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IN the death of Mr. J. Morgan Slade, which took place very suddenly last week, the architectural profession in New York loses a young member whose devotion to his duties and interest in all relating to them bade fair to raise him to high eminence. Mr. Slade received his professional training under Mr. Edward Kendall, the example of whose skill and care served admirably to prepare him for his subsequent work. On entering into business on his own account, he soon found himself busily occupied with commissions for the construction of mercantile buildings, which many circumstances combined, after his first successes, to throw in his way; and this branch of professional practice claimed nearly all his attention until the time of his death. The pursuit of any special class of work is usually attended with a certain disadvantage to a young man in retarding the growth of a reputation which is best acquired by dealing with a more varied *clientèle*, and it was only of late years that Mr. Slade found himself gaining a large general practice, which brought him more into contact with the rest of the professional world, whose fuller sympathy he enjoyed and appreciated as much as his associates did the experience and good judgment which he brought to the solution of problems of common interest. His loss will be a serious one to the New York Chapter of the Institute of which he was a member, and will be perhaps still more seriously felt among the business men, with whom he held extensive relations, and by whom he was regarded as an excellent adviser in matters relating to his profession.

THE Society of American Artists has published a circular containing the text of a resolution passed at a meeting held November 7 last, which calls the attention of the present Tariff Commission and of Congress to the fact that "whereas the United States is the only leading nation in the world which has not inherited the works of art of any great epoch of the past, it is at the same time the only nation that puts a penalty, by means of a tariff, upon the importation of works of art, both ancient and modern," and expresses the opinion that "all works of art should be excepted from the payment of duties, both in the interest of art in general, and of American art in particular." If this resolution expresses, as we suppose it does, the sentiment of the better class of artists on the subject, both they and the public are to be congratulated on the change of feeling which has slowly taken place. According to the *Evening Post*, it is only about fifteen years since a petition with many signatures was presented to Congress in favor of increasing, instead of diminishing the duties on foreign pictures, on the ground that the admission of works of art from other countries, even under the severe restrictions then imposed, interfered with the sale of the product of native genius. Such an appeal as this, although not very flattering to the capacity of American artists, perhaps expressed the self-distrust and consciousness of its own shortcomings which really characterized the best art of the country at that period; but a decade of success, abroad in competition with the best foreign masters, and

at home in steady popularity and employment, has greatly raised the courage of the best American painters, and enabled them to understand the disadvantage to the community, and finally to themselves, of a virtual embargo on the pictures and sculptures which would, if introduced into this country, best serve to educate the public to an appreciation of the efforts in a similar direction of their own fellow-citizens. The ridiculous severity with which the statute has been administered probably hastens and gives point to the memorial of the artists, as it will still more to the expressions by which the general public will second it. As the law now stands, it is impossible for the American owner of a foreign picture to take it with him on a journey beyond the limits of the country, or to lend it for exhibition abroad, without paying the duty upon it over again, every time it is brought back to the place where it belongs. Under this interpretation, a gentleman of New York who happened to own a painting by a celebrated foreign artist was compelled to pay an enormous sum for the privilege of getting it back again after lending it to be hung with other works in a transatlantic gallery; and as Mr. Millet says in a letter to the *Evening Post*, the managers of an exhibition of the collected pictures of Alma-Tadema, soon to be held in London, are prevented from obtaining a considerable number of his best works, which happen to be owned in this country, by the fact that an unconscionable tribute will be levied upon them by the Government before they can be returned.

SOME foreign correspondents of the Woman's Institute of Technical Design in New York have conveyed to this country a proposition which the principal of the Institute, Mrs. Florence Cory, wishes to have at least thoughtfully considered. It seems that Christian Hammer, a wealthy resident of Stockholm, Sweden, has made a collection of bric-à-brac and objects of various kinds of interest which he is desirous of selling. He has received offers for portions of it from the South Kensington Museum, but prefers to keep the collection together, and would like to sell it to Americans, with the charitable hope, as it appears, that he may thus be instrumental in supplying, in part at least, the needs of a country so destitute of works of art as ours. With all necessary gratitude for the benevolent wishes of the venerable gentleman, we may venture to suggest that America is not quite so destitute as he imagines of the minor objects of fine art, and that a museum like that which we hope the Woman's Institute is forming can much better afford to pay a large price for a few pieces of furniture, jewelry or other objects of art-workmanship of high excellence than to spend three hundred and fifty thousand dollars, which is what Herr Hammer asks for his collection, to obtain in return a deluge of pictures, books, coins, porcelain, stone arrow-heads, scalping-knives, flint-lock guns, clocks, old boots, clothes, and manuscripts, of which one-half would probably be mere rubbish. It is said the collection comprises eighteen thousand portraits, of which we may safely say that not more than a dozen would be worth transporting across the Atlantic; while another large portion consists of books and manuscripts, some of which might possibly be of value to a library, but hardly to a school of technical art. The specimens of wrought-iron and glass work are probably well worth possessing, although not at an unreasonable price, and the same might perhaps be said of the porcelain; while many of the pre-historic relics might find place in one of the two ethnological museums in this country. The class of objects, however, which derive their interest from historical association would be worse than wasted here, and the credulous person or association of persons who may undertake to endow New York or Philadelphia with the clocks of Marie Antoinette, the jewels of the Empress Josephine, or the boots of Charles the Twelfth, will receive little thanks for their pains. What this country needs at present is, as Mrs. Cory justly feels, good examples of the lesser arts—beautiful works in glass, iron, brass, gold and silver, tapestry and embroidery, without regard to their history, associations, age, or other extrinsic qualities, which only serve to give a false or distorted idea of their value, and defeat the influence upon the mind and taste which they ought to produce. Such things are still to be bought at reasonable prices both here and abroad, and the judicious expenditure of a small part of the price asked for the Hammer collection would give the Institute a most excellent outfit.

THE meeting held in New York to promote the object of securing funds to build the pedestal for Bartholdi's statue of Liberty proved very successful, and it is pleasant to know that public interest in the occasion was sufficient to fill the Academy of Music completely. The speeches delivered were brief, happy, and to the point, and the gratifying announcement was made that a large part of the sum required had already been subscribed. It is much to be hoped that the remainder will soon be secured, if for nothing else, at least that the French contributors to the cost of the statue may have no further reason to complain of the coldness with which their gift is received. As to the statue itself, we do not at all share the fears of those who think that the eyes of the New Yorkers, trained to the appreciation of form by contemplation of the wonders of sculpture in the Central Park, will be unable to bear the sight of Bartholdi's masterpiece; and there are few pleasures of the future which we take more satisfaction in anticipating than that of occasionally seeing this modern Colossus, by far the largest statue ever made, predominating, from a height very little less than that of Trinity Church spire, over the giant city of the Western world. It is difficult to realize without some reflection how conspicuous the figure will be to the neighboring country. There is no natural eminence on Manhattan Island so high by nearly sixty feet, and the level beams of Liberty's torch will reach far over New Jersey and Long Island, and some distance, at least, into Connecticut. Its rays will be the first signal which will indicate to the traveller by sea, or from the Sound, his approach to the city, and they will follow him as he leaves it until all other trace of it has disappeared.

THE last issue of the *Proceedings* of the Royal Institute of British Architects contains some very interesting details of the new examinations for admission to the Institute. Evidently, the examination is to be a serious matter, and it is gratifying to read the minute instructions to candidates for what is henceforth to be a real and valuable professional distinction. In what seems to be a little address to intending candidates, the paper says, very truly, that "it has come to be recognized that a young man, in order to prepare himself sufficiently for the profession of an architect, must do four things, namely: 1. Pass at least three years in a professional office. 2. Become a member of the Architectural Association, work in its classes, attend its lectures and compete for its prizes. 3. Pass the examination in Architecture. 4. Accept the professional obligations required from an Associate of the Royal Institute of British Architects, and submit himself for election to the corporate body." The examination itself is two-fold, candidates being obliged to submit "probationary work," in the shape of plans, elevations and sections of some simple building, with a perspective drawing, a sheet of details, and a sketch of ornament, from the round or bas-relief, which must be approved before they are admitted to the final trial. This examination proper is partly oral, and partly written, and occupies four days. A fee of three guineas must be paid by each candidate, but if he passes the examination and is elected an Associate of the Institute this is credited to him as his admission fee. The total number of marks allowed for the examination is six hundred, and candidates must obtain three hundred of these to be entitled to pass, while encouragement is given to those who make special effort by the offer of the Ashpitel prize, amounting to about ten pounds, to the candidate who gains the highest distinction. The first day of the examination is devoted to the history of architecture, which must be illustrated by sketches; the second is devoted to materials and construction, including the properties of stone, brick and timber, and the application of formulas for determining strength and stability; and on the third a plan, section and elevation of a given building must be drawn, and a specification for a single trade written, with the general conditions which usually accompany a set of specifications. The last day is occupied by an oral discussion of the probationary drawings.

THE connection of the Architectural Association with all this examination work is particularly noticeable, and we know of nothing of the kind pleasanter and more admirable than the manner in which the provinces of the two great professional bodies in Great Britain have been defined, so that each does for the other the work which it cannot do for itself, both gaining immeasurably in dignity and usefulness by their mutual coöperation. The classes for instruction in professional mat-

ters which have always been maintained by the Association are now arranged with direct reference to the Institute examinations. For practice in work similar to that which is to be submitted by intending candidates, two classes of design have been established for the present season, with a third devoted to color decoration. In the elementary designing class an ingenious plan has been devised for inducing the members to carry on a parallel course of historical study, by giving the same problem for the whole year, but repeated under eight different forms. The project first makes its appearance as "an atrium to a Pompeian house;" four weeks afterward it assumes the form of a court attached to a Roman bathing establishment or palace; the next month it is a Byzantine cloister; then a Lombardo-Gothic cloister; then a late thirteenth-century cathedral cloister; next an English college quadrangle of the fifteenth century; then the court-yard of an English mansion of the Renaissance; and finally, the cortile of an Italian palace. Visitors, all members of the Institute, are appointed to receive and criticise the *rendus* in this class, and the classes generally are under the supervision, or perhaps we might say the advice, of some Fellow or Associate of the Institute. The advanced class in design undertakes problems of some difficulty, but excellently selected for practice; and the class for color decoration, besides making visits to existing examples of the art, prepares studies on subjects such as a "council chamber to a town-hall, in dark blue, Pompeian style;" "a boudoir in blue and white, Japanese," or a "dining-room, green and yellow." Besides these classes, courses of lectures on theory and practice are carried on throughout the season, and a combined system for giving and receiving instruction is applied to the study of construction, by distributing to members at the beginning of every month a set of printed questions, to as many as possible of which each is expected to find answers, and report them at the next meeting. As an incentive to the members of the classes to do their work well, no less than twenty prizes, varying in value from one to something like twenty guineas, are offered by the Association. We need hardly say that we look forward with hope, as well as desire, to the day when such an admirable system for raising the standard of professional attainment shall be imitated here. In three of our large cities there are already flourishing Architectural Associations of the younger members of the profession, as well as Chapters of the American Institute. So far, the relations between the older and younger bodies have been of the pleasantest character, but to make them as useful as they are capable of being, the one should come to be regarded as an introduction to the other. Rightly understood, their provinces are quite distinct, and the members of the junior associations would as little think of discussing the points of professional practice or etiquette which concern the Fellows of the Institute as these would of forming classes to instruct each other in drawing or writing specifications, but for all that, it is much to be desired in the interest of unity of practice and modes of thought, that the members of the Chapter should be familiar with the things taught and studied in the Association; and in default of any other entrance examination, the simple requirement that candidates for a Chapter should pass through the Association would tend very much to raise the standard, and promote the professional influence and enthusiasm of both.

A NEW and cheap process has been invented for the manufacture of hydrogen on a large scale. Peat, wood, lignite or other semi-vegetable substances capable of furnishing by destructive distillation a light carburetted hydrogen are heated in a retort, and the gas given off is transmitted through a layer of quick-lime, which withdraws the carbon from its union with the hydrogen, to leave the latter pure. Except for the fact that the uses of hydrogen are so few, this process would be of great importance, and it will at least be of service hereafter in promoting and facilitating experiments in aerial navigation, for which it has been generally necessary, on account of the great cost of hydrogen generated in the old-fashioned way, by decomposing acidulated water with zinc, to use ordinary illuminating gas, a substance more than ten times as heavy, and requiring the use of balloons of ten times the size, to obtain a given ascensive force, that would be required if they could be filled with pure hydrogen. It is possible also that the oxy-hydrogen blow-pipe, the most important materials for which can now be procured so cheaply on a large scale, may come into more extensive use.

REPLY OF THE ARCHITECTS OF THE NEW CAPITOL AT ALBANY.¹

STATE OF NEW YORK: ALBANY, October 6, 1882.

TO HIS EXCELLENCY ALONZO B. CORNELL,

Governor of the State of New York: Sir,—



WE have maturely considered the report of the Commission appointed by you "to examine the different parts of the New Capitol, as to the safety and durability of the work, more especially as concerns the Assembly Chamber and the ceiling thereof."

The Commission finds, as the result of its examination of the Capitol, that "its material and workmanship in general, are exceptionally good," and that "no defects worthy of special consideration other than those of the Assembly Chamber and the portions of the building immediately above and below it have been discovered."

As no defects above the Assembly Chamber are mentioned or exist, and as those below it are elsewhere in the report dismissed with the remark that "they are no evidences of danger to the building and may be repaired, as suggested by the architects," the observations of the Commission in respect to the Assembly Chamber, its abutments and foundations, alone require comment from us.

Some time before the appointment of the Commission we had the honor to address to you a letter upon this subject, in which we stated that "Our own careful and repeated researches, both while the Assembly Chamber was being designed and since it has been built, have convinced us that there is not the slightest reason for apprehension as to its safety. The reasoning which convinces us of this, convinces us also that any competent Commission, with a full knowledge of the facts in the case and with sufficient scientific knowledge to draw correct deductions from the facts, must come to the same conclusion."

We propose to show that the report of the Commission fully supports our opinion that "there is not the slightest reason for apprehension as to its safety;" that so far as these researches have been repeated by the Commission, the results are the same as our own, and that where the deductions of the Commission lead to a recommendation inconsistent with these results, it is because of a necessarily imperfect knowledge of certain facts in the case; facts that have been matter of close practical investigation by us for years, but which have been but incidentally considered in the large and varied examination required to be made by the Commission in a few weeks.

The question to be considered is the stability of the vaults of the Assembly Chamber.

This involves the principle of the arch.

The conditions of stability in an arch, aside from its foundations, are:

1st. That the area of its voussoirs is sufficiently large to resist the pressure upon them, the resistance of the material being known.

2d. That the line of pressures passes through the middle third of the voussoirs.

3d. That the abutments are competent.

