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CONTENTS.

THE expert committee of architects, chosen by the Secretary of the Interior to examine the competitive plans submitted for the restoration and reconstruction of the Patent Office Building at Washington, made their required report on the 9th instant. Thirteen competitors submitted 110 sheets, containing more than 254 drawings. The committee have decided that the contribution submitted, as afterwards discovered, by Mr. J. A. Vrydagh, of Terre Haute, Indiana, contained "the most intelligent embodiment of the requirements and suggestions" of the programme. This design proposed the erection of an additional story or "attic" upon the walls of the present building, so as to form an essential part of the architectural composition of the exterior, giving an entire new story of offices, seventy-two in number. All attempts made by the competitors to contrive, as suggested by the circulars of the Department, a new story which should be practically invisible from the streets, were found to result in such obvious imperfections of distribution in the plan, and to involve such serious inconveniences in respect to light, air, space, and circulation, that the alternative of a new story, as allowed by the Department, was considered the only practicable scheme. The committee also approved the arrangement of a central connecting passage across the court-yard of the building, as proposed by the successful competitor, or, instead of this, a rectangular building, seventy by seventy-five feet, in three stories, connected with the opposite wings by passageways, and containing eighteen offices. The committee recommended certain modifications of the scheme for the interior arrangements of the new Model Room, and approved the proposition of one competitor (S. C. in monogram) for "the restoration of the building substantially as it stood before the fire," but explained in detail its objections. The report seems to be exhaustive, impartial, and workmanlike. We hope to be able to present it in full in our next issue.

THE Congressional Committee appointed to collect evidence respecting the present depression in business and the consequent distress among laborers, with a view to ascertain causes and to suggest remedies, closed its first session on the 6th inst. and adjourned to the 20th. Up to this time the committee has had no reason to complain of paucity of testimony or of reticence on the part of its witnesses. Employers and employed, labor reformers, representatives of Workingmen's Unions, of Congresses of Humanity, of the Socialist Labor Party, of Associations of National Reform, have availed themselves of the ample opportunity of the occasion, and have been patiently heard. In the midst of the enormous mass of undigested theory and rubbish presented, most of which is familiar amongst the curiosities of political economy, the committee will have much ado, we imagine, to find the precious mustard-seed of knowledge. Up to this date, Daniel has not come to judgment. The notes of the committee are full of denunciations of the present order of civilization in every detail, and of complete and ready remedies for all the present evils. Among these remedies, socialistic and coöperative nostrums were abundant in every form: the establishment of government schools of mechanics, of elaborate systems of internal improvement for the employment of labor, the taxing of government bonds, an unlimited inflation of the currency, restriction of the rights of patentees, systems of public loans to all applicants, compulsory curtailment of hours of labor, the abrogation of the contract system, direct employment of labor by government, the distribution of the public lands, the reëstablishment of the income tax, — out of such contradictory propositions as these, the committee can hardly hope to develop a rational and symmetrical system of reform. But having gathered such wisdom as it could from volunteer and promiscuous advisers, it now proposes, on reassembling, to hear only such persons as it specially invites to present their views concerning the variations in the prices of labor and of manufactured products, of the necessaries of life and rents, and the profits of manufacturers, during the past eighteen years. These witnesses are to be selected from among all classes of bankers, merchants, and manufacturers, from tradesmen and workingmen, and from all grades of employers and employed.

WHETHER the committee will find as ready response when it comes to the serious part of their work, the collection of trustworthy information as to "the causes of general business depression, especially of labor," and the searching out of measures of relief, remains to be seen. Experience shows that manufacturers are not fond of the trouble of furnishing statistical information as to the course of their business, still less as to their profits, and even statistics are seldom enough in themselves to explain causes or prescribe remedies. The means of relief suggested on the popular side of the question, it will be seen, all come in the end to some way of increasing taxation, or distributing other people's money by the aid of legislation. It is not our business to discuss questions in their purely political aspects; but we may be allowed to notice that these schemes are a pretty natural extension of the habit of special and class legislation, of which we have seen and heard much; and that, the principle being once fully recognized, it is only logical to carry it out and make like provision for the aid of ministers, lawyers, bank clerks, widows, orphans, architects, and what not. When this is fairly done, we shall not be far from the consummation desired by socialists, — a general distribution or "divvy," based on a hypothecation of all the immovable wealth of the country.

WE understand that the real workingmen complain that the committee is endeavoring to make the cause of labor ridiculous by permitting and perhaps encouraging all sorts of crazy theorists to appear before it and offer contradictory testimony. Apparently, however, the workingmen have no case against the committee, for they have had equal opportunity with the rest to detail their wants and explain their remedies; indeed, the records of the committee are not without a very small amount of honest and sensible evidence from the dissatisfied class. In Philadelphia it is proposed to hold workingmen's meetings, so that, by the cumulative force of many voices and by unanimity of complaint, the true state of the case may be more effectually set before the committee than by isolated statements. *Una voce poco fa.* Doubtless such gatherings will have their value; the committee can hardly shut its eyes and close its ears to them But, unless they choose representatives to present their case to the committee of Congress in the appointed manner, to be questioned like other witnesses, we do not see how much good can be got out of them. Truth can be elicited only by such impartial processes as the committee seems disposed to make use of. If Kearney and his like have real grievances, let them ask for a hearing and state their case plainly, without the embellishments of rhetoric which befogs, or of blasphemy which betrays, the cause of truth. But the California phenomenon has already publicly denounced the committee. The new theory of the "pooling of issues" is not of a nature to bear cross-questioning before any committee, and will make no formal appearance in Mr. Hewitt's inquisition.

THE representative of the socialistic Guy Fawkes in Washington seems to be one Cohen, who, on the 5th inst., visited the District Commission at the head of a body of men claiming to be a

delegation from a mass-meeting of laboring men, and submitted a series of resolutions said to have been adopted at that meeting; these called upon the officers of the Government to fix eight hours for a day's work and $1.50 for the lowest payment therefor, and to require all contractors on public works to be placed under similar obligations with respect to their laborers. The laborers' demonstrations have been active enough to elicit from the Supervising Architect a card stating that no officer in the Treasury Department has power to fix in any way the prices of labor; that the contractors on public works in Washington find no difficulty in obtaining all the labor needed for $1.00 to $1.25 per day; that men who prefer to work for this price rather than lie idle and starve have a perfect right to do so, and should not be interfered with; and that delays in the work occasioned by violence and riot do more harm to the workmen than to the Government. These are fundamental principles in the employment of labor, but we hardly believe that Cohen and his fellows will take them to heart, or that they will lay their troubles before the Congressional Committee. Their methods are different, and their aim is not to discuss, but to compel acquiescence; not to adjust themselves to natural and inevitable conditions of living, but to create political parties, to have a larger share in the spoils, to overturn society and build up a new fabric in accordance with theories which are impracticable and ideas which are dreams. There will be agitation and more or less of disturbance, until labor shall have learned that its true leaders are not noisy demagogues, but men of virtue and temperance, as well as of power, — true citizens of the republic.

It is some months since we mentioned the formation of an Architectural Draughtsmen's Association in New York, of whose aims and purposes we knew little, but of whose successful organization and work we would gladly hear more. There must be in New York ample material for the formation of a good working society, whose proceedings can be of incalculable benefit to its members, and which may become, after the manner of the Architectural Association in London, of no inconsiderable weight in the profession, and may gather to itself, as has been done by its prototype, those members of the profession who are repelled from the existing organizations by personal or other considerations. It is one thing, however, to found such a society in a large metropolitan city, where all the conditions are favorable, and whither the peripatetic draughtsman so often turns his steps, thus bringing ever fresh recruits; while it is quite another to enter upon such an enterprise in an inland city, as has just been done at St. Louis, where we imagine the ranks of draughtsmen receive but few recruits in the course of the year, and these chiefly of indigenous growth and home training. The St. Louis Architectural Draughtsmen's Association will have, however, the whole field to itself, for as yet no chapter of the American Institute of Architects has been established there. so the new society may hope to acquire, in the course of time. the support and coöperation of those older members of the profession who are already members of the Institute, or who would become so if a chapter were established in the city. Unless too great reliance is placed on the activity and enthusiasm of a few members, Western pluck and enterprise will probably bring this, as other enterprises, into successful and well-ordered operation.

Before either the proposition of General Spinola or that of the New York Steam Heating Company has been accepted by the government of New York, it would be well to wait a little longer, in order that the results of the system of steam heating at Lockport may declare themselves a little more clearly. Unquestionably much may be said in favor of the economy, convenience, and adaptability of the system, but before leave is granted to introduce the Holly system into cities, and more particularly into such rural cities as Auburn, N. Y., and Springfield, Mass., which, we understand, have already voted to adopt this latest of modern improvements, it should be definitely known what effect it will have on trees and vegetation, whose hygienic and indeed civilizing influence on the dwellers in cities can hardly be overestimated. At the best, trees have small encouragement in cities. If they border a thoroughfare the air and water are effectually excluded from their roots by the pavement, the surrounding buildings cut them off from the sunlight, city foresters think it their duty to trim and amputate their limbs, and their development is stunted by the continual exposure and mutilation of their roots during the laying and repairing of gas pipes, water mains, and sewers, even if a leaky gas main does not so pollute the soil as to make vegetable life an impossibility. If they beautify a park their condition is bettered only in that they have more light and air, advantages which are offset by the chances of having impermeable asphalt pavement run over their roots, or street sweepings so heaped about them as to cause their death, as lately in Boston. If to these unfavorable conditions is to be added the warmth of even carefully protected steam pipes, which will cause the sap to start at every winter thaw, and will vaporize the last atom of moisture left by an August drought, our cities may finally be compelled to content themselves with such pastoral suggestions as may be furnished by tin palm-trees and tinsel vines, such as form the umbrageous retreats of the Jardin Mabille at Paris.

