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THE issue of a suit which was lately brought against the New York Capitol Commissioners is of interest to architects, for it touches one of the most troublesome questions of the contract system. It is less satisfactory in that it has turned, as so many suits that concern the profession have turned, chiefly on some points of verbal interpretation, leaving unsettled points of importance that were really involved, but did not come to the surface, and were taken for granted without discussion. The case was this: a short time ago the Commissioners advertised for bids on the carpenters' work of the Assembly chamber in the new capitol, under an act just passed by the legislature, requiring them to insure the finishing of that part of the building by the first of January, 1879. A law of the State requires that "all contracts shall be awarded to the lowest *bonâ fide* responsible bidder or bidders," after due advertisement and on the giving of proper bonds by the bidders. The committee, it is true, advertised with the usual proviso, which reserves the right to reject any and all bids, but it is difficult to see how any commissioners, acting under such a law, can reserve this right. The lowest bidder was a Mr. George Martin, whose bid the Commissioners rejected, although he gave the requisite bonds, because they found him to be in pecuniary embarrassment, and the contract was awarded to the next lowest. Mr. Martin therefore applied to court for a writ of mandamus to compel the Commissioners to award him the contract, on the ground that his bid was the lowest, and that he was responsible, inasmuch as the securities which he offered were adequate, which was not denied.

THE decision of the court turned naturally on the meaning of the word responsibility. The ruling was that according to the manifest intent of the statute the contractor must not only give satisfactory bonds, but must be himself pecuniarily responsible as well. "Though a person may be able to give security to his employer," said the judge, "yet his ability to do and perform with promptness a heavy contract, involving large expenditure, must greatly depend upon his own resources. For this reason it is assumed that the statute required the successful bidder to be a responsible one, in addition to the giving of the bond for the faithful performance of the contract. Of that responsibility the contracting board must judge." This is tantamount to saying—and the common sense of most people will confirm it—that if the bondsmen only are solvent, and the contractor not, it is the bondsmen only, and not the contractor, who are responsible bidders. The judge also cited—what is of interest only in this particular case—the provision in the recent act which required the Commissioners to "take such measures as shall insure the completion and finishing of that portion of the new capitol" in the specified time, which he said gave the Commissioners large discretion and authorized them to discriminate between bidders, inasmuch as efficiency and promptness in doing heavy work depended largely upon the man who did it, "having reference to his integrity, ability, and responsibility." The writ of mandamus was refused, and the relator, Martin, was ordered to pay the costs.

THIS decision is reassuring, so far as it goes, to architects and engineers, who have the care of public work. Such men

are often embarrassed, in letting the work by contract, by the universal rule which obliges them to award it to the lowest bidder, in spite of the proviso that he must be a responsible bidder. It has been the chief argument of officials who have opposed giving out government work by contract, that no authority is allowed them to reject either dishonest or incapable, or even impoverished bidders, if only they can find adequate security. As to the meaning of the word responsible, in this connection, important as it obviously is, we do not remember any case in which it had been brought into court for definition. There is some relief in the decision of the New York court,—if it is followed, as we presume it must be,—that a responsible contractor must mean one that is solvent enough to carry through his contract; but after all it goes very little way. The court did not, in this case, entertain the question whether responsibility had any other than a pecuniary bearing, and as the word is most commonly and carelessly used, we presume it has not. At the same time it is difficult to see for what reason the responsibility of a contractor should not extend to his capability and his character for honesty. As the usage is, and apparently the law, there seems to be no authority for refusing to put such a work as the Albany Capitol or the Cincinnati Post-Office into the hands of the poorest journeyman who might assume to undertake it, provided he could command money or credit sufficient, nor could the worst character for rascality be made a reason for rejecting him. The purpose of the law is doubtless to prevent favoritism in the distribution of contracts; and its theory, that provided the government is secured against pecuniary loss, its officers can exact the quality of work that they require. It is, to our mind, directly demoralizing to require that such officers shall enter into a struggle of wits with sharpers, or devote themselves to extracting satisfactory work from incompetent men, if it can be avoided,—and it ought to be possible to avoid it by giving a proper discretion to them. If it be held that the government must assume all men to be honest, it is still beyond the stretch of official optimism to assume that every one is capable of doing difficult work satisfactorily. Or it may be said that the necessary authority cannot safely be deputed; and if we accept the theory that our chosen officials are as likely to be untrustworthy as any contractor who may hover round them in search of a job, we may at least remember that they are more directly under control, and that the temptation to collusion with dishonest contractors is as great after contracts are awarded as before. The proper remedy, we believe, is in giving officials a good measure of authority and holding them to a strict accountability for the use of it.

MR. SAMUEL B. TEBBETTS has taken up the cudgels against the Commissioners on the Indiana State House, and, as it is generally understood, on behalf of the architects who think they were wrongfully treated in the competition. As a taxpayer of the State he has applied to the Superior Court for an injunction to restrain the Commissioners from accepting Mr. May's plans and engaging him as the architect of the capitol, on the ground that they have refused to be bound by the law under which they have been appointed; that their action is illegal and "contrary to equity and good conscience." Mr. Tebbetts's complaint alleges: that the experts appointed were not allowed by the Commissioners to make a thorough examination of the different plans and specifications which were submitted; that they were ordered to carefully estimate on only two designs, and to compare the others with these by simply cubing their contents; that they did not test the estimates of Mr. May's design; that it could not be carried out for the estimated cost; that it was condemned by the experts and adopted by the Commissioners against their report and judgment; and finally that the building, if built in accordance with the plans and specifications, would not be permanent or safe, but would fall by its own weight, or upon a slight increase of weight or pressure. He therefore prays the court to set aside the award of the Commissioners and perpetually enjoin them from carrying out Mr. May's plan, but to compel them to make a new examination and judgment of the plans which have been submitted. According to the *Indianapolis Journal*, the competing architects maintain that all these accusations can be maintained, and are divided in their minds whether their remedy is in requiring a new competition or a reexamination of the old one.

WE have no means of judging the merits of the Commissioners' selection, but to architects in general, and for people outside of Indiana, the most important point in the case is the treatment of the experts by the Commissioners. The legislature apparently meant, as it certainly ought to have meant, that the Commissioners should pay deference to the advice of the experts with whom it required them to consult. The principle thus recognized is one which it is of great importance to have recognized in competitions. There is reason to believe that on the contrary the Commissioners arrogantly overrode the judgment of their professional counsellors, and suppressed their report. It is very desirable that this report, which ought to be the most valuable fruit of the deliberations of the Commission, should be made public, both for the information of the people of the State, and because such a report is of technical value everywhere. If the architects are wrong, and simply smarting under the soreness of disappointed competitors, they have their natural reward for going into an oppressive competition, and the Commission ought to be justified by the publication. But if they are right, the remedy called for in the complaints that have been entered seems a lame and impotent one. The charges brought against the Commissioners are serious. There is not much hope of getting a fit decision from a body which had justified them. It may be possible to lead the horse to the water, but it is hard to see how a whole legislature could make him drink. The only proper treatment of such a commission would be to abolish it. Then if a new one were appointed, the wise thing to do would be to allow a board of experts to select a design and leave the Commission to carry it out.

THE day after Mr. Tebbetts's complaint was filed, eight of the competing architects, represented by one of their number, entered an application for an alternate writ of mandamus, to compel the Commissioners either to reconsider the plans that have already been received, or to call for a new competition. The application recounts substantially the same grievances as the first complaint, and says that Mr. May's plans and specifications are incomplete and insufficient; that the building would be unsafe, the walls not being thick enough, nor the floors strong enough, nor the substructure heavy enough; that it is not properly lighted, and its architectural effect is beneath the dignity of the State; that it will cost a great deal more than the two millions allowed by law, as was declared by the experts, and known by the Commissioners. We must confess that we are at a loss to see the necessity of this second application. So far as the Commissioners evaded the law, or set it at naught, in their action, by overriding the experts whom they were required to consult, it is desirable that they should be brought to book and frustrated. But the first complaint would seem to be sufficient for this, if any would, and it seems to us that the architects weaken their case by descending to criticism of their competitor's plan. As for the Commission's choosing the wrong plan, as commissions are very apt to do, this is one of the incidents of competitions which those who rush into them must expect, and for which there is ordinarily no remedy, unless dishonest collusion can be proved. We will not say that there are not cases in which the competitors are justified in resisting and overturning, if they can, the decision of a committee. Or when it came to the pass that there was actual and visible danger of seeing an unsafe building put up, they would be justified in protesting in the interest of the public, but not in their own. But when an architect enters a competition, it is with an implied agreement that he accepts the decision of the judges; only fraud or illegal action justifies his resisting it, and any accusation of this ought to be kept entirely apart from professional criticism. If a bad plan is chosen, the committee must bear the responsibility; it would be intolerable if it came to be a habit for disappointed competitors to fall foul of their successful fellow and pull his plans to pieces in public, however bad they might be.

A JOINT resolution was passed a few days ago, by the House of Representatives, authorizing the Commission on the Washington Monument to spend thirty-six thousand dollars of the money heretofore appropriated to it in strengthening the foundations, so that the work might go on. The resolution was stoutly opposed by some members,—by Mr. Conger, on the ground that the monument was in the wrong place and was insecure; by Mr. Cox of New York and Mr. Clymer, because it was unsightly and unsuitable as well. Mr. Cox proposed that the monument should be razed, and another, such as should be approved by

persons of refined judgment in matters of art, an arch for instance, should be built on some higher situation. This drew from General Butler the characteristic questions, whether there was any place that Congress wanted to arch over; whether there was an arch anywhere which led nowhere; and whether the gentleman wanted any more such exhibitions of modern taste as the present calico fence at the foot of the hill near Pennsylvania Avenue. He also made the suggestion, which is worth preserving for future use, that the House should allow those to whom it had entrusted the matter to go on with their work "without undertaking here, in this House, to decide questions of civil engineering." Mr. Clymer proposed that an arch should be set over the approach to the eastern front of the Capitol. The kind and degree of interest which the House took in the matter appears somewhat from the facts that those who showed any interest in the debate seemed vastly more concerned that the monument should be conspicuous than that it should be appropriate; and that for 227 members who voted when the doorkeeper question came up immediately after, only 153 voted on this question,—ninety-four for and fifty-nine against the use of the appropriation. Mr. Foster made the point, with authority, we presume, though we have never heard of it, that Washington himself selected the present site for the monument, which was then exactly in the centre of the District. It is well known, however, that the first planners of the city miscalculated entirely the directions of its chief growth, and the relative importance of its different quarters. But we wonder how great satisfaction it would have been to Washington, or to the people who loved and revered him, to be told that after three generations of promising, an indifferent Congress would, as much to save themselves trouble as anything, vote money to bolster up a private undertaking that had languished for thirty years, in which nine tenths of their countrymen took no interest; upon which the engineers of the Government looked with distrust, and most of the qualified judges who had considered it as a matter of art, with extreme disapproval.