1st. With reference to the strength of the material used in the construction of the ribs and arches of the Assembly-Chamber vaults, our tests upon a series of two-inch cubes had shown them to fracture under loads varying from 24,000 to 39,000 pounds per cube, which gives a minimum resistance of 6,000 pounds per square inch, and a safe load of 600 pounds per square inch, while the load imposed upon the stone in the ribs of the Assembly-Chamber vaults is but 270 pounds per square inch.²

The Commission also has made tests, as appears from its report, the result of which, no statement having been given in the report, we may presume left no question of the abundant ability of the ribs to resist the pressure imposed upon them. The report states that the stone "is not uniform in quality or strength." This is true of all building stone and must have been markedly so in the specimens taken for trial by the Commission, inasmuch as these were cut from the broken stone that had been removed from the southwest rib in 1880, which stone is known to have been strained beyond the limits of elasticity, and thus had ceased to furnish a criterion of the strength of this material.

2d. With reference to the lines of pressures the report of your Commission says: "We have critically examined the plans of the architects for the construction of the Assembly Chamber, and the work connected with it, and have given due consideration to their

¹ An Examination of the Grounds on which the Security of the Assembly Chamber is held to be in Question. By the Architects of the Capitol. Submitted to the Governor, November 17, 1882.

² The tests made by Major-General Q. A. Gillmore, U.S.A., in his official report of 1878, on two-inch cubes of the same stone are as follows:— 36,000 pounds, 37,650 pounds, 17,000 pounds, 24,000 pounds.

full and clear explanations of their computations and methods of construction. We have constructed lines of pressures for the main arches and vaulting ribs, and have made such other computations as were necessary for analyzing the strains of the different parts and comparing the results with the devices arranged to resist these strains. We have had the entire vaulting, with its supports and backing, measured, and their weights carefully computed, as a check to the accuracy of the quantities furnished to us by the architects, and we find that their calculations are substantially correct."

As these quantities were furnished to the Commission in their relation to the lines of pressures and in connection with them, this shows that the lines of pressures were also found to be substantially correct.

3d. With regard to the competency of the abutments, the report of the Commission implies, if it does not assert, that the abutments are now perfectly competent. It says: "If we could be sure that the unequal settlement of the foundations had permanently ceased, and they were capable of safely bearing an increased load, and that the present mixed construction of flying-arches and iron rods would always hold the arch-springers with absolute rigidity," etc.

But the Commission is not sure that the present mixed construction of flying-arches and iron rods would always hold the arch-springers with absolute rigidity, because, although it says that "the present construction is very ingenious, and its details have been studied with a minute care which reflects great credit upon its author," it also says that "the necessity which he has felt of introducing artificial heat in the attic to insure the safety of the Assembly Chamber, the largest room in this great monumental structure, should alone have been sufficient reason for abandoning the idea of securing the stability of a system of vaults by the devices adopted," and also because, as stated elsewhere in the report, "we have had the main granite shafts in the Assembly Chamber plumbed, and find that one of them is slightly out of plumb, leaning in the direction of the plane containing the line of the resultant of the thrusts of the groined vaulting and the arches sustaining it;" a result which would tend to show that these rods are not now fully doing the work they are intended to do.

If two corresponding columns standing on a line, north and south or east and west, did both lean outward in the direction of the resultant of the lines of lateral pressure of the vaults, this fact might be accepted as presumptive evidence that the arches had spread in spite of the restraint of the tie-rods which were intended to hold these springers firmly in place, and if the maintenance of a given temperature were necessary to the efficiency of the tie-rods the objections of the Commission would be well grounded. In fact, however, none of the columns lean in the direction of the lines of pressures, as will appear from the diagram and report below; and the heating of the attic is not at all essential to the efficacy of the tie-rods, as will be shown later under the head of Anchorage.

THE COLUMNS.

The following is a copy of a report of the survey made by Mr. Bingham for the Commission, upon plumbing the columns of the Assembly Chamber:

"The southeast column leans east $\frac{1}{4}$ inch. Plumb on north and south sides.

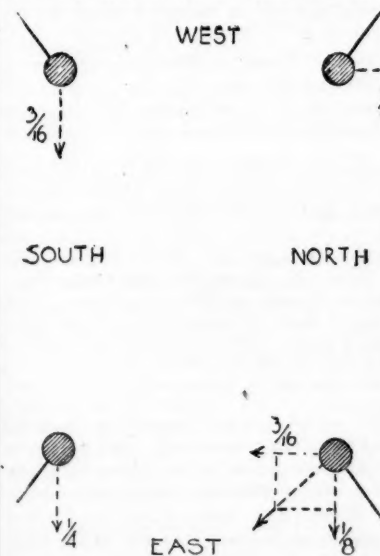
"The northeast column leans east $\frac{1}{4}$ inch; south $\frac{3}{8}$ inch.

"The southwest column leans east $\frac{3}{8}$ inch. Plumb north and south.

"The northwest column leans north $\frac{1}{4}$ inch. Plumb east and west sides."

From the above table it appears clearly that no one of the columns has been found to lean in the direction of the resultant of the lines of pressures of the vaults; and that the inclination of two of them appears to be nearly opposite to that direction.

If any inference is to be drawn from the position of these columns; if their leaning of a quarter of an inch is of any constructional significance, it indicates that they are not in the least affected by the lateral pressure of the vaults and arches, and that so far as they are concerned the tie-rods are doing their work effectually. On the other hand, it may be asserted that a deviation of a quarter of an inch from the plumb line of a column twenty-two feet long and four feet in diameter is of no constructional significance. It may be due to an irregularity in setting; it may be a



deceptive appearance owing to the ellipticity of the column itself. That deviations from the vertical, in columns of the character of those in question, do not exceed those reported by Mr. Bingham would be generally regarded as evidence of great accuracy in building.

THE ANCHORAGE.

The nature and condition of the iron anchorage — viz.: the system of rods which connects the heads of the inverted flying-buttresses — when affected by changes of temperature, seems to need a more clear and technical explanation than has yet been given to this subject.

Wrought-iron expands under an increase of temperature of 180° Fahrenheit one part in 820 parts of length of iron. The range of temperature in the space (between the Assembly Chamber and the attic) wherein these iron rods are housed, a dark vault inclosed in masonry on all sides, would not be greater than 60° if the building were not heated in winter.

The temperature, under the circumstances, would not run down to the freezing point, nor would it rise in summer above 90°. The rods being 92 feet long, their expansion under the above rule of one part in 820 parts for 180° Fahr. amounts to 0.45 of an inch. The stone-work expands one part in 1,200 for 180° of heat, hence its expansion in 92 feet of length, under an increase of temperature of 60°, amounts to 0.3 of an inch. The expansion of the iron rods over that of the stone-work is thus 0.15 of an inch.

By reason of the greater conductivity of iron the expansion in the iron rods would ordinarily become effective before the stone has been heated sufficiently for a proportionate expansion, as stated above, but this is provided against by encasing the iron in brick-work, whereby it becomes impossible that the iron should attain a higher or lower temperature before the stone-work has attained the same.

This misapprehension that the heating of the building is necessary to the efficiency of the abutments is the only reason which the Commission gives for entertaining any doubt in regard to that efficiency. There is no reason to think that the Commission shares the belief which has been expressed by others that iron rods, as applied in the Assembly Chamber, are subject to a periodical expansion and contraction under changes of temperature, and that this expansion and contraction tends to deteriorate both the rods themselves and the stone-work constrained by them, inasmuch as the Commission has asserted no such objection to the system adopted. It may be well, however, to show why in practice no such alternation of expansion and contraction can occur.

Assuming the extreme case, that these rods came to a bearing under a temperature of 32° Fahr. (which was not the fact, — the arches and vaults were completed in May and the centres struck early in June), and that subsequently, say, during the heat of summer, or while the room was heated in winter, this temperature was raised to 92° Fahr.; then a rise of 60° in the temperature of the rods will, as we have seen above, elongate these rods 0.45 of an inch, and will also expand the stone-work 0.3 of an inch. Now what occurs? The rods being 0.15 of an inch longer than the stone-work, their hold upon the stone-work is relaxed to the extent of 0.075 ($\frac{3}{8}$) of an inch on each side of the centre, and the stone-work follows the expansion of the rods by reason of the lateral pressure of the arches acting upon it.

When the temperature of the rods and stone-work is subsequently lowered again to 32° Fahr. the stone-work contracts 0.3 of an inch. The contractive energy of the rods being 0.45 of an inch, the balance of energy of 0.15 of an inch is converted into strain upon the rods by reason of friction which does not permit the stone-work to return to its original position.

This strain can be computed as follows: $1104 : 0.15 :: 26000000 : S$, where 1104 is the length of the rod in inches; 0.15 its energy to contract in inches; 26000000 is the modulus of elasticity, and S is the resulting strain. From the above we have $S = \frac{26000000 \times 0.15}{1104} = 3532$ lbs. pressure for one square inch area.

The only question remaining to be answered is, Are the rods strong enough to sustain this strain in addition to the load imposed upon them.

The iron used in the manufacture of these rods resists an ultimate strain of 72,000 pounds per square inch; its limit of elasticity is 36,000 pounds per square inch, and the safe load which may be imposed upon it is 18,000 pounds.

Now, the load actually sustained by these iron rods is 5,000 pounds per square inch. If to this we add the strain caused by change of temperature, which is 3,532 pounds, we have a total strain of 8,532 pounds per square inch, which is less than half the load per square inch that the rods are capable of safely sustaining.

If, on the other hand, the rods of the anchorage attained their utmost tension in the first instance, that is, if the abutment came to a bearing under a high temperature, which was actually the case of the Capitol vaults, then as soon as a lower temperature is reached, the contractive energy of the rods is converted into strain. In hot weather the load upon the rods is simply that of the lateral thrust of the arch which they restrain. In cold weather to this load is added the strain of contractive energy.¹

¹This strain of contractive energy is popularly believed to be of unlimited magnitude. It is believed that an iron rod contracted by cold will so contract in spite of an opposing force, no matter how large; but this is not true. Con-

The Commission reports no fact justifying a suspicion that the occurrences that gave occasion for this inquiry resulted in the least degree from any action or failure to act of the iron rods composing the anchorage of the Assembly-Chamber vaults. On the other hand, with reference to the suggested possibility of such failure in the future, because of a liability to greater changes of temperature than the rods have yet been subject to, the foregoing computation shows that any probable range of temperature, in the absence of artificial heating in winter, would not tax the capacity of the rods to one-half the amount of the load that may be safely imposed upon them.²

FOUNDATIONS.

1. *Continued settlement.* — The advice of the Commission that the vaulted ceiling should be demolished and a ceiling of wood substituted for it, rests substantially on its inability to obtain perfect assurance that the foundations on which its supporting piers finally rest have yet reached their final settlement. It says that the evidence that they have done so, "though strong, is not conclusive." And it adds that even were it conclusive, a contingency might be imagined in which the settlement would recommence. That is to say, if it should ever occur that by any means the subsoil of the site should be drained of its waters, the contraction that would result would involve a renewed settlement.

All sewers which will be required in the quarter of the city near the Capitol have already been constructed, and none of the results apprehended by the Commission have manifested themselves in the Capitol. That they have not done so is due to the fact that the bottom of all the sewers adjacent to the Capitol, are above its foundations. Even if they were not, the safeguard provided by the puddled wall surrounding those foundations, would effectually prevent injury from that source; but if, notwithstanding, the site should be drained of its moisture, no part of the structure, nor of any structure in Albany, resting on the same bed of clay, would be safe, and a study of the possible special effect of an occurrence so remote and improbable on the vaults of the Assembly Chamber can hardly be asked of us.

Turning then to the question of the present, it is to be stated that levels have been taken from time to time during the last two years with a view to determine whether the settlement had been completed, and that the surveyors have invariably reported their inability to find any appreciable evidence of change. We cannot say that this leaves no room for doubt, but we submit that no such destructive and costly proceeding as that proposed by the Commission can be properly based on such doubt, particularly so when it would be perfectly feasible within a month or two, by the use of processes and instruments of special construction and refinement, to obtain observations, to say the least, of much more nearly conclusive character.

On the other hand, if strong evidence did not exist that the settlement has ceased; if a doubt could be reasonably sustained; even if strong evidence could be produced that the settlement is still continuing, it should not be forgotten that the practice of mechanics presents various methods by which a further settlement can be arrested. Under date of September 10, 1882, we presented to the New Capitol Commission a report, accompanied by a drawing, which shows how the area of the footings under the piers which support the Assembly-Chamber columns might be doubled with an inconsiderable outlay of labor and material. The adoption of this expedient would effectually remove all doubt on the subject.

2. *Inequality of settlement.* — The report of the Commission contains the following sentences:

"To this end we caused a new set of levels to be taken, from which it appears that, although no very unusual amount of settlement has occurred, the settlement has not been uniform. The footing-courses directly under the large granite columns which carry the vaulted roof of the Assembly Chamber were uncovered for our inspection, and we find that the piers resting on them have settled more than the adjacent walls, and that there is a difference in settlement between the piers themselves."

The above explains that the total settlement is not larger than might be expected in such a heavy building upon any foundation other than rock, but that all walls and piers have not settled alike.

We have carefully investigated this, and find the fact to be that all the outside walls, the walls running up to the roofs everywhere, and the piers under the columns of the Assembly Chamber — in other words, all the supports forming the main structure of the building — have settled alike, but that all these have settled more than the piers and walls which support only the floors of the building.

Contractive energy is a form of mechanical work, and as such can be measured accurately, as has been shown above. The limit of elasticity of the material being known to be 36,000 pounds, the question may be answered, "what is the temperature which will initiate a deterioration of the cohesive strength of the rods?" The load being 5990 pounds per square inch, the rods will not be strained by a reduction of temperature beyond the limit of elasticity until the strain amounts to 31,000 pounds. The strain caused by a reduction of temperature of 60° being 3532 pounds, we have $3532 : 60 :: 31000 : X$ wherein X = the number of degrees Fahr., which will extend the rods to the limit of elasticity, and $X = \frac{31000 \times 60}{3532} = 528.6$, which means a variation of temperature from 90° down to 43° 6' below zero.

²The attic understood by the Commission to be artificially heated with a view to avoid a contraction of the tie-rods is designed to be used as a document room. When so used it will need means of artificial heating. The misunderstanding of the Commission as to the motive of the premises would have been impossible had its examination of the premises been made early last winter, when not only was the apparatus not in use, but the windows were left open night and day.

The difference of settlement between the two sorts of walls and piers is something less than one inch.

As the piers under the Assembly-Chamber columns have not settled any more than the outside walls, which are now no heavier than the walls had in view by Mr. McAlpine when he designed the foundations of the Capitol, this is presumptive evidence that the footings under the walls supporting the Assembly-Chamber columns are not loaded more per foot than the footings under other walls which are not considered by your Commission as being loaded to the verge of safety. The Assembly-Chamber columns supporting a symmetrical structure are all loaded alike, and unless there is a material difference in the compressibility of the soil upon which these columns are founded (a difference much greater than that described by Mr. McAlpine in his published report), the inequality of settlement between the piers of the Assembly Chamber, if such an inequality exists, must be very small. An examination of Mr. Bingham's report of levels taken for the Commission, of which the following is a copy, will throw light upon the point.

Mr. Bingham, taking levels at the top of the bases of the Assembly-Chamber columns, and comparing these levels with the top of the base of the northwest column, finds—

"The top of the base of the northwest column is 0.000 datum.