We learn from a despatch to the *World* that Colonel Casey of the Engineer Corps, Superintendent of Public Buildings and Grounds, has laid before the Washington Monument Commission a detailed report upon the condition of the structure. He proposes so to strengthen the foundations that they will be able to bear, not only a total height of four hundred and eighty-five feet, as heretofore contemplated, but an increase of height to five hundred and twenty-five feet, which, as we understand, is now favored by the Commission, in order that the obelisk may far outreach the loftiest structure yet erected by the hand of man. If the obelisk is to be continued at all, we trust that it may be stretched to the utmost, so that there may be no question on the point of its preëminence in respect to height. Under the act we understand that work upon the superstructure cannot be resumed without direct authority of Congress. The interests of art, which we endeavor to represent, are concerned to prevent the completion of this work in the manner indicated, as we have many times taken occasion to say; we trust, therefore, that no proper effort may be spared to inspire Congress with a due sense of the responsibility which it has assumed, and although the strengthening of the foundation, which is now to be begun, will furnish to the friends of the obelisk an additional argument for the completion of it, let us not cease to hope that civilization may yet have its effect upon this blank and meaningless pile, and give to it a new grace, an expression more appropriate to the great occasion, a significance more in accordance with our intelligence and culture.

ARCHITECTS AND ENGINEERS. I.

The separation of architects and engineers into two professions is quite a modern device. The engineer's profession is in fact a young and strong-minded daughter of the architect's, begotten of the modern tendency to the mechanical development of science and to the division of labor. Needlessly divided sympathies separate those whom the family relation and common interests ought to keep in close union. In older ages of the world the works of architecture and engineering were always the same. The engineer's duty was only a part of the architect's. It was not till the time of the Renaissance that the seeds of a future family separation were sown, when, as we have often been told of late, architecture began to be outwardly independent of construction. Then first architects were amateurs and *dilettanti*, artists merely, who looked at the art of building from without. This divorce between architecture and construction, which thoughtful architects have learned to regret, and over which writers on art have lately spent so much eloquence, was the type, itself unnecessary, of the division of work which had to come. Even then the two duties were united in one person. The great architects of the Renaissance were the great engineers and constructors, as well as the great painters and sculptors. But the two offices having once come to be distinct, everything was ready for the establishment of two independent practitioners, as soon as the increased complexity of modern requirements and the reach of modern science called for it, and it was easy for them to fall rapidly into disunion. The gap between the professions has widened, till in our day we have seen architects who are either innocently ignorant or superciliously disdainful of the whole theory of construction, and engineers who attempt the most imposing monuments without any concern for architectural teaching. Visconti, the architect of Napoleon's tomb in the Invalides, and the projector of the new Louvre, looked upon construction as a study beneath the attention of an architect. Sir Joseph Paxton and Captain Fowke built the Crystal Palace and the great hall at South Kensington with no idea of calling an architect into council.

The separation of duties has nevertheless become necessary, because nowadays there are constructions which call for greater scientific skill than architects have commonly time to acquire; while the transformation of architecture from an art of close traditions to one of historical and eclectic study has greatly increased the amount of special acquirement it demands; because there is a vast amount of constructive work going on which gives but the smallest occasion for architectural care; and, in a word, because the tendency of civilization sets irresistibly in the direction of a division of labor. But if the separation is necessary, the dissociation is not. It is purely gratuitous; we might almost call it factitious and perverse. There are no two classes of practitioners, except physicians and surgeons, — not even architects and sculptors, — whose work should bring them more constantly into consultation than architects and engineers. This is especially true of them in England and the United States, where the dissociation is greater than elsewhere; where architects are too ready to underrate constructive training, and engineers to look upon art as vanity and vexation of spirit. Apart from the loss of the benefits that might follow from association, the visible results of divergence are unfortunate on both hands. Each profession has lost something in quality by their disunion, which a reassociation might help it to recover. Architects bungle in their construction, and engineers make a mess of their designs. The architect, too, is apt to fail of the straightforward manliness which a clear constructive sense would give to his designing. The work of the one becomes fantastic or effeminate, and that of the other coarse, ugly, and brutal. In the good time when architecture and engineering were associated, as they had to be when they were united in the same practitioner, an important work was at once the best in construction and in art that it could be made. The domes of the Pantheon and St. Sophia, the vault and clerestory of Amiens, the cupolas of Florence and of St. Peter's, were triumphs alike in both respects. But now we find the United States strewn with bridges, lighthouses, and other structures that need not have been hideous, and with the *débris* of buildings that need not have tumbled down, if their designers had been both engineers and architects; or if the members of each profession would have taken good counsel from the other.

As things stand the engineers have rather the advantage before the public in our country at least; not because they do the architectural part of their work any better than architects do their constructing, but because their successes in their own field are more easily recognized and their failures in their neighbors' less so; because, perhaps, they set a higher value on training than architects; because they are better united as a profession; because, in fine, the age they live in is more a scientific and mechanical age than an artistic one. On the other hand, inasmuch as architects depend more on construction than engineers on design, there are many architects who are trained constructors, while there are perhaps no engineers who are trained designers. There are architects — we can call to mind several in the United States — who have added to their studies a regular schooling in engineering, and these, other things being equal, should be the best equipped of their profession, but this is naturally the exception rather than the rule. The architect is under heavier penalties to guard his weakness, for his building, however well designed, may tumble down, bringing its beauty to naught and its author to disgrace; whereas the engineer's may still be useful, if it turns out hopelessly ugly. Neither profession can get along without the knowledge that belongs to the other. No one would trust, in these days, the architect who openly rejected constructive skill; and it is probably safe to say that the engineer does not exist who does not always, however utilitarian he may be, do something to make his constructions look well. There is, in truth, no sharp line to be drawn between the works of engineering and those of architecture. There are many buildings which may be classed with either, and are given to the practitioners of either, as convenience may require. There are others, such as mills, elevators, lighthouses, which are usually given to engineers, that, if they are to be given to one profession exclusively, might with advantage in some respects be turned over to architects. There are others which, by their monumental character, and by their difficulty of construction, call for the best powers of both professions. There are indeed persons who assume to practice both, calling themselves architects and engineers, which on the debatable ground is not unnatural; but it is safe to infer that they do not stand, or even aspire to stand, in the front rank of both professions, if of either.

Practising as they do the two branches of constructive art which ought to be at one, and can never be wholly separated, but which modern usage has necessarily and irrevocably assigned to different professions, architects and engineers, one would say, were natural allies. They ought to profit by constant consulting over common interests and analogous occupations. Each profession ought to be the most appreciative spectator of the other's work, to study to understand it, and to be first in leading the public to a sympathetic comprehension of it. Each should recognize the benefit of an appeal to the other for advice, in those parts of its work which trench on the ground of the other. Their professional relations, their legal standing and liabilities, are analogous. There is, therefore, much that they might do in common to establish reasonable and orderly rules of practice, and to strengthen the position of both before the public. Not that there is no recognition of brotherhood between the professions, with more or less consultation, and occasionally some concert of action; but there might with benefit be a good deal more, especially in our own country, where the two guilds have but lately succeeded in defining their own personality, as it were, and where whatever union there may be is perhaps as much in a confused identity as in the helpful intercourse of two well-distinguished professions.

Many ways naturally suggest themselves in which concert of action between the two bodies of men would be valuable. Of some of them, and of some means by which it might be furthered, we shall speak in another article. That any single class of men can in these days be thoroughly skilled both as architects and as engineers is not to be looked for. Since engineers exist, architects will do well to recognize and take advantage of their superiority in their own province. Engineers may remember that a skilful designer can add a grace to their most conspicuous works, which the public will value, if they do not. If there had been a habit of coöperation between them we might have escaped some such disasters as that of the Rockford Court-House; nor need we, in case the Brooklyn bridge remains unfinished, have seen its huge piers stand predominating over two cities in unnecessary ugliness, while unredeemed by any useful office.

THE DETERIORATION OF OIL-PAINTINGS.[1]

OIL-paintings are subject to various kinds of changes, which may be considered as diseases, requiring different treatment according to their different nature. A science needs to be formed, a pathology and therapeutics of oil-paintings. The pathology would have to describe and explain those diseases and their progress, and to develop the methods by which a correct diagnosis could be arrived at in each individual case. The therapeutics would teach the remedies which might be applied either to cure or to alleviate the disease, or at least to stop its progress. A hygiene would follow, which would have to teach how to avoid pernicious influences, and which, besides, while giving precepts for the technical process of painting, would have to forestall those constitutional diseases, which, even in cases where no noxious influences can be traced, are the causes of decay, after a comparatively short period of existence. As medical science is above all things based on anatomy and physiology, so the exact knowledge of the structure of a picture would have to be acquired previously to any study of its disease. Unfortunately, direct investigation alone can procure no such exact knowledge; on the contrary, we are obliged to enter upon a minute historical investigation of the material as well as of the technical methods adopted by artists of different schools and different periods.

The excellent works of Cennino Cennini, Mérimée, Sir Charles Eastlake, Mrs. Merrifield, and others have already furnished most valuable material; but still the field for investigation remains unlimited; for, in order to enable us to secure the conservation of each valuable painting, we ought to know exactly how it was made. The artists of the present time would spare infinite trouble to the investigators of future times, if, along with their works, they would leave the account of their practice in the case of each picture. A treatment without exact knowledge of the normal condition, as well as of the nature of the disease, is, as we shall see, as dangerous for the picture as it would be in the case of living beings.

Professional restorers of pictures admit this danger in a general way; each of them, however, is convinced that he himself, by his personal knowledge, skill, and care, knows how to avoid it. The public pays too little attention to the subject, and therefore it occurred to me that it might be useful to give a short account of what we know about this question, of the changes to which oil-paintings are exposed, as well as of the means either to avoid or to cure them.

We have to consider, first, the material on which the artist has painted; that is, as far as oil painting is concerned, principally wood

[1] A paper by Dr. R. Liebreich, read at the Royal Institution of Great Britain, and published in the *Architect*.

and canvas. Secondly, the priming: that is, the substance with which the surface was prepared in order to be made fit for painting. Thirdly, the painting itself; that is, the pigments and vehicles used for it, and the liquids that were added during the painting, the mediums, megilp, siccative, varnish, essential oils, etc. Fourthly, the coat or coats of varnish spread over the picture.

The wood on which a picture has been painted may either warp or get chinks in it, or become worm-eaten or even altogether rotten. Against warping the remedy usually applied is moisture. If the panel is very thick it is first made somewhat thinner; then the back is moistened, and the picture is left to lie on its back for twelve to twenty-four hours, after which time it will be found to have bent straight. Of course this must not be continued longer than necessary, otherwise the convex surface, instead of becoming plane, would become concave. When straight, the picture is kept so by beads, which have to be adapted in a particular way, a certain degree of shifting being allowed for the expansion and contraction of the wood. Cracks in the wood are drawn together by inserting pieces of wood of a special shape. Sublimate solutions are employed to destroy worms.

