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THE burning of a tenement-house in Brooklyn last week repeated with little variation the lesson of that in Boston a week before. The conditions were essentially the same: a three-story wooden house with a single staircase, to which, as in the other case, it is believed an incendiary set fire; no fire-escape; and all the occupants of the upper stories injured more or less seriously, though happily none of them killed outright this time, in jumping from the windows and roof. That New York and Boston are full of houses just as dangerously built as these, and occupied in the same way, is acknowledged, and undoubtedly other large cities are like them. Existing building laws in both cities, imperfect as they are, call for precautions which would in a considerable degree offset the dangers, although fire-escapes and restrictions on lodgers will never make a dangerous building a safe one. The immediate difficulty is that the laws as they exist have not been, and possibly with the existing machinery could not be, properly enforced. Houses are continually built under permits for one use and occupied for another, or planned ostensibly for a given number of families and sublet to twice as many; or the precautions inserted in the plans to meet the law are omitted in the building when the inspector's back is turned. As for the fire-escapes, required as they are by building ordinances, they hardly ever exist. Inspectors complain that it would require a much greater force than they have to see that all the provisions of the laws are duly observed, and it is difficult to refuse to believe them. Even to keep watch and record of the new tenement-houses as they are built, and to insist on their fulfilling the law, requires a great deal of watching and many inspectors, now that circumstances have turned so much of the building effort of these dull times in that direction. To insure that the many thousands which already exist are put into the proper condition is a more difficult duty, and to see that their ever-varying tenants do not sublet and crowd them beyond what is allowed is yet more arduous.

THE *Evening Post* reports that the force of fifty inspectors, which has been at work in New York since the first of August, making a special examination of the tenement-houses in that city, has already done half its work, having examined nearly all the houses in the lower half of the city. They have visited more than thirteen thousand out of the twenty-five thousand which the city is estimated to contain, and these are the worse half, inasmuch as they are in the older and most crowded quarters. A plan of each, with a description of its condition, is filed in the Sanitary Bureau. The average number of families in each house is found to be six. It appears that even in the face of the recent stirring up of the tenement-house question and movement for reform, houses of this class are building which set the law at defiance, and whose plans have not been submitted, as required by law, to the Health Department. The inspectors have made plans of these houses, and as soon as they are occupied the owners are to be prosecuted. This enormous work of registration once accomplished, and if it is adequately done its progress certainly shows admirable activity, the greater but necessary task will remain of reducing these almost innumerable houses to conformity with the laws, which doubtless the greater part of them now violate in one way or another, and of maintaining them in proper order.

As for the disasters we have just recorded, so long as the habit of building among us is what it is, we shall be liable to

them. When a year or two ago a similar tenement-house burned on Shawmut Avenue in Boston with fatal effect, the people of that city were much excited for a time, the coroner's jury urgently recommended a more careful supervision, an increased force of inspectors, and the reasonable precaution of requiring fire-proof stairs to be put into such buildings; the newspapers complained that nobody was made accountable for the mischief, and things went on as before. Of the need of holding somebody responsible for injury that follows a violation of law there can hardly be two opinions. It is clear enough that owners are not disturbed by the fear of losses which, if they dread them, they can easily and cheaply transfer to the insurance companies, nor by any considerations of danger to their tenants. The legal restrictions should, therefore, be either abolished or enforced by adequate penalties, and the penalties to be adequate should be heavy and inexorable. But in both the former and the last of the Boston cases it appeared that there was a plain violation of law on the part of the owner. In the case of the inspectors, the interests at stake are too serious to be safe in the hands of any nerveless administration. If inspectors neglect their work, or allow themselves to be easily evaded, public safety requires exemplary punishment for them; and if dereliction from duty were as offensive to our people as offences against party, they would get it. But since they ought to be held to account for neglect of their work, they ought to be enabled to do it thoroughly; and to do it thoroughly would require undoubtedly a considerably larger force of inspectors than our cities provide, and a severer administration than our people, except under occasional excitement, are accustomed to demand, as well as greater expenditure than they like to provide for. There is no doubt that in our policy of letting people build pretty much as they please, and then assuming to protect them and ourselves from the evil consequences of it, we commit ourselves to a very difficult and costly system. But so long as there is reason for the laws as they exist, there is reason to enforce them. When the community can be educated up to the point of beginning at the beginning with a better system of building, the work of securing ourselves against danger will be greatly lightened. It is a great deal easier and cheaper to see that houses are properly built than to make people live in them carefully after they are built. At present the staircase is their most vulnerable point, the opportunity of the incendiary and the peril of the inmates. Better building, with less dependence on constant inspection, is our best refuge.

NEXT to actual larceny of plans the most pronounced case of architectural thieving which we have seen brought out as a public example is that for which Mr. David S. Gendell, of Philadelphia, architect and builder, seeks redress. He had built himself a pair of houses which, as appears from his complaint, he desired, with a feeling which the more earnest members of our branch, at least, of his profession will share, "should be a specimen of his artistic skill, and should not be a mere copy of other houses." The fruit of his artistic skill was lucky or unlucky enough to attract the liking of a Mr. Orr, who is his fellow in the other branch, being a builder, and Mr. Gendell was soon annoyed by persons who, in spite of his prohibition, persisted in entering his grounds and making measurements and drawings of the porch which he had put before his houses. Presently he found his porch duplicated on the front of a pair of houses which Mr. Orr was building a few blocks away. Mr. Orr, when remonstrated with, replied with unblushing confidence that he was in the constant habit of appropriating other persons' designs, and that he should finish his porch. Mr. Gendell has thereupon applied to court for an order to restrain Mr. Orr and the owner of the buildings from continuing the porch, and to compel them to remove it, on the ground that the design was obtained from him surreptitiously, illegally, and by trespass. Most architects are more or less qualified by experience to sympathize with Mr. Gendell's trouble, and to recognize in Mr. Orr's proceeding one of the several ways in which astute and not over-scrupulous people manage to get the benefit of an architect's services without paying him for them. We are all familiar with the owner who employs his architect vicariously by sending his builder about to copy what the architect has done, or with the inconsiderate client who hastens to one architect with a request to copy the work of another, and with the accommodating builder who saves his patron or himself the expense of

plans by cribbing them from an architect with whom he has worked, or by modelling his house on some other man's. The remedy is not so obvious. It will be a matter of interest to the profession to note the action of the court. We hardly see what resource is open to aggrieved architects in such cases, except in an action for trespass, since the courts have not yet, so far as we know, recognized any property in designs, except when they are embodied in copyrighted drawings. We should have our misgivings, if the case went before a jury, as to the amount of damages which the plaintiff would recover. Against the copying of executed work through the eye we may never be able to guard, and the *American Architect* has never thought it worth while to argue for protection against it in ordinary cases. But it would be well, certainly, to put a check on such flagrant meanness as seems to be illustrated in the case before us, if it is possible.

THE Boston newspapers have been more or less occupied of late with the treatment of the new Back Bay Park in that city, and especially of the entrance to the park from Commonwealth Avenue. A correspondent, whose letter we print on another page, calls our attention to this matter, and makes the timely suggestion that the design of this critical part of the scheme should not be fixed without very careful study, nor without referring to architects for suggestions as to the architectural treatment of the surroundings. We must modestly disclaim the possession of any voice that can be called "authoritative" in such a question. If we had one we should wish to think carefully before we raised it to advocate any particular solution of so difficult a problem. We may mention, however, one or two points which we think are to be borne in mind in considering it. Unquestionably the Park Commission is bent upon doing the best it can for the beauty as well as the convenience of that part of the city which is put into its hands, and it could not have done better than to choose Mr. Olmsted for its counsellor. But it is impossible without damage to dissociate the laying out of the park from that of the adjacent streets, as, indeed, the care which the Commission has bestowed upon its plan shows; and it is equally dangerous to study the laying out of such a conflux of important avenues without an eye to their ultimate architectural treatment. The obvious way, as it is with us the common way, is to lay out the streets as they will lie easily on the plan, and leave them to be built up, as chance may direct, by the individual owners of adjacent lots. Nor would it be practicable in this country to exercise any considerable control over the kind of buildings private owners put upon their land, however much the city might gain in general elegance by it. Nevertheless the architectural character of important points might be determined by the choice and design of some commanding features, and the work of private owners made subordinate to these. For this intelligent devices of all kinds are worth considering, and, naturally, none so much so as those of capable architects, whose business it is to plan for like exigencies.

Of the approaches to the park that from Commonwealth Avenue will probably be the most important, and at that approach, on the other hand, should naturally be the crowning interest of this ambitious highway; so that here we have an opportunity and a need for effective treatment, the like of which will probably not occur in the city for some generations. We are inclined to think, as many people do, that to run the avenue across the end of the park in the way the Commissioners' plan proposes is not the best thing that could be done. So many modes of treatment are possible here, so many ways of carrying them out might be suggested, and architectural handling must play so important a part in the result, that architectural study is very necessary, and a competition of architects, as proposed by our correspondent, would be peculiarly appropriate. The problem might be set before architects in such a way as to be of rare interest to them, and we should be surprised if in the present leisure of the profession the most capable architects did not gladly avail themselves of any reasonably presented opportunity to offer suggestions. We should of course be very glad to publish good designs for this improvement, but the invitation of public authority would be far more successful in procuring them than ours. We do not know how far the powers of the Park Commission go in this direction,—how much authority they have to consider the treatment of the streets of the city outside the limits of the park, or to expend money in securing designs. The Commission has at least power to make recommendations,

and since the park and the abutting streets cannot be successfully considered apart, the power to decide upon their treatment might reasonably be lodged in the same hands. A competition to be successful would involve some expenditure, to be sure, but a small one in comparison with that necessary for the labor of execution. The essential aim in providing a park is to secure beauty, and this requires study and technical skill. It is fair, therefore, to remind tax-payers that designs are as essential to the work as loads of stone and gravel, and as well worth paying for.