"The top of the base of the northeast column is + 0.015 feet.

"The top of the base of the southeast column is + 0.030 feet.

"The top of the base of the southwest column is + 0.080 feet."

This means that the top of the base of the southwest column in the Assembly Chamber is now $\frac{3}{4}$ of an inch higher than the top of the base of the northwest column.

Can we conclude from this that the northwest column has settled more than the southwest column by nearly an inch? Surely not. Inasmuch as the total settlement amounts to two inches only, this would imply a compressibility of the soil under the northwest column 100 per cent greater than under the southwest column. This, of course, cannot be. But Mr. Bingham has also taken levels on the top of the concrete in the sub-basement, where he found, taking the top of the concrete under the north-west column as .0000 datum,

"The top of the concrete under the northeast column — 0.090 feet.

"The top of the concrete under the southeast column — 0.200 feet.

"The top of the concrete under the southwest column — 0.270 feet,"

which means that the top of the concrete under the south-west column is now $3\frac{1}{4}$ inches below the top of the concrete under the north-west column; or, in other words, that if the concrete was built level originally, the southwest column has settled $3\frac{1}{4}$ inches more than the northwest column.

Taking these two tables together, it would appear that the column which settled the most on the top settled the least at the bottom. This is an impossibility, and must lead to the conclusion that these measurements indicate not settlements, but irregularities in building.

All that can be said to sustain an opinion that inequalities of settlement can be detected in Mr. Bingham's report of 1882 is this: that while the greater part of this seeming difference in the levels of the Assembly-Chamber bases is doubtless owing to a difference in the original setting of the stone-work, a part of it may still constitute an actual difference in settlement, and it is an interesting engineering question whether this is so or not. An approximate solution of the problem becomes possible if we can compare the status of levels of the bases of the Assembly-Chamber columns with the status of similar levels taken at some other time, and the principle involved which leads to a sound conclusion is as follows:

If two piers, A and B, of equal weight and equal or unequal area of footing, compress the soil upon which they are built unequally, for the reason that this soil is not of equal density, or for the reason that the footings are unequal, or for both reasons combined, an unequal settlement must ensue. For example, to take an extreme case, the pier A may go down into the ground two inches, while the pier B settles but one inch. Now, if this settlement should continue a year or two, the preponderance of the probability is that the increments of the additional settlement will be proportionate to the respective original settlements, and while the pier A settles, let us say one-fourth of an inch during the ensuing two years, the pier B will settle during the same time one-eighth of an inch, and at the end of two years the differences of levels between the two piers will be one inch and one-eighth, while after the first settlement the difference was but one inch.

This leads to the establishment of the following general law: *Differences of unequal settlements, as above described, if continued for any length of time, increase in quantity; and if in a structure we find an inequality of levels we cannot consider this inequality to be the result of an unequal settlement unless the inequality is known to increase in time.* If it does not increase in time we must conclude that this inequality of levels is nothing more than an accidental irregularity in building, common to all structures of masonry.

Now, levels of these same bases, taken by Mr. Bingham in December, 1880, nearly two years ago, were as follows:

The base of the northwest column being 0.000 datum.

The base of the northeast column was + 0.009.

The base of the southeast column was + 0.034.

The base of the southwest column was + 0.088.

The inequality of levels observed in 1880 has not increased in 1882; according to the tables it has decreased. What conclusions can we draw from a comparison of these tables? Simply that they do not indicate either a progressive or an unequal settlement. But they do indicate errors of building or of measurement, or both; which, when their minuteness is considered (the largest being less than 0.1 of an inch) are not a reproach either to the builder or the surveyor.

The "material and workmanship" of the Capitol, the Commission says, "are exceptionally good," yet there can be no doubt that if levels were taken throughout the building, or in any other building, whatever its excellence of workmanship, variations proportionate in magnitude to those found in the Assembly Chamber, would everywhere be discovered. The tenor of the report shows that the Commission is, itself, more or less impressed with the insignificance of these variations. In a work which is not a machine, an astronomical instrument, but a piece of masonry, differences of fractions of an inch are not of practical account, and cannot be made the basis of conclusions detrimental to the stability of the structure.

CONCLUSION.

It appears from the foregoing that the apprehensions expressed by your Commission (1) of a possible future failure of the foundations by reason of a drainage of the soil on which they rest, and (2) of a possible failure of the tie-rods by reason of extreme variations of temperature, would not have been entertained if the facts in the case had been fully and completely brought to the knowledge of the Commission. In a technical review of the report of the Commission, we do not feel called upon to advert to apprehensions expressed by persons who may have discussed the subject without either the knowledge or the responsibility upon which the Commission has acted. The report of the Commission sufficiently shows that there is nothing alarming or unusual, as seems to have been supposed by persons less familiar with the history of monumental architecture, in the expedient of adding to or otherwise rearranging the load of a vault in order to perfect its equilibrium, and that this process does not necessarily indicate defective construction; that during the process of settlement, and under conditions of imperfect equilibrium, a stone or a number of stones may be fractured without compromising the stability of the vault. When these things occur, the question presented to the constructor is, whether the cause of these derangements is organic or incidental? If organic, can it be remedied; if incidental, has it passed away?

The fractures of the ribs in the main vault of the Assembly Chamber are traceable to the disturbance of equilibrium during the main settlement of the building. This settlement, though small in quantity, was, and could not but be rapid in its progress. The north centre of the Capitol, which contains the Assembly Chamber, was run up from the floor-line of the chamber in something less than eighteen months. From this floor-line to the ridge of the roof, the building thus constructed, considered by itself, constitutes a structure 140 feet high, 142 feet long, and 92 feet wide. Considering, moreover, that the chamber was vaulted, eighteen months was a very short time to allow for the erection of such a building and for the completion of its settlement. That such evidences of disturbance as are presented by the fractures of the ceiling should have followed is not matter either for astonishment or for apprehension, nor is it so considered by the Commission.

That the causes of these fractures are neither organic nor permanent, is manifest from the report of the Commission, and has, we think, been fully demonstrated in the course of this communication. Practical proof of this is furnished by the facts that the stone substituted in 1880 for a fractured stone then removed from the southwest rib has since stood, and now stands, in perfect condition; and that there has since been no notable change in the fracture noted at the same time in the northwest rib.

It is believed that the assurance which the Commission was unable to find of the continued efficiency of the system of abutment employed in the Assembly Chamber has been supplied by the explanations we have given of that system. No reason, therefore, can be found in the report of the Commission, taken in connection with the facts herein presented, why the vaulted ceiling of the Assembly Chamber should be demolished, unless it be the apprehension of the Commission that, in case of a future drainage of the sub-soil, the vaulting of the Assembly Chamber may be earlier or more seriously affected by the resulting settlement than other portions of the Capitol, by reason of the greater weight imposed upon its foundations.

We have already given our reasons for not sharing the opinion of the Commission that these footings are more heavily loaded in proportion to their area than footings under other main walls of the building, or the apprehension of the Commission that such a drainage will occur, or that its effects, if it should occur, would be more disastrous to the vaulting of the Assembly Chamber than to any other part of the Capitol, or to the Capitol than to any other building in Albany which stands on the same bed of clay; but, inasmuch as the footings under the piers of the Assembly Chamber may be readily increased so as to diminish their loads to less in proportion to their area, than those imposed by walls in regard to which no apprehension is felt, the adoption of the plan for that purpose heretofore submitted will serve as a measure of abundant precaution against even these improbable contingencies.

We find in the report of the Commission no warrant for any further recommendation, except that the fractured stone still remaining

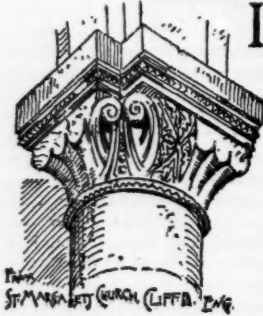
in the main vault be replaced; that the work be properly pointed, and that the equilibrium of all the vaults be reviewed, and if need be, corrected. Nor can we find in the report warrant for any other opinion than that when these slight repairs are made, the vaulted ceiling of the Assembly Chamber will be a perfectly sound and permanent structure. In its present condition and without repairs, there is nothing in the condition of the ceiling to warrant apprehension in regard to its safety, or to prevent the immediate occupation of the Chamber by the Assembly.¹

Submitting all this to your kind consideration, we have the honor to be,

Most respectfully,

LEOPOLD EIDLITZ,
H. H. RICHARDSON,
FREDERICK L. OLMSTED,
Architects of the Capitol.

PAPERS ON PERSPECTIVE.—XVI. SHADOWS BY ARTIFICIAL LIGHT.



IN determining the form of shadows cast by artificial light we might follow the same line of argument as when we discussed the shadows cast by the sun. Here, as there, the (invisible) shadow of a point is a line drawn through the point from the source of light, and its (visible) shadow on any surface is the point where this line pierces the surface. Here, as there, the (invisible) shadow of a line is a plane in space, and its (visible) shadow upon any plane that receives it is the line of intersection of these two planes, its vanishing point being at the intersection of their traces. Here, as there, the trace of the plane of shadow might be found by drawing a line through the vanishing points of two of its elements, one being the vanishing point of the line that casts the shadow, and the other the vanishing point of the (invisible) shadow of some point in that line.

306. But the two cases differ in this, that in the case of sunlight the vanishing point of this last line is always known beforehand. The shadows of all the points are parallel lines, and have a common vanishing point, either in the sun, or in the shadow of the spectator's head, opposite the sun. With artificial light, however, the lines drawn from the source of light to the different points of the line whose shadow is to be found are not parallel but divergent. Each has a direction of its own and a vanishing point of its own, and if a method were followed analogous to that employed for parallel rays of light the vanishing point of each ray would have to be separately determined.

307. In casting shadows by artificial light, however, it is not so important to obtain the vanishing point of the line of visible shadow as it is in sunlight. For, in the sunlight, the vanishing point of the shadow of a line, when once obtained, serves for the shadows of all the other lines of the system, since the shadows are parallel as well as the lines themselves, and all have the same vanishing point. But in artificial light the shadows of parallel lines are not parallel, and the vanishing point of one is of no service in drawing the next one.

308. It is accordingly just as well, and it is much easier, to find the shadow cast upon a plane by a line exposed to artificial light by finding the shadows of its extreme points and drawing a straight line between them. Figure 81, a, shows how this may be done. The point in which the ray S' touches the ground is one point of the line of shadow, the ray S'' gives a second point, and the point where the line itself pierces the ground gives a third. Either two of these suffice to fix the line of shadow in position and direction. The shadow of any point in the given line can then easily be determined.

309. This is, whether in sunlight or artificial light, the most convenient way of determining the shadow of a curved or irregular line. It amounts, virtually, as the figure shows, to letting fall a perpendicular from each point upon the plane in question, and drawing its shadow, and then passing a line of shadow through the points thus obtained, as is shown in Figure 81, b.

310. But a plane given by a line and a point can be determined by a line drawn through the point parallel to the given line, as well as by one crossing it. The same result as in Figure 81, a, may accordingly be obtained by employing the method shown in Figure 81, c.

311. The point V^M having been determined, a ray, S^M , parallel to M , is drawn through the apex A , touching the ground at its point of intersection with the horizontal line beneath it, the line M being also prolonged to a similar point. This ray, the line M , and the horizontal line, L , joining their extreme lower points, are obviously all in the plane of shadow.

312. The line prolonged in the other direction, beyond M , being the line in which the shadow of M intersects the horizontal plane, is obviously the visible shadow of M on that plane, the exact length of which can be cut off by drawing divergent rays from A through the extremities of M , as in Figure 81, a.

¹ Two remarks of the Commission touching supposed defects of the vaulting have not been noticed in the above review, since both are plainly founded upon imperfect observation. The wall referred to as being out of plane is not in fact a wall, but a row of thin ashlar, screening a hollow space. The "portion of vaulting surface resting upon" the north-west rib is not "cracked." The joints are open, and only need filling with cement.

313. The shadow of any line cast on any plane surface by an artificial source of light may accordingly be found by drawing a single ray parallel to the line in question, and finding the points in which both the line in question and the ray will pierce the plane on which the shadow falls. A line joining these points will be the line in which the plane of rays passing through the line intersects this plane, and, if produced beyond the point where the line pierces the plane, will give the line of its shadow.

314. This method seems less direct than that of Figure 81, a, which is, indeed, often preferable for single lines. But the method just explained is to be preferred where several parallel lines are subjected to artificial light. For the point z , Figure 81, c, where the parallel ray pierces the plane upon which the shadow falls, holds the same relation to one line of the system as to another, the shadows of all of them passing through it. The shadow of the line M_2 , parallel to M , in the figure, is directed towards this point. It is then an apex of converging lines, and is as important and serviceable a point when the shadows of parallel lines are cast by artificial light as their vanishing point is when they are cast by sunlight, and answers the same purpose in saving labor.

It appears then that, in artificial light, the shadows upon a given plane of a given system of parallel lines all converge to the point in the place at which it is pierced by an element of the system passed through the source of light.

315. Figure 82, Plate XVIII., illustrates the ease with which can be found the shadows of vertical lines upon a horizontal plane. The shadow of every such line is obviously a vertical plane, of which the vertical line dropped from the source of light, A , is also an element. The line joining the lower ends of these vertical lines is accordingly the intersection of the plane of shadow with the ground, and its prolongation gives the line of shadow. This has, indeed, been done incidentally, as was said, in Figures 81, a and b.

The figure shows, also, that a similar procedure may be followed in the case of a horizontal line, normal to a vertical plane, the projection of the apex of rays upon that plane being known. (314.)

316. The principle of Figure 81, c, is illustrated in Figure 83, where the shadows of several parallel lines are thrown upon a broken surface composed of several planes. The shadow of each line is directed, in each plane, towards, or away from, the point where a ray drawn parallel to it through the apex of rays, or source of light, pierces that plane. As the same ray is parallel, of course, to all the lines of the system, one ray suffices for them all, and their shadows, in each plane, are directed towards the same point.

The vertical and inclined lines that cast the shadow lie in a vertical plane, and the vertical and inclined rays taken parallel to them lie in a vertical plane parallel to it. The points 1, 2, 3, 4, 5, 6, 7, 8, 10, 11, in which these rays pierce the planes on which the shadows fall, lie in the line in which the plane of rays cuts those planes.

Of these points, 1, 2, and 3 are those in which the vertical ray pierces the ground and the two inclined planes at the bottom of the wall, and the shadows of the vertical bars cast upon these planes are directed to these points; 4, 5, and 6 are the points at which the horizontal ray pierces the three vertical planes of the wall and base, and the shadows of the horizontal bars cast upon these planes are directed towards these points; 7, 8, and 9 are the points at which the inclined ray pierces these three vertical planes, and 10 and 11 those at which it pierces the two inclined planes, and the shadows of the inclined bars falling upon these five surfaces are directed necessarily towards these five points or apexes.

The shadow upon the vertical wall of the irregular line of the arch and the moulding that supports it, is found by the method shown in Figure 81, b, (309). Horizontal lines are drawn from successive points perpendicular to the surface of the wall, and a line of shadow is drawn through the shadow of the successive points.