THE Secretary of the Treasury has communicated to the House of Representatives his answer to their resolution of inquiry concerning the adoption of the Metric System. He acknowledges that the system is "the more perfect theory," but does not think it desirable to make it obligatory in any transactions at present; on the contrary, he thinks great confusion and much litigation would result from adopting it before it is well understood and acquiesced in by the body of the people. Mr. Elliott, chief clerk of the Bureau of Statistics, in a letter appended by the secretary, suggests that the system might be made obligatory in international transactions—custom-house measurements and the like—or for postal charges; and the secretary thinks that it might properly be adopted by Congress in raising the tariff, but doubts if much good would come even of this. Mr. Hilgard, assistant in charge of the Coast Survey, finds it "difficult to say how an obligatory statute could be executed in this connection." He thinks that if it were left to itself, its growth would be very slow, and it would probably not come into use in less than fifty years, but that an active propaganda would hasten it, and so would the fixing of a time in advance at which it should become compulsory, which time might be safely set at the year 1900. But Mr. A. H. Stephens is not disposed to wait for this, and has introduced a bill of his own into the House of Representatives, not to compel, but to encourage its use; and fancying that the long names by which the measures are known are against it, he has tried to smuggle it in under some very odd-sounding names, such as 100 hairs make a nail; 100 nails make a meter; 100 meters make a kile; 100 corns make a nut; 100 nuts make a bipound or bip, etc.—of which some newspapers have made sport very disrespectfully. Mr. Stephens apparently forgets that his countrymen are fond of big words, especially of those that have a Greek sound, and are delighted with an opportunity to make their own abbreviations, which they do with great promptness and decision.

MR. KEELY and his motor will not down. Lately Mr. J. B. Knight, secretary of the Franklin Institute, has been examining the invention, and his testimony is not favorable. He even intimates that Mr. Keely falsifies his gauges so as to make them show a pressure many times higher than really exists. Mr. Keely furnished him with a sample of the so-called vapor used in the machine, which was charged into an iron vessel under a pressure, it was claimed, of twelve hundred

pounds to the inch. This, upon examination, proved to be only atmospheric air, and the tension of it was found to be only two hundred and twenty-five pounds to the inch. We have before mentioned (*American Architect*, No. 96) the reason there was to believe that Mr. Keely's force, whatever it was, could only be made to act intermittently and through a very small space, so that it was not likely to be useful. Even under the enormous pressure which he claims, a small quantity of air would lose its tension very quickly by the inevitable expansion in being drawn off for examination. It would probably be very difficult to test the accuracy of his gauges, or to judge of it with certainty without a careful examination of their construction. But we do not understand that Mr. Keely allows his machine to be taken to pieces, or even that he lets it be known just what is inside. Mr. Knight concludes that the "multiplier" and the "reacting device" cannot produce the force that is claimed, and that their enormous strength is unnecessary and only contrived for effect; that the gauges were wrong, and the pressure probably in no case greater than five hundred pounds to the inch; that the vapor which Mr. Keely has discovered is only condensed air, and his vacuum produced not by absorption of this vapor but by mechanical exhaustion. On the other hand, Mr. O. M. Babcock writes to the *Philadelphia Bulletin*, deploring the backwardness of scientific men in admitting new discoveries, which most people are accustomed to consider one of the world's great safeguards; and says of the Keely motor that:—

It is so far in advance of the present stage of human knowledge, so far above the highest flights of imagined possibilities, so far superior to human conceptions, and so completely upsets some supposed settled theories, that learning stands appalled at the wonderful demonstrations, and in silence waits to see whether it is real or only a dream; while Stupidity cries "Deception, fraud, collusion," Conceit says with a swagger, "Nothing new," and Cowardice closes its mouth and watches to see upon which side, by success or failure, it will find warrant to speak, for accident may deprive this generation from profiting by the fruits of the enterprise.

He offers to give one hundred dollars to any one who will show that there is anything wrong with the gauges, and that Mr. Keely does not "show pressures of his so-called vapor of ten thousand pounds per square inch, and this without pump or piston."

Mr. RUSKIN had printed some time ago autographic reproductions of a few of the etchings of Turner's "Liber Studiorum." The original plates were etched in outline by Turner himself, it will be remembered, and then handed over to the engravers to be worked up in mezzotint, except when he did the mezzotinting himself, which he did in ten of the plates. The reproductions did not satisfy Mr. Ruskin, and he did not continue them. He has, however, been encouraged by some heliotype reproductions to send a score of the etchings, which are extremely rare, to Professor Norton, of Harvard College, who will have them printed in *fac-simile* by heliotype, together with some of them which are in Mr. Norton's possession, making thirty or thirty-five in all. They will be printed with great care, for subscribers only; and the number of copies will be limited to the number of subscribers, which is perhaps to be regretted. It is expected that they will be issued in June.

THE OLYMPIAN EXPEDITION.

THE representatives of the German Empire at Olympia have recently published, in a second portfolio,¹ the results of excavations which, during the winter and spring of last year, were made in the Altis, that sacred inclosure of the Greeks at the confluence of the Kladeos and the Alpheus rivers. This later part of their work, brief as it is, contains so much new material, not only for the study of Hellenic antiquities and civilization but also for the history of architecture, that the only previous authority of note concerning the Olympian plain, the *Expédition scientifique de Morée*, may be regarded as wholly superseded in so far as it relates to this subject. Indeed, after an inquiry into the accompanying German text, one cannot but feel astonishment at the boldness of M. Abel Blouet in making such elaborate restorations from the inadequate facts he obtained by a most incomplete examination of the ruins. Yet honor is not to be denied him for having been the first to penetrate at all beneath the present surface of the earth. The great temple of Zeus, like all the monuments of the Altis, was, until within this century, known only from the scattered notices given by ancient writers, if we except the account left by Pausanias,² merely unimportant mentions. The first description of the condition in which the ruins of the city of Elis³ have remained since their submersion ten centuries

or more ago, was given by Mr. Stanhope in 1824. It was shortly after, in 1829, that the base of the temple was partially unearthed and measured by the French expedition referred to. Since that date nearly half a century has again elapsed and no further investigations were undertaken on the spot until the autumn of 1875, when Professor Dr. Curtius began the work of excavation which is now being carried on. Thirty years ago, in 1848, this same expedition was planned by the celebrated geographer Ritter and Herrn Bötticher and Curtius, but the political uneasiness of that time prevented its departure from Berlin. The treaty which Germany, at the instigation of the latter gentleman, has now concluded with the government at Athens allows everything that may be discovered, all statues and remains of whatever description, to become the property of Greece. The empire certainly labors most unselfishly for the advancement of science, as it thus gives up its claim to any of the valuables it might unearth, contenting itself with results which it shares in common with the whole world. And these results are already of the greatest scientific and artistic importance. We might not regret the apparent illiberalness of the treaty, if convinced that all brought to light in Olympia would hereafter be accessible to universal scrutiny and enjoyment by being worthily provided for in Athens. But that doubts must be entertained of this is lamentable. To-day the statues and architectural fragments lie huddled together in the wooden sheds which the Germans were obliged to build for their temporary reception and shelter. Will Greece ever undertake the labor and expense of conveying these colossal marbles to Athens, through a country almost destitute of roads, and then, after placing them in museums, will it see that they are correctly ordered and catalogued? Those who know that poor and restless land in this century, striving continually for high-flown political aggrandizement, while wholly destitute of means, will not be able to repress a doubt.

It is to be feared that with many discussions and fine phrases no satisfactory result will be reached, but that the statues will be left in their present miserable condition for years, or, what is worse, that they may at last find their way to Athens, there to be thrown together into some government warehouse in such disorder that after a decade no one will be able to decide upon their relative position and significance; the very field of their discovery may be forgotten. Such evils have been known to take place. It is almost to be wished that the Olympian marbles might be carried to Berlin; they would there most certainly elevate the "National Ausstellung" to a formidable rival of the British Museum. For the works of sculpture with which we have here to deal are of the very best period of Greek art. Few originals of the time of Phidias and Praxiteles have hitherto been known, and here whole groups of figures have been disinterred which were formed by their emulators Paionios and Alkamenos, at the very time when Phidias and his scholars were working, in their little house by the banks of the Alpheus, upon the great chryselephantine statue of Olympian Zeus. The world has few creations of greater beauty, of greater dignity and repose, than the best of these fragments which now lean against the sides of the German sheds.

Yet, as before said, the gain in architectural respects is hardly less. The krepidoma⁴ of the famous temple of Zeus has for the first time been entirely uncovered and its expanse accurately measured. The dimensions of the height, also, are approximately ascertained, and the restorations which architect Adler promises in the form of a monograph will, without doubt, be final. We shall then look with interest to a confirmation or disproof of that curious and elaborate system of proportions which the Professor of the history of art in Harvard College has ingeniously applied to this structure.⁵ At present we must be contented with the small wood-cut of the plan which is given in the letter-press, and with the lithographic plate of the front elevation. This is drawn on the same scale, 1:100, as the engraving of the front in the *Expédition de Morée*, and shows the chief error of the latter to have been the excessive height allowed the columns. Their dimension, as deduced from repeated measurements of the separate drums plus a small allowance for their joints, is stated as 10.48 m.

On the French plate it is 11.18 m., a very considerable variation, nearly one third of the lower diameter of the shaft. The magnitude of the plan does not so materially differ, but in the interior of the naos there is an arrangement of hypæthral columns entirely at variance with that suggested by Blouet. It is disappointing to learn that sufficient parts of the roof-opening have not been found to justify a reconstruction of it; still, another year may bring material evidence for a definite decision of this vexed question. From the front, the dimensions of which alone are absolutely certain, it is clearly to be seen that the proportions of the Zeus temple are among the most vigorous known, are equally distant from the exaggerated ponderousness of the early Sicilian examples, and from the graceful elegance of the later Attic Doric, which was ever prone to degenerate into mere concinnity. The temple of Olympia in general composition bears the stamp of the majestic grandeur and firm organism of the earlier Doric; its beautiful details may be compared to those of the

¹ Die Ausgrabungen zu Olympia. II. Uebersicht der Arbeiten und Funde vom Winter und Früh-jahr 1876-1877. XXXV. Tafeln. Herausgegeben von E. Curtius. F. Adler und G. Hirschfeld. (Berlin. Verlag von Ernst Wasmuth.)

² In his travels through Greece. 'Ελλάδος περιήγησις. See Book V., which relates to the country of Elis. Chapters 11-16.

³ The title of Mr. Stanhope's picturesque work is The Ruins of the City of Elis. Olympia, by the way, was never a city, not even a town, properly speaking.

⁴ The krepidoma or sub-structure of a temple comprised the foundation (stereobate) and the stylobate or steps bordering it.