THE New York papers, on their part, have lately complained with much bitterness of the neglect and injury which the Central Park has suffered since the removal of the former board of commissioners, and the loss of Mr. Olmsted's oversight. The old nicety and freshness which distinguished the park are wearing off for want of protecting care, and a rubbishy look is stealing over it. The new work, not done with the same thoroughness or finish as the old, shows the marks of negligent superintendence. Carefully studied effects are being obliterated by neglect or wanton interference, and both natural and architectural features begin to show deterioration. In some places a neglected growth has swallowed up spaces that were meant to be open; in others the original studied planting has been wilfully sacrificed. The most conspicuous and mischievous destruction has been at the entrance on Fifth Avenue, where a row of trees that divided the drive, and made a fine double vista, were one day cut away without warning, and, it is said, without notice to the chief gardener, at the instance of persons who wanted better opportunity for fast driving. This, we take it, is a not unnatural result of taking the charge of the park out of the hands of men whose tastes, professional feeling, and pride were all enlisted for the preservation of it, and of putting it into politics.

IN a communication in another column, Mr. George C. Mason, Jr., whose article on the Old Mill at Newport we lately noticed, enforces the theory of the fireplace. We have not espoused any side in the controversies over this building, not having sufficiently minute knowledge of the structure to warrant us in going beyond the queries we have already suggested. But it may be noticed that Mr. Mason does not adduce any evidence that the niche in the wall of the mill had ever been used as a fireplace, confining himself entirely to *a priori* arguments,—a theory based on which is good, as the saying goes, till another is advanced. His arguments would be more applicable, it seems to us, to a structure built round a preëxisting floor than to one in which the beams could be placed to suit the masonry, wherever the builders chose. To us the difficulty of imagining any other use for them is the chief reason for thinking the niche and flues to have served for fireplace and chimney, for which, if they were so intended, they must have been a disheartening failure; while their manner of construction was not quite such as was employed for such uses, so far as we know, in either the eleventh or the seventeenth century,—clearly not the latter. Mr. Mason's discussion will interest our readers, and his main point, that, whenever built, the structure was built essentially as we see it, seems pretty clearly made out by his examination, with a fair probability in favor of the later date.

THE SEWERAGE OF THE SMALLER TOWNS.¹ II.

THE use of the Field flush-tank promises to lead to some radical modifications of sewerage practice. Briefly described, this tank is a vessel of any desired capacity, placed at the head of a drain or anywhere in its course, and receiving the outflow of several houses, or, better, where a small contribution from the public water-supply can be secured, receiving pure water. When it becomes filled, its stationary, automatic siphon comes into action and discharges its whole contents with great rapidity, producing a flow adequate to the thorough cleansing of the drain or sewer into which it discharges.

The tank being discharged, air is admitted to the siphon, and it remains inoperative until its reservoir is again filled, when a second discharge takes place. If properly protected against the admission of grease and coarse matters, this tank needs little, if any, attention. It is always on duty, retaining all that comes to it until full, and then discharging its contents with a cleansing flow. The contributions to it may be copious or slight, without affecting the regularity and promptness of its action.

I am not prepared to say that with the aid of the flush-tank it

¹ A paper by Colonel G. E. Waring, Jr., read at the Social Science Convention lately held at Saratoga.

will be safe to do entirely without man-holes to give access to the sewers, but I believe (and I have some experience upon which to found my belief) that it will be safe entirely to avoid these expensive appliances; or, at least, to place them only at such long intervals as may be necessary to supply air for the ventilation of the sewer.

Aside from its sanitary advantage, the use of this small size of sewer will be very much cheaper than that of the large sizes now employed. I regard the economy, however, as less important than the cleanliness and rapid delivery which the smaller size must secure.

Not the least of its benefits is to be sought in the more thorough ventilation which even limited ventilating appliances would effect in a small pipe than in a large one, for the reason that the amount of air to be discharged is very much less; that the rapidity of movement of an equal quantity of air is much greater; that the air-space above the flowing stream is subject to a much greater fluctuation in proportion to its volume; and that from its smaller volume it is more susceptible to the impulse of differences of temperature in the water flowing through the drain, and of friction.

The adoption of small and cleanly flushed sewers, furthermore, is of importance in the case of sewers which deliver into harbors or into rivers. It is an accepted standard of extremely foul sewage that it kills or drives away the fish which existed before the waters were contaminated. Such contamination is due, not to the introduction of organic matter, but to the introduction of organic matter in an advanced stage of decomposition. Leaving out of the account the effect of the outflow of chemical works, etc., recent sewage, — the faeces and kitchen waste of dwelling-houses, etc., — so far from being injurious to fishes, is welcome food for them, and all who have watched the outlets of house drains into streams of water must have noticed the avidity with which all their solid contents are devoured. We are not now considering how this would affect the value of the fish for human food; but even on this point, if we recall the diet of the barn-yard fowl, we need not be too severe in our condemnation. It is undoubtedly true, that if the whole of the organic wastes of the town could be delivered into a stream within twelve hours of the time of its production, the fishes of that stream would become its complete and efficient scavengers. Not relying, however, upon this means of disposing of town sewage, we have to consider the whole question from an engineering point of view.

The investigations made years ago in many of the larger towns of England where water-closets are used, as compared with those where water-closets are not used, showed, chemically, very little difference in impurity. This has long been taken as an argument for paying the same regard to street waste that we do to household waste. But this conclusion implies a condition which is never admissible in any well-regulated town; that is, that the streets shall be allowed to become as offensive as the water-closets. What I desire to impress upon your minds is the obvious fact, that in one way or another the surface of the streets should be kept absolutely clean, and I would ask you to consider favorably my opinion that they may be much better cleaned by other means than by washing their dirt into elongated cesspools underneath them, and allowing it there to remain and decompose, to our great injury.

The street dirt and storm-water being set aside, we get rid of the chief engineering difficulty of the whole problem of disposal, which is a great variation in the volume of the sewage. The outflow of private houses, hotels, factories, etc., is pretty nearly uniform in its quantity. It varies but little from day to day, and scarcely at all from week to week. If, on the other hand, we attempt to admit floods of rain-water into our system of sewers, the volume is subject to fluctuations so enormous as to upset all our calculations. Ordinarily the flow will be far too little properly to employ the works which we have prepared to deal with it; at other times these will be taxed to their utmost, and whether our means of disposal be agricultural or chemical, we are sure to have too great a volume at times, and a relatively insignificant quantity as a rule.

The importance of this branch of the subject when sewage is delivered into water-courses is trifling, but the time is coming, and in some places it has come already, when the rights and requirements of our neighbors further down stream must be respected to the extent of purifying our sewage before we deliver it into water which flows to them.

These troublesome fluctuations in the quantity of the sewage being eliminated from our problem, it is a very simple matter to make provision for chemical or agricultural treatment in such a way as to prepare for the gradual increase of outflow which will accompany an increase of population. The quantity with which we have to deal being a fixed one, it becomes a simple matter to adjust our works to the duty to be performed. It will then be easy to manage the question of river pollution, and we shall have saved enormously in the cost of construction.

For example, in the village of Lenox, in Massachusetts, it was found that the only stream to which the sewage could be carried was the Housatonic River, some miles distant, over a difficult country. To lay an outlet sewer to the Housatonic would cost much more than the whole fund available for drainage purposes. Storm-water being excluded from the sewers, it became easy, with the help of the flush-tank, to establish a system of subsoil irrigation in a field near the town, and the whole work was completed in a satisfactory

manner for less than the expenditure that had been contemplated. It has been working steadily and regularly and well since its construction, several years ago.

At the Reformatory Prison for Women, near South Framingham, Massachusetts, the delivery of sewage was into a stream which found its way into the water supply of the city of Boston. The daily outflow is between twenty-five thousand and thirty thousand gallons. There was no means by which this could be carried to an unobjectionable river outlet without an inordinately large outlay. Had the amount of sewage to be treated been subject to such variations as occur in towns where rain-fall is admitted to the sewers, this would have been the only recourse. The quantity being practically uniform, it was easy and economical to establish a system of sub-irrigation disposal upon the limited grounds of the establishment, in such a way as to overcome every objection.

While on this question of sewage disposal it may be well to describe briefly the sub-irrigation process which is now promising such good results. The principle upon which it works is this: All soil has a very considerable power to extract and withhold organic impurities from water which passes through it. That is, all soils in their fresh condition are good filters, more or less good according to their composition and drainage. If a foul stream flows constantly through any soil, the accumulation of organic matter clogs it, obstructs its action as a filter, and makes it increasingly foul. The great purifier of all filters is the oxygen of atmospheric air. A mass of earth, which would become foul under an uninterrupted addition of organic matter, will become entirely purified by oxidation, if the same quantity of impurity be added in a short time, if it be spread over a wide surface, and if it be left for a sufficient time subject to the oxidizing process.

In the sub-irrigation system, as applied in practice, the outflow of the sewer or drain is caught in a Field flush-tank, and held there until the tank is filled. It then discharges itself into common agricultural drain-tiles laid only ten or twelve inches below the surface of the ground and having open joints. The discharge flows on through the various ramifications of the system of drains, leaking away at every joint, until the whole discharge from the tank has settled into the ground and has more or less saturated it. The water of the liquid settles down by its own weight to the drains or into the porous earth below, leaving its impurities attached to the surfaces of the interior particles of the earth. As the water of saturation settles away, fresh air enters the soil, and the oxygen sets up that slow combustion of organic matter which is its great purifying office to the world over. In due time the earth has become purified, the flush-tank has again filled itself, and a fresh volume of sewage is delivered into the drains. This description is hardly more simple than is the process itself; and it must seem absurd to those who are not familiar with it, to suppose that it is capable of dealing with the troublesome problem of the purification of sewage of a town. I have come to believe that its capacity is almost unlimited, and I am sure that for those towns which may properly be called "village-cities," it offers almost universal relief.

The use of agricultural drains in this way was the invention of the Rev. Henry Moule, the originator of the earth-closet. The value of an intermittent discharge in the application of sewage to the soil is the suggestion of Dr. Frankland. The combination of the two was the natural outgrowth of observation and ingenuity.

I believe that the system was first introduced in this country in a systematic manner, in the grounds about my own house at Newport, in 1870. It has gradually worked its way, as experience has indicated its capabilities, until, in 1876, I did not hesitate to apply it for the whole sewage of Lenox; and it is now accepted, I believe, by all who have given attention to it, as being entirely reliable, economical, and efficient.