317. It is to be noticed that if one were to stand under the arch, with his eye at the point occupied by the lamp, he would see just so much of the wall as is now in light. These processes enable us then to determine how much of what is shown in a picture is visible to the personages represented in it. In Figure 83, for example, if we suppose the eyes of the young man standing outside the arch to be an apex of visual rays, and then find the shadow, so to speak, cast by them upon the wall, the point 12 being the projection of this apex upon the plane of the wall, we find that the light of his eyes just reaches the young woman sitting at the window within.

PNEUMATIC TRANSMISSION OF FORCE.—A new system of transmitting force to a distance is about to be tried in Paris. It consists in maintaining in a pipe system by means of engines at a central station a certain degree of vacuum (57 centimetres of mercury). A branch pipe enters the house of each subscriber, and is connected with a rarefied air motor devised by M. Tatin. The sewers in the Boulevard Voltaire and the Avenue Parmentier are utilized for the pipes, a distance of 600 metres. The canalization is calculated for a development of one kilometre distance from the central station, and the losses by friction in the pipes do not exceed three per cent. The pipes are mainly iron, but those entering the houses are lead. The Tatin motor possesses the necessary qualities of great simplicity and easy replacement of pieces. It has a vertical oscillating cylinder. Each motor is arranged to work at an average speed; the work for all is thus sensibly constant, whence results a very easy method of charging subscribers for their consumption of power.—*St. James's Gazette.*

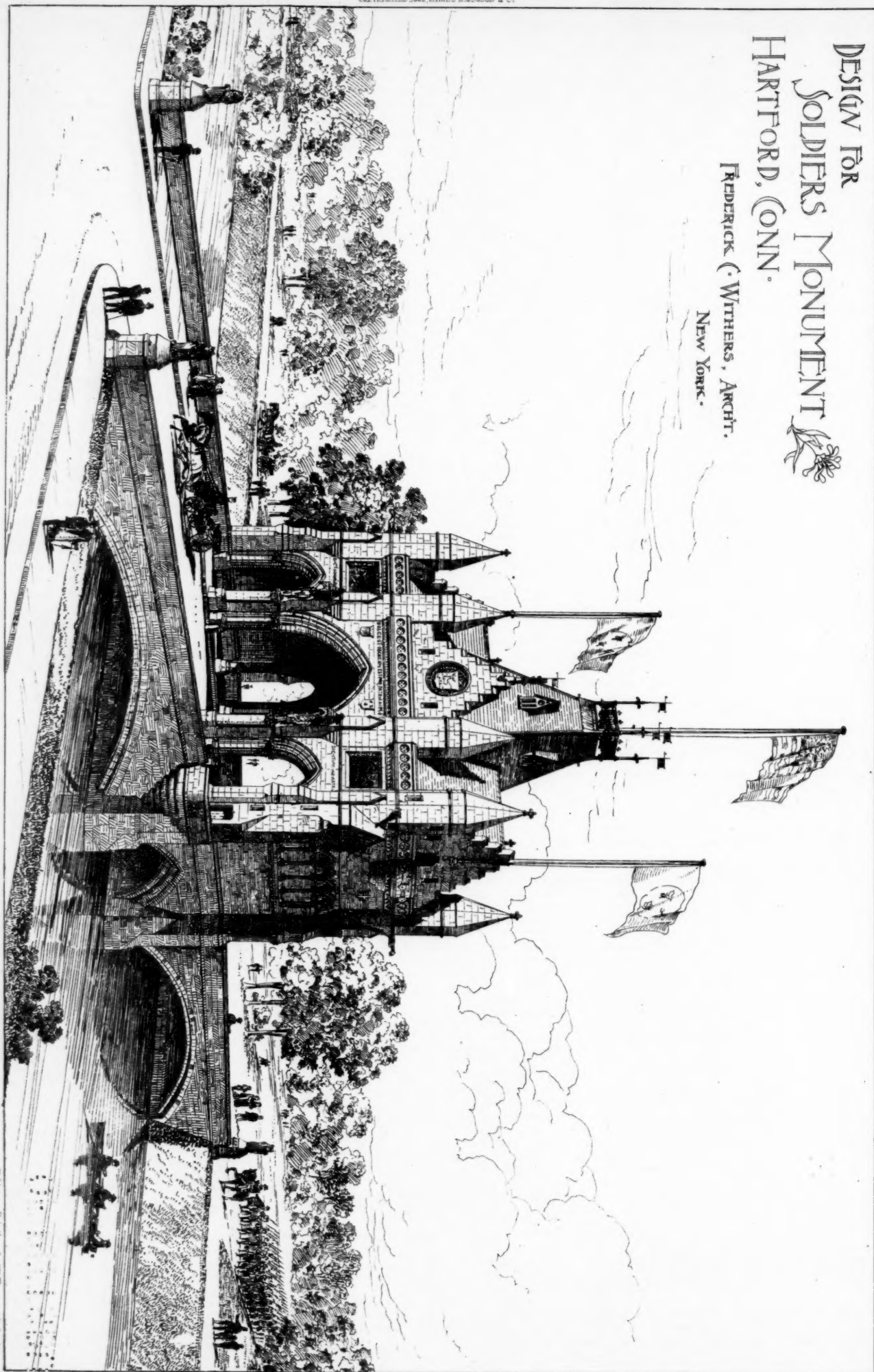
THE DANGEROUS OPERA-GLASS.—The Lord Chamberlain, in view of the fact that a heavy opera-glass falling from a height on a human skull may seriously damage the latter, has ordered a small ornamental gilt-wire netting to be placed upon the arm-rests of the boxes of London theatres.

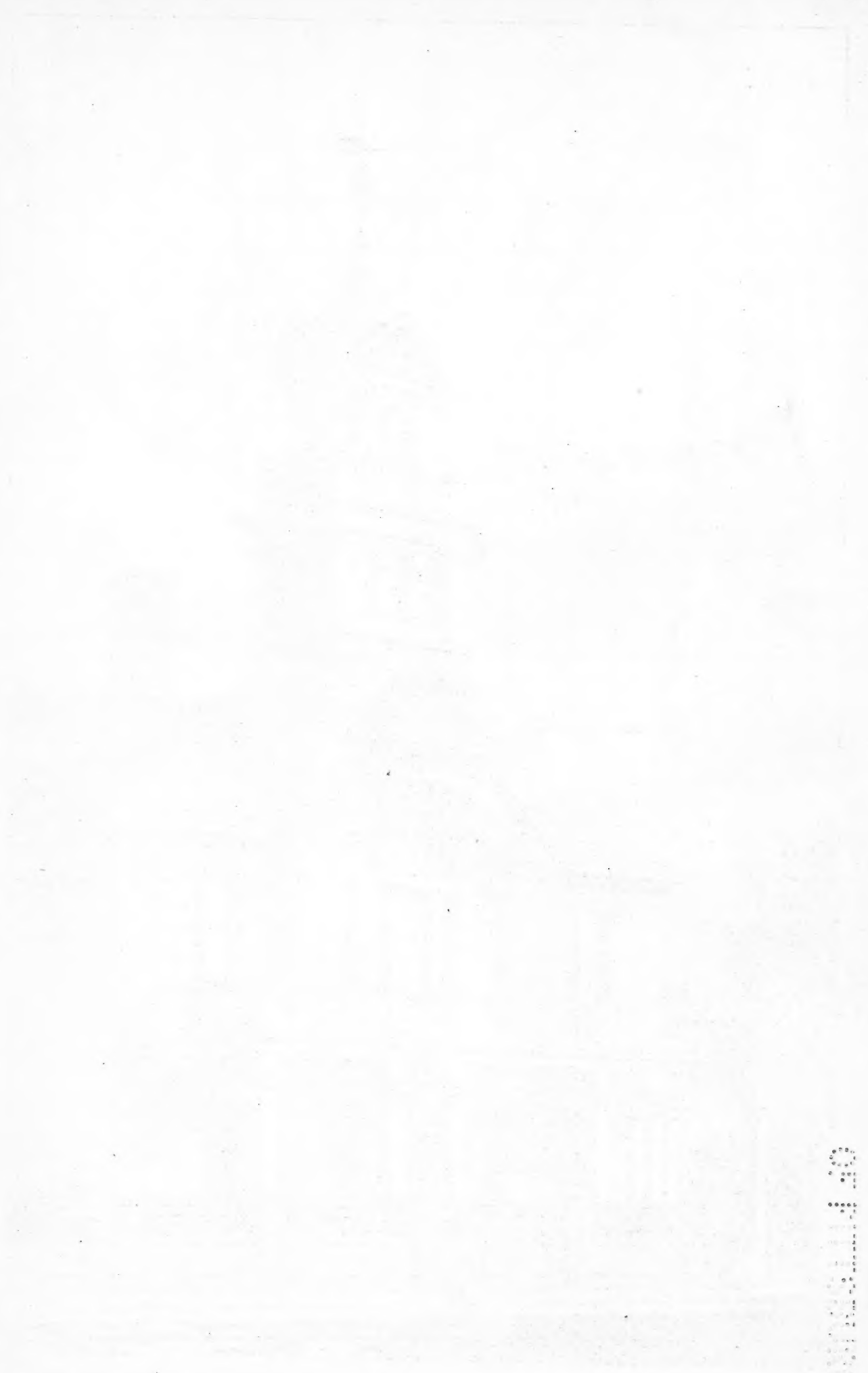
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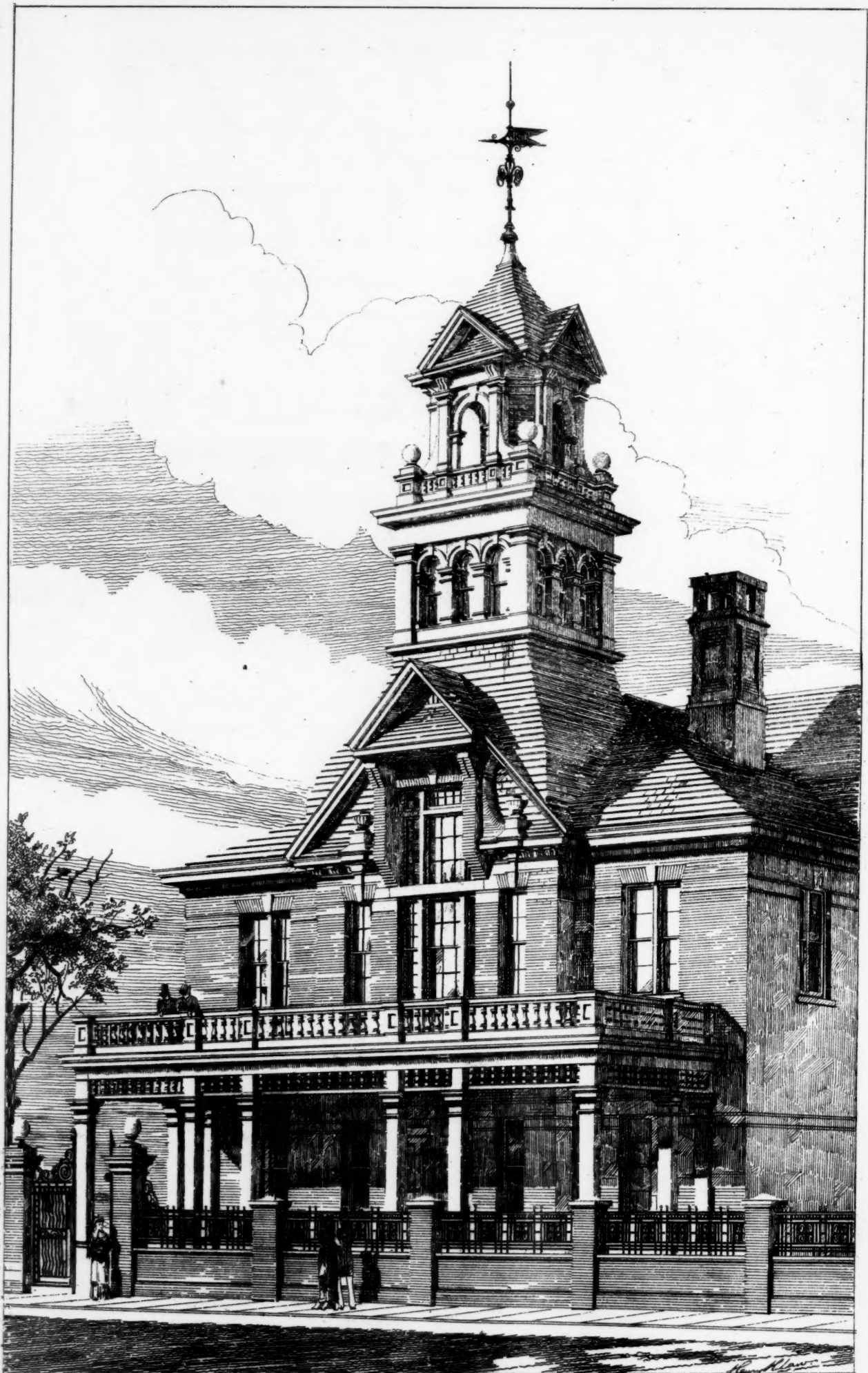
DESIGN FOR
SOLDIERS' MONUMENT
HARTFORD, CONN.

FREDERICK C. WITHERS, ARCHT.
NEW YORK.