⁵ The Dimensions and Proportions of the Temple of Zeus at Olympia. By Charles Eliot Norton. Proceedings of the American Academy of Arts and Sciences. Vol. xiii. 1877.

older Parthenon, which the writer conceives to have been built at about the same time.

By the discovery of the greater part of the pediment-groups the original arrangement of that in the eastern gable is evident. The breadth and power of this creation of Paionios, when compared with the arbitrary reconstruction of the group by the French, causes the latter to appear to the greatest possible disadvantage. A more edifying example of the infinite superiority of Greek originals over restorations made even by the most capable and cultivated of modern artists could not be desired. The line lithograph of the temple front is not pleasing; the entablature is disfigured by the huge shields of the Roman Consul Mummius, and the entasis of the columns is exaggerated with unhappy effect. Still the drawing does not pretend to be more than a makeshift, — a schematic rendering of the dimensions in default of the accurate drawings which are to be published on the completion of the discoveries. For, though the excavated space around has been cleared, the larger stones of the ruined temple, the overthrown columns and epistyle, have not been removed, and under these many a fragment of the marble roof and upper detail must lie concealed.

The building appears to have been completely dismantled before the occurrence of that earthquake which left not a shaft erect. It is evident that the final demolition must have been the result of some convulsion of nature; the colossal drums are flung out from the cella, far beyond the stylobate, and yet have remained in due order beside one another. It is as though the careless motion of a hand had lightly pushed over little piles of coins, so evenly do the stones of each column lie. The destroying force may be said to have worked from the centre, a large fissure in the stereobate giving additional weight to this supposition. The story of their disorganization as told by the ruins is an interesting one: neglect and plunder, fire, earthquake and flood, each has done its part. Attempts were made in vain during the first year to discover the remaining buildings of the Altis under the sand with which the Alpheus has flooded the plain. This season the efforts were attended with greater success. Prospecting trenches struck upon the Heraion, and from the map of excavations its substructure seems to have been laid well-nigh bare. This Doric peripteral temple appears from the short-coming reports to be the most abnormal example of its style on the continent. With a hexastyle front it has sixteen columns on the side which gives it a very exceptional length. May not this unusual number stand in symbolical relation with the sixteen maids of Hera for whom the temple was built, who here held their festivals and represented the sixteen cities of Elis at that time in existence? Be that as it may, the structure is most curious, there are unnatural variations in the number of the channelings of the columns, and their capitals are of diverse forms. The foundations inside the naos seem to have been intended for columns, and these suggest an hypæthral disposition which, from the agonal¹ destination that we learn through Pausanias² the temple had, seems not improbable. In the cella were found the weathered remains of sandstone Ionic capitals and fluted shafts: the interior order may possibly have been of that style. If it prove so, this will be the first known instance of the adoption of that dual system which in later times became quite general. But with our present defective knowledge all suppositions are vain. It is to be hoped that the thorough investigators may find warrant for a trustworthy restoration, and that they may be pleased not greatly to delay its publication. Of the Byzantine church which was described in a note in No. 103 of the *American Architect*, nothing further of import is stated; indeed, the excavations at its site have been discontinued, as it offers little of architectural interest not already published.³ A Roman exedra, built of brick and situated near the Heraion on the northerly confines of the Altis, should not be forgotten. A semicircular structure it is of very considerable size, the diameter being 15.70 m. The thickness of its walls (1.80 m.) has led to the opinion that it was roofed, but at present there is no means of ascertaining in what manner. More interesting are the two little round temples which flanked it; each a monopteros of eight columns, they were designed to receive statues, perhaps of the Roman emperors. From the plan their greatest diameter appears to be about 4 m.; it has not pleased the expedition to print any exact information regarding them. In character midway between these architectural discoveries and the unearthed statues, there remains as an especially valuable result of this year's work the base of the Nike statue of Paionios. Being the only pedestal of the period which has been found at all intact, it is most noteworthy. It consists of superposed triangularly prismatic stones, seven in number, which vary in height from 0.60 m. to 0.70 m., and are surmounted by a cornice molding somewhat similar to the capital of an anta, and supported by a profiled socle and base. The plans of separate prisms diminish in size as they ascend, so that while immediately above the socle the length of the triangle side is 1.40 m., under the capital it is but 1.15 m. The shaft consequently appears very delicately stepped. The unsatisfactory representation of the Nike in the line lithograph shows the statue as facing the angle of its prismatic support; in the letter-press, on the contrary, it is stated that an examination made since the publication of the plate has shown, from the mark of the figure on the upper block, that it

faced one of the sides, not one of the angles; and this from very evident reasons seems a far more natural and befitting arrangement. This restoration is altogether ungraceful and not pleasing: it would have been well if the plate had been omitted from the portfolio. Various walls and foundations discovered in parts of the Altis are of greater archaeological than architectural importance, fragments of stone and terra cotta, details, gutters, beam-coverings, etc., in some instances with ornament in relief, but more frequently in color, promise, when systematized, to be more valuable additions to our knowledge of the spirit and methods of antique building.

Interesting in every respect, and profitable beyond the most sanguine expectations, have already been the results of these excavations in the Altis of Olympia. J. T. C.

THE PROPORTIONS OF THE TEMPLE AT OLYMPIA.

PROFESSOR NORTON'S essay⁴ is the latest venture into a tempting and dangerous field of speculation: tempting, because every line of inquiry that offers even a faint hope of finding out what the makers of masterpieces were thinking about while at work has a great and legitimate fascination, while the juggles of arithmetic always seem just on the point of making some profound revelation of truth; and dangerous, because the interest of the search is apt to bias the judgment, and because it is, in the nature of the case, hard to tell how far the numerical relations that are sure to turn up are really due to anything peculiar in the data, and how far they are due simply to the means of investigation. It is not easy, for instance, in reading Mr. Norton's paper, to see at once whether the curious relations between the different parts of the Olympian temple that his cyphering brings to light, really illustrate the theory of Greek architecture, or whether they only illustrate the theory of numbers.

The point which his figures go to establish, or, as he would prefer to say, would seem to do so, is that the builders of the temple in question were guided in their choice of dimensions by the Pythagorean doctrines of number, giving a conspicuous preference to the numbers 3, 5, and 7, which, among others, he shows that the Pythagoreans held in high esteem. The numbers 35 and 105, multiples of these, also appear constantly in his tables; while the front of the temple would seem to have measured 735 minutes, each minute being a sixtieth of the lower diameter, and that diameter itself 7.35 Greek feet, if the size of the column and the size of the foot are correctly assumed. Now 735 is, by a curious coincidence, just seven times 105. It is also assumed, in accordance with some analogies derived from other temples, that the width and height of the temple and the height of the column are to each other as 7, 5, and 3, although these analogies seem to have been misleading, since the recent measurements now give a different proportion. We are inclined to believe also that this recurrence of the number 735 is merely an accident, and that it must have been unknown to the builders. For, in the first place, the largest measured dimension of the lower diameter is 2.244 metres, which would give in Greek feet from 7.082 to 7.313, according as we take the largest or the smallest estimate for that measure given by different authorities, the standard adopted in his essay, indeed, giving only 7.279. To jump from this to 7.35 seems unnecessary. Moreover, since decimal fractions and estimating by percentages, which enter so freely into modern forms of thought, were unknown to the ancients, and their means of expressing broken numbers was rude in the extreme, it would seem that even if the dimension 7.35 were just what they intended, they would have called it seven and seven twentieths. But we fancy that what they really intended was to have the diameter seven feet and a quarter, or seven and a third, this inch of uncertainty as to their intention being less than the admitted range of error in the computations. Besides, reckoning the total length of the front of the building in minutes seems an unlikely procedure.