Trifling losses of substance are replaced by cement. Small portions of rotten wood, not extending too near the painting, are cut out and replaced by wedge-shaped pieces. If, however, the greater part, or the whole substance of the panel, is rotten, the picture must be separated from it and transferred to new wood, or rather to canvas. This was first tried by Hacquin, in Paris, and was performed successfully upon many pictures, and, among others, upon one of Raphael's Madonnas, in the Galerie du Louvre, and upon Sebastian del Piombo's Resurrection of Lazarus, now in the National Gallery. The process no longer appears so very marvellous; it is generally executed in the following way: —

First of all the surface of the picture is pasted over with gauze and paper; after that the wood is made straight by moistening, or, if necessary, by making incisions with the saw, into which cuneiform pieces of wood are driven. By means of a tenon-saw the panel is to be sawn into little squares, which must be removed by a chisel, and in this way the thickness of the wood is reduced to half an inch; it is then planed until it becomes no thicker than paper, and the rest is removed by means of a knife and with the fingers. The painting being thus severed from its basis, it can be fixed on canvas if the priming is sufficiently preserved. In the opposite case, a mixture made of chalk and glue, or something of the kind, must be put on first, and very evenly smoothed after being dry. This done, the new canvas has to be fixed upon it by means of a mixture of glue, varnish, and turpentine, and the substance of the picture pressed tightly and evenly against it by means of warm irons.

In order to avoid deterioration, the most minute precepts have been given for preparing the panel. It has to be taken from the best oak, or nut trees, or cedars. The wood is to be cut into boards during winter-time, and kept till autumn before being dried; it can then be prepared only in the following spring, etc. It would certainly be preferable to give up wood panels altogether for large pictures, and only to think of means to make the canvas stronger. For small pictures, panels offer certain advantages, and can be more easily preserved from decay.

In the canvas we meet with the results of injuries or spontaneous decay. A rent may be mended by rags of linen stuck at the back of the picture. Even a hole may be filled up by pieces taken from other decayed paintings. If the picture is considerably damaged, it will be best to line it. But if the whole canvas is rotten and tattered, it will be preferable to sacrifice it by pulling off the threads one by one, after having secured the painting itself by pasting paper on the front of it. This done, the painting is transferred to another canvas in the same way as those removed from wood.

There are different modes of priming, which may be brought under two principal heads, — the distemper and the oil priming.

(1.) The canvas is distempered by a mixture of chalk or plaster and paste, or glue, which may be laid on raw, unbleached canvas; or this latter may be beforehand prepared with glue or paste. Several coats of this mixture must be put on in succession, one being perfectly dry before the next can be applied. Many of the older oil paintings are painted on such ground. It has the advantage of being quicker prepared, of absorbing the excess of oil, of permitting the color to enter into the priming and to dry quicker, and, moreover, of containing a white absolutely innocuous to the other colors. The inconveniences, on the other hand, are that it more easily breaks, and under the influence of humidity separates from the canvas.

(2.) The oil priming consists of several coats of oil colors. As each of these must be perfectly dry before the next is laid on, and as, moreover, time must be given to the whole to dry completely before painting upon, in order to avoid the sinking in of the colors, the whole preparation is much slower than the distemper. Nevertheless, it is now generally adopted.

Rey, in France, has pointed out a process which is a compromise between the two methods; he begins by distempering, and after several coats of distemper, having dried one after the other, he puts on a coat of oil which, as it were, changes the distempered ground into an oil-color ground.

With oil priming it is of importance that the principal color be white lead, to which are added comparatively small quantities of yellow, black, or other colors. For a whole century a school — that of Bologna — predominated in Italy which abandoned this principle. During the second half of the seventeenth and the first half of the eighteenth century, most of the Italian masters of other schools followed its example. Probably for the purpose of obtaining more easily the desired effect of the chiaro-oscuro, they painted on a brownish-red priming, which consisted of bolus mixed with umber. Not one of those pictures has kept its original coloring. Not only has the priming caused all the dark parts to grow much darker, but it has destroyed, or nearly so, all the glazing, so that only those colors can be recognized which either contain white or are glazed on white. I can show you numerous instances of this, for, on account of the extreme fertility of this school, there is little difficulty in procuring pictures of masters of that time, or of their pupils.

Wood priming does not require the same elasticity as that of the canvas, which ought to be capable of being rolled. Therefore the priming of the wood shows less variations. It is generally composed of chalk or plaster, tempered with starch, paste, size, or glue, and more or less thickly laid on. In some pictures of different centuries we find, either between the wood and the priming or between the priming and the painting, canvas, and, exceptionally, even paper.

The diseases of the priming are not of a very complicated nature. They manifest themselves principally in three different ways: (1) by cracks in the priming itself; (2) by the severance of the priming from the painting; (3) by the severance of the priming from the wood or the canvas. The third disease is by far the most frequent, especially among pictures on canvas distempered with paste. If small pieces only are scaling off or blistering, they are fixed again to the ground by letting a solution of size pass between the detached part and the canvas, and pressing both gently together. If the deterioration extends over a considerable surface, the picture has to be lined. While this is being done, and while the gluing substance penetrates into the picture, the detached parts are pressed on again with slightly-heated irons. If the whole priming threatens to come off, it will be better to take the picture entirely from the panel or canvas, and to transfer it to a new canvas.

I shall show you examples illustrating the before-mentioned points, and among them two pictures, — one in oil, taken off from canvas, the other in tempera, taken off from wood. Both of them, strange to say, have escaped destruction without having been transferred to a new canvas, and without being covered with paper, as is usually done, before taking them off. They show you the painting by itself from both sides. I have of course used every precaution in bringing them safely over from Florence, where I happened to discover them carefully stowed away among heaps of old pictures.

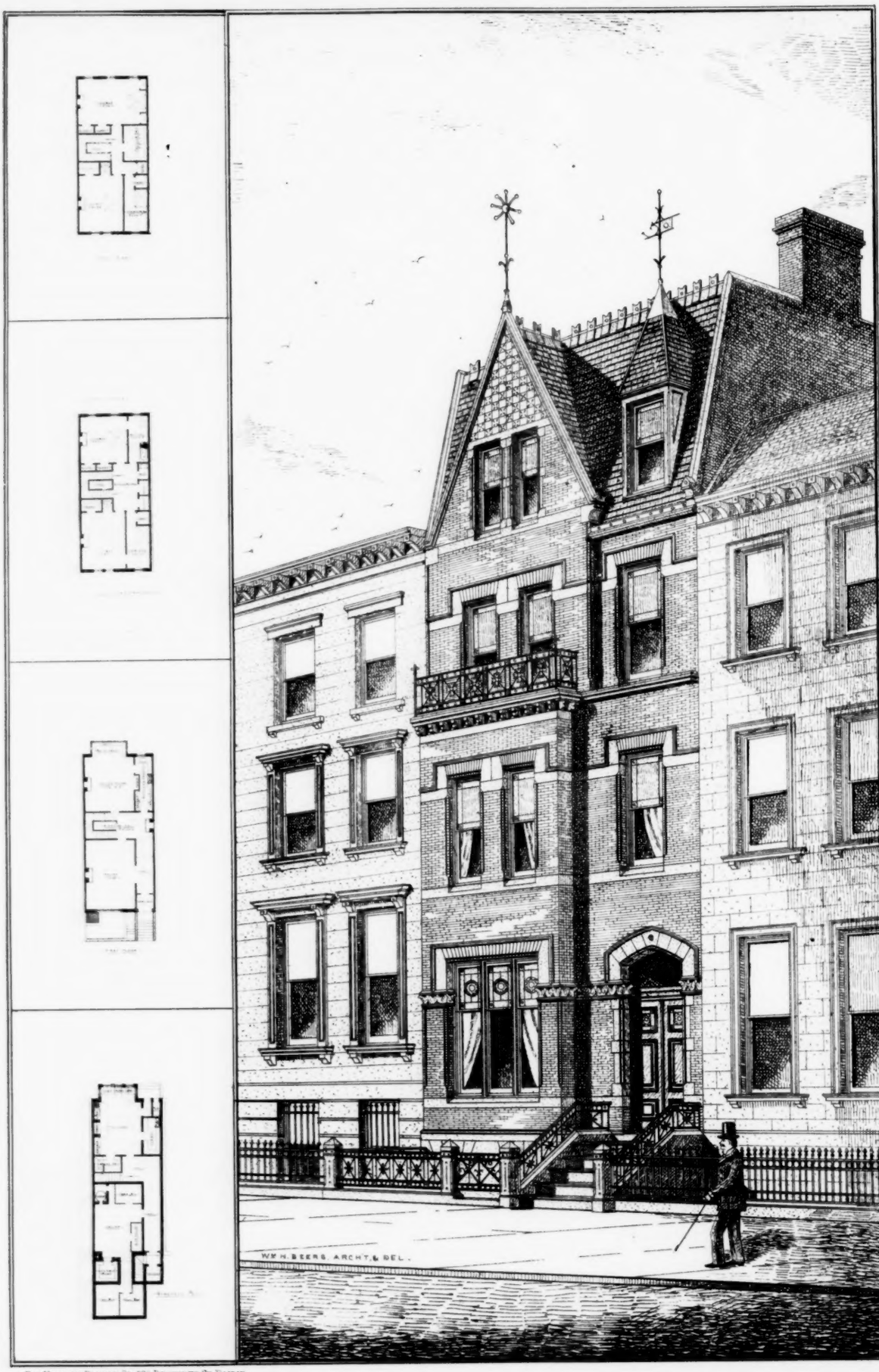
We come now to the most important part of the picture, — the painting itself. We meet very often with the idea that the old masters had been in possession of colors, that is, pigments, the knowledge of which has been lost, and that this accounts principally for the difference between the oil painting of the fifteenth and sixteenth centuries, on the one hand, and that of the eighteenth and nineteenth, on the other. But this is a great mistake. We know perfectly well the pigments used by the old masters; we possess the same, and a considerable number of new ones, good, as well as bad, in addition. In using the expression of good and bad, I am principally thinking of their durability. From this point of view the pigments can be placed under three headings: —

(1.) Those that are durable in themselves, and also agree well with the other pigments with which they have to be mixed. (2.) Such as when sufficiently isolated remain unaltered; but when in contact with certain other pigments change color, or alter the others, or produce a reciprocal modification. (3.) Those which are so little durable that, even when isolated from other pigments, the mere contact of the vehicle, the air, or the light makes them in time fade, darken, or disappear altogether.

