects to it also. The tenant has, moreover, been invited to explain how the smoke would be gotten rid of. Nor has his answer been accepted as satisfactory when he tartly said he would consult the authorities. In these circumstances of difficulty, an ingenious gas-fitter has contrived a manifestation of asbestos, which is to look like a pile of fagots in a condition of incandescence, lying on a sound slab of stone about a yard square, and professional persons have been considering whether this can be allowed by the law. It is the declared intention, moreover, of Mr. Georgius to forswear carpeting for the room, and to go in for strewing the floor with rushes. It is his further intention to go in for occupying the apartment after the ancient manner, by night as well as by day, and in fact to sleep here on the floor between a pair of quilts, with his feet to the fire. 'If a man is a true artist,' he says, 'he ought to go in for it logically.'

Master Georgius is commissioned to build an abbey, a task in which his soul delights, but as the work goes on he finds some difficulties in the lack of sympathy of the director.

"Your rooms," says Monsignore, "seem to me to be made almost as uncomfortable as they possibly can be."

"Why, of course!" exclaims the astonished artist, fixing his glass somewhat indignantly in his eye, "what you call uncomfortable I call quaint."

"Very possibly I should call it the same; but, my dear sir, *cui bono?*"

"*Cui bono?*" answers the architect, contemptuously; "that's what all modern people say; that's the horrible mistake of the whole modern world; we shall never recover the tone of the old men till we get rid of such jargon. Now, just for an instance, imagine the fathers of this abbey of ours going in for washhand-basins!" He dropped his eye-glass in sheer dismay at such an idea.

"Why not?"

"Why not? I said washhand-basins! and jugs — just think of it!" says the architect, refixing his glass, — "jugs!"

"What would you have, Mr. Oldhausen?"

"A laver, of course."

"In what form?"

"A stone trough, of course, outside the refectory door."

"At which gentlemen are to put their heads under the pump, I suppose."

"Pump? No! Do you suppose we shall have pumps? They can put their heads into the laver if they want. But I don't agree with much of that; the old men did n't encourage any of that unnecessary affectation."

"Soap, I suppose, you would interdict."

"Well, soap, you know, ain't architecture; but if I were abbot they should have very little of it, I can tell you." He drops his eye-glass here with a determined air.

He has convictions on the subject of squinches and slypes: —

"Then I go in for squinches; they're structural, certainly; very quaint; the quaintest thing out. I would n't have a corner without a squinch for anything."

"Would you not?"

"No; an architect who does n't use squinches is not an artist at all."

"I hope they do no harm, at any rate."

Master Georgius drops his glass, scornful to answer a remark so unbecoming; and feeling that he can scarcely threaten, even metaphorically, to punch the head of a Prelatic Chaplain of the Vatican, he changes the subject. "Perhaps you don't," he says, "believe in slypes."

"I remember the slype at my college; a narrow, dirty, disagreeable passage-way; is that what you mean?"

"As for its being narrow, that's the primary charm of such a thing; and it ought to be crooked if you can get it."

"All straight gate, I suppose, and narrow way."

"Certainly; and as for being dirty, that depends upon the weather. The word 'disagreeable,' I can't say that I understand. I call our new streets disagreeable if you like — great, wide, gaping gulleys, without a bit of quaintness to be had from end to end; everything seen at such a horrible distance, you know. I would n't allow any street to be more, if I had my way, than about 7 feet wide; and I would have an angle of 45° at least at every 50 feet."

And in the matter of a refectory his opinions are very uncompromising.

"I am going in for doing it inside in red brick, and vaulting it in red brick too, with black diaper patterns all over, you know?"

"How pretty!"

"I hope not!" (Dropping his glass.) "The diapers will be quite irregular, and full of what you would very likely call mistakes!"

"A sort of intentional accidents, George."

"Yes, not a bad term. And then the joints will be all raked out roughly, and the brickwork smeared, you know. I have quite a new idea about that. I mean to go in for letting the workmen have the use of all the rooms, with liberty to smudge them as much as they like, and so at the end we shall have a sort of antique effect, you know."

"They will be dirty."