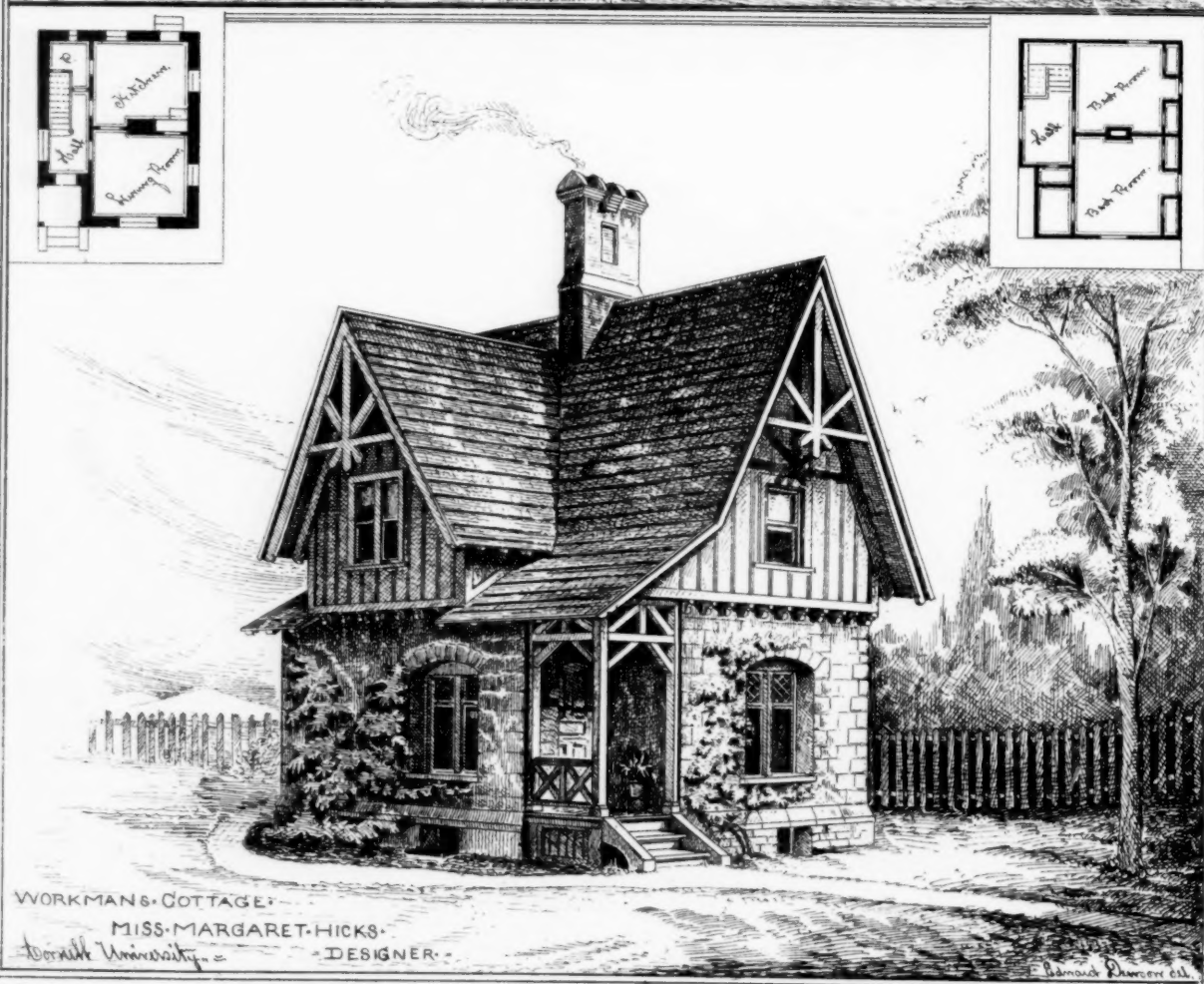
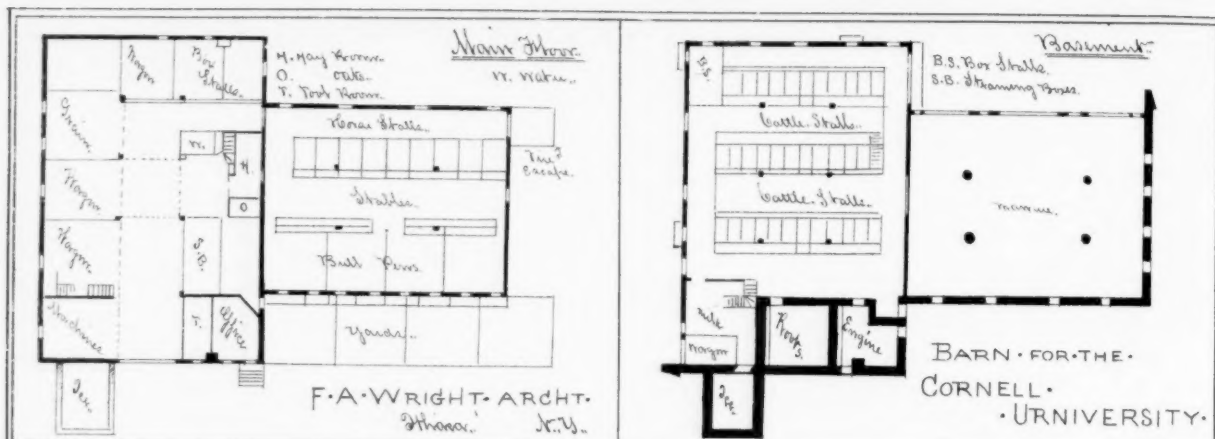
"It would seem," says Mr. Norton, "that the architect, having determined to base his design upon 35, the number called harmony itself, had exercised his ingenuity in devising such dimensions for his temple as should form a complete and most complex composition of harmonic relations." But the constant recurrence of the numbers 35 and 105 is due to the assumption, made from certain analogies, that the upper diameter of the shaft was intended to be three quarters of the lower diameter, the sum of the two making seven quarters. As the lower diameter is divided into sixty minutes, each quarter diameter measures fifteen minutes, and we have at once the factors 7, 5, and 3. The number of minutes having been originally set at sixty, because this number is divisible by 3, 4, and 5, the presence of 3 and 5 in the quarter diameter does not need to be accounted for, while the assumption of three quarters of the lower diameter for the upper diameter accounts, as we have seen, for the presence of 7 in their sum. But even if the source of these numbers were more occult than it is, we should hesitate to attach any special importance to them, for the operation of adding together the two diameters seems a meaningless one, and we cannot entertain the idea that the main proportions of the temple were laid out in terms of their sum, as the paper supposes. It is conceivable that the mean diameter may have been used as a modulus, or common measure, which would

¹ The agonal temple was not solely consecrated as a dwelling of the god, but was used during the celebration of games and festivals. It thus stood in need of the light of day, which was admitted through the hypæthron. Compare Botticher, "Ueber agonale Festempel und Theauren," and the discussions between Ross, Herrmann and others which this publication elicited.

² See the work before cited, Book V., chapter 16.

³ In the *Expédition de Morée*, plate 61.

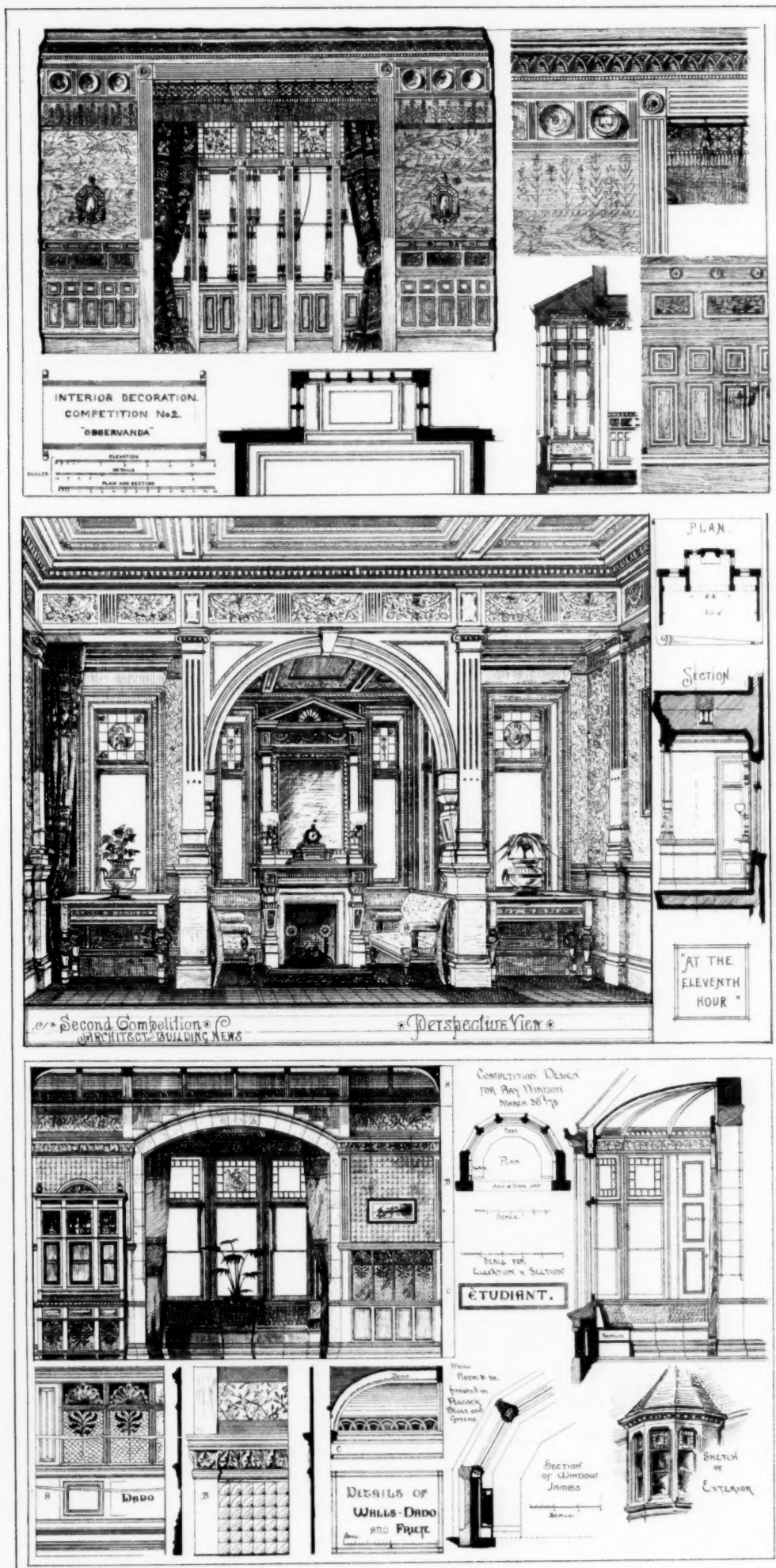
⁴ The Dimensions and Proportions of the Temple of Zeus at Olympia. By Charles Eliot Norton. From the Proceedings of the American Academy of Arts and Sciences, vol. xiii.