We must not forget the very important question of the ventilation of public sewers, which it seems to me is less adequately treated than any other branch of the work to which attention has been given. Concerning the large sewers of cities opinions vary, and there is no occasion for me to express my own here, further than to say that I regard what are called "perforated" man-hole covers as an ineffective attempt to carry out the system of man-hole ventilation which is so much and so justly commended. Nothing less than a coarse iron grating whose spaces are at least equal to its solids will answer the purpose.

Much reflection on the subject has convinced me that, were it possible to enforce the regulation, no means of sewer ventilation can be nearly so effective as that of connecting every house-drain which joins it, without the intervention of a trap anywhere in its course, with an open soil-pipe, reaching above the roof of the house. To be efficient this system must be compulsory and universal. If the authorities of a town have the right to assess private property for the construction of sewers, and to establish the conditions under which private persons may connect with them, they surely have the right to make it one of those conditions that this open ventilation shall be given, and to impose as severe penalties as may be necessary to protect itself against any interference with the ventilating action of each connection.

Could this system be carried out in connection with the small sewers which I have described, we should have a small volume of air contaminated only by the decomposition of the slight sliming of the walls of the sewers in open connection with the atmosphere at the

outlet or outlets, and at the occasional man-holes, and through a tall and somewhat heated soil-pipe in every house along its course, connected in such a manner as to secure a constant and efficient change of the atmosphere of the whole system of sewers and connections.

In judging of the advisability of this system we must dismiss from our minds the sort of air with which we are familiar as escaping from the limited vent-holes of the foul public sewers common in our cities. The sewers which I am now recommending will at no time contain organic matter in an advanced stage of decomposition. They will contain at no point any accumulation of solid matter. They will be frequently flushed to the height at which their current may deposit a slimy coating, and they will be constantly swept by a movement of fresh air supplying oxygen for completing an immediate decomposition, rendering putrefaction and fermentation impossible, and diluting and removing, as fast as it is formed, the slight amount of resulting gas. They will not be sweet. Their contained atmosphere will not be fit to be admitted into a living-room; but they will be so infinitely less foul than the common sewer of the present day that there will be no objection to discharging their air above the roofs of our houses.

I venture the opinion that within ten years this system of sewerage and sewer ventilation, or its equivalent, will be universally accepted as the best, at least for our smaller and more sparsely built towns.

I have still a word to say concerning the removal of soil-moisture, and the thorough under-drainage of the sites of our towns. I fully endorse all that has been said in its favor, and I fully accept all that Dr. Bowditch and others tell us of the enormous and fatal disadvantage — so far as our national disease, consumption, is concerned — of its absence. I only protest against the use of public sewers for this purpose. They may properly afford an outlet for water brought to them by suitable under-drains, but they should never, under any circumstances, act as absorbent drains themselves. Where the inclination of the surface is sufficient it is an excellent plan, so far as possible, to lead the outflow of under-drains into the flush-tanks by which the sewers are to be cleaned. Where this is not possible they may be led to man-holes, or to special branches of the sewer, the connection being so arranged as to prevent sewage from flowing back into them and leaking out through their open joints into the soil.

As I am speaking upon my own specialty I shall, I trust, be excused for attaching greater importance to it, and for according it wider advantages than are recognized by those who are less familiar with it. I would not underestimate the benefit of a public water-supply, but I think that we may, to a certain extent, weaken the sanitary argument in favor of introducing extraneous water for the supply of a village. This sanitary argument is based upon the contamination of drinking-water wells by infiltration from private vaults and cess-pools.

I would abolish absolutely and totally, by compulsory public enactment, every form of private vault and cess-pool, and make sure that all outflow from every house, good or bad, rich or poor, should be carried immediately quite outside of the town by a system of perfectly tight and impervious sewers and drains. I would leave nothing within the limits of the town which could act as a source of well-water contamination. The cause being removed the effect must cease. There being no longer a source of foulness in the soil there will soon be no contamination of the water.

In all cases the introduction of sewers must follow if it has not preceded the introduction of a public water-supply. In some cases, at least, the introduction of sewers would render the introduction of a public water-supply unnecessary.

I have now sketched, hastily, as one must on such an occasion, the general features of the plan of sewerage that I propose, and the leading reasons upon which the recommendation is based. I am sure that there are those in my audience who utterly disagree with the doctrines that I have advanced, or who doubt the soundness of my position. I hope that they will not hesitate to express their objections or their doubts, to the end that we may secure such light as comes of free discussion.

THE ILLUSTRATIONS.

COMPETITIVE DESIGN FOR A TOWN-HALL, UXBRIDGE, MASS.
MESSRS. FERRY & GARDNER, ARCHITECTS, SPRINGFIELD, MASS.

The programme in accordance with which these designs were prepared called for a main hall capable of seating six or seven hundred persons, a public library room capable of holding five thousand volumes, a small hall, say 20 by 50 feet, for caucuses, and offices for the selectmen, town-clerk, and overseers of the poor. The limit of cost was fixed at \$12,000. These designs were among the rejected.

NEW CUSTOM-HOUSE, ST. JOHN, N. B. MR. T. S. SCOTT, CHIEF ARCHITECT, DEPARTMENT OF PUBLIC WORKS, OTTAWA, CANADA.
MESSRS. MCKEAN & FAIRWEATHER, SUPERINTENDING ARCHITECTS, ST. JOHN, N. B.

This building covers a portion of the site of the custom-house destroyed by the fire of 1877. There are two stories of ten feet each, between the levels of Prince William and Water Streets, and three full stories above the former street. The four fronts are of freestone from the Dorchester quarries. The roofs are framed of iron and the

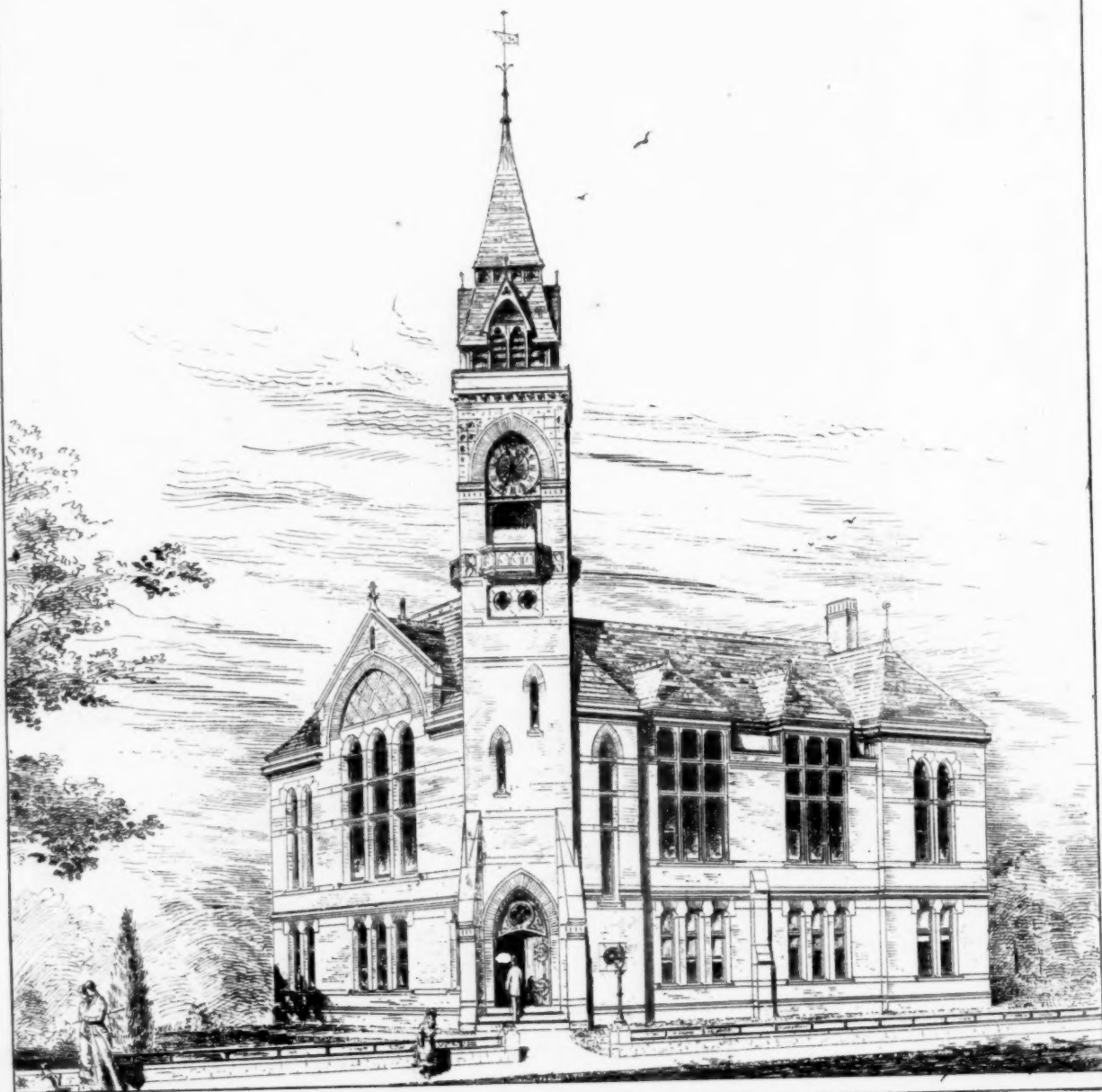
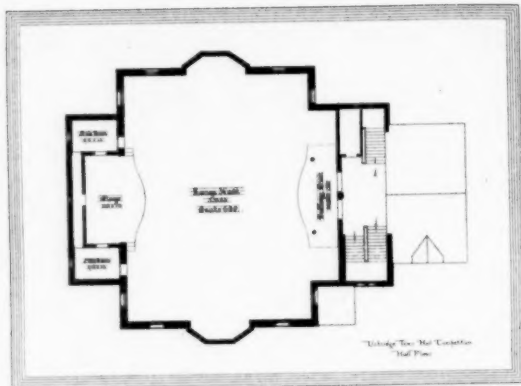
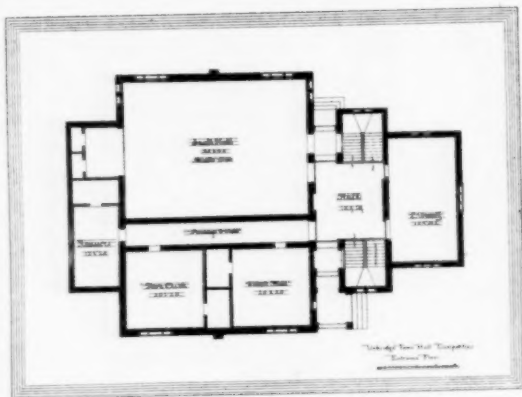
floors made fire-proof with corrugated iron. Plaster of Paris and concrete are used, with wire netting to hold the plastering, all suspended from iron rods run through the centre of the joists. The two towers are for the "time-ball" and for repeating the shipping signals from Partridge Island, and for the "storm drum." The cost will be about \$250,000.