"You may call it dirt," says Georgius, refixing his eye-glass, "I call it

Art. And there will be marks here and there, where the fellows have lighted fires, you know."

"And caricatures on the walls, I suppose."

"Of course. I shall go in for that very much. I shall offer a prize for the quaintest. I'll have them done with a brush of paint, you know, or scratched with a screwdriver, and so on. I call that real art."

"So it is, George."

"And smudges of candle-smoke everywhere; and grease, and all that sort of thing. Well, then here's the dormitory; that's in yellow brick, with white ones and red ones, and so on, intermixed at random. Magnificent!"

NOTES OF EXPERIENCE AND INEXPERIENCE.

38. DAYLIGHT REFLECTORS AND VENETIAN BLINDS.—Can you give me the address of any parties who make "daylight reflectors," and also of parties who make "Venetian blinds." I am informed a firm in Philadelphia make the latter, but my informant could not give names. Perhaps the information might be of as much use to other parties as it would be to C.

NOTES AND CLIPPINGS.

A FIREMAN'S SCHOOL.—The *Fireman's Journal* states that the Chicago Fire Department School of Instruction is about to be reopened; and, as the scheme on which it is conducted and the course of instruction adopted seem to be admirable, it is to be hoped that all cities in which similar schools are not already established will make haste to profit by Chicago's example. The school is held one day in each week, during the winter months, and has been the means of disseminating much useful information among the members of the department. Following is the programme of instruction marked out for the ensuing year: (1.) Combustible and explosive oils, especially kerosene, gasoline, and that class of hydro-carbons most in use at present; their nature; their use; their danger; how they may be used safely. (2.) Other combustible matter, showing gradual spontaneous combustion. (3.) Explosive compounds. (4.) Causes of fire in paint-shops, drug-stores, warehouses, wooden roofs, asphalt roofs and defective chimneys. (5.) Buildings where steam-power or steam-pipes are used; the danger thereof. (6.) Boiler explosions, the cause, and how to prevent the same. (7.) Lightning as a cause of fire; lightning rods, their construction and utility. (8.) The chemical engine, its principles and use. (9.) Engines, their nature; pumps and vacuum. (10.) Effect of fire upon iron, granite, marble, sandstone, limestone, and brick. (11.) Electricity. (12.) Laws of falling bodies.

THE WEAR AND TEAR OF BUILDING MATERIALS.—At the tenth annual meeting of the Fire Underwriters' Association of the Northwest, held at Chicago in September last, Mr. A. W. Spalding read a paper on the wear and tear of building materials, and tabulated the result of his investigations in the following form:—

MATERIAL IN BUILDING.	Frame Dwelling.		Brick Dwelling. (Shingle Roof.)		Frame Store.		Brick Store. (Shingle Roof.)	
	Average Life, Years.	Per Cent per Annum De- preciation.	Average Life, Years.	Per Cent per Annum De- preciation.	Average Life, Years.	Per Cent per Annum De- preciation.	Average Life, Years.	Per Cent per Annum De- preciation.
Brick.....	—	—	75	1 1/2	—	—	66	1 1/2
Plastering.....	20	5	30	3 1/2	16	6	30	3 1/2
Painting, outside.....	5	20	7	14	5	20	6	16
Painting, inside.....	7	14	7	14	5	20	6	16
Shingles.....	16	6	16	6	16	6	16	6
Cornice.....	40	3 1/2	40	3 1/2	30	3 1/2	40	3 1/2
Weather-boarding.....	30	3 1/2	30	3 1/2	30	3 1/2	30	3 1/2
Flooring.....	20	5	20	5	13	13	8	8
Doors, complete.....	30	3 1/2	30	3 1/2	25	4	30	3 1/2
Windows, complete.....	30	3 1/2	30	3 1/2	25	4	30	3 1/2
Stairs and newel.....	30	3 1/2	30	3 1/2	20	5	20	5
Base.....	40	3 1/2	40	3 1/2	30	3 1/2	30	3 1/2
Inside blinds.....	30	3 1/2	30	3 1/2	30	3 1/2	30	3 1/2
Building hardware.....	20	5	20	5	13	13	8	8
Piazas and porches.....	20	5	20	5	20	5	20	5
Outside blinds.....	16	6	16	6	16	6	16	6
Sills and first floor joint.....	25	4	40	2 1/2	25	4	30	3 1/2
Dimension lumber.....	50	2	75	1 1/2	40	2 1/2	66	1 1/2

¹ If carpeted, double the life and reduce depreciation one half.