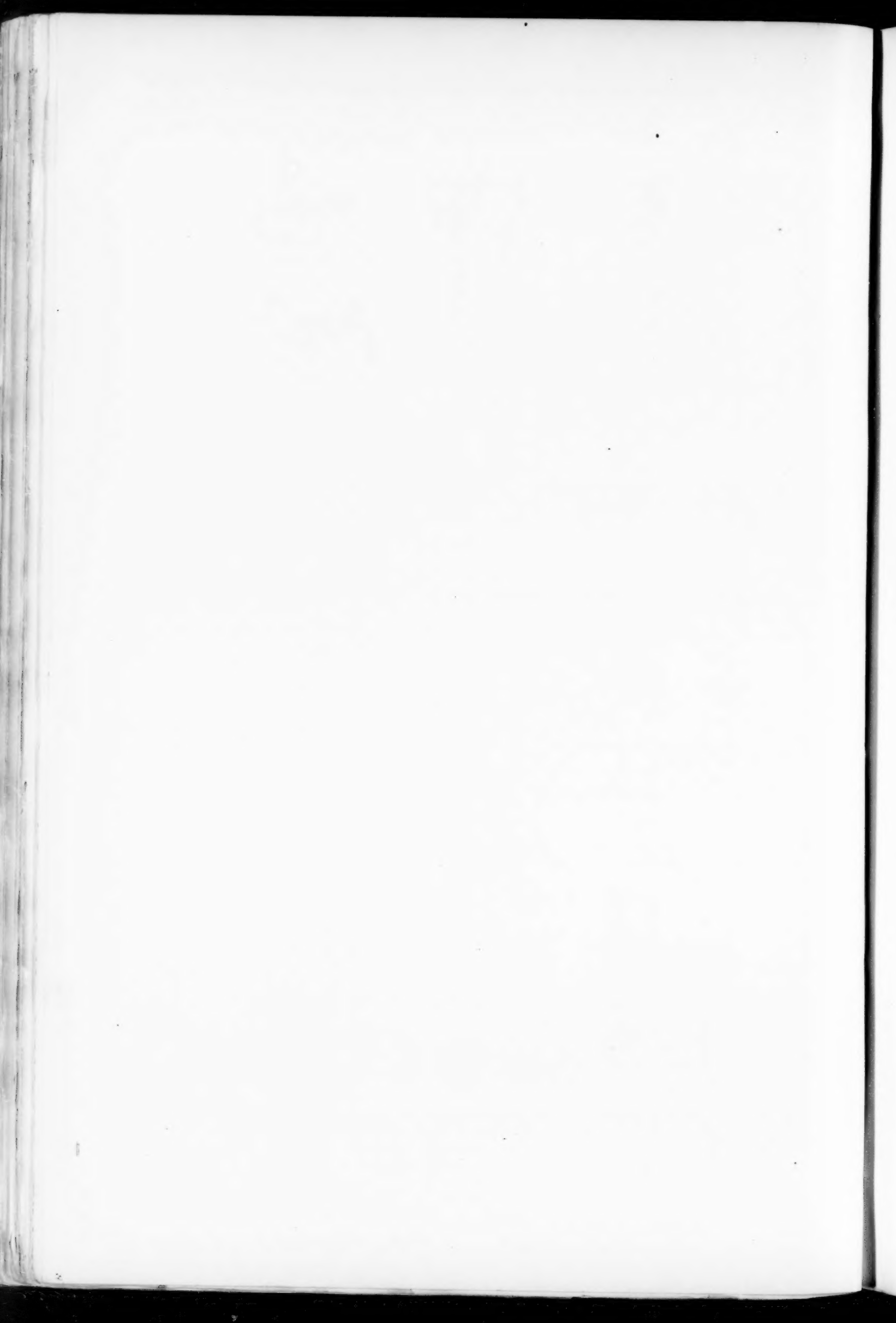


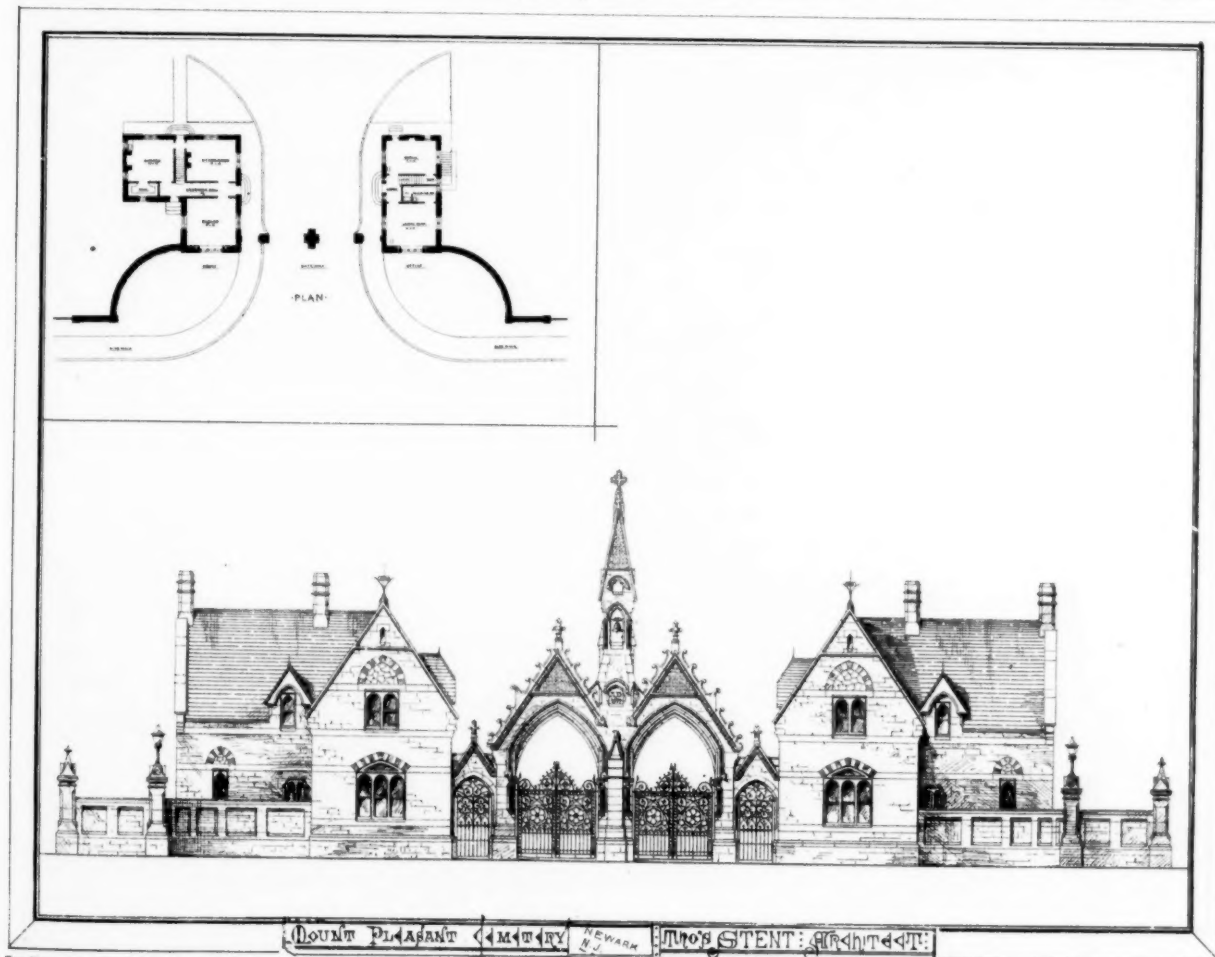
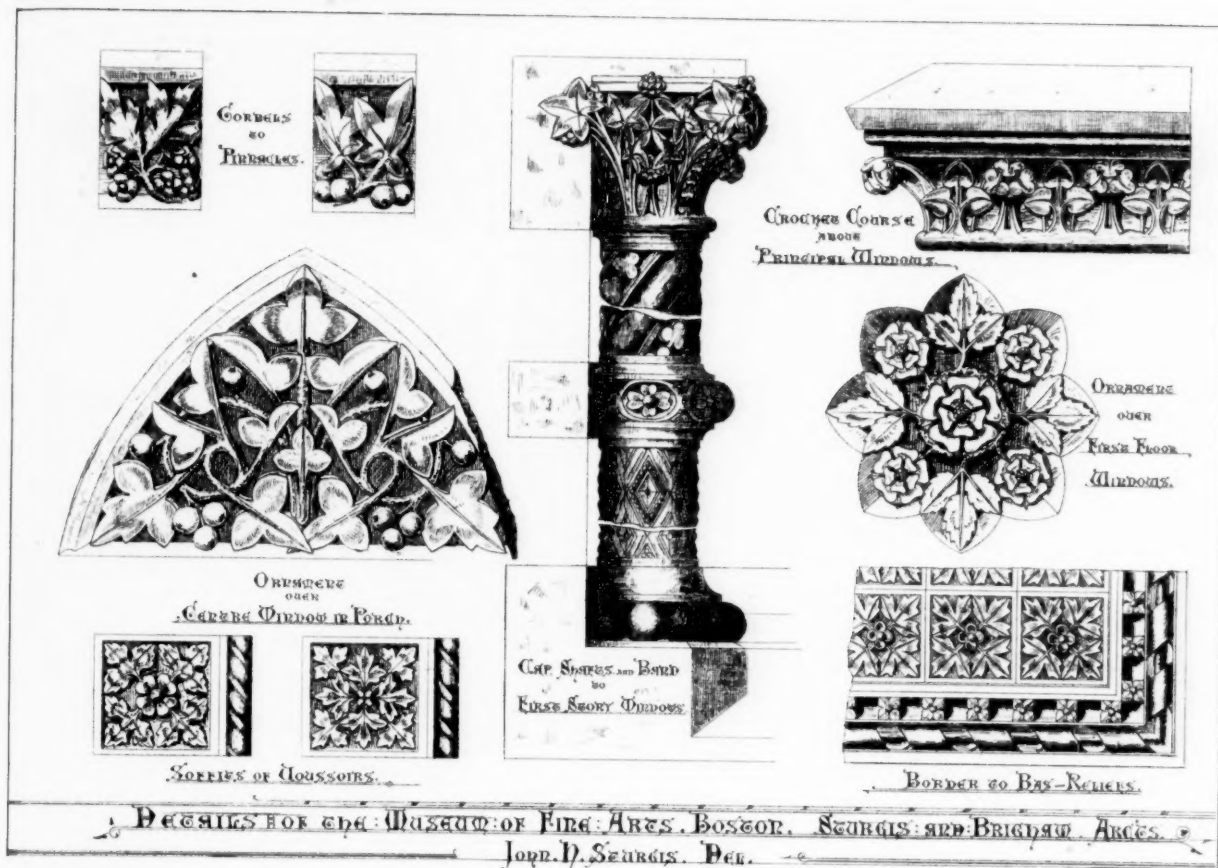


THE RELIANT PHOTOGRAPH CO. 280 DEVONSHIRE ST. BOSTON

THE QUADRANGLE, MUIR COLLEGE, ALLAHABAD UNIVERSITY, INDIA
W. EMERSON, ARCHITECT







come to the same thing. If the sum of the diameters, or 105 minutes, gives the principal dimensions of the building when multiplied by 3, 5, 7, and 16, the mean diameter, of course, will produce the same result with 6, 10, 14, and 32. But in this case the minute or sixtieth part of the modulus would have been measured at the middle of the shaft, not at the bottom, and the curious coincidences upon which the conclusions of the essay are based would disappear or give place to others. For, as the Pythagoreans also imputed mystical properties to 1, 2, 4, 8, 9, 13, and 27, as well as to 3, 5, 7, and 35, almost any dimensions, however measured, would invite similar investigation, and would seem to promise a like reward.

The suggestion, nevertheless, that the simple numerical relations, which in some form or other are generally supposed to have controlled the proportions of the Greek temples, were dictated by a mystical scientific philosophy, seems to us one of great value. Accepting the doctrine that, as Mr. Watkins Lloyd has it, "the Greek architects attached great value to simple ratios of low, natural numbers," writers upon the subject of proportion have generally taken it for granted that there was some æsthetic quality in these relations which gave them importance. As much zeal and patience has indeed been spent in trying to recover the arithmetical or geometrical canons by which the Greeks achieved their mastery of form as in the search for Captain Kidd's treasure, and with about as much result. Mr. Norton keeps clear of all such nonsense, and his suggestion that these subtleties, so far as they existed at all, lay outside of the domain of art altogether must greatly commend itself to artists of every sort, and especially to architects. For none know so well as the designers of buildings how much effect small differences make in one place, and how little change is produced by considerable differences in another; how vastly, in fact, the effect of masses is controlled by the treatment of details. The notion that fixed arithmetical proportions will make the beauty of his work is to the architect a stumbling-block and foolishness; and he will easily believe that they can be dictated by any external considerations whatever, and yet not have power to mar it.

AMERICAN INSTITUTE OF ARCHITECTS.

BOSTON CHAPTER.

April 5, 1878.

The Boston Society of Architects met as usual in the Architectural Library of the Institute of Technology, the president, Mr. Cabot, in the chair.

Mr. Longfellow read a paper on the "Qualifying of Architects," in which was urged the importance of having some standard of professional attainment established, in the interests not so much of the profession as of the public. An informal discussion ensued, in which Messrs. Cabot, Clarke, Cummings, Longfellow, Preston, Sears, and Ware, took part, the main object of which was to discover what precedents were afforded by legislation, or by the action of professional bodies, here or abroad, that would throw light upon the questions raised in the paper.

A vote of thanks being moved it was voted, in addition, that Mr. Longfellow be requested to publish his paper in the *American Architect*, and that a committee be appointed, of which he should be chairman, to further consider the subject and report at a subsequent meeting. The chair appointed him with Messrs. Preston and Sears, to constitute this committee, with power to add to their number. It was understood that they were to obtain information in regard to the questions of fact that had been raised, and if practicable to suggest a scheme of action.