STRASBURG CATHEDRAL, GERMANY.

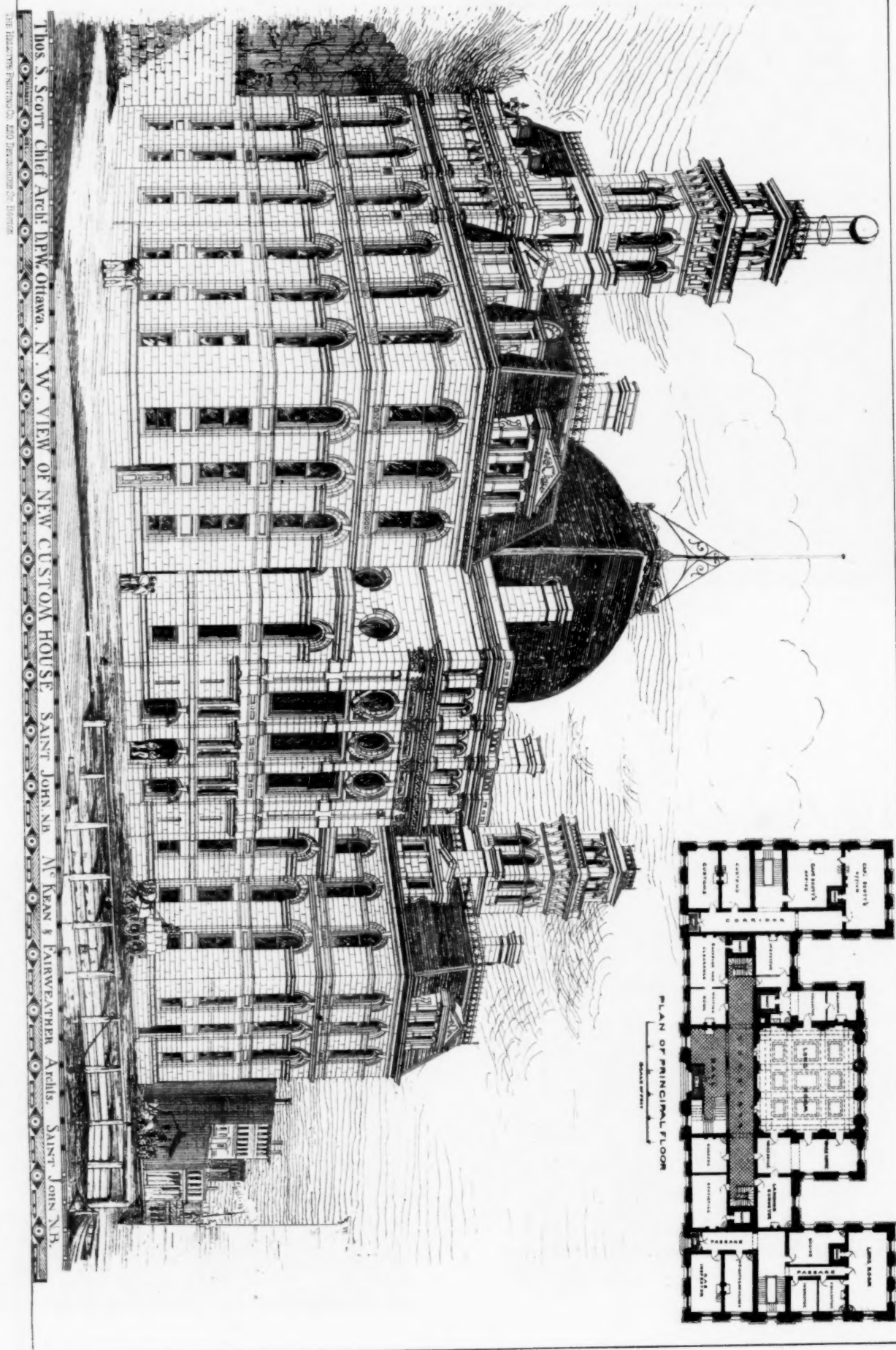
The nave was finished in 1275, and the façade, begun in 1277, was a long time in finishing. Fig. 1 shows the western front, Fig. 2 the southern transept, finished circa 1200, with its fine transitional doorway, and Figs. 3 and 4 show interior views. See article "The Cathedrals of Metz and Strasburg," below.

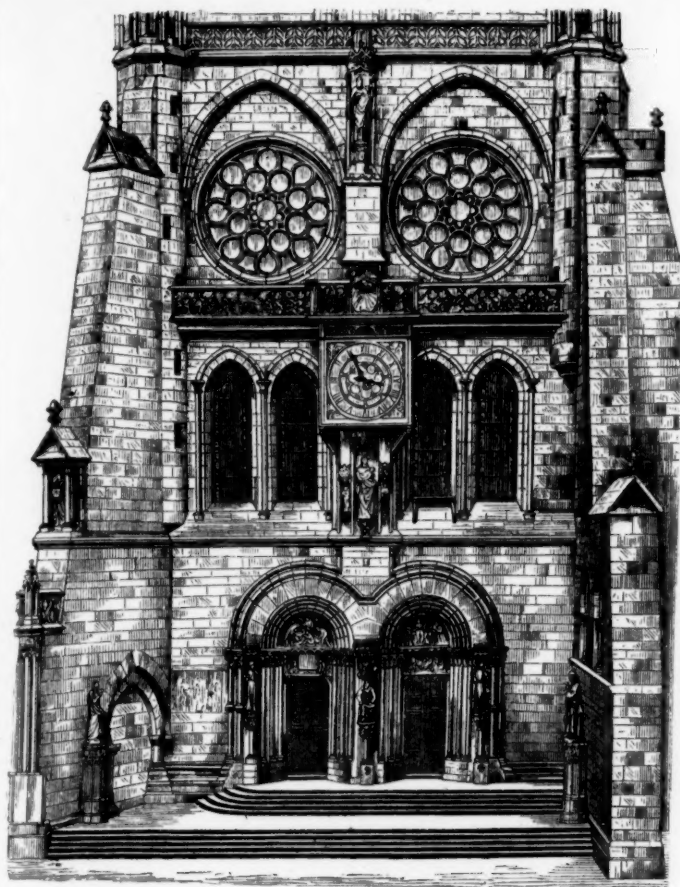
THE CATHEDRALS OF METZ AND STRASBURG.

THESE ancient and stately edifices, which became partly ruinous before that of Cologne approached completion, have ever since the termination of the Franco-German war been in process of repair. For that of Metz a new roof is determined upon, for which the architects of the two provinces have been invited to compete, while the great gates of the Strasburg edifice are to be regilded by artificers from Paris. It is worthy of remark how many of the most celebrated European cathedrals are at present in a state of decay, more or less irreparable. The arches of Amiens are in danger, and its polychromatic decorations are rapidly vanishing from sight. The spire of Antwerp, even, had lately to be restored to save it from mouldering to destruction. At Asti recent restorations have destroyed the beautiful natural coloring of the stones. Saint Bavors, at Ghent, was only rescued from utter dilapidation a few years ago, while that of Troyes has been endangered by the very means employed for its conservation, — an iron girdling, which gave way beneath sudden atmospheric changes. It is to be feared, indeed, that many influences exist throughout Europe tending to the neglect and disintegration of these historic structures, as witness the state in which are left the bronze doors of Pisa, the pulpit of Ravenna, the balustrades of Rouen, and the towers, even, of Tournay, the most antique among the religious monuments of Belgium. Those of Ajaccio, Madrid, Chateauroux, Marseilles, Moulins, and Nantes are, indeed, scarcely more than so many new buildings erected on old foundations, though claiming to be dated with them. That of Metz, however, which the German government — arbitrary in matters of architecture, as in all else — has resolved upon re-roofing, possesses a particular interest. The work was originally determined upon, however, by a French government, simultaneously with that of Beauvais, and the scheme was that of a Frenchman, who exhibited his designs so far back as the year 1852, — a plan with two sections, including the choir, stalls, pulpit, high-altar, lamps, and decoration, in stone, wood, and color generally. Upon this last part of the subject a discussion has been in progress from that time to this, and is not yet terminated, whether the precedents shall be followed of Aix-la-Chapelle, almost stern in its severity; of Alby, almost pagan in its adornments of pyramids, porches, clock-towers, mosaics, painting, and sculptures; of Amiens, with its brazen-lidded tombs; of Auxerre, enriched with color down to its very crypts; of Chartres, with its gilded tables, bas-relief in stucco, and stained windows, or of Citta-di-Castello, with its enamelled pavements. Ultimately the resolve was adopted to preserve the original outlines and style, so far as they were known; and the German desire is, it may be said, to act upon the suggestions of the French architect. As for Strasburg, it would be an act, so to speak, of artistic impiety to depart from them. On the principal door are inscribed these simple yet impressive words, "In the year of Our Lord 1277, on the Feast of Saint Urbain, Master Erwin, of Steinbach, commenced this glorious work." Erwin died A. D. 1318, his son John continued his labors after him for a period of twenty years, then the task was taken up by John Hultz, of Cologne, who died A. D. 1449, nearly a century and a quarter after the laying of the foundation stone. All three belonged to the plebeian order, yet the noble chapter of Strasburg raised their monuments in the cathedral, an honorable custom of the age, not there exemplified alone. The three architects of Amiens are magnificently commemorated beneath its roof, though the history of their memorial is a curious one. Jean de Chelles is not forgotten in Notre Dame de Paris. At Toulouse the names are preserved of the artisan monks — "rectors of works" they were termed — who assisted in its building, and in the metropolitan church of Chartres are the tombs of its chief architects, Robert de Courcy and St. Ignace. But at the general conference held upon this question at Paris, nearly forty years ago, the report of an architectural committee was submitted, the recommendations of which were: That the original outlines of the apse should be retained; that the Roman-Byzantine should be preferred before any purely modern adaptations; that the altar then existing — a marble slab, supported upon four dwarf columns — should be replaced by an altar of Oriental or Byzantine form; and that the stalls in the choir should be replaced by others of "a fashion less burlesque," with an episcopal chair "copied from the basilicas of Italy." Moreover, the apsidal arch was to be painted in fresco on a gold ground, while the cupola was to be similarly adorned, with groups of the Evangelists, and their respective attributes symbolized. These conclusions were not adopted in their entirety, because some peculiar theories of architecture prevailed at the Strasburg Congress. Some