The old masters used, without reserve, only those belonging to the first of these three categories. For those belonging to the second they imposed on themselves certain limits and precautions. Those belonging to the third they did not use at all.

That some of the modern masters have not followed these principles is not owing to a lost secret, but to the fact that they disregarded those well-known principles, and even consciously acted against them. In Sir Joshua Reynolds's diary, for instance, we read that in order to produce certain tints of flesh he mixed orpiment, carmine-lake, and blue-black together. Now, orpiment is one of the colors of the second category, carmine-lake one of the third. That is to say, orpiment, as long as it remains isolated, keeps its brilliant yellow or reddish-orange color; but when mixed with white lead it decomposes, because it consists of sulphur and arsenic, and it, moreover, blackens the white lead, because the sulphur combines with it. Carmine-lake, even if left isolated, does not stand as an oil color, and therefore has been superseded by madder-lake.

Unfortunately, some of the most brilliant colors are perishable to such a degree that they ought never to be used; yet it seems to me that just in one branch of art, in which of late remarkable progress has been made, — I mean landscape painting, — the artists, in order to obtain certain effects of color not easily to be realized, do not always resist the temptation to make use of a number of pigments, the non-durability of which is proved beyond doubt. However that may be, I think it pretty certain that the pigments in themselves play only a subordinate part in the deterioration of oil-paintings, and that the



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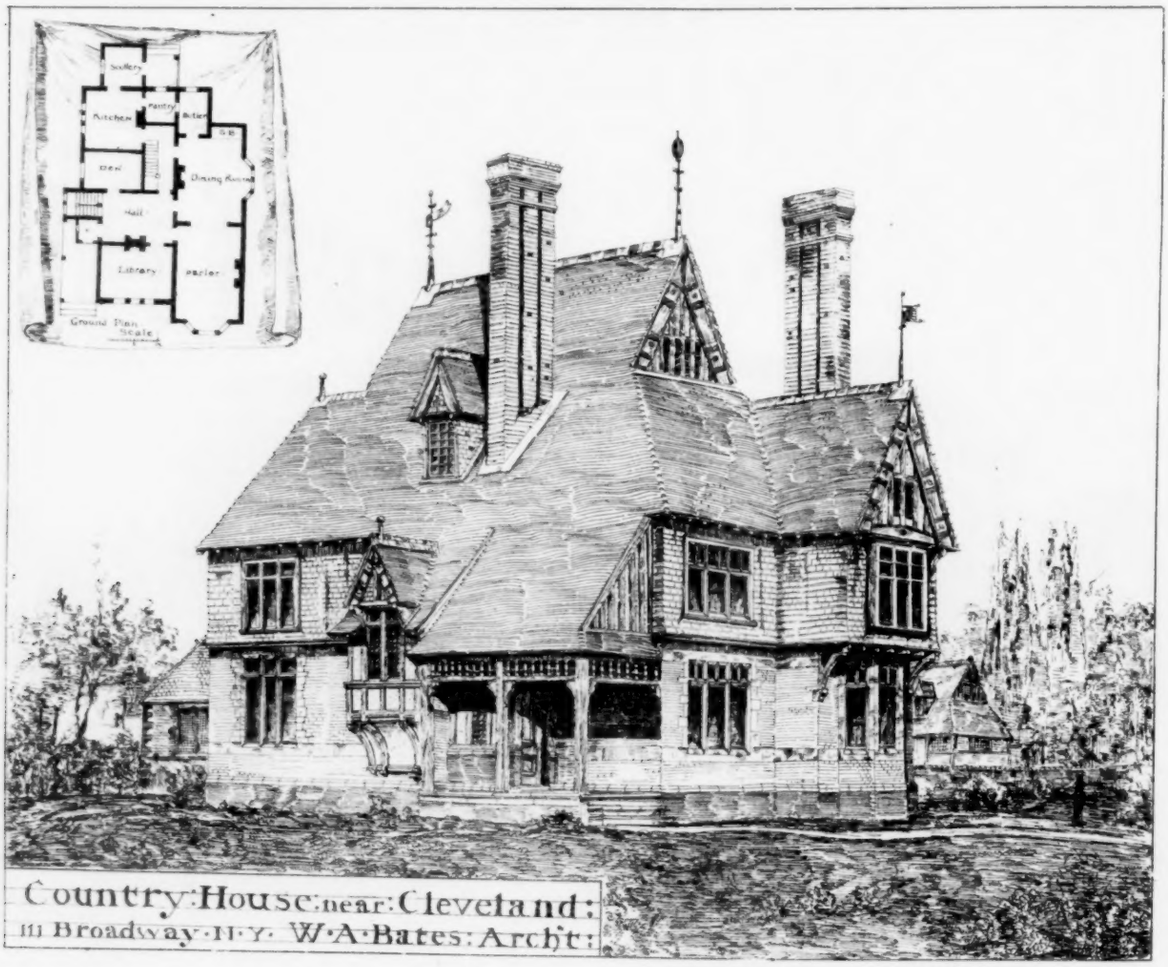
COUNTRY HOUSE — A.B. JENNINGS. ARCH'T. 71 BROADWAY, N.Y.



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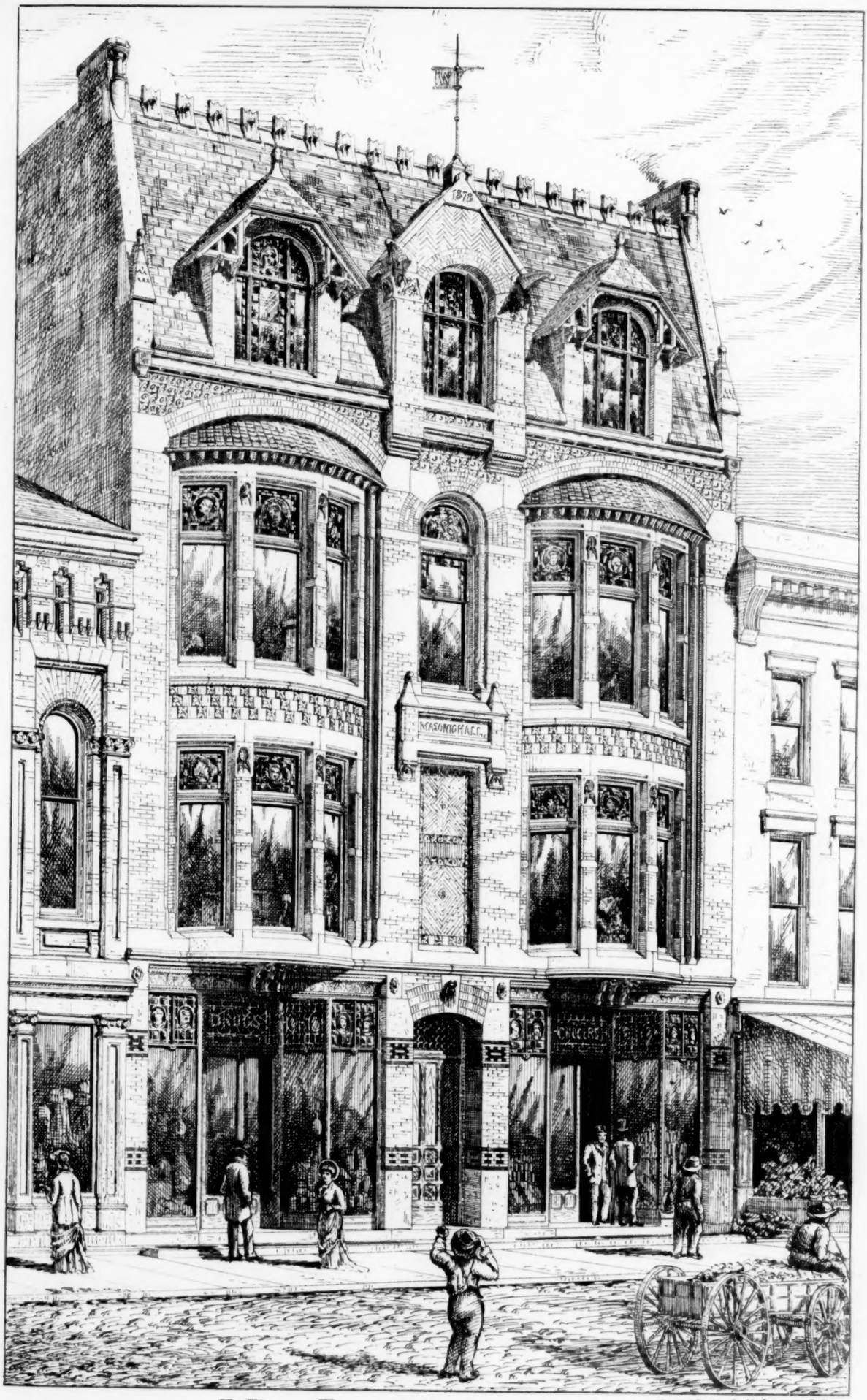
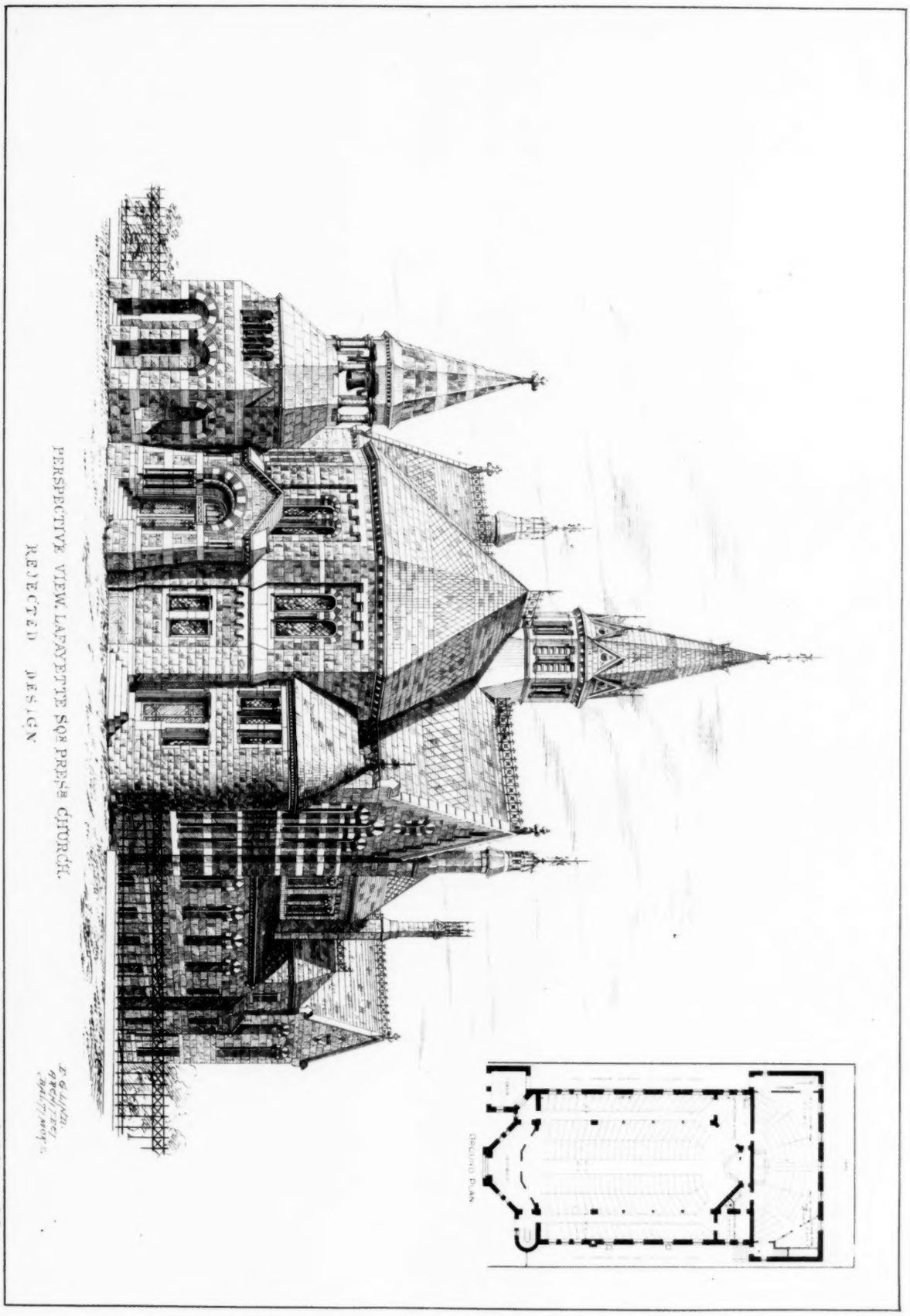