Mr. Sears then introduced the subject of surveyors' quantities, calling attention to the great practical inconvenience of having no uniform and well-established system of measuring work. After some general conversation on this topic the meeting adjourned.

THE ILLUSTRATIONS.

MUIR COLLEGE, ALLAHABAD, INDIA. MR. WILLIAM EMERSON, ARCHITECT.

This illustration, which is copied from the *Building News*, shows one corner of the college now building. This college is intended to form part of the University of Allahabad, where the native Mohammedans are to obtain a higher education. The building is designed in an admixture of Caireen and Indian Mohammedan styles. At present only two sides of the quadrangle are building. The large domed building on the left is the convocation hall, named after H. H. the Maharajah of Vizianagram, who contributed £10,000 towards the work. The open staircase leads to the public gallery. The tower, which is to be one hundred and eighty-three feet high, will contain a peal of bells. The low buildings on the right are the lecture-rooms with open verandas on either side, which the intense heat of the climate render necessary. The stone used in construction is whitish, and is nearly as fine grained as marble.

BARN FOR CORNELL UNIVERSITY. MR. F. A. WRIGHT, ARCHITECT.

DESIGN FOR A WORKMAN'S COTTAGE. BY MISS MARGARET HICKS.

This design was prepared by the only female student in the architectural class at Cornell University.

DETAILS OF THE MUSEUM OF FINE ARTS, BOSTON, MASS.
MESSRS. STURGIS AND BRIGHAM, ARCHITECTS.

This drawing is one of the series prepared by the "Portfolio Club" of Boston.

ENTRANCE TO MOUNT PLEASANT CEMETERY, NEWARK, N. J.
MR. THOMAS STENT, ARCHITECT.

This gateway and the buildings connected are built with brown stone, from the Belleville quarries. The whole is set back forty feet from the avenue, has nearly two hundred feet frontage, and offers a fine approach to the cemetery. On one side is the keeper's residence, on the other are the company's offices and reception-rooms for the public.

DESIGNS FOR THE INTERIOR OF A BAY-WINDOW. — COMPETITION NO. II.

PAINTING AND SCULPTURE AT THE CENTENNIAL. VII.

[The report of Mr. John F. Weir in behalf of Group XXVII., embracing Plastic and Graphic Art.]

CONCLUSION.

REVIEWING the impressions gathered from the art-exhibits of the International Exhibition of 1876, we arrive at certain general conclusions respecting the character of the display.

An exhibition containing so vast a number of works of art (in painting alone the exhibit contained more than five hundred numbers in excess of that of Paris in 1867), and collected from so many sources, must necessarily be far from select, and the first impression, which perhaps outweighs all others, is that derived from the large number of works of but average merit, which, by force of numbers and extent, fill the eye of the observer. This is generally the case with regard to first impressions of art-exhibitions. The more glaring and conspicuous features — the crude, the violent, the bad, and the endless mediocrities that are neither good nor bad — carry the day. It is only by degrees and after the subsidence of these first impressions that works of real merit quietly and unassumingly assert themselves, and the garish, the meretricious, and the false sink to their proper level or remain thereafter unnoticed. It is then that a more deliberate and just impression is formed. If we were to accept the first impression as the true one we should perhaps pronounce the art-exhibit at Philadelphia a disappointing one. But first impressions are rarely based on critical estimates: the feelings, rather than the judgment, find exercise, and, for the most part, are affected by superficial considerations. When, therefore, we reflect upon the large number of really excellent works of art distributed through the galleries, and when we consider the fact that a majority of the most distinguished living artists contributed representative examples of their work, such sweeping estimates are out of place. In some instances, it is true, this representation was very incomplete, but in general it was a fair one and in many cases admirable and select. When we consider, also, how many elements are to be combined, and the large number of interests that are to be consulted, in forming an art-exhibit on so vast a scale, it could hardly be expected that it would have that unity and completeness which a single wise and vigorous direction might possibly effect.

It is a fashion in criticism to decry all art that has not the sanction of time or of established reputation to commend it, and it is a common platitude to apply standards of estimate that prevail in certain schools or in a by-gone age as the only true and immutable estimates of merit. But art is by its very nature pliant and expressive, and as language undergoes continual change and modification with the necessities or conditions that mould and fashion it, so art is likewise subject to these conditions and the time of which it is a voice or expression. It is easy to discern the dominant tendencies of the art of the various nations gathered in this vast exhibition, and these tendencies have been briefly commented upon in the preceding review. It only remains to determine the more general and prevalent characteristics of modern art as manifested in the art-exhibit as a whole. The influence of large and oft-recurring exhibitions is a question worthy of some attention. It is always noticeable that the exhibitions — as at the annual Paris *Salon* — engender products that are not always conducive to the promotion of a correct taste: the clever, the spectacular, and the meretricious often fill a conspicuous place and are held requisite to attract attention. The prominence thus accorded violence and exaggeration is doubtless injurious to the true interests of art, the genuine qualities of which, though lasting, profound, and sincere, are not well adapted to the conditions of such an arena. The artist, therefore, is tempted aside from his better aims to attain the rewards of popular success; and this is so far true that it is a very general custom for artists, particularly the younger members of the profession, to seclude themselves for a few months previous to the opening of the annual *Salon*, while at work upon their pictures for the exhibition. In other words, the picture is painted for the *Salon*, and the motive is that it shall command attention in this questionable competition. This leads to that prominence accorded technical cleverness, and often reduces the products of art to the level of objects of commerce competing in a common market. It would certainly promote the true interests of art if these exhibitions occurred less frequently, allowing time for more mature

and thoughtful work. It is to those alone who are strong enough to resist and ignore this influence that we are indebted for the advancement of art in a true direction, and they compose the very exceptional and leading few whose work has permanent value.

The question of awards is also one that is subject to great diversities of view. Are the elements for comparison of sufficient exactness to allow of just and conclusive discrimination? In the case of mechanical industries and instruments of precision it is possible to set one merit over against another and compare definitely the results. But fine art is an intellectual product, a matter of truth of expression as well as of technical skill; and within any one branch of art questions of preference or comparative merit may arise that are incapable of this arbitrary method of solution. The elements for comparison being wanting, the judgment not infrequently rests upon individual tastes or caprice. It is idle to ignore questions of a higher kind and reduce this competition in art to mere matters of technical skill; and, on the other hand, the subject, though unskillfully rendered, may receive unwarranted preference. A balance of estimates, therefore, is impossible under the circumstances, and it is becoming very generally recognized that the conferring of awards in the fine arts is altogether unsatisfactory because not always properly discriminative. It has but little importance or significance with those who really understand art, and it is not infrequently promotive of false and meretricious estimates. The true verdict in such matters is not always that accorded by juries of award, but that rendered by an intelligent and discriminating public.

The total number of awards conferred in painting and sculpture at the Exposition of 1867, at Paris, was one hundred and three, while at the Vienna International Exhibition of 1873 the total number awarded in these departments of art was seven hundred and eighty-seven. At Philadelphia the total number of awards in the same class was two hundred and sixty-five. At Paris the number of pictures exhibited was 2,004; at Philadelphia the number was 2,971. The following table will show the distribution of awards in painting and sculpture:—

NUMBER OF AWARDS ADJUDGED.

Nations.	Painting.	Sculpture.	Total.
England	29	—	29
France	37	12	49
Germany	21	2	23
Austria	14	1	15
Belgium	16	4	20
Netherlands	27	—	27
Spain	10	2	12
Italy	12	16	28
Sweden	2	—	2
Norway	3	—	3
Russia	6	—	6
Canada	1	—	1
Brazil	1	—	1
Mexico	2	1	3
United States	41	5	46
Total	222	43	265

It has been the aim, in this report, to select those works that seemed specially worthy of comment, for the purpose of analyzing the character of the exhibits of the various nations, and in order to form some reasonable estimate of the tendencies that are most marked in the fine arts at the present time, as well as to form a proper critical review of the Art Department of the International Exhibition of 1876. This task has been, in some respects, a difficult one to execute; but the endeavor has been to render it free from personal bias, and if the estimates are not altogether accurate it is not from any lack of strict judicial purpose on the part of the author.

DISPUTED POINTS IN HOUSE-DRAINAGE.

1. MR. BAYLES'S criticism, on page 103, of our recommendation to trap the soil-pipe (outside of the foundation wall) would be a good one if the public sewer were properly constructed, and if every other house had its soil-pipe in untrapped connection with it. But it is not desirable that one house out of a hundred should furnish ventilation to a sewer which ninety-nine other houses are helping to foul. We want a circulation through the soil-pipe, but we should prefer to take our supply from the open air rather than from a foul and imperfectly ventilated sewer,—such as we had under consideration.

A water-seal will not prevent the transmission of gases from the sewer, but it will prevent a current of sewer air. As to the blowing out "through fixtures, into living and sleeping rooms," the plan which we suggested would not have this effect, there being another and easier means of escape.

2. The Emerson ventilator, which we recommend, keeps out ice and snow. If enclosed in coarse wire netting ($\frac{3}{8}$ inch mesh) it keeps out birds. A bend reduces the practical area of the pipe and retards the movement of air,—up or down.

3. If sewers are properly made, then the recommendation for open man-hole covers and free ventilation through the soil-pipe of each house has, and has had, our fullest indorsement. But we must make the sewers right in the first place.

CORRESPONDENCE.

THE INDIANA STATE HOUSE.—A CURIOUS LEGAL CASE.

CINCINNATI, O.

WE learn from one of the experts in the Indiana State House competition, that he can see no just grounds for discontent among the disappointed architects,—every one could not be successful. It seems that the award at the competition did not lay with the three experts, as many persons suppose. The experts merely reported to the commissioners simple facts in each set of plans as regards heating, lighting, ventilation, cost, strength, and perhaps a dozen other points; these various reports were made without comment by the experts, and the commissioners were left to draw their own conclusions. In short, the commissioners made the award, and not the experts. It is said further that Mr. May's plans were perhaps the only ones that fully complied with the printed conditions that governed the competition, or at least they came the nearest to the mark.

We paid a visit to the Music Hall building with the view to giving a full description of it, but everything is in such an unfinished state that it would not be fair to offer any criticism at this time for fear of being unjust.

A novel case is now before our courts for settlement. Messrs. Hurlburt and Bell are joint owners at Wood's Theatre, at the corner of Sixth and Vine streets,—each party having a deed to one half the lot upon which the building stands. For some reasons Mr. Hurlburt desires to pull down his half of the building and erect on the site a different kind of a building, and had in fact already engaged an architect for the preparation of the necessary plans; whereupon Mr. Bell, through his attorneys, asks for an injunction to restrain the defendant from tearing down the building. The court granted a temporary restraining order, and the case will come up for final hearing within a week or so.