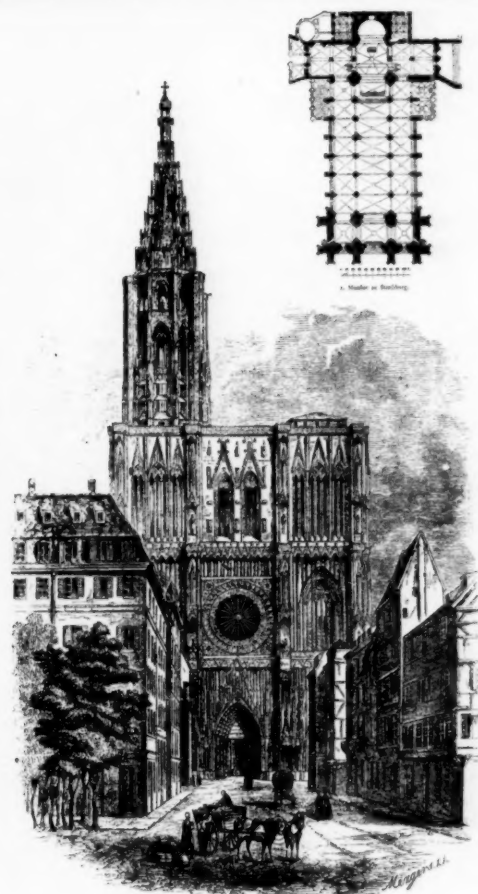


• TOWN-HALL UXBRIDGE • FERRY & GARDNER, ARCHTS.

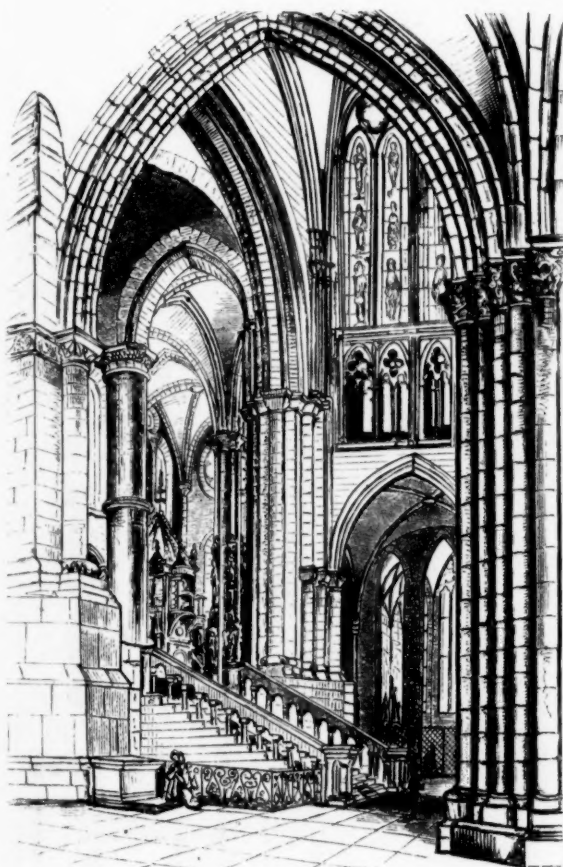




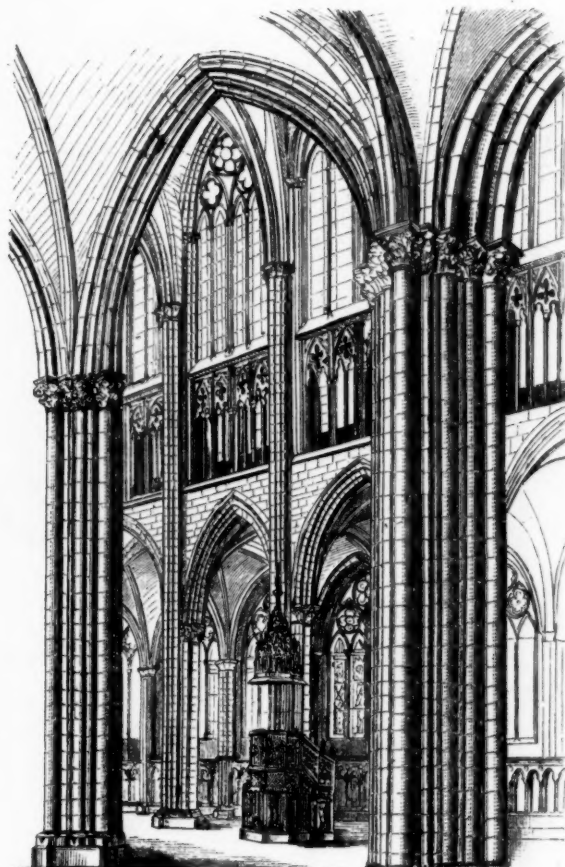
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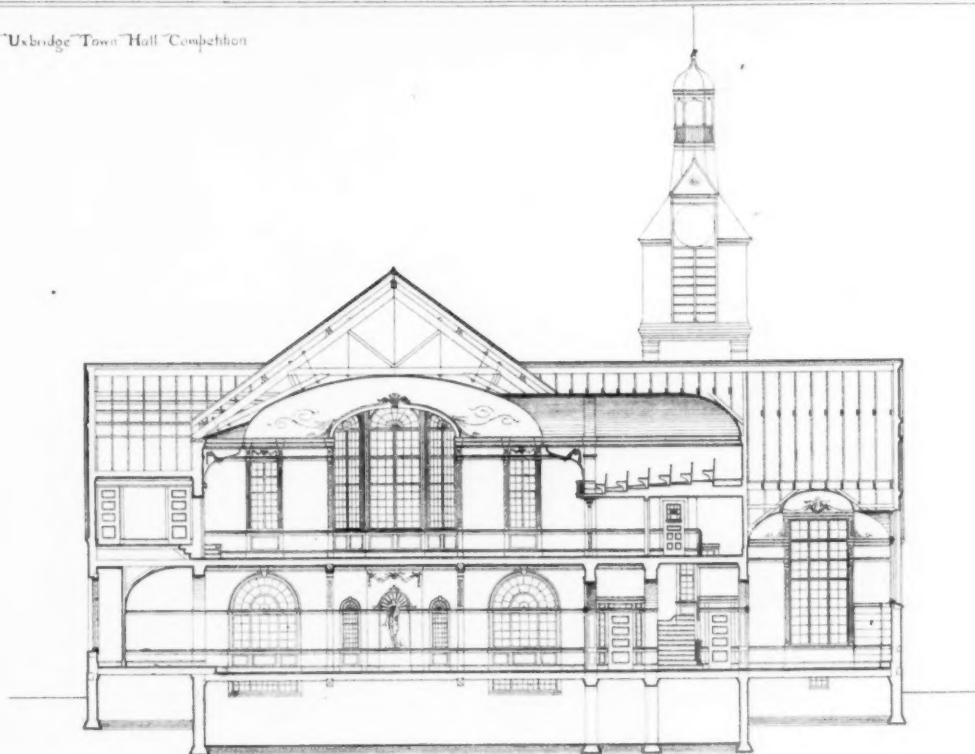
Uxbridge Town Hall Competition.

FERRY & GARDNER, ARCHTS.

ALTERNATIVE DESIGN.



Uxbridge Town Hall Competition



Longitudinal Section

of its members repudiated the Byzantine idea altogether, and pleaded for the style in vogue when the fifteenth Louis of France was king. Others thought that every Christian order of art should be represented in a Christian edifice; a few insisted on the Gothic, and every one is now aware of what the result has been. In relation to Strasburg Cathedral, however, the works now going on with respect to its renowned astronomical clock are curious. In one way or another the machinery got out of order several years ago, and not a few mechanics of repute felt reluctant to meddle with it. The first of these constructions was accomplished in 1352; two centuries later an attempt was made, as most people thought with small success, to improve on the original model, and the experiments have not ceased to this day. A history of this marvellous clock, however, would require to be written by itself.

