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ARCHITECTURE

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CONTENTS.

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CONTENTS.

THE appointment of Mr. Jeremiah O'Rourke, of Newark, N. J., to take the place of Supervising Architect to the Treasury Department vacated by the resignation of Mr. W. J. Edbrooke, is reported and will be accepted by the profession as a more than usually satisfactory appointment, as the new incumbent is known generally as an architect of more than average capacity and information, who, during the last twenty years, has enjoyed a larger practice than has fallen to most of his fellows. The fact that the greater portion of this practice has consisted in the construction of ecclesiastical buildings of various kinds for the Roman Catholic Church does not, under the changed conditions attending the designing of Government buildings, affect the propriety of the selection. Mr. O'Rourke, who is a Fellow of the American Institute of Architects, was born in Dublin, Ireland, February 6, 1833, and received his professional education in the Government Schools of Design in that city. Emigrating to this country in 1850, he entered upon an independent private practice in 1856, which gradually became both extensive and lucrative. Amongst the many structures designed and built by Mr. O'Rourke — who has always worked without a partner and hence will have to abandon wholly his private practice in order to serve the public — may be named the Church of St. Paul the Apostle, in New York City, St. Michael's Hospital and the Dominican Monastery both in Newark, N. J., Seton Hall College at South Orange, N. J., St. Agnes's Parochical School in New York City, while a long list of similar buildings of minor importance could be added. Mr. O'Rourke already has some familiarity with Government methods, as he was appointed local superintendent of the new Federal building at Newark during its construction.

WE have often warned our readers that, in controversies between architects and their clients, the Institute schedule should be brought into court as little as possible. In most cases, the architect's bill will be made up in accordance with it, and every architect and builder, and all laymen familiar with an architect's work, will testify that the amount of a bill so made up is a fair and reasonable charge; but the claim should be made on the ground that the charge is just and reasonable, and not that it is in accordance with a certain schedule drawn up among themselves by a small body of professional men. The importance of this suggestion was strikingly illustrated a few days ago in the trial of a case in England. The plaintiff, an architect, had been requested by the defendant, a real-estate speculator, to make plans for two buildings, to cost four thousand pounds. The speculator had made an agreement with Lord Cadogan for the lease of a piece of land, and this was the sum fixed in the lease for the cost of the buildings. The architect, as it appeared, was informed of this fact. The plaintiff made some sketches, which were modified at the defendant's request, and it was in evidence that the defendant was told that, as modified, the buildings would cost between six and seven thousand pounds. When the drawings and specifications were finally completed, and tenders invited, the lowest of these proved to be more than seven thousand pounds. The defendant then abandoned the plans, and the architect, and employed a second architect, who made new drawings, and carried out the buildings, at a cost of thirty-five hundred pounds. Meanwhile, the first architect had sent in a bill for three per cent commission on something over seven thousand pounds, with two per cent more for taking out quantities, and an extra charge for making surveys, etc., the total amounting to four hundred and fifty pounds. The speculator refused to pay this bill, but offered to pay the first architect, for what he had done, one hundred and ten pounds, which was just what he had paid the second architect for complete service.

IN opening the case, the plaintiff's counsel, who ought to have known better, began by citing the Schedule of the Royal Institute of British Architects, which, as he said, fixed the fees, where the work was abandoned after tenders were received, at three per cent on the lowest tender. Hereupon Lord Coleridge, who was the judge in the case, interrupted the counsel to say, that "he would not allow the Institute to dictate to juries what sum was to be paid for work not done." The counsel persisted that, as the speculator had been told that the Institute rules would apply, these terms formed part of the agreement between the parties; but Lord Coleridge replied: "Unless there is clear proof that they were part of the contract, I shall treat the rules of the Institute as mere waste-paper." The defendant testified that he had sent the plaintiff his agreement with Lord Cadogan, which was to build two houses, to cost four thousand pounds, and said that this limit of cost had been fixed from the first, and that he had requested that the buildings should be designed so as to cost not over eight-pence per cubic foot, which would give substantially this sum for the total expense. He denied also making any alterations in the plans which would involve additional expense. On finding that the buildings would cost seven thousand pounds, instead of four, the plaintiff had proposed to cut down the cost of the design, but the defendant replied that it was not a case for cutting down, and concluded that the whole design was so extravagant that it was hopeless to try to do anything with it, and it would be better to begin afresh with another architect.