C.

MODERN CHURCH ARCHITECTURE.

TROY, N. Y.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Dear Sir,—The article, "The Church Architecture that we need," published in your number of January 12th, contains many good points, but it does not elaborate the subject sufficiently to commend itself to the majority of those interested in church building.

English Gothic, especially Decorated Gothic, is a beautiful style, rich, flexible, and perhaps superior to any other for church buildings, and no one can object to its adoption as a basis. The interior arrangement suggested for a church, of a nave, combined with a deep chancel, divided into choir and sanctuary, with its apsidal end, its steps, railing, altar, reredos, rich furnishings and decorations, and its side organ chamber, will readily commend itself to the Episcopalians, but this admirable arrangement fails to meet the wants of the Methodists, Baptists, Presbyterians, and Unitarians, who are largely the church builders, and who need good advice in church-building matters more, perhaps, than do the Episcopalians. What I propose is to suggest an arrangement suited to the services of the denominations named, and I will consider, first, the interior.

The simple proportions of twice the width for the length of an audience-room will answer in small buildings; for larger ones, one and a half times the width for the length is better, and if to this room, or nave, are added transepts of moderate depth, the effect will be improved. These transepts should be deep enough to receive a tier of pews, six feet or eight feet in length, and when so utilized, the result is to bring a large proportion of the audience near to the speaker. To the nave, with its transepts, add a deep recess, chancel or sanctuary, and the plan becomes cruciform. Make the chancel as wide as the nave and deep enough to receive the organ, and to accommodate everything connected with the service. The floor in its front portion should be raised at least three feet above that of the audience room, and should project slightly into the transepts or nave, so that all may see and hear the speaker properly. This floor or pulpit platform should be spacious, and on it should be the pulpit and reading desk, which should be as small as will answer. In front of this elevated floor place a lower platform, raised one step above the floor of the audience room, and make this large enough to accommodate the communion-table and the necessary chairs for those who officiate at the communion-service,—and in Methodist churches, surround this lower platform with a kneeling-step and railing.

Place the organ at the rear of the chancel, and arrange its pipes with care, so as not to obscure the window or windows in the end wall. Make the floor in that portion of the chancel back of the pulpit platform two feet higher than that used by the speaker. Place seats or stalls for the choir on either side of this raised portion of the chancel, and provide seats enough for a large choir; these seats are to face each other; and a wide floor space is to be left between them. Place the keyboard of the organ in line with these seats, and so avoid making the organist conspicuous, and provide seats at the side of the chancel, on the pulpit platform, for the use of the clergy.

In Baptist churches, place the baptistry in the centre of the upper portion of the chancel, in front of the organ, and provide screens on either side, so that candidates can enter and leave the baptistry without being seen by the audience, and the baptistry should be elevated above the choir floor. Entrances to the chancel, at the sides, should be provided for the use of clergy and choir. In

churches where the font is used, place it on the main floor, to the right of the pulpit platform.

With the above arrangement, all the services can be conducted "decently and in order," and can be enjoyed by the audience without any discomfort.

The audience room should have a broad central aisle, two side or wall aisles, a wide space in front of the pews, and a wide vestibule; this latter should extend across the front of the church and should be kept warm in winter weather. If a gallery is added, place it over the vestibule: make it as small as will answer, and provide two stairways leading to it. No galleries should be introduced if they are not needed to accommodate the ordinary congregation. Provide ample entrances at the front of the audience room, and also ample means of exit at the opposite end of the room, which may be used in case of fire or panic. Rooms for the clergy and choir should be placed conveniently near to the chancel.

In the matter of height, great care must be taken. If the height of the room in the centre equals its width, it will be found sufficient. Lofty rooms, having groined ceilings or open timbered roofs, if well designed, are beautiful, but such rooms are difficult to heat in cold weather, and unpleasant acoustically to both speaker and hearers. Flat ceilings for small rooms will not be found objectionable, if properly decorated, and they are, of course, economical. A good form of ceiling is that which rises from the side walls to the centre, leaving the tie beams of the roof trusses exposed. These beams can be chamfered or moulded, and under their ends can be placed hammer-beams and braces, on which a large amount of ornament can be bestowed. The plain surfaces between the beams may be of wood or plaster and can be enriched with ribs, and any amount of color decoration. This form of ceiling, when applied to nave, transepts, and chancel, gives a very rich effect at the intersection, and the chancel portion can receive that superior richness which should be given to it. In beautifying the audience room, all its adornments should be churchly; the style of architecture, the furniture, and the decoration must harmonize. Plastered walls and ceilings will be used in the majority of churches. Tint the walls a pleasing warm color,—use a rich blue for the body of the ceiling and make all applied colored ornamentation "flat work," and avoid the use of all imitation raised work, panels, or recesses, and all imitations of stone-work.

Gilding and bright colors should be used, but not profusely. Introduce under the cornices of the side walls, around and over the chancel arch, in the vestibule, and in other proper places, texts, in richly illuminated letters; let the letters be ornamental, but legible also, and let the texts be, not the Ten Commandments, or those passages which form a basis for the creed, but those which are dearest to the heart of every Christian, the words of Christ, and those which preach continually of God's love and wisdom.

Insert in the walls memorial tablets, in honor of the respected dead and those who were beloved by the church when living, and who are tenderly remembered. Make the windows large enough to give ample light after it is "strained" through colored glass. Let the glass be such as will deprive the light of its glare. Give to the windows beautifully designed emblems, and let them be memorials also, but introduce no stained glass pictures, unless they are those which can claim the perfections of art.

Frescoed pictures and paintings in oil, illustrating the personages and the stories of Scripture, are an appropriate adornment for churches; these are costly, if worthy, but I hope the time will come when they will be largely introduced, and that our church interiors will be made rich with pictures and with statues, monuments, frescoes, memorials, and all art works of an appropriate character, as are the grand interiors of the churches of Continental Europe, and when they are so enriched they will gain a hold on the affections of the people, which our ill-designed and barren sanctuaries never can. No ornament, enrichment, or work of art, is too good for the church; all that is beautifying, all that will please the senses, and compel reverence, should be used as far as resources will permit.

The pews, chairs, stalls, tables, and all minor furnishings should partake of the general churchly character, and cabinet-makers' articles should be avoided. The furniture and finishings of wood should be of ash, walnut, or some other hard wood, finished with oil or varnish. Painted wood-work soils easily and requires much cleaning and frequent repainting. Pews should be of ample width; not less than two feet eight inches from back to back, the seat fifteen inches high, fourteen inches wide, and the back nineteen inches high with an inclination of five inches; these dimensions will suit most persons.

To ventilate an audience-room, provide a large number of flues in the walls, having registers at the floors; let these flues extend up to the space under the roof, and in this space continue them to openings in the roof near the ridge, covered by small gables; a lighted gas-burner placed at the bottom of each flue will rapidly create a draft, taking the air from the bottom of the room. Fresh air is supplied by the heaters when they are in use. When they are not, or when a supply of outside air is needed, it can be secured by means of openings in the exterior walls at the floor line, and so arranged as not to make the floor objectionably cold. To get rid of the overheated air, place ventilators in the ceiling and roof, controlled by valves and cords.

But church edifices require much besides the audience-room; the chapel or session-house should be placed at the side or rear of the

main structure, and connected with its rooms or halls which are on either side of the chancel. If the chapel is made two stories in height, place the Sunday-school room in the upper one, so that its ceiling may extend up into the roof; furnish this room with connecting chairs, which can be arranged in straight lines or curves to suit the classes, and connect with it a library-room, an infant-class room, and two or three others for Bible classes; and provide two stairways, widely separated, leading to the first story. In the first story place the lecture-room and make it no larger than the average attendance requires; connect with it the needed class-rooms, and provide a study, a large and a small parlor, also a kitchen and pantry. Decorate the rooms in the chapel in a manner to harmonize with the church. Make all its rooms cheerful yet churchly. Furnish the parlors with carpets, easy chairs, sofas, pictures, curtains, and everything essential, that will render them inviting and home-like. Ventilate these rooms in the manner suggested for the audience-room.

If the necessities of the site compel the placing of the Sunday-school room and the others referred to in a basement, let this basement be a story of from twelve feet to fifteen feet in height, and have its floor above the ground a step or two. The great objection to such an arrangement is the fact that the audience-room must be reached by long stairways. To help this matter, provide six or eight outside steps at the entrances. Make the vestibule wide and long, and divide the two stairways into two sections each, having broad landings or platforms half way up. All church edifices having a basement should be provided with a "safety-valve," in the shape of a spacious rear stairway, and all doors used by the audiences should open outwards.

The general preference given to Gothic architecture in church buildings seems natural and proper. It is a style which affords an endless wealth of examples, an unlimited field for artistic invention. It suits all forms and situations; it admits of modification, of new detail, of new materials; and so long as its aspiring spirit is not violated, the architect can combine its ancient characteristics with his original work in a manner which will produce happy results.

M. F. CUMMINGS.

THE PERSPECTIVE OF STATUES.

LEAVENWORTH, KAN., April 2, 1878.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Dear Sir,—Can you tell me through the columns of the *American Architect*, the rule for ascertaining the height that a statue should be, which is to be placed on a high tower or on any elevated point, to appear the height of an ordinary person to an observer at a short distance from the tower? Hoping to receive an answer, I remain, Respectfully yours,

C. A. DIETRICH.

ART WORKMEN.

A RETROSPECT of the progress of art during the past ten years may give us some hope and encouragement that in the future a higher degree of excellence will be attained. There has been some advance made toward the acknowledgment of principles in architecture, and an endeavor to be honest in the expression of our designs, while at the same time faithfully working out in planning and use of materials a perfect adaptation to modern requirements. The taste of the general public has been educated and a healthier tone prevails, greatly attributable to the diffusion of literary works on decoration and household furnishing, and the production of improved designs in furniture, a reaction from the lavish works of the preceding period.

But while we have in these things made some progress, has the workman risen in intelligence and appreciation of art? It would seem in England, at least, in spite of all the incentives there for the encouragement of a true art feeling, the workman remains as much as ever a mechanical tool. Mr. J. P. Seddon, in a recent article to the *London Times*, says:—

"I had told an audience of the same class that art workmen were conspicuous only by absence; that architects had to rack their brains to produce effect by designs capable of being executed by idiots; that it was impossible now to get one leaf well carved, although quantities of carving were being done which looked, to half-shut eyes or at a distance, like old work, but which was not; that the results of that very exhibition showed that time had been spent better than in public-houses, and that some ingenuity of a practical and scientific nature existed; but that as regards art work, whether in point of design or execution, there was nothing there above mediocrity (except a couple of walking-sticks carved by a plasterer named Sable with a pen-knife), and, in fact, nothing artistic to equal what came to us from people in the East whom we choose to think savages. I told them to go to Westminster Abbey Chapter-house, to examine and reverence the leafage of its capitals, and to the Architectural Museum near Dean's-yard to see the casts collected there, and to learn thence how in all parts of the world, at all times, until the last three centuries, men's work had been generally beautiful and true. I trust Canon Farrar's recommendation that such exhibitions should be widely imitated will be carried out, and that art work, for which there is sore need, be fostered by them, and that we may cease to have to try to dispense with carvers and to supersede masons by puddlers of Portland cement; or that we should have to go to Japan for good joiner's work and to Belgium for cheap metal and marble work. I have infinite faith in the powers of English workmen if they will only learn to use them, and think that they might, and would, soon again beat the world in craftsmanship, if only they would first beat or leave the unions which have degraded them."