The progress of all these cathedral restorations, whether undertaken by the French or the Germans, has been singularly slow. Thus, the Chapel of the Nativity, though commenced more than thirty years since, is not thoroughly completed yet. No doubt it is an exceedingly intricate and beautiful work, involving a more elaborate employment of color and gilding, which had frequently to be suspended through the severity of the weather for weeks, sometimes altogether, and, indeed, many external causes have delayed the artists at their labors. As at Cologne, in fact, generations of them have passed away since the undertaking was begun. Of course, if we choose to be antiquarian, we can go back to the age of Clovis, to the days when ten thousand workmen assisted, free of wage, in the erection of this mighty shrine, simply "for the good of their souls," and so forth; but it is the structure under its latest aspects that has to be considered. The equestrian statues of Pepin the Little, Charlemagne, Otho the Great, and Henry the Fowler are comparatively new. So is the gigantic group, in sculpture, of the Last Judgment, with a part of the spire, which attains to a height not much more than two yards less than that of the Great Pyramid, which, as is well known, is the loftiest structure in the world. Such edifices, it may almost be said, are never complete. Every generation adds to them, and every generation, also, has to repair more or less of their decay. That of Barcelona, for instance, ancient though it be, has still one of its porches unfinished. That of Isaac, at Moscow, is even now swelling its proportions. That of Clermont only received its high-altar, covered with plates of beaten gold, so lately as the year 1855; that of Lausanne was quite recently repaved with asphalt; only the other day, as it were, a municipal vote was passed to facilitate the progress of the noblest cathedral in the South of France; and it yet remains a problem of nineteenth century architecture whether or not the towers of Notre Dame shall spring into pinnacles, and thus transform, as it were, the horizon of Paris. To true Parisian archaeologists, this notion appears hardly less profane than the projected coating with stone of the beautiful brick towers at Alby, the modernizing of the architectural relics at Carcassonne, the paganizing of the great knocker at Durham, or tearing away its copper coverings from the Lacon cross. Transformations of the kind, as architects are well aware, are going on all over Christendom. — new friezes along the aisles of Chartres; new windows and wood-work at Evreux; a painted iron grille at Fribourg; decorations in lava-stone at Palermo; freshly designed gargoyles for the great Catholic Church of Paris, — the stones of which, for the future, are to be silicitized; and at Perpignan new walls to sustain an old roof. Amid all these cathedral patchings and restorations, however, a few stand, as we have said, signal and prominent. They are those of Cologne, Chartres, Metz, and Strasburg, with, in a lesser degree, those of Rouen, Saint-Denis, and Troyes. Yet others have no less been given up to the destroyer, — at Angoulême, at Bourges, at Cahors, at Dijon, at Laon, even the marble mosaics of Sienna. Again, in view of certain ravages said to have been wrought by rust on iron-work, various reparations have been ordered at Rouen, at Saint-Denis, at Troyes, at Saint Peter's (Rome), at Notre Dame (de Paris), and in the marble cathedral of Milan itself. The proper restoration, or rescue rather, of such edifices from both the processes of decay and the processes of the "restorer" becomes a question of the utmost magnitude. In France it is computed that there exist in our day forty-eight cathedrals, which, it is computed by M. Viollet-le-Duc, upon a calculation into which we dare not follow him, have cost, from beginning to end, 250,000,000 francs, and which are maintained in rather "a ruinous integrity," for about £40,000 a year. This £40,000, says the same authority, is totally unequal to its object. It is not a hindrance of decay, it is simply a postponement of ruin, and there is evidence to show that a similar disintegration is threatened over the entire Continent. In point of fact, there is scarcely a cathedral which has not been, in a certain degree, dismantled, and which does not require, in the same degree, to be restored. But in what "sense" are these restorations to be made? The guardians of the Notre Dame de Paris declare that they tremble when they reflect upon the probable architectural fate of Metz and Strasburg. They fancy its arches contorted, its columnar clusters deranged, its inscriptions obliterated, its monuments superseded, its chapels degraded from their original sanctity. Precisely so with the great fane of Rouen, whose glorious windows are the admiration of Europe. Fifty years ago, or rather more, a conflagration destroyed its central spire, and imperilled the existence of the entire structure. The leaden roof flowed, liquid, into the streets; it has since been replaced by a covering of zinc. The inflammable spire was superseded by one of cast-iron.

It now asserts for itself, in fact, an altitude superior to that claimed by the Cathedral of Strasburg; but this, it must be remembered, includes the gilded cross, with the lightning-conductor above it, which, of course, constitute no part of the architecture or the elevation. Here again, however, is an example of the slow process by which cathedrals are restored to form and life after once having experienced a disaster. During not far from twenty years Rouen Cathedral was enveloped by a hideous mask of scaffolding; its splendid façade was literally obliterated, and its noble interior roof was spun over by spiders. The new parts of the structure when taken down were discovered to be rotten, albeit that their masonry was no more than, comparatively speaking, a few years old; while as for Chartres, perfect in proportion and venerable in point of age, it has been "restored" over and over again, and is yet demanding reparation, with its brethren of Bayeux, Menz, Vendôme, Verona, Volterra, and, as we began, Metz and Strasburg. They are gradually but surely crumbling, these beautiful and sacred dedications of times past, and half of the European architects are engaged upon plans, theoretical or practical, in order to their preservation for future times. That of Strasburg, however, may be expected to grow into completion under the steady German genius which, while adopting the French plans, patriotically insists upon their Germanic origin. Account must be made, however, for the sufferings incurred during the German bombardment, which reached a total of nearly £50,000 sterling, the roof having been almost wholly destroyed, while the walls were shattered, even among their foundations. Seven years ago the plans for this reconstruction were laid before Europe; and now, though of French design, they are adopted by the German government, so that a structure which is neither German nor French, but of universal historic value, may be redeemed in its power, as a work of beauty and art, if only the "restorers may be trusted." — *Building News*.

SLOW-BURNING CONSTRUCTION.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Sir, — In reply to C. I beg to say that in our practice gypsum is avoided as a close covering for wood on account of its impervious quality, and on iron because of its corrosive action when used by itself. It is undoubtedly a better non-conductor of heat than lime mortar, and more durable under fire, but a thick coat of good lime mortar mixed with hair, and laid on wire or dove-tailed wooden lath, meets the rule of slow combustion sufficiently well, and in ordinary cases may have an outer hard finish of gypsum. We do not expect to prevent fires occurring; in fact, they are absolutely unavoidable in the nature of the work done in the factories that we insure; but our exemption from heavy loss by fire is secured by assuring slow combustion and by not permitting a concealed space to exist in the factory, where fire can be protected from water. That is about the whole of it in respect to construction, but this would not suffice if the axiom, that "cleanliness is the absolute condition of exemption from fire," were not enforced by constant supervision under the penalty of summary exclusion from all the benefits of mutual insurance.

Observe the difference between this practice and compulsory legislation.

The Mutual Underwriters pay no regard to building acts, because the self-interest of their members is more effective than any statute can possibly be; neither do they control any man's business; every man is at liberty to build and operate his mill as he pleases.

We can only advise, and if the advice is not taken our only power is to cancel our policy. Yesterday a member asked if he might use what is called a gas machine and light his mill with the vapor of gasoline or naphtha. Our reply was, "Certainly, if you wish to do so, only on the day on which you are ready to light up please send us your policy to be cancelled, and we will return to you the unearned premium." He will not use a gas machine.

This method of advice usually suffices, because the average dividend or repayment to the assured by our combined mutual companies suffices to pay the average salary of the principal manager of every factory insured by us; gives indemnity for actual loss by fire without danger of dispute or litigation; prevents the interruption of business by serious fires, by the easy control that its methods give to its members in the management of the fires that must occur; and lastly, because the whole benefit is secured at a cost for conducting the combined companies of less than the interest upon the premiums deposited with them to meet annual losses and expenses.

In the consideration of the question of building laws and other matters, treated unprofessionally by C., the writer must follow his example, and laying aside his professional character of underwriter, he will attempt to treat the subject as a matter of grave importance in the social economy of the country.

As has been before stated, the annual cost of fires to the people of the country, direct and indirect, consists of: —

Losses,	\$100,000,000 to \$80,000,000
Cost of conducting Insurance Companies not less than	30,000,000
Cost of sustaining Fire Departments not less than	20,000,000
Total,	\$130,000,000

This is the heaviest single tax now imposed on the nation for unproductive purposes, and it is, to the extent of at least two thirds, useless and avoidable if the right methods of remedy could be adopted and made general. How can this be done?

In his function of trustee C. is obliged to disregard the rules of safety in construction and in methods of preventing fire which his judgment as architect would require him to adopt, and to avail himself of the contract of indemnity given by his policy of insurance, as a cheaper substitute. In this practice he would doubtless be sustained by common opinion. But in order that he and others may be prevented from availing themselves to the fullest extent of the opportunity that the present method of insurance would give them in building unsafe buildings if they choose to do so. C. invokes the action of the Legislature and calls for the compulsion of statutes. In this he would also, doubtless, be sustained. The writer concurs fully in both the positions taken by C. as trustee under existing circumstances, but is it absolutely necessary to set a statute to catch a statute? Must not a true remedy be found in a much more fundamental treatment of the subject?

The best building acts have not secured the safest construction. The insurance system has only secured partial indemnity against loss by ordinary fires, and is utterly inadequate in respect to extraordinary fires.

The community pays as high a cost for inadequate indemnity as the indemnity itself amounts to to the individuals who enjoy it.

The present methods are steadily and surely tending toward disaster.

The present want of a true method of protection from loss by fire costs the community a vastly greater sum than would be required for safe construction and adequate apparatus for the prevention of fire.

We pay the bills, but we do not secure the results in either adequate safety or adequate indemnity, and C. may, perhaps, say with truth, as one of his associates lately said, that it is the American hap-hazard system that is on trial rather than the builders, architects, or underwriters; a system which we have outgrown in many directions, but not in this matter.

The official statements of the fire business of eighty-three New York insurance companies give the following results:—

Ratio of Fire Losses to Premiums.	Ratio of Expenses to Premiums.	Total.
Twelve months in 1878, 50.7 per cent.	47.1 per cent.	97.8 per cent.
Six " " 1879, 71.2 " "	50.2 " "	121.4 " "

Insurance of any kind is but a form of contract for mutual indemnity, and the premiums are the fund to be permanently relied upon. The capital of stock companies is but a guaranty.

In the companies included in the above report the assured have contributed one half their premiums as the cost of an attempt at mutual indemnity, and the losses have absorbed twenty-one per cent more than the remainder. How long can this system last?

The present customary method of conducting the business of insurance consists mainly in employing agents to bet that bad methods of construction and ineffective measures for preventing fire will not result in loss. The odds are against this method, and ere long either it will culminate by way of another great fire, for which all the circumstances are favorable, including an inadequate supply of water in some places that we could name and where we will not take a risk at any price, or else it will culminate in the "survival of the fittest" of the insurance companies and a heavy advance in the rate of insurance.

In the mean time, unless C. is a very exceptional trustee, he may not have read the various policies on which he relies for his present indemnity. He may perhaps be surprised to find that by the terms of many of them all his decorative effects are uninsured, such as the parquetted floor, the carved staircase, the frescoed ceiling, the plate or colored glass window, the pendant gas-fixtures, etc., etc.

It is yet an open question, whether or not the State supervision of the contract of insurance and its undertaking to give a quasi guaranty that companies are entitled to do business because they have complied with certain rules, and because their statements accord with a certain test of solvency, which is in fact somewhat fallacious, does not really do more harm than good. It is a question whether it does not invite the establishment of badly managed companies, promote a vicious kind of competition, and whether it does not tend to give the assured a sense of security which relieves them from that personal care and supervision of their own contracts which would alone make them safe.