WOOD'S BL'D'G WILKES-BARRE PA.

BRUCE PRICE, ARCH'T.

841 B'WAY, N.Y.


PERSPECTIVE VIEW. LAFAYETTE SQR PRES. CHURCH.
REJECTED DESIGN.
E. CLARK, ARCHITECT, BALTIMORE.
GROUND PLAN.
THE HELIOTYPE PRINTING CO. 330 DEVONSHIRE ST. BOSTON.

principal part belongs to the vehicle with which the colors are ground and to the liquids which are added during the painting. I hope, therefore, you will excuse my making some elementary explanations about these liquids.

Oil and fat are bodies consisting of carbon, hydrogen, and oxygen. They may be considered as salts in which glycerine, as a basis, is combined with different acids, — stearic acid, palmic acid, oleic acid. If oil is exposed to the air, it changes: certain kinds of oil remain liquid; others become thicker and darker, and are gradually transformed into hard and opaque bodies. The drying of oils is based upon a chemical process, during which the oil oxidizes by absorbing oxygen from the air, and combining a part of it with carbon to form carbonic acid, and another part with hydrogen to form water. The different oils dry with different rapidity, but this rapidity may be modified by the presence of certain substances, or by certain treatment. Linseed oil, for instance, according to the way in which it has been pressed out of the seed, contains more or less mucilaginous substances. These latter impede the drying of the oil, and have, therefore, to be removed by a refining process. If linseed oil in a shallow vessel is exposed to the air and light, especially to a green light, it soon begins to dry, and is transformed first into a kind of varnish, and gradually into a solid opaque substance. The drying may be quickened by boiling, and more particularly by the addition of lead, zinc, or manganese. In this way a quick drying oil varnish may be prepared and used as a siccative. It follows that there are certain substances which impede the drying of oils, and others which facilitate it. Amongst the pigments are some which belong to this category of bodies, — white lead, zinc-white, minium, vermilion, for instance, facilitate the drying; others, such as ivory-black, bitumen, madder-lake, will impede it. Supposing, now, we should add to each of the different pigments the same quantity of oil, the drying of it would progress at different rates. But in reality this difference is very greatly increased by the fact that the different pigments require very different quantities of oil, in order to be ground to the consistency requisite for painting.

Pettenkofer quotes the following figures, given to him by one of the color manufacturers: —

100 parts	(weight)	White lead	require	12	parts of oil.
"	"	Zinc-white	"	14	"
"	"	Green chrome	"	15	"
"	"	Chrome yellow	"	19	"
"	"	Vermilion	"	25	"
"	"	Light red	"	31	"
"	"	Madder-lake	"	62	"
"	"	Yellow ochre	"	66	"
"	"	Light ochre	"	72	"
"	"	Camel's brown	"	75	"
"	"	Brown manganese	"	87	"
"	"	Terre verte	"	100	"
"	"	Parisian blue	"	106	"
"	"	Burnt terre verte	"	112	"
"	"	Berlin blue	"	112	"
"	"	Ivory-black	"	112	"
"	"	Cobalt	"	125	"
"	"	Florentine brown	"	150	"
"	"	Burnt terra sienna	"	181	
"	"	Raw terra sienna	"	240	"

According to this table 100 parts of the quick-drying white lead are ground with 12 parts of oil; and, on the other hand, the slow-drying ivory-black requires 112 parts of oil.

It is very important that artists should have an exact knowledge of these matters. But it seems to me that they are insufficiently known to most of them. All of course know perfectly how different the drying quality of different colors is. But that these different colors introduce into the picture so different a quantity of oil, and how large this quantity is in the colors they buy; and, further, that the oil, as well as the mediums or siccatives they add to dry the colors, is gradually transformed into a caoutchouc-like opaque substance, which envelops and darkens the pigments; and moreover that the oil undergoes, not in the beginning, but much later on, when it is already completely dry, changes of volume, and so impairs the continuity of the picture, all this is not sufficiently known. Otherwise, the custom of painting with the ordinary oil colors to be bought at any colorman's would not have been going on for nearly a hundred years in spite of all the clearly shown evil results, — results due, chiefly, to the principal enemy of oil-painting, that is to say, the oil.

That the masters of the fifteenth and sixteenth centuries did not use colors prepared in this way you may consider as absolutely certain; and if we hear the lost secret spoken of, and if we read that the pupils of the old masters had to pledge themselves to keep the secret, we may be sure that it is neither the method of painting nor the pigment used for it which is concerned in that secret, but exclusively the way of preparing the colors. The preparation was a very complicated one, varying with the different pigments; and we know that the pupils passed six years — that is, half of the apprenticeship — in grinding the colors for the master.

And therefore it is to this very point that every one who wishes to study the method of the old masters must first of all direct his attention. I, too, was led, by the study of this question, to analyze and restore old pictures. The possibility of making such analysis we owe to the relation between the old masters and their pupils. Of course we could not dissect or chemically analyze works of Titian or Raphael. But, fortunately, the pupils painted with the same material and by the same method as the masters, and thousands of pictures by the pupils, well preserved or in different stages of decay, may be easily procured.

I have myself, from among a very great number of such pictures, selected about one hundred specimens, part of which I have brought before you. As their artistic value is not, as you perceive, of the highest description, we need not feel any scruple in experimenting upon or even destroying them if we can thereby gain any valuable information.

THE ILLUSTRATIONS.

WOOD'S BUILDING, WILKESBARRE, PENN. MR. BRUCE PRICE, ARCHITECT, NEW YORK.

PHILADELPHIA pressed and moulded brick are used in the front of the building, which is relieved with finish of Wyoming blue stone and terra-cotta tiles. The roof is covered with red Vermont slate, and finished with terra-cotta cresting. The window heads and spandrels are filled with rolled cathedral quarrels.

DESIGN FOR A COUNTRY HOUSE NEAR CLEVELAND, OHIO. MR. W. A. BATES, ARCHITECT, NEW YORK.

COUNTRY HOUSE. MR. A B. JENNINGS, ARCHITECT, NEW YORK.

HOUSE ON BROOKLYN HEIGHTS. MR. WILLIAM H. BEERS, ARCHITECT, NEW YORK.

This house will be commenced in September; the front will be built of Philadelphia face-brick, with moulded bricks on the angles of window jambs, etc.; the lower story to the height of water table, and all stone work, are to be of Connecticut sandstone.

REJECTED DESIGN FOR THE LAFAYETTE SQUARE PRESBYTERIAN CHURCH AT BALTIMORE, MD. MR. E. G. LIND, ARCHITECT.

This building, which was to be of green serpentine and drab Ohio stone, was intended to seat seven hundred persons. Its estimated cost, including school and lecture rooms at the rear, was $42,700.

CORRESPONDENCE.

THE EXHIBITION BUILDING IN THE CHAMP DE MARS. — GLASS AND IRON. — BRICK AND IRON.

PARIS.

NONE of the former great exhibitions have been of so direct an interest to the architect as the present one in Paris. The Palais du Trocadéro is unusually interesting, from its designer's eclecticism in boldly choosing from different styles the character which could best express his construction; yet a still deeper curiosity urges the visitor across the river. At the English Exhibition at Sydenham, in 1862, the architects watched to see what the engineers would do with their new building materials, glass and iron. It is now the turn of the engineers to examine what the architects have done towards appropriating a material they at first despaired of making artistic. Until now art has failed to overtake science in building; but the economy of mechanics is inexorable, and the designer must keep up or give up the struggle. The Champ de Mars will probably be the field of many a battle of this kind, but this year it seems as if art, by the aid of new allies, had regained her lead.