Who has not wished that the workman might be imbued with more understanding and sympathy for art; that he might attain the excellence of the old builders who worked on cathedral and church,

carving there the expression of their power? In the work of the mediæval ages much was left to the individual worker, but now how different! The whole of the work of any building, down to the smallest detail, has to be delineated, and, during execution, constantly supervised, thus entailing enormous labor on the architect. But with workmen who had the proper training and culture this burden would be lightened. Again, the more directly an idea is expressed in building — translated into stone — the more vigorous and effective will it be. The designer of any piece of carved work will execute that work more truly — technical knowledge being equal — than another to whom the working out of the design is given.

Hence, with a wider diffusion of feeling for art among our workmen, the labors of the architect would be lessened, our architecture would become more of a living art, and the general sympathy and appreciation of the public for good work would be greatly increased.

R. B.

NOTES AND CLIPPINGS.

STRIKE. — Undaunted by the ill-success that has attended the recent strike in London, the masons of New York have now struck for \$2.50 per day. Already six hundred masons are said to be out.

STRIKE. — On April 7th, a strike occurred at the insane asylum now building at Topeka, Kan. The contractor receives pay upon the estimates submitted to the board at their monthly or bi-monthly meeting. The strikers are sub-contractors and men who say they have not been paid as they should be. The grade-men have also struck because they have not been paid. It is said that the non-payments are not the fault of the State or board.

ACCIDENTS. — Two accidents of an unusual character have happened during the past week. One at Rochester, N. Y., where an oven used for baking the japanned tin cases of thermometers exploded, destroying the building, killing one person and maiming several others. The other accident was at Buffalo in the same State, where a large vat at the Grape Sugar Works, which contained some fifty tons of wet corn, burst and fell through five stories to the ground, killing one man and wounding others. The vat was a new one and was being t-e-ted at the time of the accident. The knowledge that the power exerted by swelling grain is almost irresistible makes ship-owners unwilling to transport cargoes of grain in bulk, because, if the cargo gets wet, the loss of the ship is almost certain. One of the curious uses to which this property of grain is put is the disarticulation of the bones of the skull, which are forced apart by the slow action of the swelling grain so as to injure them as little as is possible.

ACCIDENT. — While taking down a frame building in Ottawa, Ill., the roof fell and injured three workmen.

THE PHILADELPHIA WATER SUPPLY. — Lately the Messrs. Cramp and Sons offered to supply for five years certain portions of Philadelphia with water, receiving pay at the rate per million gallons raised one hundred feet that is now paid by the city, or twice as much per million raised two hundred feet. The Messrs. Cramp state that they can build the necessary machinery for \$100,000, and with it raise 14,000,000 gallons daily to a height of two hundred feet, at a cost to themselves of \$200 per day, which would enable them at the end of five years to turn their plant over to the city and leave them with a balance to their credit.

ARCHÆOLOGY IN MISSOURI. — Several crypts or vaults walled in with dressed limestone have been opened recently upon the bluffs of Blackwater River, about two miles from Warrensburg, Mo., in which were found specimens of pottery, stone pipes, and various implements whose use is not known. Twenty-four skulls were taken out at one time, all of which were so fragile as to be difficult of removal. The same is true of the pottery. Upon some of the pottery are unintelligible inscriptions. The vaults so far explored are about ten feet square and six feet high. There are a large number of these mounds on the banks of the Blackwater, at this place, some of them covered with very large trees.

GAS LIGHT AT WASHINGTON. — It is said that the cost of the gas for lighting the public buildings and Capitol grounds at Washington was last year nearly \$92,000, and that the cost of lighting the President's house alone is \$10,000 a year.

THE MORMON TEMPLE. — It is said that the walls of the Mormon Temple at Salt Lake City are now eighteen feet above the surface of the ground. Work was begun twenty-four years ago, and if the same rate of progress is preserved throughout, the walls, which are to be 120 feet high, will be finished in about 150 years.

A MOVING TOWN. — There seems to be good proof that Virginia City, in Nevada, is slowly moving down hill. Whether this motion is due to the tunnelling and mining operations going on beneath it, whether it is owing to seismic action, or whether it is caused by some other geological movement we cannot say. The facts which indicate the movement are a crack on the western side of the town some eight inches in width, on one side of which the ground is three feet lower than on the other side; a water-main recently uncovered which was found to be telescoped for the length of a foot and was besides this so bent that a portion had to be replaced; and the statement that the International Hotel has moved five inches since it was built.

THE KRUPP IRONWORKS. — The *Economist* cites from the report for the year 1877 of the ironworks of Herr Krupp, at Essen, the following figures: Notwithstanding the reduction of the number of workpeople, Krupp still employs 8,500 men in his cast-steel works. The works contain 298 boilers and steam engines, with 11,000 horse-power; 77 steam hammers from 2 to 1,000 cwt. each. In 24 hours the works can produce what would

be required for 12 English miles of railway, besides wheels, rails, axles, springs, and also 1,500 shells. In one month 300 cannons can be made in these works. Since 1847, 15,000 cannons have been cast in Krupp's Works. Thirty-six thousand hundred weight of coke and coal are used every day. The conveyance within the works is carried on by railways, extending over 60 kilometres, with 24 engines and 700 cars. Forty-four telegraph stations are within the works, besides a well-regulated body of firemen and 8 steam fire-engines. Near Meppin, Krupp is having an artillery-range prepared for him, which extends over 18 kilometres. In Krupp's mines for iron and coals, 5,300 men besides are at work. He has mines in the north of Spain producing 4,000,000 cwt. of iron metal yearly, which are transported in five steamers belonging to Krupp. The work-people, with their wives, number 16,200 persons, who live in 3,277 apartments belonging to the firm.

RUGBY. — It is intended to build a museum of the fine arts at Rugby, in the interests of that famous public school.

THE DOURO BRIDGE. — The Northern Portuguese Railway has lately completed a fine work of engineering skill, which we have already mentioned, in a bridge over the Douro, at a point where its breadth is 140 metres (455 feet), and its depth 18 metres (59 feet). The bed is sand and mud, with a thickness varying from 15 to 56 metres (49 to 182 feet). The river is subject to great and rapid freshets, which sometimes raise the surface 12 or 13 metres (39 to 42 feet) in 24 hours. The railway reached the bank of the stream at a height of 60 metres above the low water level, and at this height the distance between the banks was 350 metres (1,140 feet). The construction of a viaduct, under the circumstances, presented serious difficulties. Plans were presented by four firms, and the one offered by G. Eiffel & Cie., of Paris, was adopted. It was impossible to think of building a pier in the river; it was therefore bridged by a single iron arch, of 160 metres (520 feet) span, a little larger than the central span of the St. Louis bridge. The arch abuts against piers of masonry on each bank; there are two other piers on one side, and one on the other, at distances varying from 29 to 37 metres (94 to 120 feet). The central arch is crescent-shaped, formed by two parabolas, intersecting at the abutments and having a height of 10 metres (32 feet), at the crown. It is composed of two principals side by side, hinged at the abutments, so as to allow for changes of temperature; at starting they are 15 metres (49 feet) apart, but the distance is reduced to 4 metres (13 feet) at the crown. This arrangement was made in order to secure effective resistance to the violent winds which are frequent in the valley, and all the trellis-work, both of the roadway and of the piers, was planned for the same purpose. The mounting of the arch presented great difficulties, on account of the impossibility of erecting scaffolding, but by the help of steel cables, crossing the river at the level of the platform, the two halves, simultaneously constructed, met at the key with absolute precision. — *Ann. des Ponts et Chaussées.*

THE DRESDEN THEATRE. — The size of the stage of the new opera house is said to make it unsuited to the drama.

THE PUERTO DEL SOL. — The Puerto del Sol at Madrid is now illuminated by the electric light. The lights are six globes of opal glass in sets of three, on two lamp-posts, which are about twice as tall as those usually used for gas. These six globes were all of equal brilliancy, and emit a soft, penetrating light as steady as an argand burner.

THE ECCENTRICITIES OF FORGETFULNESS. — The Viennese architects seem to have been peculiarly unhappy in forgetting some of the most common essentials of their buildings. Thus, it is said that at the new Opera-House the heating apparatus and the water-closets were forgotten. While at the University the stairs to the observatory tower were forgotten, as well as the janitor's quarters, while the library was so small that a portion of the books had, from the beginning, to be stored in the cellar. It is also said that it was found out after the bell had been hung in the tower of a new church, that the tower was so small that the bell could not be rung.

MANUFACTURING COLD AIR. — Professor Gamgee is exhibiting in California, says the *New York Tribune*, a machine for making air cold, by means of which he hopes to be able to reduce the heat of mines, to keep the holds of vessels at a freezing temperature while conveying fresh meat, to maintain a floor of ice in a skating-rink during the hottest weather, and to perform many similar wonders. An ammonia-machine last summer did such work for a beer-brewery in New Jersey, situated near the line of the Delaware and Lackawanna Railroad. None of these devices use ice in the process of cooling air. In a recent pamphlet by Mr. Robert Briggs on the "Relation of Moisture in Air to Health and Comfort," he shows by a mathematical calculation that the quantity of ice needed to cool an apartment in a hot summer's day to the temperature of spring might be thirty times the quantity of coal needed to heat the apartment on a cold winter's day; even under the most favorable conditions, when the air is so dry that no moisture would have to be removed, the proportion of ice to coal would have to be fifteen to one. Cooling by means of compressed air suddenly allowed to expand would, Mr. Briggs thinks, be far less expensive than the use of ice, but still too costly for ventilating purposes to serve practically in making our houses cool in the summer.

THE FLEXIBILITY OF FREESTONE. — A piece of freestone 16' 0" long, 3' 6" wide, and 8" thick, being raised to its position in the Music Hall at Cincinnati (some 20' 0" above the ground) with grappling hooks, showed a clear deflection of 1½ inches.

THE BASTILLE. — At the time of the destruction of the Bastille, it was proposed by M. Palloy, architect, that the memory of the downfall of the execrated building should be perpetuated by sending to each of the districts of France a fragment of its walls. This was done, and in many places these fragments were built into existing buildings, as for instance, into the wall of the church at Clichy, where it has remained until lately, when some repairs made it necessary to remove the fragment to the *mairie*.