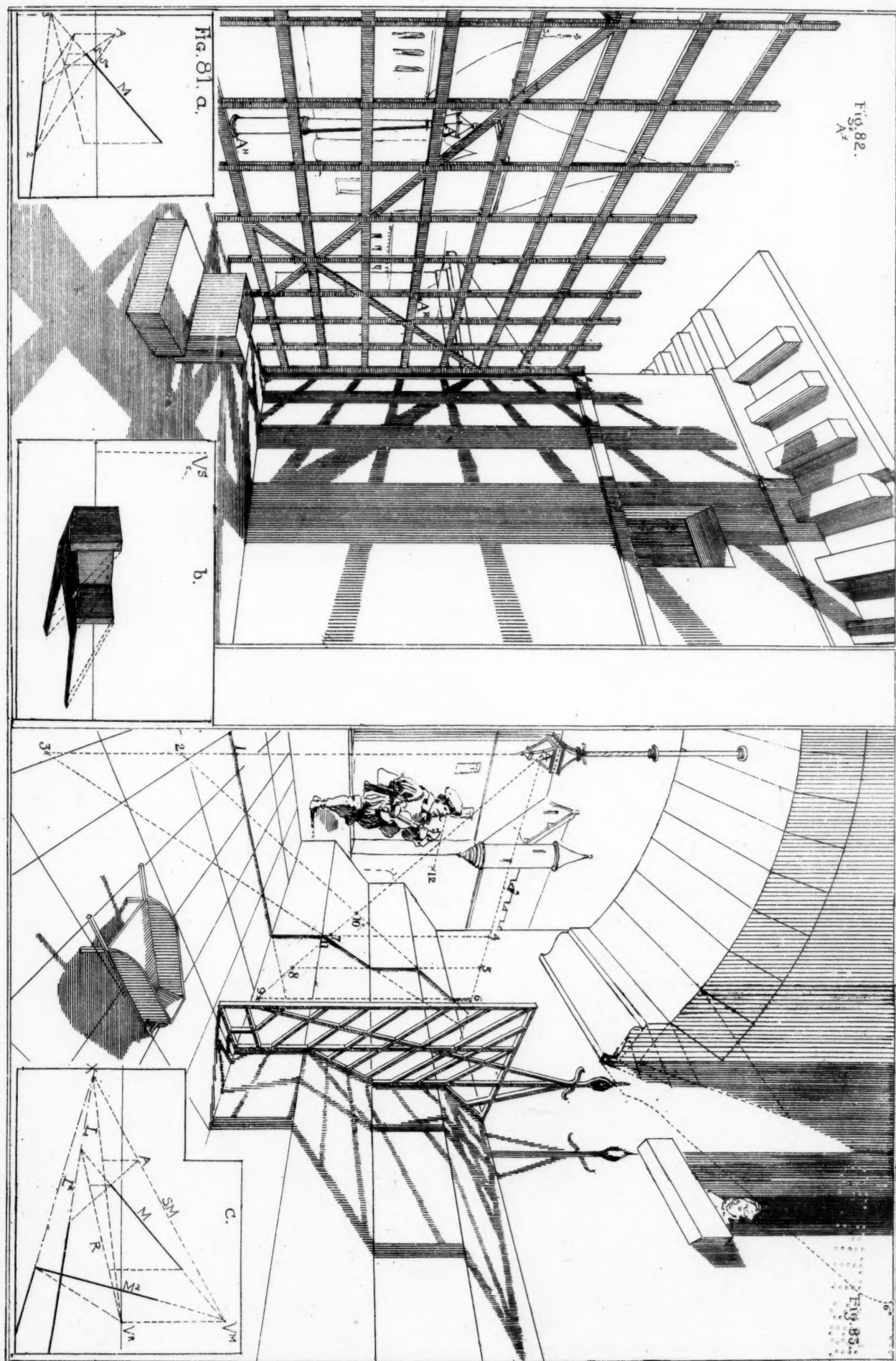
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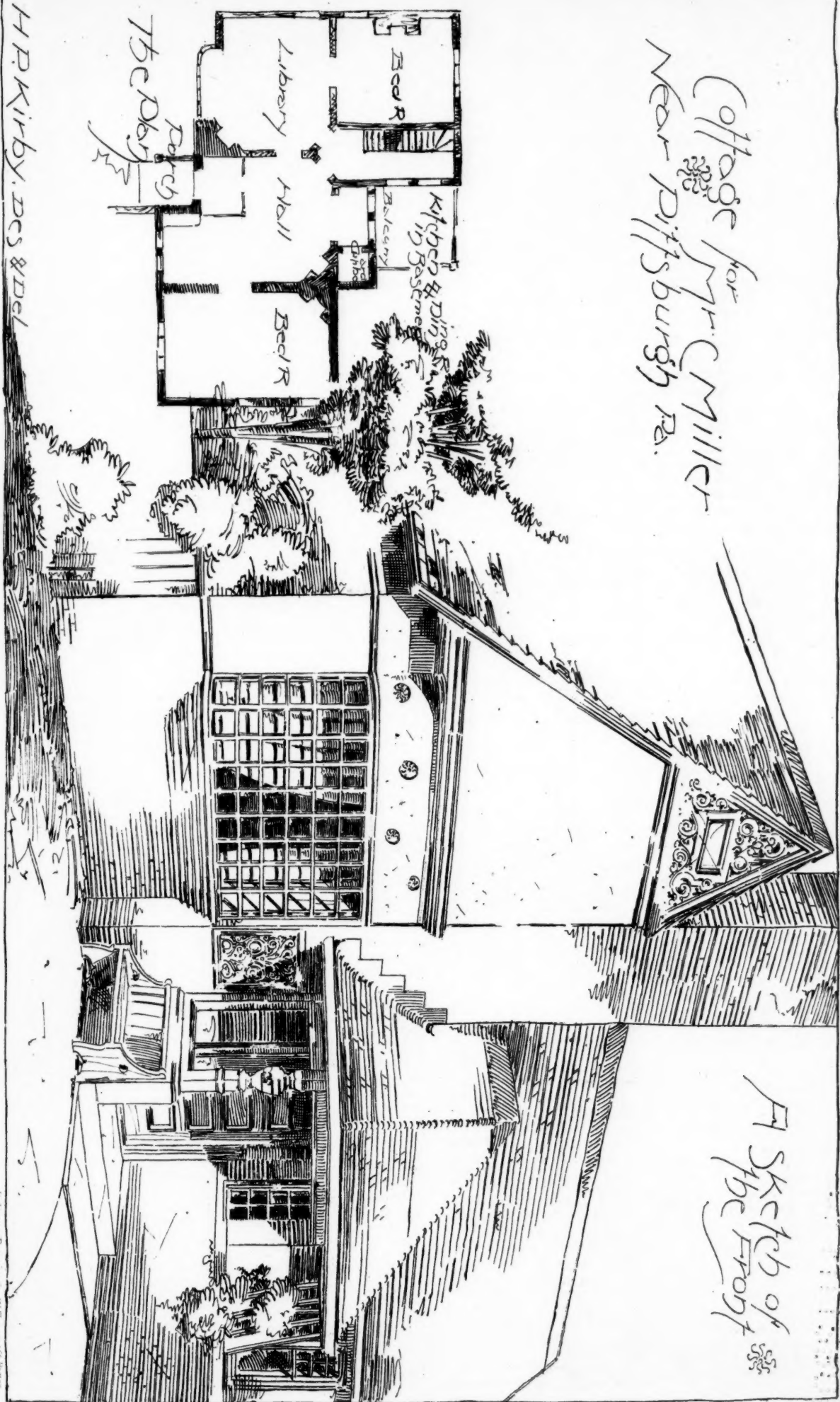
PLATE XVIII. SHADOWS BY ARTIFICIAL LIGHT.



OFFICE OF THE SECRETARY OF THE ARMY
WASHINGTON, D. C. 20315

Cottage for
Mr. C. Miller
Near Pittsburg Pa.

A Sketch of
the Front





THE FIRST AND SECOND PARTS OF THE HISTORY OF THE
1552

THE OLD MASTERS OF BELGIUM AND HOLLAND.¹

To satisfy those who have known and loved Fromentin's book in the original, a translator must accomplish an unusually difficult task. Surely I am far from alone in my belief that it is the most perfect book about pictures ever written in any tongue—the most clear in aim and expression, the most logical in thought; at the same time the most incisive and the most temperate, the most self-possessed and the most wisely enthusiastic, the most convincing and the most inspiring, the most technical and the most intellectually suggestive. Perhaps its chief virtue is that of *balance*: a virtue too often absent from writing that treats of art, conspicuous by its absence, for example, in the work of such diametrically opposed authors as Ruskin on the one hand and Taine on the other. No other man, it seems to me, has had so clear a perception of both technical and intellectual elements in painted work as Fromentin, and none has kept his head so perfectly while discussing them, or made their charms and value so clearly perceptible to his readers. But Fromentin's book is something more than a wonderful treatise on the painter's art. In style it may not be compared with any book of its class in any language whatsoever. It is a masterpiece of prose writing in a tongue which beyond all others has made of prose writing a fine-art in the truest sense. Artist as was Fromentin with paint and canvas, he was a far more marvellous artist with pen and ink. When we remember that he has often been classed with the four best prose writers of modern France—with Gautier, and Mérimée, and St. Beuve, and Georges Sand—above all rivals in a close and vigorous competition; when we remember that though he had written but four small volumes, he would have been made an Academician had not death come first, we may imagine what difficulties his translator must encounter. The technical niceties, the intellectual subtleties of his writing must be transferred to our tongue, less rich in technical niceties and fine shades of meaning than his own. And the charm of his unique style must be preserved as well. This style possesses, to a greater degree perhaps than any other, all the qualities possessed to some degree by all good French prose: brevity, grace, simplicity, a rapier-like adroitness, and a fascinating variety of construction. Hence it is in proportion even more difficult to reproduce than that of others. It is this difficulty, doubtless, which has hitherto interfered with the translation of *Les Maîtres d'Autrefois*, in spite of the book's great fame. So far as I know, it has never been published in our tongue till now; at all events there is no currently-known translation, and we should therefore be doubly grateful to Mrs. Robbins for the work she has accomplished. Even had she done but half that work, had she given us only Fromentin's valuable matter, shorn of his delightful manner, English-speaking students would have had cause for gratitude. But she has done more than this. She has produced a sympathetic and charming version which, in spite of certain faults, gives the reader a good idea of Fromentin's peculiar magic. She has caught and reproduced his general tone: that of delicate and graceful, yet keen, earnest and thoughtful conversation. And she has shown remarkable skill in reproducing his short Gallic phrases, neither losing their structure in the long sentences to which English lends itself more readily, nor giving them the clipped, staccato accent too often attendant upon literal translations.

Passing now to details we see Mrs. Robbins in so many cases rendering difficult passages and fine shades of expression with admirable, intuitive accuracy, that we are surprised to find them offset by other passages of careless or blundering interpretation. The phrases I shall cite may seem of minor import to some, who do not appreciate the refinement of Fromentin's workmanship. The vivid pictures he draws for us of an artist's nature or an artist's work are not boldly and strongly outlined, but built up gradually with minute and extremely precise strokes, each telling delicately but perceptibly toward the general result. To alter the meaning of one such stroke is to alter the final impression left upon the mind. No accuracy could be too close, no attention too scrupulous in the translation of such criticism. But it looks as though Mrs. Robbins's blunders were the result of carelessness rather than of want of perception; for, as has been said, she is often extremely successful in very critical places. As an example of a rendering which shows perfect familiarity with her original I may cite a place where colored "*dans la matière ou pardessus*" is written "colored solidly or glazed," and the fact that Mrs. Robbins has felt that "opinion" is often used by Fromentin in a sense which must be given in English by "public" or "popular opinion." Instances of this sort might be cited from every page. But on many pages occur instances of a contrary kind. "*A fleur de toile*" as used of work which has no depth does not mean "flat on the canvas," but "on the surface of the can-

vas;" "*Grace d'état*" does not mean "state of grace;" "*Moulage*" has no reference to "modelling," but to "moulding;" "*Esprit*" applied to an artist can never be translated "mind." His genius and his great power" is a different thing from *son génie en sa toute puissance*; and "*richesse sans coloris*" is the exact opposite of "richness of coloring." Comparing Mrs. Robbins's version with her original, line by line, such slips are far too frequent; and, as I have said, the book is one with which such comparison is especially in place. It is in no spirit of captiousness that, while greatly admiring Mrs. Robbins's translation as a whole, I have dwelt upon these blunders. No one who loves his Fromentin can help being distressed by them, can help seeing that the author's thought is marred by every slightest slip from perfect exactness. No one can help wishing, however, on the other hand, that Mrs. Robbins's translation may meet with the success its general merit amply warrants. And if such success attends this first edition, and a second one should follow, I believe that a careful revision of the book on the translator's part would make it an almost perfect English version of its admirable original.

The volume is attractively printed and bound, and the heliotype illustrations serve their purpose in conveying a general idea of some of the chief pictures in question to unfamiliar eyes, though they can make no claim to much artistic value.

M. G. VAN RENSSLAER.

THE ILLUSTRATIONS.

DESIGN FOR SOLDIERS' MONUMENT, HARTFORD, CONN. MR. FREDERICK C. WITHERS, ARCHITECT, NEW YORK.

THE Committee appointed for erecting a monument in memory of the soldiers and sailors from Hartford, who fell or died in the late war, having decided that the memorial shall be in the form of a bridge, the accompanying design was submitted in competition. None of the designs, however, meeting their exact views, they have selected the author of this as their architect to prepare one in accordance therewith.

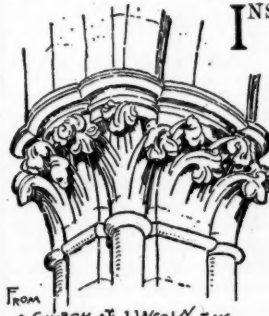
This design contemplated a bridge of three arches of a total length of 150 feet between the abutments. The monument was intended to be divided into three triumphal arches, the central one being for a carriage-way, and those on either side for pedestrians: The inner faces of the side walls were designed to receive the memorial tablets.

PERSPECTIVE PLATE XVIII.—SHADOWS CAST BY ARTIFICIAL LIGHT.

COURT-HOUSE FOR PRINCE GEORGE'S COUNTY, MD. MR. F. E. DAVIS, ARCHITECT, BALTIMORE, MD.

COTTAGE FOR C. MILLER, ESQ., NEAR PITTSBURGH, PA. MR. H. P. KIRBY, ARCHITECT, ALLEGHENY, PA.

DR. F. SEYMOUR HADEN'S LECTURES ON ETCHING.



FROM A CHURCH AT LONDON, ENG.

INSTRUCTIVE and interesting as these lectures were they could not claim the attention of the listener more than the lecturer himself. His strong personality, his earnestness tempered by sweetness, his refined bearing, his unconsciousness were quite as entertaining as the words he uttered, and his picturesqueness fully equal to that of the etchings which decorated the platform. A racy man is always refreshing; so is one who believes in himself and maintains his ideas with vigor; but a militant spirit must expect to find adversaries. He invariably arouses the susceptibilities of others.

Dr. Haden is a brave champion in favor of etching. He tilts fearlessly against the engravers and everything else that savors of dryness. I do not propose to battle for the engravers, who are quite competent to battle for themselves. Every one knows that steel-plate engraving is obsolescent, principally on commercial grounds, though the French Ecole des Beaux-Arts thinks it worth the while to encourage it. The fashion of the hour, too, is for the picturesque—a fashion which may change at any moment. The fact is, steel-plate engraving has certain monumental or classic qualities, with which Dr. Haden is not in sympathy, but which are still highly prized by many. Naturally there are hosts of cold, wiry steel-plate impressions, just as there are myriads of careless dissipated-looking etchings. Art is manifold in its expression, as is literature. It is a great mistake to judge it by an immutable canon. What is sympathetic to one may prove caviare to another. Etching has delightful qualities. It is personal and picturesque; Dr. Haden's feelings are for the picturesque; but picturesqueness is but one of many phases, which are commensurate with the ever-varying tastes of man. How fortunate that it is so! The mirth-provoking experiment of enlarging the engraver's interpretation of flesh, drapery, etc., is (as Mr. Koehler has already observed in the *Daily Advertiser*) a double-edged weapon that will cut both ways. Moreover, these ridiculed dots and lines of the burin do interpret flesh as the etcher's needle cannot, that is, from a statuesque point of view.

¹ *Les Maîtres d'Autrefois*. By Eugene Fromentin. Translated by Mrs. Mary C. Robbins. Boston: James R. Osgood & Co.