In the different annexes iron is employed with other materials in nearly every proportion: from the Pavilion of Public Works, which is of brick, with iron only at the angles, and for the gutter, roof, etc., used rather as a decorative material, to the main Exhibition building, which is essentially an iron structure. It is in the façade of the latter that terra-cotta and tiles, the allies of which I spoke, have been so judiciously introduced as to clothe agreeably with warmth and color the gaunt iron skeleton. These are used merely to fill the spaces between the iron beams; they are partly decorative, and there is no uncertainty, as too often happens with brick and iron, as to the functions of each material. The outlines of the building are probably well known from the illustrated journals, but the iron façade in reality gains from the skill with which the gardens in front are laid out. The Champ de Mars could not admit of a conspicuous terrace, yet the ground in front is sunk so that a low one is formed, which, broken here and there with steps and fountains, gives picturesque dignity to the vast structure behind. This matter of terraces, by the way, is hardly appreciated with us. In Europe — in Italy especially — they are at pains to form terraces both for the grandeur of public buildings and for the picturesqueness of dwellings, as a balustrade with statues or vases is decorative even when raised but a few steps. The central feature of the façade is a vast, projecting, yet deeply recessed arch, rising to twice the height of the adjoining galleries, and buttressed by two low corner staircase towers, which give access to a wide balcony within the arch, one third of its height up. These stairs and the balcony supports, as well as the great corner pavilions up to the springing of their domes, are of stone, — or rather artificial stone in cement, — and give solidity in appearance. The corner pavilions rise higher than the central one, and are crowned by four-sided domes, so largely penetrated by four huge semicircular windows as to be very light and airy.

In the galleries connecting these pavilions lies the chief artistic merit of the whole design. They have ten bays on each side, and are crowned by a high gutter ornament of deeply moulded iron relieved with red and gold. This harmonizes well with the brilliant color and bold design of the tiles encased in the square pillars which separate the bays, and are crowned with bronze figures supporting colored shields and flag-staffs. Against these pillars, under the shelter of a broad *marquise*, are colossal statues of the nations. They are

boldly designed by eminent sculptors, and look none the worse for being roughly done in plaster. The bays are filled with glass stamped in pale blue patterns, which looks well. In the interior of the vestibule there is little to praise beyond its airiness; the decoration is pretentious and coarse. The flat central dome and the segmental arch of the galleries are formed of slight iron ribs, filled in with vulgar plaster caissons painted in gold and metallic tints, so that the iron skeleton is quite lost sight of, and the whole becomes one heavy mass, — far too heavy for the slight side supports. A good commentary on this vestibule is found in its pendant at the rear. There, being less important, less was attempted, and the effect of the natural color of the plaster caissons encased in the iron web and painted a pale blue is good. An unfortunate idea of the architect, M. Hardy, was to make two flat niche heads to correspond with the great entrance arches in supporting the flat dome. In his hurry he was utterly unable to arrange the former, and they are left hanging over the entrance to the galleries like half saucers, while from without they look like the elbow-joints to a hydrant. The interiors of the end pavilions, with their vast semicircular windows forming simple penetrations in the dome, look better because nothing has been done; simply painted the roof explains itself, and is light and appropriate. Under these pavilions are, respectively, a colossal bronze statue of Charlemagne and a lofty wooden tower for the Canadian exhibition. The galleries are further filled with a fine display of the presents received by the Prince of Wales during his Indian tour, and now arranged in cases and Indian pagodas. Opposite these the government Sévres and tapestry exhibition is badly shown off in a pretentious structure of wood imitating a stone portico. The entrance to these pavilions is under a *motif* as ugly as it is inexplicable. Imagine a niche head placed facing outwards, its corners resting on two iron pillars, while its back touches the building. The interior is brilliantly gilded, and I can imagine it used with some success to reflect an immense swinging lamp; but I fear this was not the original idea in view. To use a French expression, much in vogue in the *ateliers*, "It was an idea, — only it was a bad one." M. Hardy has done credit to his name by his audacious energy, which leads him to dare and do anything, and in the short time he has accomplished wonders, — sometimes of ugliness. It would be difficult to conceive anything more ugly than the two immense loggias which terminate the series of semi-detached fine-art galleries in the middle. Three gigantic round arches with domes are supposed to recall — but by what an effort of imagination! — the Loggia dei Lanzi at Florence. They look like some inner structure of masonry which is waiting to be treated architecturally; but there they stand quite completed. Their walls are covered with landscapes and colossal figures in tiles, principally from the manufactories of M. Deck and of M. Loebnitz. No art industry seems to be so much appreciated as faience in its various forms, and many countries have superb exhibitions, which it would require volumes to discuss.

Separated from these unfortunate loggias by gardens, in the centre of the whole plan, stands the Pavilion of the City of Paris. From its size and character much was expected of it, as the last word in iron building. It has disappointed expectation, as perhaps was natural. Although originality was to be its charm, its very novelty disconcerts the public, and they have not given it what praise it really merits. It consists of a large rectangular hall flanked by iron porticoes; its end façades are of brick, rising over the entrance into a pediment, or, as the mouldings are almost without relief, I should rather say a gable crowned with a terra-cotta ornament. The entrance, closed at the top by a window, is surrounded by a brilliant band of tiles, slightly splayed inwards; and outside of this, again, a broad band of terra-cotta (plaster painted in imitation), with scroll foliage, is carried up and around the gable. Only the edges of the T-shaped iron uprights show as they rise to support the iron cornice. The iron is painted gray, picked out with deep blue. The whole is brilliant and original, but not altogether satisfactory; perhaps because the bricks are too pale in tone for the other colors, and, I think, because sufficient iron does not show to explain itself, as there is so much brick-work it seems superfluous. At least the square iron piers filled with terra-cotta work seem senseless at the corner of a solid brick wall. This same gable is repeated at the sides to receive the lateral porticoes. In designing the latter M. Bouvard has been entirely successful. They are charming. Delicate iron columns support a metal entablature and gutter. The high frieze is of plaster cast in graceful designs; the background delicately tinted, and dashed here and there with gilding. Painted canvas forms the ceiling, and contrasts well with the deep blue and green of the iron-work. The interior also is fine. Nothing could be more light and airy than the graceful iron columns, which rise some two metres from the wall to support delicate latticed trusses, such as M. Coquart designed for the covered court of the École des Beaux-Arts. Almost the whole ceiling is occupied by five flat lights filled with ground glass in patterns. The coved surfaces are painted in buff and pale blue, and with the deep red of the walls produce a charming effect of color. The building exhibits admirably the artistic and scientific works lately carried out by the city.

I have already hinted at the Annex devoted to the Department of Public Works. It is also of iron and brick, or rather, I might say, of brick with iron finish. It is crowned by a revolving electric light, and its front is really covered by tiles in diaper patterns. In short, the building is a good example of the exaggerations to be avoided in using these three materials. Within are models of bridges, tunnels, harbors, and other public works of the government. There are also specimens of stones and building materials, with catalogues and much concise information for engineers. No less than seven hundred kinds of stones, one hundred and forty-one cements, and twenty-seven varieties of brick are catalogued. R.

A CONTRIBUTION TO POPULAR IGNORANCE ON THE SUBJECT OF SMOKY CHIMNEYS.

To the Editor of the American Architect:

Dear Sir, — Some four years since I made an addition to my house, containing two chimneys. About one of these I felt great doubt. It had one fire-place on the first floor, and directly above that were two rooms, the partition between them standing over the fire place below, and each room having a fire-place diagonally across the corner. Each fire-place has a dump flue. In order to support these diagonal fire-places it became necessary to corbel the brick-work very sharply through the one foot space afforded by the floor, to twist the dumps through this space, to work the flue in by the side of them and bring it up back of the diagonal fire-places, and then connect them with it, dividing the flues again above to let in a truss beam just under the third story fire-place, as a support for the partition above named. In short, it made a very crooked piece of brick-work, and I was hardly more pleased than surprised when, on trying the various fire-places, I found that they all worked finely, which they still continue to do.

The other chimney is, with one exception, the tallest in the house. It comes out on a gable of one wing, and is higher than any part of the house near it. Its height above the ground is fully forty feet. It contains on the west side a flue for hot air, supplied from a furnace in the cellar, and opening into chambers by registers just above the floors of the second and third stories; at which latter point it stops. Next this, eastward, is a flue running almost perpendicularly from the cellar to the top of the chimney. It is about 8 ins. × 8 ins. except in the upper part above where the hot air flue reaches, where it is nearly 8 ins. × 12 ins. It is used for the smoke flue of the furnace and draws fairly. Into this flue, at a height of eight or nine feet above the floors respectively, the flues of the first and second story fire-places open. The third story fire-place has an independent flue running to the top of the chimney. There are dump flues running down from all the fire-places to the back and east side of the chimney stack, but in no way interfering with the other flues.

Neither the first nor the second story fire-place has ever drawn well. The chimney seems to have an aversion to smoke. The air lies dead. The smoke puffs out in clouds as soon as a fire is lighted, and is ready after the fire is fairly started to do so on the slightest provocation, such as the opening of a door or the sweep of a lady's dress before the fire. The fuel used is wood.

Sometimes when a fire is built on the first floor the smoke pours out through the fire-place on the second floor. This led me to believe that there was some stoppage of the main flue above the point where the second story flue enters it. I therefore had a hole cut in the chimney, and by letting down a candle I was able to examine every part of the inside of the flue. I found everything clear, the main flue uniform in size except for the enlargement before mentioned, the curves where the other flues came in well rounded, and, so far as I could see, everything in good order. There are rather large openings over the fire-places. I have narrowed the throats of these temporarily by putting in pieces of sheet-iron and brick.

I have put on a revolving turret. I have extended the chimney six feet or so by a piece of pipe. My mason cheerfully suggests that I brick up the fire-places and use stoves. As my chief object is ventilation, I decline this. My neighbor across the road suggests that I change ends with the chimney. There is merit in this, but I dislike the expense, and my wife objects to the dirt. What shall I do next? Can you help me? K.