It is held by many that there will not be such discrimination by the assured as to whom they will insure with as will enable strong companies to require greater safety in construction, and to compensate owners for adequate measures of prevention of fire by lower rates of premium, until the State shall limit its interference to mere registration and such taxation as may be suitable to secure adequate publicity in the accounts of the insurance companies. At present few of the assured appear to pay much attention to the actual condition of the companies in which they insure, except the members of the mutual companies.

Is not the following the actual condition suggested by the strangely illogical but at the same time perfectly defensible position taken by C.? Because he can obtain an apparently adequate contract of indemnity against loss by fire from a corporation created by one statute and certified to be apparently solvent under another, it is more profitable to build or to maintain an unsafe building than it is to adopt safe methods; but this condition involves such public danger

that he invokes the force of another statute to forbid him and others from taking advantage to the full extent of the opportunity which could not exist except for the statutes of insurance.

If it were necessary for C. to be as careful in regard to the solvency and credit of the underwriters as he is of the tenants, would he dare, or would it be profitable, to take any risk that could be avoided in the construction or maintenance of his building?

Insurance companies are assumed to be safe if they have met the fallacious requirement of the State, and therefore the rates of premium are fixed by the competition of the agents of the weakest companies, who take risks in which the only interest of the agent himself is his own commission on the premiums, ranging from five to twenty per cent of their amount.

Under these circumstances it is not a matter of surprise to those whose business it is to become cognizant of the facts, that the efforts of parties in interest to introduce apparatus for the prevention of fire, and other methods for additional security, are met by the tacit and sometimes active opposition of the representatives of insurance companies.

In fact, it may be said to be a question open for discussion, whether or not the present facilities for obtaining an apparently adequate and delusively cheap policy of insurance, under a quasi certificate of solvency from the State, are not in large measure the cause of the heavy annual losses by fire.

The mutual method that has been applied to the insurance of dwelling-houses and factories cannot for obvious reasons be applied to the general class of risks that are now insured in stock companies. It might be profitably extended to very many special classes, such as rolling mills, flour mills, breweries, tobacco factories, nail-works, and other branches of industry, to their great profit, and by such extension great losses might be prevented.

But the general class of risks must continue to be insured upon some plan substantially like the present one. The question therefore is, How can the present method be so improved as to make it the paramount interest of the underwriter to prevent the occurrence of fire, and to conduct the work so that it shall cease to be a bad method of betting? Whoever can solve this problem will be a great public benefactor.

Finally, in conclusion of this branch of a pleasant discussion, and before I send you some drawings of mills, by which it may be made to appear that the young men employed by the mutual underwriters can give good architectural effect to buildings in which art is subordinated absolutely to safety and utility, permit me to say that if the respondent C. be the man whom I suspect, his city warehouses, stone churches, brick school-houses, and hospital buildings might be insured in the mutual companies, so far as their method of construction is concerned, without material variation from his own plans when he is permitted to have his own way; and I still adhere to my conviction that if many architects, or many who assume to be architects, were as competent to plan and as capable of proving to owners what their true interest required as he is, there would be fewer examples of architectural effect achieved at the cost of the most combustible construction. I believe we can rely upon no one more fully than we can upon C. in constantly urging the necessity of adequate instruction in our schools of architecture in the art of safe building, and in absolutely subordinating all attempts at decorative effect to the necessary conditions of safety and utility in mills, works, warehouses, school-houses, hospitals, and hotels.

In respect to hotels, it may be well to observe that the number destroyed wholly or in part by fire in the United States has averaged a little over one and a quarter per day for the last two and a half years. There are several hotels that it needs only a horse-car to reach from your office, that are execrable examples of combustible construction combined with considerable architectural effect.

E. A.

THE VIBRATION OF MILL BUILDINGS.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Sir,—E. A.'s question, how to stiffen heavy wooden beams without exposing truss-rods, might, I think, be answered by some of the modes of forming built-up beams, as, for instance, in the subjoined sketch, taken from Rankine.

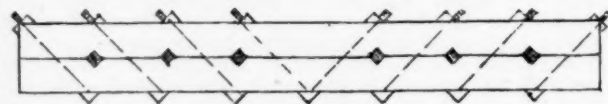


Fig. 1.

Here the bolts are buried in the wood, and thus protected from heat or from gathering lint. There is no question that in such a construction the whole strength of the wood is brought into action.

Another way of building such girders in order to avoid deflection, which, on account of the shrinking of the wood about the bolts and keys, is considerable in those constructed as in Fig. 1, would be to lay the two beams composing it one above the other, without keys, and nail boards one or one and a quarter inches thick, diagonally on each side, reversing the direction on the opposite sides. If the diagonal boards are well nailed, there will be but one neutral axis in the compound beam, the whole of the upper stick being in

compression, and the lower one in tension, just as in a solid beam. This mode of building beams avoids the trouble of exact fitting of

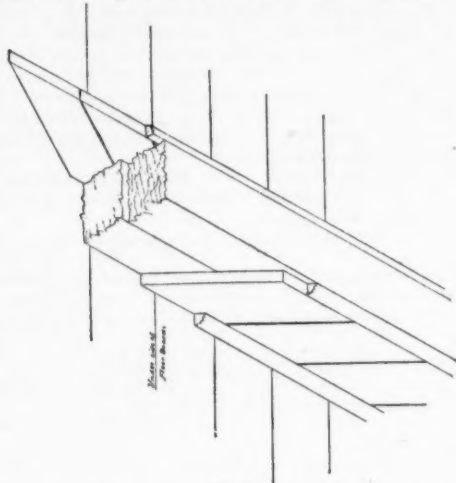


Fig. 2.

the surfaces, which is necessary in the usual methods, so as to gain friction between them. The diagonal boarding carries the strains perfectly without help from friction, and the rough sticks can be used as they come from the yard, without dressing. Moreover there will be no shrinkage endways of the board struts, and consequently no change in the stiffness of the girder. In fact the resistance to deflection is the greatest advantage in trussing a beam in this way.

Two experimental beams which I had made, and tested to breaking, not only bore between ninety and ninety-five per cent of the calculated breaking strain for a solid beam of the same dimensions, which is about the usual ratio with built beams, but the coefficient of deflection up to one eighth of the breaking weight was slightly less than that of a solid beam. This stiffness and its permanence would give such girders considerable advantage where they were required to support shafting.

For such structures as E. A. mentions two 8 by 12 inch or 9 by 12 inch sticks, laid one above the other and diagonally sheathed, would give the stiffness required. The boarding need actually extend but half the length of the beam on each side, and, by calculation, one inch would be sufficient thickness at any part, but it would look better to sheathe the whole beam, which will need no other finish, and I should use one and one fourth inch stock, to prevent curling off in case of fire. Two good coats of silicate paint would then protect the sheathing from ordinary fires, or it might be plastered. In regard to vibration I should think it might be practicable to take the strain entirely off the walls, especially if it were allowable to have posts against the piers, by combining each transverse line of posts and girders into a frame, as shown on the drawing, stiffened by inclining slightly the middle posts, or better, all of them. In this way any impulse transverse to the length of the building would be resisted by a part of the whole weight above the post which was inclined to meet the impulse, proportioned to the extent of the inclination, as this weight would have



Fig. 3.

to be lifted before the post could be moved laterally. The posts would have to be stronger than if placed vertically, but they have usually a surplus of strength against compression.

With very heavy machinery the resistance caused by the weights above might be increased to any extent by iron straps, as shown in the figure. With this assistance to move the top of the post toward the wall, not only the weight upon it must be lifted, but the iron straps must be broken. By cross-bracing between the frames any impulse to one would be communicated to and resisted by several others.

A combination of frames, as suggested, might be made as independent of the walls as a trestle bridge. Similar trussing could be introduced even where there were no posts against the wall, but there would be many advantages in having them, one of the greatest being that the girders, which would thus be free from the wall, would not be affected by its settlement, and shafting hung from them would retain its alignment. This independence of the wall would, moreover, allow the whole frame to be tied together without danger to the wall in case of fire, though it would be nearly as good, even if the beams were simply hooked to the posts on the under side. For stiffening mills already built heavy Ts of cast iron might be bolted to the sides of the posts and girders, which would perhaps answer a good purpose, and be out of the way of the machinery.

T. M. CLARK.

THE OLD STONE MILL AT NEWPORT.

NEWPORT, R. I., September 24, 1879.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Dear Sir,—Permit me through the medium of your paper to explain in detail some statements made by me in an article on the "Old Stone Mill at Newport," published in the *Magazine of American History*. In your remarks, under date of September 20, attention is called to the construction of the fireplace and of the lower floor, and the question is asked, whether it is clear after all that "the niche with its queer little flues was a fireplace."

I think it was, and for the following reasons:—

In an ordinary windmill a fireplace would not be required, but in the early colonial days the Newport structure stood at some distance from the settled portion of the town, and may have been occupied by the miller and his family. Being strong and well built, the tower would prove a very rock of defence against an Indian foe, and might be called upon to stand a siege of several days; under such circumstances a fireplace would be of great advantage. Let us, however, reason simply from the construction. A fireplace built in the thickness of a wall two feet in section, whether owing its origin to the mechanics of the eleventh or seventeenth century, must have been built in the same way. The two small flues, I think, were a compromise for one flue with an area of eighty inches. Eight inches in depth is all that the rubble wall would stand, and to make the flue the whole width of the fireplace—three feet—would have destroyed all bond in the stone-work. Above the fireplace one of the "summers" entered the wall; this divided the flue, and the stone-work protecting the beam served as bond and withe.

The question of pargetting adds strong evidence in corroboration of my theory. The object of pargetting a chimney flue is to prevent the passage of chance sparks through any small interstices in the jointing of the brick or stone-work. An examination of a modern chimney flue will show that when it forms one of a stack it is only pargetted on two sides,—those nearest the wood-work,—the inner withes being left with struck joints. This is the key-note. In the "Old Mill" the north flue runs up nearly vertical and at a distance from any wood-work; this flue is not pargetted. The other flue curves off to the south and then turns up, passing directly beneath and close to the wooden "summer." This flue is fully and carefully pargetted and seems to show conclusively that whoever built it had in mind the use of fire, and the protection of a wooden floor to be placed in position at the same time.