To call the steel-engraver a "manufacturer" is very unjust. Any artistic interpretation — not downright copying, be it understood — calls for *feeling*, which some engravers have shown in a high degree, giving many of the qualities of the original, and something besides. Dr. Haden's own magnificent interpretation of Turner — Calais pier — perhaps the best thing he has done, certainly the most striking — is a fine illustration of the truth of this remark. A Morghen may not be the peer of a Sanzio — but to call him a manufacturer!

One is almost weary of hearing that old bit of sophistry "There is no line in nature." Of course there is not — save where the electrician has adorned her. No more is there any paint in nature. All art is a convention. When people speak of lines, they mean *outlines*. Objects under certain circumstances have outlines, and very definite ones.

Dr. Haden left his audience in a somewhat vague frame of mind as to his opinions on education. He, himself, studied faithfully for many years, partly in French drawing-schools. He recommended a laborious course of training, and then concluded his remarks by anathematizing schools and academies. To emphasize his assertions he cited the pitiable example of the "School of Raphael." Even supposing that Giulio Romano and Pierino del Vaga were pigmies — though compared with many of our popular idols they are giants — one is inclined to ask "How about the schools of Perugino, of the Bellini, of Ghirlandajo?" The "academic" question has been fully discussed elsewhere. No one now-a-days upholds the old, effete, cold, academic style. Americans, in particular, have no reason ever to dread its advent.

But a pupil must be taught his alphabet somewhere if he would write his madrigals, sonnets, or epics; and where better than in a school which, if conducted by artists of common-sense, would never dream of imposing a cast-iron system on its scholars? At first every one must be imitative, just as Raphael or Titian were imitative. If a student is not robust enough to enfranchise himself eventually, then indeed he must be made of poor stuff. The word "finish" seems to offend Dr. Haden greatly. The truth is a work of art is finished when the idea of the artist is complete. If his idea be sketchy, then his work will be sketchy; yet it will be finished. If, on the contrary, his idea be clearly defined, if it embraces modelling and all the subtleties of the human form, the expression of it must be precise, and it is this precision that calls for a long, sustained effort, only to be made by men of character.

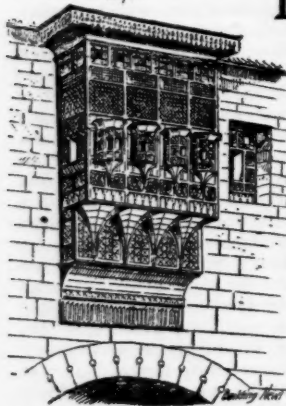
Sketching is almost an art by itself. The whole question of finish can be summed up in these words: *The idea and the expression of it must be co-equal.* It is the exact equilibrium maintained between the conception and the execution that made the Tintoretts, Titians, Raphaels, and Michael Angelos of the sixteenth century. When the idea predominates, the work is interesting but imperfect — Blake's work, for instance — all poetry. When the work is superior to the idea, it savors of the work-shop.

What Dr. Haden said of the advantages he had derived — as applied to his etching — from his medical training, from his habit of analyzing effects and tracing them to their causes, should be a strong inducement to tyros to enlarge their scope of information, and discipline their minds.

FREDERIC CROWNINSHIELD.

IN REGARD TO THE ESTABLISHMENT OF A VALID TEST OF PROFESSIONAL ABILITY.¹

W. A. ROE, Esq.



IT were most devoutly to be wished that this subject were in abler hands, but it is hoped that the suggestions herein offered may incite advantageous discussion and result in suitable action if deemed worthy.

The suggestion is offered for your consideration, the establishment of a Board of Examiners composed of gentlemen eminent for their professional attainments, whose duty it shall be to ascertain by *rigid examination* the qualifications of candidates for degrees, with the vested right to grant diplomas in accordance with the rank and standing of such applicants.

Why the necessity of such action? If there be a necessity, then what manner of men arise up with the right to construct such a board?

First, as to the necessity: in every profession there is more or less of the evil of malpractice to contend with, but that of architecture seems to have more than its quota, for the reason that there is no established authoritative defense whatever.

Most professions are protected to a considerable extent by examinations and diplomas, and with a proper diploma one is armed with authority to practice; in most instances this authority establishes the confidence of clients and the practitioner moves onward and upward "*mens sibi conscia recti*;" while those who are not thus pro-

vided are obliged to sneak through the world self-upbraided impostors sooner or later exposed — the public thus cautioned and the particular profession indirectly benefited by such exposure. Not so with architecture; in the present order of things (or more properly speaking *disorder*) our profession is comparatively unprepared to resist attack, is unable to meet opposition and has no security against "foes within the ranks." There is no law, rule or usage by which designing men may be commanded "thus far shalt thou go, no farther." A man (generally a young and ambitious one) tired of home and anxious to improve, is desirous of adventure; armed and equipped with perhaps a shoemaker's kit or a set of tinker's tools (or other equally proper and suitable architectural traps and accessories) and possibly a piece of chalk, together with plenty of assurance, he moves out into the country to seek his fortune and to grow up. Well, if nothing offers in the way of honest employment at cobbling or the restoration of dilapidated tin-ware, then as a *dernier resort*, and not being particular or proud, this inevitable and irrepressible genius falls back on the piece of chalk, puts out his shingle as "So and So, Architect," and in too many cases succeeds, *i. e.*, succeeds in heaping dishonor upon a worthy but unprotected profession. This may seem a somewhat exaggerated character of co-worker, yet many or most of you have undoubtedly met instances almost if not quite as bad as this. I have known several that were worse, for the fellows were minus the before-named tools, etc., and had only the impudence and irrepressibility; but what they lacked in one respect was fully made up in the other.

In almost every town and hamlet in the land there is a greater or lesser number of these untutored pretenders, men who were never taught, and never acquired even the rudiments of the science; who are unfamiliar with a single principle upon which it is based; who know nothing whatever of the history of architecture or the peculiarities of orders or styles; nothing of the elements of design, nothing of decent, not to say proper construction. There are others a shade more advanced, who perhaps have been in an architect's office, and after a few months' destruction and waste of stationery therein, have graduated and gone out into the wide, wide world, full-fledged with cheek, tongue, and impudence; who call themselves architects, and

"do botch and bungle up
With patches, colors, and with forms."

Of such are the pseudo co-operant forces; their name is legion, and as one is adjudged by the company he is in, the public, looking upon every one as an architect who styles himself such, naturally charges any incompetency to the profession at large. Modesty bespeaks merit, but sometimes merit is so exceedingly modest as not to speak at all; hence the charge too frequently goes unanswered.

The question arises then, what may be done in the premises? We submit that the suggestion initiatory of this paper will to a great extent meet the demands. It is not desired or deemed indispensably necessary, perhaps, that one should be thoroughly versed in every department of the science before he shall be able to commence practice; but we submit that the limit and extent of practice should be held strictly in accordance with a degree granted by proper authority, and one should continue in this degree until proficiency entitles him to advancement. There should be, we think, a certain number of degrees arranged, graduated, and determined upon by this board, and careful examination made in each. It is suggested that these degrees include among other acquirements a thorough knowledge and familiarity with *Classic Architecture*; this is an all-important and absolutely necessary foundation for the proper and successful study of architecture. True and standard proportion is here to be found (not to raise the question of beauty of detail); in it is the soul and sentiment, the true and fundamental element of design; the correct theory of proportion; it is to the student or practitioner what anatomy is to the sculptor. Without a knowledge of the situation, structure, and economy of the different parts of a body, the sculptor is not properly able to give true expression to a face or form, nor to produce a gracefully draped figure; in like manner, to the architect a knowledge of classic architecture is the underlying and governing principle of design.

Besides a proper standing in this branch, there should be a due amount of information as to styles and purity of detail outside of the orders; construction, materials, their strengths and methods of application, a general knowledge of mechanical work in the various trades, sanitary conditions, drainage, ventilation, acoustics, heat and light, preparation of various grounds and foundations — in short, a general and practical familiarity with the numerous and varied branches and parts which necessarily combine to form a thorough knowledge of the science or art of good, proper, and correct building. Candidates should pass examinations with credit; and degrees with diplomas, conferring the power and authority to practice in accordance with the standing adjudged, should be granted to those who have worthily passed to the required grades of such degrees.

This requirement for honorable practice is not too exacting; those who cannot creditably pass such an examination are not fit to be entrusted with works involving an outlay of capital and a risk of life and limb; if something of this kind may be thought advisable, and is put into execution, we think that even members of the profession who already possess acknowledged ability, will not object to, but will favor, rather, the endorsement of good authority, and incompetency will be marked and held at bay. The public may then be apprised, and may engage those who are vouched for as skilful, or themselves

¹A paper by Mr. A. C. Nash, read at the Sixteenth Annual Convention of the American Institute of Architects.

be in a measure to blame for any failures through the employment of incompetent persons.

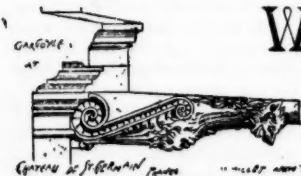
Now, if there be a necessity for a movement in this direction who shall be the appointees of said Board? The answer—Who may more properly act in such capacity than those of acknowledged ability within the body of the American Institute of Architects?

This is the largest and most important collective body of architects on this continent. The objects of this Institute, as declared and adhered to, are "to unite in fellowship the architects of this continent, and to combine their efforts so as to promote the artistic, scientific and practical efficiency of the profession." Argument seems unnecessary to sustain the proposition that the Institute would be the proper authority, and that if a move should be made in the direction suggested, it should emanate from this source.

We would also respectfully suggest in this connection that the number of the F. A. I. A. should not be limited to seventy, as at present. We think that there should be no limit; the gates of this Institute should be "gates ajar," for the free ingress and welcome of all such as apply, and are worthy and well qualified, and for the gentle egress of those who are not, if any such there be. We would not for a moment be understood to insinuate that there is a doubtful member; far from such thought; we believe that gentlemen of the Institute would not object to this examination, and its accompanying endorsement; but if this body of architects should decide to establish a board as suggested, the law of self-preservation would dictate self-examination, and it would become its first duty to so act as to be able to stand entirely above suspicion; it should act firmly in accordance with the spirit and letter of that teaching, which commands: "If an eye offend thee, pluck it out."

Again, as regards the number of Fellows, we respectfully urge that none who are properly qualified should be kept out; all laudable effort should be made to increase the membership; there should be no isolation of the component parts of the general machinery; there should be the combination of a perfect whole; thus the machinery may be set to working for the achievement of the greatest results. In all things, in every phase of existence, in things animate and inanimate, from materiality to mentality, from things to thoughts, in unity there is strength; in combination there is power; with intercourse and interchange of thought there is enhanced ideality.

THE PROGRESS OF DECORATIVE ART.



WE may, I think, without rashness, congratulate ourselves on the progress made in decorative art of late years. I should be loth to speak slightly of any of the brotherhood to which I belong, past or present, but the plain fact is that some twenty-five years ago these arts of mere decorations were in such a state that one is bound to say that they looked as if they were coming to an end; of the traditional part of them there was, in England at least, scarce any more left than there is now, i. e., nothing. On the more obvious and self-conscious side there was nothing stirring. What individual talent was left could only show itself in eccentricities that most often deserved to be called by any other name rather than decoration. The public was as blankly ignorant of the history of the art as the designers were of its first principles. The contempt with which the whole subject was treated in those days is shown pretty clearly by the law which relates to the copyright in industrial designs, which, strange to say, is to this day all the protection accorded to them. The framers of that law doubtless wished to secure to manufacturers all reasonable advantages for those designs which they had paid for or invented; yet to this day it is only possible to protect such designs for three years. Three years seemed at the time when that law was made ample time for a manufacturer to reap all advantages from any design he might produce. I don't think I need make much comment on that. Well, really, I must say that twenty-five years ago it did not much matter whose design you got hold of. They were all much the same, and did little but spoil the materials out of which they were made. I well remember when I was first setting up house, twenty-three years ago, and two or three other friends of mine were in the same plight, what a rummage there used to be for anything tolerable in the way of hangings, for instance, and what shouts of joy would be raised if we had the luck to dig up some cheapish, commonplace manufacture, which, being outside the range of fancy-goods, had escaped the general influence of the vacuity of the times. On the whole, I remember that we had to fall back upon turkey-red cotton and dark-blue serge; since even the very self-colors of fancy-goods had grown to be impossible, which is the more inexcusable as at that time the beneficent march of science and commerce had not yet destroyed the ancient and worthy traditions of the craft of dyeing, as it has since done. This last sentence shows itself to me like the skeleton at the Egyptian feast, and reminds me that I have something else to say than self-satisfied triumph over our advance on the blank nothingness of the first half of the century. Yet certainly

that advance has been made: a reaction from ugliness to beauty has touched at least some part of the people who live among civilization, and in what we technically call the decorative arts this new Renaissance has been helped in this country by many agencies, not least among which has been the steady endeavor on the part of the Department for Science and Art to spread artistic education among the public in general. Some of the results of this new Renaissance are now before the people of this great city, and I think I may say that they fairly represent what has been done in the arts of decoration since the change I have been speaking of took place. Nor am I ashamed, in the name of my brethren in the craft, in the first place, to beg some tenderness from the public for our shortcomings, considering the difficulties we have had to fight against; and in the second place to remind them that things have changed; that no young housekeeper need now take so much pains for such a scanty result as I had to do in 1859; that any one can now find in shops all over the country goods at commonplace prices which both intend to be and are beautiful, and more or less marked by artistic individuality; that, in short, any one who chooses can make the interior of his house comely and pleasant without an unreasonable expenditure of time and trouble.

Now, I will not ask my craft-brethren to be content with my using no greater words in praise of our noble selves than these, which after all do seem to me to imply great encouragement to us all; for something more I have to say before I sit down. I am always asking myself is this apparent success real—is this seeming advance of a quarter of a century going somewhere or nowhere? That is a serious question, to which it is impossible to answer aye or no. But, after all, to us as practical people it does not matter much whether it can be answered directly always, so long as we see clearly what are the conditions of the health or disease, the life or death of our art—in short, so long as we can see what work is immediately ahead of us to maintain our art in a hopeful state. Now, to my mind, it is not so very difficult to see this. First, we have, to put the matter in its simplest form, to interest the whole public in the work. First, and indeed last, there is nothing else for us to do; that once done, the whole public will see to this matter. Well, that is easy to say and very hard to do—short to say and very long to do, and yet we must set to work about it unless we aesthetic upholsterers are content to be what I am afraid many people think us, contemptible waiters or mere pleasure-seekers and triflers with life. For in truth these decorative arts, when they are genuine, real from the root up, have one claim to be considered serious matters, which even the greater arts do in a way lack, and this claim is that they are the direct expression of the thoughts and aspirations of the mass of the people; and I assert that the higher class of artist, the individual artist—he whose work is, as it were, a work in itself, cannot live healthily and happily without the lower kind of art,—if we must call it lower—the kind which we may think of as co-operative art, and which when it is genuine gives your great man, be he never so great, the peaceful and beautiful surroundings and the sympathetic audience which he justly thinks he has a right to. If you compel a Michael Angelo to live in a world of dullards and blunderers, what can happen to him but to waste his life in ceaseless indignant protest, till his art fades out in sour despondency and his whole career has turned out a useless martyrdom?