[The freaks of chimneys are curious, and we should be bold to claim to be able to account for them all. But there is no doubt that our correspondent has required of his smoky chimney a great deal more than it ought to be expected to perform. He has carried the smoke from his furnace and two open fire-places into a single flue eight inches square. The expansion at the top does not help matters, for it is above the upper fire-place, so that all the smoke must first pass through the narrower part; it probably makes things worse by diminishing the velocity of the flow above. Most experienced architects and constructors will agree that either of the three duties imposed is enough for his flue. A furnace or an open fire-place ought to have one as large as this to itself, — the utmost that it is usually thought safe to add is a hole for a close stove in another story; and careful persons prefer to provide for every open fire-place a clear flue of eight by twelve inches. It is not surprising then that our correspondent's fire-places will not draw, but rather that even his furnace should be found to draw tolerably. The real puzzle is that the fire-places in the other chimney which he describes should succeed, if, as he seems to imply, they are all carried into one flue; although he does not say that the flue area is equally small, or that he has ever tried to burn all three fires at once. Things sometimes succeed that are done against all probability; we remember the saying of a clever physician that a baby might live if it were hung out of a window. As for a remedy, the only possible one, we should say, since our correspondent does not want stoves, is to build or to appropriate new flues for the smoking fire places. — Eds. Am. Architect.]

AN EXPLANATION IN REGARD TO THE COMPETITIONS IN INTERIOR DECORATIONS.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Sir, — As a disinterested, though not uninterested, spectator of the "Fourth Competition," I write for information. I cannot reconcile the "report" with the award of prizes.

The first prize (if I read aright) is given to a design of which the report speaks in no very flattering terms, to say the least; while the design placed first in the report — thus "roughly indicating its relative rank," and which is spoken of in the highest terms — gets the second prize. The design next mentioned, as equal (or nearly so) to the first in merit, gets no prize at all; while the design receiving "honorable mention" is not very honorably mentioned in the report.

Of course, there may be disqualifications, of which I am unaware, which have changed the order of merit from that (apparently) indicated in the report. If so, should they not be stated?

Respectfully, M.

[The discrepancy which our correspondent notices is due to the fact that the award and the discussion are independent of each other, the one being the work of the committee of architects invited to decide the competition, and the other of the regular contributor who analyzes the designs for our paper. That there should be occasional discrepancies under such circumstances is probably inevitable. It may be remembered, however, that different authorities may see the same merits and the same faults in designs, and yet assign them different rank according to the various degrees of importance which they attach to this or that special quality. The value of any criticism is less in the degree of its commendation than in the qualities it can point out. — EDS. AM. ARCHITECT.]

THE SIZE OF AMERICAN BRICKS.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Sir, — I wish to call the attention of your readers to the present shape of our common hard burned brick. A brick should, with a reasonable joint of mortar, say $\frac{1}{8}$ of one inch, more or less, in thickness, measure 8 in. × 4 in. × 2 in. With these dimensions the headers would, however, not serve to produce an eight-inch wall, but one $7\frac{3}{8}$ in. thick. Let the actual brick be 8 in. long, then its width should be about $3\frac{5}{8}$ in., leaving in an eight-inch wall a joint of $\frac{1}{2}$ in. between stretchers. I have made many measurements of the best hard burned brick manufactured about New York, and find the average dimensions to be, length $7\frac{3}{4}$ in., width from $3\frac{1}{4}$ in. to $3\frac{1}{2}$ in. These bricks, placed in a so-called eight-inch wall, leave a joint in extreme cases of an inch and a quarter between stretchers; in a foot wall we have header $7\frac{3}{4}$ in., stretcher, say, $3\frac{1}{3}$ ins., joint nearly an inch; with three stretchers we have 3 times $3\frac{1}{3}$ or 10 in., and two joints of an inch each. To this great mass of weak mortar I attribute the failure of many walls. Why should not the brick be $\frac{3}{8}$ in. wider or $\frac{3}{8}$ in. shorter? N. L. D.

THE STORY OF AN OLD BRIDGE.

FRANKFORT-ON-THE-MAINE.

THE Old Bridge over the Maine at Frankfort is one of the most curiously interesting structures of its kind in Germany, and though not the oldest of its class, nor so rich in statues as the famous one over the Moldau at Prague, its known history, together with that of its predecessors on the same spot, takes us back to the days of Charlemagne. In general appearance it is not so antiquated as it really is, and many of its old and distinguishing characteristics have long since disappeared. Yet there is much left of ancient date to interest us. There are curious and rude sculptures over the doorways leading down to the mills; and on the opposite side, a crucifix surmounted by a gilded rooster, whose joint history leads us back some five hundred years, and about which legend delightfully clings. Then there is the red sandstone monument of Charlemagne, looking Rhinewards, holding in one hand the imperial apple, and in the other the imperial sword; a recent creation, indeed, erected in the year 1843, in commemoration of the thousand years' existence of the German empire. Goethe called this bridge the only ancient structure of importance in Frankfort.

The bridge has many legendary memories. The gilded rooster on the crucifix could tell us much of history if so it chose. Indeed, it is rather a mysterious bird. The boatmen think it was placed there to point out the deep current for their vessels; but the antiquary thinks it was perched there on purpose to defy him in his researches as to its why and wherefore. But legend has given the bird immortality, and a certain importance in the history of the bridge which we cannot overlook.

The story goes that the contractor found that he was unable to complete the structure within the specified time, and, fearing the consequences, he prayed to the devil for aid in his emergency; for in the good old times of which we speak, Satanus was a personage of authority, and much sought after in times of need. The devil, as we know, seldom leaves his friends in the lurch, and he promised to help the bridgemaker out of his difficulties on one condition. He would aid in finishing the bridge by the appointed time, and as his reward he simply claimed that the first living creature which should pass over the completed structure should belong to him. The devil drew up the contract, and the contractor signed it with his own blood, as was customary in such contracts. On the appointed day the bridge was completed, and the devil wanted his pay. But this time the "old familiar gentleman" found that the contractor had proved too many for him, for, instead of permitting any good Frankfort citizen to pass first over the bridge and lose his life and soul, he caused to be driven over before him a live rooster, and thus cheated the devil out of his pay. The devil was, of course, very angry at having made a contract so indistinctly worded, — so angry, indeed, that after tearing the innocent bird to shreds, he partly destroyed the completed work, shaking the central arch till it gave way; and it is just possible he would have destroyed the bridge entirely had not the clergy taken the precaution to institute a solemn procession and consecrate the structure on the following day.

The present bridge dates only so far back as the year 1342, although it had predecessors of stone and wood dating some centuries earlier. Batton says that Charlemagne built a wooden bridge here. In 1342 a violent flood tore down the tower on the Sachsenhausen side, and nearly destroyed the bridge. The present structure dates from this period, though it was not finished until the year 1419. In the middle there were two places left unarched, and simply covered up with boards that could be easily removed in case of hostile approach. The two places were walled over only in 1840. Thus the devil's wrath turns out to be after all simply human strategy.

The bridge was an interesting structure in those days. Besides the towers at either end, on which were on the one a crucifix and an insulting fresco directed against the Jews, and on the other an image of the Madonna and a box for the reception of donations towards keeping the bridge in repair, there were two mills, built about 1410, which may be seen to this day in newer shape. There were also a small chapel or sanctuary, and a little structure styled the Rat-house; and somewhere there were two secret chambers, the one for men, the other for women, — probably condemned criminals, who were here cast into the Maine; and, finally, there was, and is still, the crucifix with the gilded rooster. The Rat-house on the bridge was used for a very curious purpose. It was built in 1498, and in it, from this year to 1557, every afternoon a converted Jew stood and doled out a heller (farthing) for every dead rat brought to him by the city youth. After cutting off the tails, to keep as a voucher for the money entrusted to him, he cast the bodies into the river. In the year 1498 one thousand and eighty rats were thus disposed of. The money employed in this warfare against the rats was taken out of the fines paid by the Jews. In 1569 the Rat-house was transformed into a place for the storing of powder.

We have just mentioned the presence of two secret chambers for the purpose of holding criminals. The crucifix and the rooster were erected on the bridge at a time when the most inhuman punishments were inflicted on criminals. False play, the wanton cutting of forest trees, the smallest offences, could be punished with death. Tortures of all kinds were in vogue, — piercing with red-hot iron, cutting off the ears, burning, drowning, and boiling in oil. Merian tells us that in the sixteenth century one hundred and thirty-one persons were hanged, fifty-three beheaded, forty-one drowned, sixteen torn on the wheel, seven burnt, and one buried alive, — all together, over two hundred persons in Frankfort alone, which city was a model of moderation. Dr. Kriegh is of the opinion that the crucifix and the rooster stand on the spot where the execution by drowning took place on the bridge; for under this arch the river was originally strongest and deepest. Here, too, the bodies of suicides were cast into the river.

But it is with the executions by drowning that we must explain the existence of the crucifix and the rooster. It was customary during the Middle Ages to erect a chapel or a crucifix near the place of execution, as was the case at Frankfort at places where executions of other kinds took place; and the crucifix and rooster were, doubtless, placed here, the former to call to mind the Redeemer, the latter to recall the denial and penitence of the Apostle Peter. To us now the rooster serves to attach these gloomy memories of old. The last execution by drowning in the Maine took place in the year 1613. These occasions were celebrated by the city guilds with great festivities. Possibly animals suffered at Frankfort as well as at other places. In an age when the authorities sent out criers to warn the May-chafers to get out of the land, and grasshoppers were threatened with ecclesiastical excommunication if they did not stay their ravages, it was not unusual to hear of animals being sentenced to death for their transgressions. To animals, birds, and insects were attributed a high degree of intelligence, which may account for the tradition that this rooster had formerly the faculty of distinguishing whenever a Jew passed over the bridge, when he was supposed to crow in mockery. People of the city have an old saying that every time this remarkable bird hears the clock of the cathedral church strike twelve, it crows three times. All we can say is that the rooster, besides reminding us of ancient barbarism, brings up in the legend connected with it relics of heathen worship. When the primitive faith was abolished, the devil had to fill out in his one person the places previously occupied by Odin, or Thor, or Loki, and to perform the labors which the giants had been accustomed to perform in the mythological era. The devil cast blocks of stone at the Christian churches like the giants did at cities. Like the giants, the devil appears as a master-builder. As the former are betrayed by gods and heroes in the building of Walhalla, so is the devil befooled by men in the building of the Frankfort Bridge. — *The Builder.*

NOTES AND CLIPPINGS.