These figures represent the averages deduced from the replies made by eighty-three competent builders, unconnected with fire insurance companies, in twenty-seven cities and towns of the eleven Western States.

SCULPTURE IN CINCINNATI.—Mr. Preston Powers, the son of Hiram Powers, will establish himself in Cincinnati, and will take charge of a school of sculpture, under the auspices of the Art Museum Association. Mr. Powers will remove his studio from Florence to Cincinnati, bringing with him some skilled Italian artisans to instruct the workers in marble.

A LACUSTRINE RELIC.—A singular discovery has been made at Petti Cortaillo, on Lake Neuchatel, which is now so low that the banks in many places are in danger of falling in. The find consists of a single pile or pillar 1 metre 65 centimetres long, of remarkable form and surmounted by a capital, underneath which are bored five holes corresponding with five similar holes at the other extremity. The capital is cone shaped, and the space between the openings has been carefully rounded with an axe. Conjectures as to the purpose for which this object was used are numerous. At first it was taken for a lake-dweller's idol, but the most probable theory is that it served as a tool for the bending of bows, an idea which is derived from the size of the holes and their distance from each other. The instrument, which is attributed by experts to the age of stone and is in a good state of preservation, has been placed in the museum of Boudry.

M. VIOLETT-LE-DUC AS AN AUTHOR.—The *British Architect* states that M. Viollet-le-Duc was the author of twenty-eight works, and had a part in the preparation of five others, besides writing numerous reports, and contributing reviews and papers to various periodicals. The works published by Morel & Cie. are: (1.) *Dictionnaire Raisonné de l'Architecture Française du XI. au XVI. Siècle.* 10 vols. octavo, with 3,745 illustrations. (2.) *Dictionnaire Raisonné du Mobilier, etc.* 6 vols. octavo, with 2,145 illustrations. (3.) *Entretiens sur l'Architecture.* 2 vols. octavo, with 36 atlas plates and sundry woodcuts. (4.) *Essai sur l'Architecture Militaire au Moyen-Age,* with 153 illustrations. (This is mostly a reprint from the *Dictionnaire*.) (5.) *Mémoire sur la Défense de Paris.* 1 vol. octavo, with 12 woodcuts and 8 quarto plates. (6.) *L'Art Russe.* 1 vol. octavo, with 129 illustrations. (7.) *Modèles de Dessin.* (8.) *Description du Château de Pierrefonds;* (5 editions) illustrated. (9.) *Description du Château de Coucy;* (5 editions) illustrated. (10.) *La Cité de Carcassonne;* illustrated. (11.) *Lettres sur la Sicile;* illustrated. (12.) *Lettres adressées d'Allemagne à M. A. Lance, archt.* (13.) *Ruines de Champclieu.* (14.) *Intervention de l'Etat dans l'Enseignement des Beaux-Arts.* (15.) *Réponse à M. Vitet, dans l'Enseignement des Beaux-Arts.* Hetzel & Cie. published the following: (16.) *Histoire d'une Maison* (7 editions), 1 vol. octavo, with 68 illustrations. (17.) *Histoire d'une Forteresse* (5 editions), 1 vol. octavo, with 86 illustrations. (18.) *Histoire de l'Habitation Humaine* from prehistoric times to the present age (5 editions), 1 vol. octavo, with 119 plates. (19.) *Histoire d'un Hôtel de Ville et d'une Cathédrale* (4 editions), 1 vol. octavo, with 67 illustrations. (20.) *Le Siège de Rochepont* (a reprint from the *History of a Fortress*). (21.) *Exposé des Faits Relatifs au Musée de Pierrefonds.* (22.) *Histoire d'un Dessinateur,* with 130 illustrations. The works published in collaboration are: (23.) *Wagons Composant le Train Impérial,* etc. 13 illustrations by Viollet-le-Duc. (24.) *Description de Notre-Dame de Paris.* 62 plates, from drawings by Viollet-le-Duc. (25.) *Cités et Ruines Américaines.* (26.) *Chapelles de Notre-Dame de Paris.* (27.) *Habitations Modernes.* Besides the above-mentioned volumes, Viollet-le-Duc was the author of *Le Massif du Mont Blanc*, 1 vol. octavo, with 112 illustrations, and a *Carte du Massif du Mont Blanc*, both published by Baadry. Baadry published *De la Décoration Appliquée aux Edifices* (from *l'Art*), and Dumaine published *De l'Etude de la Géographie et de la Topographie dans l'Armée; La Fortification passagère dans les Guerres Actuelles, and Un Mot sur les Guerres de Montagnes.*