Great minds need no slaves to rule over, but rather fellow-workmen whom they can help and be helped by. So I say that the decorative arts are as necessary to our life as civilized men, nay as men, as the more strictly intellectual arts are, and that that which has become our end and aim, to wit, the new birth of popular art, as on the one hand it is a most arduous, so on the other it is a most worthy undertaking. Such great works both make the utmost courage necessary and inspire us with the necessary courage for carrying them out. Striving to arm myself with that courage, I will venture still to try to tell you what seem to me the chief difficulties that we have to face in our undertaking, and will beg you also to be courageous in listening to my few last words; since courage, as you well know, is the very mother of kindness and good nature. Well, once for all, I am afraid I must admit that the public in general are not touched at all by any interest for decorative art; a few of the upper and middle classes only have as much as heard that there is such a thing as decorative, which should be popular, art. How could it be otherwise? Consider! That lapse of all the arts of decoration that I began by speaking of, and which got to such a pitch at last that it became unbearable to some of the cultivated part of our population, this paralysis of the art was brought about by commerce (so-called) forbidding the exercise of art as an essential part of manufactured wares. Time was when all manufactured wares had some claim to beauty, and other things being equal, the most beautiful thing was the most marketable. I fear we cannot say that this is the case now. Pray excuse me for drawing an illustration from a very interesting and useful class of goods to which we are none of us strangers—printed cottons. If you turn over the pattern-books of this or that cotton printer in this city, you will find many patterns which are exceedingly pretty, while some of them are exceedingly—well, ugly, as, I am sure, the gentleman who prints them will admit. Now, having the honor of the acquaintance of a cotton printer in this city, I am able to say that, so far as I could understand, the ugly patterns sell quite as well as the pretty ones. Now, you know, if the decorative arts were in a healthy condition, instinctive good taste would refuse the

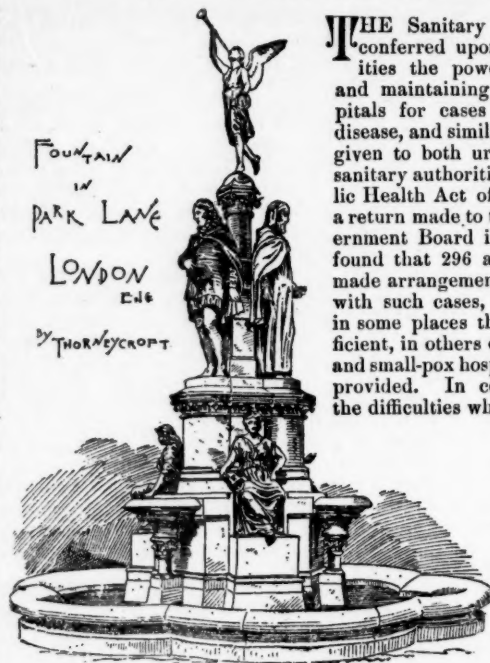
¹ By William Morris. An address delivered at the opening of the Fine-Art and Industrial Exhibition at Manchester, England.

ugly patterns and demand the pretty ones, and so prevent what I must consider a degrading waste of money, time and intelligence; for what in its way can be more wasteful than using all the accumulated knowledge and skill of centuries in spoiling the fair white surface of a piece of cloth by putting a pattern on it which you know to be ugly. And in like manner it fares with all the other industrial arts. If a manufacturer determines to be also somewhat an artist (as he most certainly should be), and to turn out nothing but what may do credit to his own reason and intellect, he must also make up his mind to give up a great part, probably the greatest part, of his business; and I will say at once, before I go farther, that if a good few of our makers of common wares were so much touched by the importance of the decorative arts of England as to do this, it would make a new era in that advance of the art which I have been speaking of; and if we could add to such a sacrifice of apparent welfare an obvious and lively interest on the part of the public in the processes and methods of the art, I do think we should be nearing our goal. For at present the divorce of commercial manufacture from art has made the public bad marketers; too often they don't know what they are buying. Often I have had it said to me when I have been showing my friends some process of designing or making a piece of goods, "Dear me, I had no idea that all that trouble was necessary." In short, it seems to be generally believed by a people, to my mind, somewhat overdone by machinery, that works of minor art can be and are turned out like the sausages in the mythical Yankee machine — live pig at one end, sausages at the other. Whereas in truth every work of art, however humble, as on the one hand there has gone to make it a real human pleasure of body and mind, so on the other every stage of its making has been attended by painful care, anxiety, and chance of failure. And this it is, this play of hope and fear, joy and sorrow over it which makes it what we call a work of art; indeed we may well call it a work of nature also.

The divorce of commerce from art has been wasteful of more than the works of man's industry, and in many places, and I must say nowhere more than in South Lancaster, has made the advice which we must always give to all students of art to go to nature somewhat of a mockery. Believe me, I do not speak of this or any other evil wantonly, but with the hope of, in my small way, encouraging those who are fighting against it; and indeed fight against this evil we must, if we are to have decorative or any other art for long. The choice lies before us, which will you have, art or dirt? In the long run I believe you will find art cheaper of the two commodities; for if we choose dirt we shall make England, all of it sooner or later, what it was not meant to be, an uncomfortable country, and discomfort breeds discontent, and discontent — what will that bring forth in this land of stout-hearted men? This is far from being beside the question; it is English decorative art I am speaking of, and can we forget what the country is like which bred that art as it once was, which has made an ancient English house, for all its simplicity and rudeness, the loveliest of the habitations of man? Surely my voice is speaking the thoughts of many people when I plead with the mighty and overwhelming commerce of England to spare the source from which all English art has sprung, what is left us of the land of England, with all its growth of familiar beauty, sweetened, every acre of it, with the memories of the men that made us. When that plea is listened to, and we make up our minds, first, to keep all we have left us of fair and unspoiled country and dwellings, and second, to replace what we have lost by a reasonable and living art which shall really express our lives and their aspirations — I say when we have made up our minds to do this, then is all gained.

Nature, which has covered with her kind hand the battle-fields of the Edwards and Henries and Charleses, will in one way or other, when we call upon her, do no less for the battle-fields of commerce. Our scientific men who, — to me, an outsider, — seem able to do anything they care to do, will have shown us the right use of carbon and sulphuric acid, and the sun will shine as brightly through the boughs outside the factory windows in Lancashire as it does through the Kentish hop garden. I think those days will come, wild as the prophecy seems. We shall not see them. Who cares, since we amongst others shall have worked to bring them about? Nor will anybody in those days need to talk about English decorative art, for every one will have it ready to his hand; like the company of a friend with whom one can talk if one wills, or be silent with if one pleases, so restful, so familiar shall it be.

NOVEL HOUSE-WARMING APPARATUS. — Professor E. S. Morse, of the Essex, Mass., Institute, has devised an ingenious arrangement for utilizing the heat in the sun's rays in warming houses. His invention consists of a surface of blackened slate under glass, fixed to the sunny side or sides of a house, with vents in the walls so arranged that the cold air of a room is let out at the bottom of the slate and forced in again at the top by the ascending heat column between the slate and the glass. The out-door air can be admitted also if desirable. The thing is simple, and its entire practicableness has been demonstrated, it is said, in the heating of the Professor's study in his cottage at Salem. The value of the improvement for daily warming buildings like churches and school-houses, which, when allowed to get cold between using, consume immense quantities of heat before they are fairly warmed again, is evident. Of course any other means of heating is available when the sun does not shine. — *N. Y. Tribune.*

HOSPITAL CONSTRUCTION.¹ — I.

THE Sanitary Act of 1866 conferred upon local authorities the power of erecting and maintaining isolation hospitals for cases of infectious disease, and similar powers were given to both urban and rural sanitary authorities by the Public Health Act of 1875. From a return made to the Local Government Board in 1879, it was found that 296 authorities had made arrangements for dealing with such cases, and although in some places they were insufficient, in others excellent fever and small-pox hospitals had been provided. In consequence of the difficulties which arose from

want of experience and from prejudice, the Local Government Board found it necessary to obtain accurate information about those hospi-

tals, and Dr. Thorne Thorne was instructed to make inquiries into the conditions by which the greatest usefulness was attained. He inspected 67 hospitals of every variety of size and construction in England and Wales, and in the following report Dr. Thorne has summarized in a compendious form the lessons which have been learnt during his lengthened investigation: —

Where the shape of a site and the necessary conditions attending the arrangement of the buildings have permitted of choice, it has under most circumstances been found desirable that the opposite side windows of the ward-pavilions should as nearly as possible respectively face somewhat to the south of east and to the north of west, and that any departure from this rule should be in the direction of a south-easterly and north-westerly aspect, rather than in that of a south-westerly and north-easterly. By this means both of the side walls of the hospital wards are in turn brought under the influence of the sun's rays, a large amount of daylight is secured, the spaces between any two or more parallel pavilions become well warmed and lighted, and, at the same time, direct exposure to the east wind is avoided.

The necessity of having every site so effectually enclosed as to prevent any communication between persons in the hospital and those outside is obvious, and a spread of infection to the outside public was in several instances ascertained to have been due to the imperfect manner in which this had been carried out. As a rule, a substantial wall or close fence at least 6 feet 6 inches high is found necessary for this purpose.

The more efficient hospitals for infectious diseases, which have been provided by sanitary authorities in order to meet the wants of their districts, have under ordinary circumstances consisted of (1) an administrative block; (2) at least four wards, in two separate pairs, and in which patients of both sexes, suffering from two different infectious fevers, can be simultaneously treated; and (3) certain out-buildings, such as wash-house, mortuary, etc. These buildings have been either permanent or temporary. As regards permanent buildings attention to the following points has been found necessary.

The administrative block is nearly always so constructed that the offices and apartments it contains are in excess of the requirements of the permanent ward buildings, and are hence adapted, without having recourse to further erections, to the wants of such permanent or temporary extensions as may at any future date become necessary. Having regard to economy of space, it has as a rule consisted of more than one story; and in its general construction the rules and regulations governing the erection of good modern dwelling-houses have been observed. The accommodation it affords must necessarily vary very much according to circumstances, but as a rule it has been found to contain adequate accommodation for a care-taker and his wife, or for a matron when a porter or other male servant is maintained on the premises; a kitchen, together with scullery, larder, pantry, etc., so fitted as to serve the requirements of all the hospital inmates; sleeping accommodation for nurses and staff, that for nurses being, in most cases, on an upper floor, where those who are at work at night may rest by day without being disturbed; a medical officer's room and dispensary; bath-room and closets for the staff, etc. In larger hospitals it is also found necessary to make provision for the accommodation of a resident medical officer, and to provide a mess-room for the nurses and staff. The ad-

¹ From the Architect.

ministrative block is always either completely detached from the ward buildings or it communicates with them by means of a passage, either in part or in whole open at the sides, so that a cross-current of air may pass between the respective buildings. It is also, as a rule, so placed with regard to the entrance to the hospital premises that visitors or other persons can enter it without passing the buildings containing the wards.

The ward buildings which have been met with in so-called permanent hospitals have been constructed either of brick, stone or concrete, alone or in combination, or of corrugated iron, or again of wood. By far the majority have consisted of brick, with stone or glazed colored-brick ornamentation; some, as at Bradford, are throughout of stone, lined with brickwork; and in one instance—namely, in the Weymouth port district—very excellent results have followed the use of concrete. Corrugated iron is not in frequent use; it has generally been resorted to when an effort has been made to cope with a threatened or an existing epidemic; the buildings have been hurriedly erected and the result has not been satisfactory. Even when the iron has throughout been lined with match-boarding, it has often been found impossible to keep the wards sufficiently warm in winter, or sufficiently cool in summer, and it has in some instances been deemed risky to use them at all during the colder season of the year. One of the better examples of iron buildings which were met with is that at Southport, but there was no available information as to the temperature at which its wards could be maintained in winter.

Of the wooden ones much the same may, as a rule, be said. Nearly all have been erected under the influence of panic, and hence they have generally been very imperfect in point of construction. But even where the walls, as also the wooden or tiled roofs have been well lined with match-boarding, a space of some 5 or 6 inches, either filled in with sawdust or not, thus intervening between the outer and inner layer, it has during the winters of 1879-80 and 1880-81 been, as a rule, found impossible at all times to maintain within them a sufficiently equable or sufficiently warm temperature, even when the fireplaces were good as regards both construction and position, and when the window surface and the means of ventilation into the outer air have been by no means excessive.

At Nottingham, where the two layers of wood forming the walls are 6 inches apart, the interspace being filled in with sawdust, it was on one occasion found impossible, even when large fires were maintained night and day, to raise the temperature near some of the beds beyond 32° Fahrenheit; in the Alcester rural district, where there is a very similar building, the temperature was found in the winter of 1880-81, and under the same conditions, to fall to 38° Fahrenheit; in several such hospitals I heard of water freezing near the beds of patients; some are designedly not used in winter weather; and in one instance one of the more substantially constructed wooden buildings was closed during a recent winter because it was believed that the death of two patients had been brought about by the low temperature which it had been found impossible to obviate. In some of the more solid wooden constructions, as at Birmingham and Oldham, so low a temperature has evidently been avoided, but in neither of these districts was I able to procure thermometric observations as to ward temperature. Having reference, however, to the experience which has been acquired, I cannot but conclude that, as regards permanent hospitals in this climate, wooden and iron buildings as ordinarily constructed are not, as a rule, well adapted to the purposes of wards. That they can be constructed so as to ensure a reasonable and a fairly equable ward temperature I do not doubt, but when so constructed, their original cost would probably not fall short of, if it did not indeed exceed, that incurred in the erection of ordinary brick buildings; they would be less durable than these, and the cost of maintaining them in a proper state of repair is undoubtedly greater than that needed for the maintenance of the more substantial structures.

Having regard to the desirability of securing surfaces which are easily kept free from dirt and infection, and which dry rapidly after being cleansed, it has appeared to me that wooden-lined wards are not adapted to the varying needs of a permanent building, especially in cases where the several sets of wards cannot always be reserved for the same diseases. On the other hand, no information has been forthcoming during the course of my inquiry tending to show that wards composed of the more permanent materials, but which are well constructed, well ventilated, and well administered, became in process of time less fitted for the reception of the sick than they were when first erected.

By far the majority of hospitals visited had all their ward accommodation on the ground-floor, an arrangement clearly the most convenient for administrative purposes and also possessing other advantages. Where, however, a site was necessarily limited, there was advantage in the hospital buildings being of two stories, and having a belt of unoccupied land around them in place of being of one story only and covering the site up to, or nearly up to, the limit of the ground. The former plan allowed of something in the shape of airing grounds being provided, besides favoring such reasonable distance between the hospital and neighboring roads and houses as is desirable for the purpose of giving confidence to the public and of reducing any real risk there may be from the proximity to the hospital. Where these conditions have been complied with and where the wards on both floors, as also the buildings generally, were well ventilated and well administered, I was not able to learn of any ex-

perience tending to show that such an arrangement had in any way acted prejudicially.