The Safety of the New York Assay Office. — An anomaly in building is presented just now in the case of the Assay Office on Wall Street, New York, where may be seen an iron building owing its safety to wooden shores and girders. It is stated that General Steinmetz, formerly Superintendent of Repairs on Public Buildings, discovered when in office that the columns and girders of this building — one of the oldest iron buildings in the city — had become so affected by the vapors and fumes of the acids used in assaying as to be presumably untrustworthy. His reports made to the department on the insecurity of the building were accompanied by scales of iron two or more feet in length, which were easily detached from the iron columns. On the strength of these representations the floors of the building were strengthened by yellow pine girders and posts, which were put in about a year ago, which are thought to be able to support the floors should all the iron floor beams and columns give way. Mr. Mason, the assayer, does not believe that the vapors of any acids used are the cause of the trouble, but thinks that a leakage from the acid tanks in the upper story of the building has been the cause of the corrosion.

Fall of a Wall. — The sight of a laborer at work in a gravel-pit, undermining at its foot the bank which rises so threateningly above him, and which too often accomplishes its threat, is so common that few can wonder at the suicidal temerity with which laborers of the same class dig under the foundation of adjoining party-walls when excavating for a cellar. This every day folly brought about the death of a laborer at Elgin, Ill., on the 8th inst., who persisted in undermining the brick wall of an adjoining building, although the work had been considered dangerous for some days, and on the day in question his fellow laborers had refused to work.

Accident. — On Friday afternoon, August 9th, the fourth floor of a warehouse, 141 McElderry's Wharf, Baltimore, gave way and in its fall carried with it the two floors below. All the floors were stored with wheat, and the cause of the accident was simply overloading. Sufficient warning was given by the breaking of the upper floor to enable those in the building to escape unhurt, with one exception.

The Water-Jet in Excavation. — The serviceableness of the water-jet in engineering operations had a new illustration at Chicago not long ago, where it was necessary to lay five hundred feet of water-pipe out into Calumet Lake, for the purpose of obtaining water to supply the locomotives on the Michigan Central Railroad. The material through which the pipe was to be laid was a stiff blue clay, so hard that pickaxes made little impression upon it. As the pipe was to be laid some six feet below the level of the water, hand-labor was out of the question, and an attempt was made to excavate the trench by exploding one-pound cartridges of dynamite, but as the result of each explosion was to make a jagged hole only about six feet in diameter, this method was abandoned as being not only too expensive, but also too unsatisfactory. The next step was to try the effect of a water-jet. By means of a special suction-pipe, water was drawn from the lake to the pumping-station and then was forced through that portion of the pipe that was already laid, to the outer end of which was attached a hose with a one-inch nozzle. This was secured in position by heavy weights and anchors, so that it might not be thrown out of its position by the recoil caused by the resistance offered by the supernatant water. The pressure of water in the pipes was about sixty-five pounds, and before the jet the clay rapidly disappeared, being carried some distance away in a dissolved state before it had a chance to settle to the bottom. The trench cut in this way was unusually straight and perfect.

The Genius of Connecticut. — A letter has been received from Mr. Rogers in Rome, announcing that the crowning figure for the new capitol at Hartford, "The Genius of Connecticut," had been successfully cast in bronze, at Munich, and that it would be shipped in a few days.

Illuminated Clocks. — Herr Reiniger, of Stuttgart, has suggested that small towns may secure at small cost the advantages of an illuminated clock by making the same use of the powers of the magic-lantern that modern advertisers have learned to appreciate so well. The image of a clock face and of the moving hands can be easily thrown upon a prepared surface, so as to be distinguishable at a considerable distance in spite of the grayness of the images of hands and figures. To produce such an illuminated dail it would probably be necessary to make use of one of those clocks called by the French *pendules mystérieuses*, which are to all seeming naught but a glass dial and a pair of hands, and the accuracy of whose movemetn there is much reason to doubt.

Conductivity of Heat. — Some recent investigations concerning the coefficient of conduction for heat of various building materials — excluding the influence of radiation, and making measurements by means of the thermo-electric multiplier — show that stones are much better conductors of heat when wet than when dry, and that various classes of them, such as marble, sandstone, granite, etc., have approximately the same coefficients of conduction, while bricks of all kinds are much worse conductors than the natural stones.

A Submarine Lamp. — In order to facilitate the work of divers by supplying them with a submarine lamp, Barnet and Foster compress oxygen to thirty atmospheres in a cylindrical iron reservoir, from which the combustion of an alcohol lamp is sustained. The escape of the gases generated is provided for.

Emigrating en Masse. — Possibly a new light may be thrown on the histories of the many deserted cities that are discovered in both hemispheres from time to time, by the statement that the walls of Morsala, Sicily, have been placarded with an announcement that its 35,000 inhabitants, in view of their inability any longer to bear the burden of taxation placed upon them, wish to sell their city. "They hope," the placard says, "to find buyers who can satisfy the cupidity of the vultures who lay waste the fair regions of Sicily, and that by emigrating *en masse* to Australia they may escape forever the talons of the harpies."

Japanese Earthquakes. — A very interesting historical paper upon Destructive Earthquakes in Japan was read before the Asiatic Society of Japan, March 23, 1878, by I. Z. Hattori, Esq. (Rutgers College), of the University of Tokio. It includes notices, drawn from native sources, of one hundred and forty-nine destructive earthquakes, distributed as follows: one in the fifth century; one in the sixth century; seven in the seventh century; seven in the eighth century; twenty-eight in the ninth century; eleven in the tenth century; ten in the eleventh century; one in the twelfth century; seven in the thirteenth century; eight in the fourteenth century; fifteen in the fifteenth century; eight in the sixteenth century; fifteen in the seventeenth century; thirteen in the eighteenth century; sixteen in the nineteenth century. Arranging the recorded shocks according to the seasons the author says: "If we take the 11th, 12th, and 1st months of the Japanese old calendar as cold months, 5th, 6th, and 7th as hot, and all the others as mild, then during the fifteen centuries, twenty-eight great earthquakes have occurred in the cold months, forty-seven in the hot, and seventy-two in the mild, or in other words, seventy-five in the extreme seasons, and seventy-two in the mild, the difference being only three." He also gives a curious description of an early Chinese seismograph, "invented by Choko in the first year of Yoka (132 A. D.)." It is quoted from the Life of Choko in Gokwanjo (History of Kwan), and is as follows: "The seismograph consisted of a copper vessel, whose diameter was eight *shaker* or feet, and whose convex cover was ornamented with characters, mountain turtles, birds, and beasts. In this vessel there was one main piston in the middle, with its eight branches, wires and springs. On the outside of this vessel were eight dragon heads, each of them having a copper ball in its full-opened mouth. Under each of the dragon heads there was a frog looking upwards with its mouth fully opened. The wire works and springs were very skilfully arranged in the vessel, but the cover was very closely fitted, and they could not be seen. Whenever the earth shook, one of the dragons dropped the ball, the frog underneath received it in its mouth, and produced a sound. By this means the direction of the shocks was ascertained. Once one of the dragons dropped its ball, but no person near it perceived any shock, and all the learned men of the capital doubted the trustworthiness of the machine; but after a few days a mail arrived from Rosei and reported the occurrence of an earthquake there." — *The American Journal of Sciences and Arts.*

The St. Gothard Tunnel. — The Swiss National Council has voted $1,300,000 as the contribution of Switzerland toward completing the St. Gothard Tunnel.

Archæological Researches in the Great American Bottom. — The alluvial plain known as the "Great American Bottom," lying on the east side of the Mississippi, in Illinois, between Alton on the north and Chester on the south, and having an average width of eight or nine miles, is a region of wonderful fertility now, and the remains of ancient occupation there abundantly found prove that the mound-builders were not blind to the agricultural value of this remarkable tract. It was indeed "one of their greatest seats of empire," in the language of Mr. H. R. Howland, who has published, in the *Bulletin of the Buffalo Society of Natural Sciences*, an account of certain notable archæological researches made in the "American Bottom." The mounds in this tract seem to have been divided into three principal groups: one lying within the limits of East St. Louis; another on the banks of Long Lake, twelve miles northward; and the third — one of the most extraordinary groups in this country — between Indian Lake and Cahokia Creek, some six miles from the Mississippi, and eight miles to the northeast of East St. Louis. In this last group is the great Cahokia Mound, by far the most important monument left by the mound-builders. The several groups are connected by lines of mounds at irregular intervals, and the total number is at least two hundred. Some two or three years ago Mr. Howland, having learned that one of the mounds in the second group was being removed to procure materials for road-making, repaired to the spot and found the work of destruction already well advanced. In the mean time some interesting discoveries had been made. At the height of four or five feet above the base of the mound the workmen came upon a considerable deposit of human bones, and on the same level were discovered a number of valuable relics, many of them wrapped in a sort of matting. This was made of a coarse, cane-like fibre, simply woven without twisting, the flat strands measuring about one eighth of an inch in width. Among the articles found were several tortoise-shells of beaten copper. One of these was about one sixty-fourth of an inch thick, two and one eighth inches long, and thirteen sixteenths of an inch in height; this was the largest one of three in the author's possession. Their shape is remarkably true, the workmanship evincing delicate skill. Each tortoise-shell appears to have been originally covered with several wrappings: first a woven cloth of vegetable fibre, then a softer, finer fabric of rabbit's hair apparently, next a membranaceous coating, finally a layer of non-striated muscular fibre — possibly intestines or bladder. Besides these singular objects are two specimens of the lower jaw of the deer, the part which contains the teeth being incased in a thin covering of copper, and the whole wrapped in the same manner as the tortoise-shells. Other relics found in the same mound — specimens of handicraft, sea-shells from the Gulf of Mexico, etc. — give evidence of the high grade of technical skill and the far-reaching intercourse of the prehistoric people who, in the long forgotten past, inhabited the "Great American Bottom." — *The Popular Science Monthly.*

The Dresden Theatre. — The new opera-house at Dresden is insured for $1,000,000, at an expense of $10,000 per annum.

A Curious Epitaph. — In one of the churches of London is said to be an epitaph quite as utilitarian as that famous one in a Paris cemetery which states that the widow of the late Monsieur X. "will carry on the business at the old stand." The Londoner is even more business-like in his grief, announcing to the world his loss in the following words: "Here lies Sarah Smithers, the loved wife of Thomas Smithers, marble cutter. This monument was erected by her husband as a tribute to her memory and a specimen of his art. Monuments of the same style £25 each."