ROMAN BATHS IN PERUGIA.—An interesting archaeological discovery has lately been made in Perugia under the direction of Cavaliere Guardabassi, who is Inspector of the Excavations and Monuments for the Government. The remains of what is supposed to have been the Roman public baths in the period of Augustus exist in the garden of the Church of Saint Elizabeth. It is well known that the Roman baths were buildings highly ornamented with sculptured marble, rich cornices, and mosaic pavements, and these are precisely the relics found here at the foot of the hill and near the university. Excavations made to the depth of twenty-one feet revealed a mosaic pavement of white and black stones representing Orpheus calling the animals by his music. This colossal figure is seated in the centre, and before him are a rook, a stag, and a swan; further off a horse and a buffalo, a boar, an aquatic bird, a hare, and a roe. There are also a rhinoceros and an elephant. Not more than the fourth part of this great hall has as yet been disinterred, but the Government will probably purchase the whole ground near and continue the excavations, which it is thought will reveal one of the most important relics of the Roman period.—*Correspondence of the N. Y. Evening Post.*

EXCAVATIONS AT PERGAMUS.—The excavations undertaken by the Prussian government on the site of Pergamus have resulted in some discoveries of interest. In the lower town fragments of sculpture have been discovered, and on the acropolis is a large hexagonal base of marble, which is thought to have supported a statue of Zeus. On the lower part are emblems of various deities, and on the frieze miniatures of the clements, with their names inscribed above them.

A VALUABLE STONE.—Professor Forrest Shepherd says that at Old Lyme, Conn., on the estate of the Hon. Charles J. McCurdy, there is a remarkable deposit of Labradorite feldspar, or carnelian granite, sufficient for building the most enduring mansions and costly edifices, or erecting monuments.

THE BRITANNIA TUBULAR BRIDGE.—It was recently stated in several newspapers that the Britannia Tubular Bridge was rapidly rusting away, and that travellers every time they crossed it were placing themselves very near eternity. Mr. Clark, who has examined the bridge, says that the rust of the whole 10,540 tons of which the bridge consists has not in twenty years amounted to a single pound weight; and he adds that if similar care were continued it was impossible to conceive how any practical deterioration could take place in such a structure even in several centuries. Mr. Clark imagines that the tar and sand with which the cells are internally coated, and which are from time to time cleared out, have been mistaken for rust.—*Van Nostrand's Engineering Magazine.*

PLATE-GLASS.—Charleroi, a considerable town a short distance from Brussels, is nearly as celebrated for its iron works as Liege, and in the manufacture of plate-glass stands unrivalled. I learned at the American Consulate in this city that glass of the largest size, plates and other descriptions were hitherto exported to the United States in large quantities from the manufactories of Charleroi. But during the last few years this trade has been gradually diminished, until now the exportation has dwindled to zero. On further inquiry I was told at the consulate that the chief cause of this diminution was the manufacture of plate-glass in the United States; that the production of this article had been very great of late, and that the Belgians are beginning to fear that the "quick-witted Americans" will soon be sending plate-glass to sell in the shops of Charleroi.—*Correspondence Cincinnati Gazette.*

PLATE-GLASS MANUFACTORIES.—There are three manufactories in this country where fine plate-glass is manufactured: one at Lenox, Mass., one at New Albany, Ind., and another at Crystal City, Missouri.