Instances were, however, met with which tended to show that in the interests of the patients themselves, and this even where a site was properly chosen, any such overcrowding of buildings, or of patients, on site, as could either hinder or interfere with the purity of the air entering the ward windows should be carefully avoided. Especially did it appear necessary so to arrange the buildings as to prevent the possibility of dead-house, laundry, kitchen, and neighboring ward emanations, from interfering with the purity of the air surrounding the patients. So also disregard of the chance of offending or injuring neighboring dwellings by reason of the proximity of the hospital buildings to them was found in some cases to have led to much inconvenience and to subsequent expense.

Among the hospitals visited, and where these several necessary conditions have been fulfilled, I would name those in the Bradford, Cheltenham, Tonbridge and Warrington urban districts, in the Berkhamstead and Solihull rural districts, and that belonging to the Weymouth port authority. In none of these instances does the number of patients per acre exceed twenty. As typical of the reverse conditions the wooden pavilions at Birmingham, which are deemed to suffice for the purposes of some seventy patients per acre, and the three-storied buildings at Salford, where some sixty-five patients per acre are accommodated, may be specially noted.

MONTHLY CHRONICLE.

NOVEMBER 1. The Alhambra Theatre, (a low resort) New York, N. Y., is burned. There had been no performances in it for a week.

November 2. Sharp earthquake shock at Valparaiso, Chili.

November 3. False alarm of fire causes a panic in the Brooklyn Academy of Music. No one hurt.

Burning of a variety theatre at Baltimore, Md., at 3 o'clock A. M. One life lost.

November 4. During a political caucus in the town-hall at Rochester, N. H., the floor gives way. One person seriously hurt.

November 5. Slight earthquake shock at Guayaquil, Ecuador.

November 6. A fire at the Theatre Comique, Providence, R. I., just before the play, is put out by automatic sprinklers.

Burning of the Provincial Poor Asylum, Halifax, N. S. Thirty-one persons burned to death.

November 7. Slight earthquake shock felt at Laramie City, Wyo. T.

November 8. A powder-mill containing six tons of powder is blown up at Windsor, Ont., Canada. One life lost.

A typhoon does great damage to Manila.

November 10. A magazine near Troy, N. Y., containing four tons of powder, explodes. No one hurt.

Cyclonic storm near Des Moines, Io.

November 12. Panic caused in St. Lawrence Catholic Church, Eighty-fourth St., New York, by the falling of a portion of the ceiling. No one seriously hurt.

November 16. The theatre at Gross Becskerek, Hungary, is burned through the overturning of a kerosene lamp. Many persons injured during the consequent panic.

Several persons are killed by the collapse of a building in the City of Mexico.

November 17. Nine children are burned to death in a school-house near Quimper, France.

Explosion of dynamite works at Llandley, Wales. Five men killed, nine injured.

November 20. A powder magazine near Guayaquil, Ecuador, explodes, destroying a church and several houses.

November 30. Burning of the opera-house at Metropolis, Ill.

FIRE-PROOF SHUTTERS.

PHILADELPHIA, December 4, 1882.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Gentlemen, — Being a subscriber for the *American Architect and Building News*, I take the liberty of asking you for information.

Will you be so kind as to let me know by return mail what is the best filler for fire-proof shutters? I propose to make them of $\frac{3}{4}$ "-iron 2" thick, and would like to know what is the best material to fill up the space with.

By answering early you will very greatly oblige,

Yours respectfully,

J. W. A.

[If circumstances lead you to prefer iron shutters to wood encased with tin, we believe that you will find mineral-wool a satisfactory filling. We are inclined, too, to believe that a lining of the porous "terra-cotta lumber," now made in New Jersey, would prove a satisfactory filling. — Eds. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS.

A RAJA'S THRONE OF GOLD. — Although the power of the native Rajahs has declined, there appears to be no corresponding falling-off in the splendors by which they have been accustomed to surround themselves. The *Hindu Patriot's* correspondent at Burdwan states that a splendid throne of gold has just been prepared by two native artists of Calcutta for His Highness the Maharaja. The names of the artists are Harokumar Roy and Kamulkumar Roy. There are 7,000 tollahs of gold in the throne (the "tollah" is nearly half an ounce Troy), and it is exquisitely decorated with vignette-work on all sides. On the top of the back there is the Maharaja's crest, surmounted with magnificent jewels of great beauty. It is added that the throne does great credit to native workmanship. — *London News*.

DISCOVERY OF AN ANCIENT TUNNEL AT SAMOS. — The *Academy* brings a communication by George Dennis confirmatory of the accuracy of an interesting statement of Herodotus (iii., 60). The Greek historian, speaking of three wonderful works executed by the Samians, places the following foremost: "A tunnel through a mountain 150 fathoms high, cut from the base upward, with openings at both ends. The length of the tunnel is seven stadia, the height and width eight feet each. Through its entire length is dug another channel, twenty cubits deep and three feet wide, in which the water of a copious spring is conveyed through pipes to the city." Some attempts at discovering this aqueduct were made many years ago, but with uncertain success, the identification being far from convincing. But, a few months ago, a Samian priest, by unearthing some stone slabs at the depth of about six feet, disclosed a channel sunk in the rock, half-way up the mountain-side on which the ancient city was built. He followed the course of the channel, by opening pits at short intervals, to the base of the rocky height at the west end of the city. "On clearing away the debris at this spot, it was found that the channel penetrated the hill-side in a tunnel, the mouth of which was a narrow passage, just high and wide enough for a man to pass through, paved with slabs, flanked by masonry of small polygons, and roofed overhead by the leaning-to of the upper blocks on each side." Mr. Dennis, in a hurried visit to Samos shortly after, repaired to the spot, and on passing through the opening in the mountain found himself, after a few paces, in a much wider passage roughly hewn in the rock, and about eight feet high and wide — the dimensions stated by Herodotus. Through the centre of this tunnel was sunk a narrow channel, barely three feet wide, and, as the traveller was told by his guide, ten metres deep, which closely corresponds to the twenty cubits of Herodotus. He was also informed that the tunnel ran thus through the heart of the mountain for 1,270 metres, expanding at the further end into a spacious chamber. This length of 1,270 metres differs from the seven stadia of the historian only by about thirty yards. The height of the mountain pierced by the tunnel is given in the Admiralty Chart No. 1530 at 747 feet, which also agrees tolerably well with the round 900 of Herodotus, whose measurement was undoubtedly based only on sight. "As there is no water in the narrow channel nowadays, and no traces of the spring within the tunnel, it probably communicated with open channels in the mountain slope, through which water from the heights to the north or east was conveyed through the tunnel to the city on the south of the range." — *N. Y. Evening Post*.

THE TEMPLE OF ANTONINUS PIUS, ROME. — "The once magnificent temple of Antoninus Pius," says a Roman correspondent of *Galignani*, "whose remaining peristyle of Corinthian columns on the Piazza di Pietra still strikes the spectator with admiration, has been lately adapted to public use as an exchange and chamber of commerce, in which capacity it was solemnly inaugurated October 16, in the presence of the minister of commerce and other functionaries. The Archaeological Commissioners of the municipality having decided that the columns shall be freed from the masonry façade in which they have been hitherto walled, the work is being actively carried out."

LONDON AND THE ELECTRIC LIGHT. — The *Pall Mall Gazette* says: — It will cost £14,000,000 to lay down the requisite plant to supply the whole of London with the electric light. If all the towns in Great Britain and Ireland were to demand to be supplied with the new illuminant, the capital outlay required would be £64,000,000, not including £16,000,000 for lamps and internal fittings. After this expenditure had been incurred the relative cost of electricity to gas of the same illuminating power would be as 29 is to 22. These figures are taken from the calculations which Dr. Siemens laid before the meeting of the Society of Arts last night. The enormous initial outlay, to say nothing of the hazardous nature of the enterprise and the extreme uncertainty concerning the ultimate development of electric lighting, ought to prevent any municipality from applying for powers to light the whole or even part of their area. It is the money of speculators, not that of rate-payers, which should be squandered on such experiments. Notwithstanding all warnings, however, some unfortunate corporation will probably have to be ruined before the others learn that they should no more undertake the responsibility of introducing the electric light than they should spend the corporate funds in buying Turks or Mexicans — a much less hazardous investment.

BEARING THE IDOL MARKET. — A Japanese paper having learned of the craze among Europeans and Americans for works of art from Japan, including the Buddhist and Shinto images, suspects that missionaries sent to that country decry the use of images for the purpose of "bearing" the market. The cunning foreigners send the missionaries to decry the popular religion, and when faith in it is duly shaken, the people are ready to part with their relics. In this way the missionaries and their employers are supposed to make a great deal of money by buying at low and selling at high prices. The explanation is an ingenious one, and may possibly be a specimen of Japanese humor or Satsuma joke. — *N. Y. Tribune*.

COLOGNE CATHEDRAL. — There is a stone on the eastern face of the south tower of Cologne Cathedral which has recently been decorated with a rich gilt border. It is at the height of the central ridge of the roof, and the very stone which was laid by King Frederick William IV, in 1842, as the foundation of the additional work on the towers, then just taken in hand, and but lately completed. From that point, in looking upward, one is able, it is said, to realize with some correctness the enormous height of the new work above the older elevations.

MONUMENT TO JEFFERSON. — Among the recommendations in the book of estimates submitted by the Secretary of the Treasury is an appropriation of \$10,000 to erect a monument at the grave of Thomas Jefferson at Monticello, Va.

THE DISTRIBUTION OF ASPHALTS. — Bituminous substances, apparently of organic origin, are found in various parts of the world. Sometimes they occur in a free state, as in the island of Trinidad, and at others impregnating calcareous rocks, or serving as a cement to hold the particles together, as at Val de Travers or Seyssel. For several reasons the asphalt lake in Trinidad possesses special interest for us. The island, which is the southernmost of the Lesser Antilles, lies off the northern coast of South America, and is easily accessible from any of our seaports. Here, amid the most luxuriant vegetation, is a lake three miles in circumference, on the surface of which lies a crust of asphaltum of such tenacity that in the rainy season a person can walk across it; but under the influence of the hot sun it softens to a thick tar. This crust receives accessions from beneath, and formerly it would overflow and run into the sea, more than two miles away. A similar substance, known as "Jew's pitch," is washed ashore in considerable quantities around the borders of the Dead Sea. In Texas, south of Shreveport, there is said to be a pitch lake containing large quantities of bitumen, but little is yet known about it. In southern California there are accumulations of asphalt on the coast at Santa Barbara, San Luis Obispo, etc., which resembles, when pure, that from Trinidad. It promises to supply the wants of the western coast, as Trinidad will that of the eastern part of this country. In Kentucky there is a considerable quantity of asphaltic mineral which may sometime be utilized for road-making. An interesting and valuable asphaltic mineral, known as Albertite, is found in New Brunswick, and a similar one, called Grahamite, occurs in West Virginia and other parts of the country. In the mountains west of Denver, in Colorado, is a vertical bed of hard and brittle asphalt, not unlike Grahamite, while Albertite is found in small quantities in Lorain County, O., and Casey County, Ky. Bitumen is likewise found in Cuba, and is brought into commerce under the name of *chapopote*, or Mexican asphalt. In Europe, asphalt occurs chiefly in limestone, which forms, when crushed and packed, an excellent pavement. The principal points at which it is found are the following: Val de Travers, in the Swiss canton of Neuchâtel, fourteen miles from Neuchâtel, and sixteen or seventeen miles by rail from the French borders; Seyssel, on the Rhône, in the French department of the Ain, about thirty-three miles from Geneva; Lobsann, a small town in northern Alsace; Vorwohle, in Braunschweig; and Lümmer, near the city of Hanover. The Italian province of Caserta, in the neighborhood of Naples, supplies Rome with an asphalt much used for terraces and flat roofs. — *E. J. Hallock in Popular Science Monthly*.

THE BRONZE IMAGE OF DAI-BUTSU NEAR YOKOHAMA, JAPAN. — The following will serve to give some idea of the size of this famous image: The bronze Dai-Butsu was cast in the year 1252 by Ono Goroyemon, with the sanction of Go Fukakusa-no-tenno, and in pursuance of the desire expressed by the Sei-i-Tai-sho-gum Minamoto no Yoritomo, of the city of Kamakura. The image was originally protected by a temple founded in 730; but in 1495 an inundation from the sea took place, and the temple was completely swept away, leaving only the foundation-stones. Since that date, a period of 387 years, the image has been exposed to the elements, and it is feared it is in danger of perishing. There is now an attempt being made to collect sufficient to build another temple over it. The image is about 50 feet high, 98 feet in circumference at the base, face 8½ feet long, from ear to ear 18 feet, length of eyes 4 feet, and of eyebrows 4 feet 2 inches; length of ears 6 feet 6 inches; length of mouth 3 feet 2½ inches; circumference of thumb 3½ feet, while the knee is 34 feet in diameter. It is cast in a sitting posture, with the feet under it, knees spread out, and hands joined in front. The eyes are nearly closed, giving a placid expression to the face. The head is covered with short woolly curls, and is slightly bent forward. It is cast hollow, and we were allowed to go inside, where there are several small altars upon which pilgrims place burning incense sticks. There are numerous names written on the inside by visitors. One of the priests takes photographs, so we climbed up on the image by a ladder, and poised ourselves in graceful positions on his hands and arms for our photos. Although the idol is worshipped by the natives, they seem to have no reverence for it, but allow foreigners to walk all over it, and do not expect them to show any respect. I have noticed this peculiarity before, in visiting temples. A thing which would be considered highly sacrilegious if done by a native is considered all right in a foreigner. — *Correspondence of the Cincinnati Commercial*.

SOLAR CANNON OF THE PALAIS ROYAL. — The little cannon of the Palais Royal, in Paris, which automatically notes the hour of noon, dates from a greater antiquity than is generally known. It thundered during the Commune, under the Empire, during the days of '48, under Louis Philippe, under the Restoration, during the wars of the Grande Armée, during the guillotines of the Reign of Terror, on the day when Camille Desmoulins harangued the people, under Louis XVI, under Louis XV. In his charming "Journey from Paris to St. Cloud, by Land and by Sea," published in 1751, Néel makes his young tourist regulate his watch by it. The pillar on which it is fixed stands at the point where, in 1641, a year before his death, Cardinal Richelieu established a bound between the manors of St. Honoré and of the Archbishopric. — *L'Astronomie*.

RESTORING FOUNTAINS ABBEY. — It has been rumored from time to time that Lord Ripon intended to mark his conversion to the Roman faith by restoring at least a part of Fountains Abbey. Certainly, if there is to be a revival of monastic institutions in England, it would be most desirable, from an archaeological point of view, that it should be the means of restoring some of the magnificent remains now scattered over the country. Lord Ripon is very rich, and has only one child, Lord de Grey. Fountains was part of the great estate bequeathed to his father in 1845 by a remote kinswoman, Mrs. Lawrence. In 1822, when the fall of five arches of the cloister threatened the destruction of the arcade, they were rebuilt, and the entire roof was shored up. Ten years later the tower was rebuilt, and in 1840 other important repairs were made. — *New York Tribune*.