To establish the thickness of the lower floor is more difficult. In my article I described it as coming "up to the under-side of the hearth, and above the crowns of the arches." Taken literally, the floor would have a depth of three feet and six inches, instead of four feet, as stated in your paper; the depth of hearth making the difference. I think it more probable, however, that the top of the floor came up just above the openings of the arches, from two feet and six inches to three feet above the abaci of the piers. All openings would naturally be closed, and with the heavy beams used by the colonists—varying in section from ten to fourteen inches—and with plankings from four to six inches thick, such a depth of floor could easily be obtained. In fact, the larger the scantling the more readily could the work be accomplished, when we consider that the colonists were compelled to hew out their timber with axes, and would naturally keep the logs as near their original dimensions as was consistent with square work. Such was their custom in house-building, and it was probably the course pursued in erecting the mill. The heavy floor possessed the double advantage of being able to sustain without deflection any weight placed over its centre and also of affording protection to the occupants of the tower from the attacks of hostile savages, or even the bullets of Europeans. By this arrangement the hearth would be some distance above the floor level. If such a disposition had its disadvantages, it must have been made the best of by the occupants; unless the floor was blocked up still higher. By consulting my original sketches it will be seen that one end of the hearth rests upon an arch; and to have set it lower would have necessitated a reduction in the width of the opening.

In connection with the above explanations, I would call attention

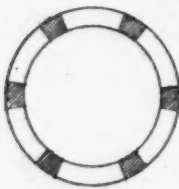


Fig. 1.



Fig. 2.

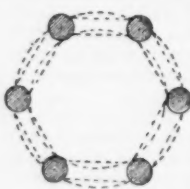


Fig. 3.

to one other constructive feature; namely, the reason that may be assigned for adopting eight as the number of piers, instead of six, as at Leamington. In my published article I stated that such a disposition might have been determined upon as a perpetual record of the cardinal points of the compass. There is, however, a constructive explanation of the causes which may have led to this radical departure from the English model. By referring to Fig. 1 it will be seen that to turn true arches between piers set out on a circle, two radii are required, — a vertical one for the rise of the arches and a horizontal one for the plan. This was easily accomplished at Leamington, where every stone was carefully cut and fitted to a pattern. With the rubble masonry at Newport it would be more difficult. Here the masons discarded the horizontal radius and threw their arches straight across from pier to pier, as shown in Fig. 2. Thus the "Old Mill" is not circular at the base, but is octagonal up to the crowns of the arches, twelve feet and six inches above the ground, the circular superstructure projecting over the centres of the arches as shown by dotted lines. With six piers, as in Fig. 3, the projection would have been still more marked, and beyond the limits of safety.

In conclusion I would observe that it has not been my intention to claim absolutely for Governor Arnold the honor of having erected the tower, for that would be impossible in the light of any evidence that has come down to us. That he used it as a mill is certain, but its origin must still remain veiled in obscurity. My object is to establish the fact that, whether erected by wandering Viking or English colonist, the tower still stands, perfect in all respects and with all the features that it possessed when first erected, — the wood-work excepted, — and that no radical changes have, or could have, been made in its interior.

GEO. C. MASON, JR.

COMMONWEALTH AVENUE, BOSTON.

BRISTOL, R. I., September 23, 1879.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Sir, — Possibly some other natives of Boston, as well as myself, may wish that architects would enter their protest against the manner in which the Park Commissioners and the city authorities wish, in the extension of Commonwealth Avenue, to build a monument for the perpetual record that Boston, in the last quarter of a century, since the avenue was first projected, has gained nothing in educated tastes, nothing in wealth; and can therefore see no difference in the value to the city between an increase of its handsome features and a gross deformity of what should be one of its chief ornaments, and, on the whole, decides upon the latter on the score of economy.

More than twenty years ago the Back Bay Commissioners and the city engineer thought themselves competent to plan the street system of a new and elegant residence quarter without the aid of architectural advice. They designed a more pretentious street than any hitherto planned in this country; but they made no provision for proportionately handsome, uniform effect in the entrance corners at the commencement of the avenue, and they made no provision whatever for its effective termination. The successive authorities have followed in the footsteps of the first Commission; and have apparently despised the advice of members of your profession, though latterly a worthy gentleman of New York, more famous as a landscape gardener than as an urban architect, was taken into counsel before settling upon the last published plan of the extension, which is in some respects worse than that of 1876. It is cheering to hear that at last an effort is being made to stay the hand of bad taste which would so wantonly waste Boston's remarkable "capabilities" for developing its youthful prettiness into a beautiful maturity. Surely, sir, this subject is worthy your editorial notice, and we beg you will not deny the public the benefit of your authoritative voice in the matter.

Could not designs for the handsome utilization of the whole of the "Full Basin" be published in your influential journal? At this centenary period the Declaration of Independence ought at least to be remembered by Boston in the preparation of a suitable site for the future erection of a monument; Paul Revere, also, should have an equestrian statue. What finer site for these monuments could be had than a generous open space at the present termination of Commonwealth Avenue, perhaps flanked by crescent blocks of houses of uniform design? A branch railway from the proposed Park Station to cross the river and connect with the Grand Junction rails in Cambridgeport, and thus enable all the Northern and Eastern lines to bring their passenger trains, or some of them, into this station and also into the Providence station, would seem a wise provision in the plan. A building for industrial and horticultural exhibitions, which might be used as a winter garden, and which could be reached

under cover from the park station, would also seem a desideratum. A plan showing these embellishments and conveniences would be appreciated by the public, and would surely be worth any architect's labor in preparing. But the proper authorities should certainly offer premiums for competitive designs for all this, and these designs should be placed on exhibition where they could be seen by the public side by side with the present plan. In making these suggestions I have no axes to grind. I am not an architect, and have not the skill necessary to prepare such a plan as my imagination pictures, and which I hope an artist may design.

Your obedient servant,
BLAXTON.

NOTES AND CLIPPINGS.

NEW YORK PAVEMENTS. — The New York Commissioner on paving sets his face against cobble, wood, and concrete materials as inefficient. He complains of the frequency with which the streets are torn up and imperfectly repaired by plumbers, gas companies, and others, in following their individual callings. To overcome these damages, he has prepared an ordinance requiring a fee on each permit for making an excavation, to cover the cost of replacing the pavement, the work to be done by skilled workmen, under the charge of the superintendent of public works.

FAIL OF AN OIL MILL. — On the 25th the oil mill and elevator of I. P. Evans & Co., at Indianapolis, was partially demolished. The weight of 30,000 bushels of flax-seed, stored on the second and third floors, forced out the walls on the north and west, damaging the entire building to such an extent that it will have to be rebuilt. The night force had just been relieved and the day force had not gone on duty. If it had happened a few minutes later a number of men would have been buried in the ruins. No architect was employed in building the mill.

THE ST. GOTHARD TUNNEL is being pushed rapidly to completion. Four thousand men are now engaged in the work, and fresh hands are taken on every day. The advance is at the rate of nearly eight metres a day, and the length still to be bored is 1000 metres, so that the tunnel will probably be finished by the end of this year or the beginning of next. The making of the Mont Cenis branch will be commenced on the first of October, and its completion is expected to coincide with that of the main line.

TH. VALERIO. — The death is announced by cable, in his sixtieth year, of Théodore Valerio, a French painter and etcher, who made himself an excellent reputation abroad by his paintings of scenes from the picturesque life of the Montenegrins and Hungarians, by his later landscapes of Morbihan, Brittany, and his numerous etchings.

GEORGE CRUIKSHANK'S autobiography was ready for publication at the time of his death on February 1, 1878, but has been delayed from various causes. It is believed now that an early issue of it will be brought about.

BRICKWORK. — Though architects' specifications usually introduce the clause that the "bricks used are to be hard, square, sound, and well burnt," it is well known that builders avail themselves of a little latitude in the interpretation of this clause. The truth is, that the estimate of a brick should be formed upon the suitability of it for its purpose, and therefore the only true method of judging of bricks is to know where they are to be placed in the building. The right brick in the right place, to slightly alter a common aphorism, should be the only crucial test. Every builder knows that the bricks he would use externally are not so well suited for interior plastered walls as those of rough and misshapen manufacture, which give a better "key" to the plaster, and which, from their being less burnt, are lighter, and more adapted for interior purposes. We may here say that only facing-bricks require to be "sound, square, and well burnt;" and for the sake of being consistent, as well as being correct, a specification ought to have such a clause as the following: "The bricks to be adapted for the purposes for which they are intended; the facings to be of selected, square make, hard, and well burnt bricks, of uniform color, and the other bricks to be of sound and well burnt quality." For paving, copings, and other portions of buildings subject to weight and wear, a hard variety of brick is necessary, and a requirement of this kind should be inserted in the specification of all new works. We may here refer to three varieties of bricks: 1. Ordinary bricks used for walls; 2. Cutters or rubbers, used for arches and other purposes, where the bricks require to be cut to some particular shape; and 3. Underburnt bricks, suitable only for inside walls. The requirements of ordinary bricks we have already discussed; "cutters or rubbers" should be made from a mild earth, freed from lumps of all kinds, so that it may be rubbed to a smooth face and leave fine arrises. For exposed outside work, it is better to use moulded bricks, as they are better burnt. A good rubber should be of uniform texture, and not easily cut by a knife — conditions, however, they do not always fulfil. In "Notes on Building Construction," there are a few useful remarks made upon the method of distinguishing between "clamp," kiln, and machine-made bricks, which we may quote for the good of our younger readers. "In clamp-burnt bricks the traces of the breeze mixed with the clay can generally be seen. Kiln-burnt bricks often have light and dark stripes upon their sides, caused by their being arranged, while burning, with intervals between them. . . . The best kiln bricks are of a uniform color. Machine-made bricks may easily be distinguished — if wire-cut, by the marks of the wires, if moulded, by the peculiar form of the mould, letters on the surface, etc. In distinguishing good from inferior kinds of brick, one point is to notice if they are free from cracks and lumps of lime, which, by slaking with moisture, split the bricks." Another, but secondary point, is the shape and uniformity of size; the edges should be fine, sharp, and square. The quantity of water a brick will absorb is another excellent test of its quality. The percentage of water absorbed varies. In hard paviers the percentage is nine and a half, in machine-made red it is about ten, but the average absorption is about one sixth of the weight, and in highly vitrified about one fifteenth. — *Building News.*