LORD COLERIDGE, in summing up, said that the case for the defendant was that he employed the architect to prepare plans for buildings to cost four thousand pounds; that this limit was fixed from the first, and that the plaintiff knew of the defendant's agreement with Lord Cadogan, so that he must have understood that he would not wish to exceed this limit. If, knowing that his employment was to prepare plans and specifications for buildings to cost four thousand pounds, the plaintiff furnished plans which would involve an expense of nearly eight thousand, these plans were entirely different from what was desired, and the defendant might repudiate any obligation to pay for them. The plaintiff's case, on the other hand, was that the defendant saw the plans, and approved of them, and had alterations made in them; and, although a limit of four thousand pounds might have been mentioned, yet the general character of the drawings was such that they could not possibly have been executed for that sum. Undoubtedly, Lord Coleridge said, architects did not keep strictly within their employer's limit of expenditure, and, on the other hand, the employer was easily induced to countenance an increase of expenditure here and there. "This was human nature on both sides." But here, when the tenders came in, the total expense was found to be near eight thousand pounds; yet the defendant had written to the

plaintiff that "a great reduction must be made," so that the defendant could not, perhaps, entirely repudiate the employment of the plaintiff, and it was for the jury to consider what was reasonable. As to the Schedule of the Institute of Architects, which, it was said, had fixed certain percentages on the estimated amount of expenditure, he thought that a commission on expenditure was open to the gravest possible objection. According to that, if a man wished to build a house to cost fifty thousand pounds, and asked an architect to make plans for such an expenditure, and the architect made a plan which it would cost a hundred and fifty thousand to carry out, the architect could say: "Well, you may build it or not, but, whether you do or not, you must pay me commission on a hundred and fifty thousand, for the Institute of British Architects says so." "He must confess," Lord Coleridge went on, "that his legal soul fired at this claim, and he hoped that no British jury would ever yield to it, for it was a most unjustifiable attempt by a body of men for their own advantage, and to increase their own emolument. He wished the jury to understand distinctly that, unless the defendant had agreed to pay the percentages claimed, he was not liable for them. If they thought the defendant was entitled to repudiate and reject the plaintiff's plans, they should find for him; if otherwise, they should fix such sum as they thought it reasonable for him to pay." The jury found for the plaintiff for two hundred pounds, and Lord Coleridge gave judgment for this sum.

MOST of our readers will think that the architect got all that he was entitled to, and that he had an amiable and fair-minded client, who deserved more skilful and careful service. As to the Institute Schedule, it is clear that it was perverted from its intended meaning to support an unjust claim, and, if the Schedule really countenanced such demand, it would deserve Lord Coleridge's opinion of it. The fact is, however, that no decent architects, and no schedules, would ever support a man in disregarding so flagrantly his client's wishes as to make him plans for a building costing twice as much as the clear and positive limit of expense assigned for it, and, after his useless services had been properly repudiated, in claiming, on the exaggerated cost of the impossible building, the percentage which has been found reasonable when applied to the cost of works skilfully and conscientiously planned, in accordance with the instructions given, and abandoned without fault on the architect's part. It is a suggestive circumstance that the Institute Schedule seems to be brought into court about as often to support claims which it was not intended to countenance as those which it was designed to summarize in a convenient form. Where an architect's charge is made up fairly and honestly according to the Schedule, ample testimony, as well as the common-sense of modern juries may be depended upon to support it, without recourse to schedules; and it is in just such cases as these, where no reasonable man could be expected to testify that a charge of nearly twelve per cent on the proposed cost was a fair one for services so carelessly or ignorantly rendered as to be perfectly useless, that the Schedule is often brought in to give a technical appearance of authority to claims which could not be justified on any other ground, and which were not really contemplated in the Schedule itself. This misuse of the Schedule is, presumably, in most cases due to the educated ingenuity of the lawyers, but it has certainly injured the credit with the public both of the Schedule and the profession for which the Schedule is made; and architects who may be called upon, as many of them are, to testify in court that the Schedule is the recognized rule of the profession, will do the great body of their brethren a service by explaining, if they find that their testimony is likely to be misused to support an unjust claim, that the presupposed condition of the application of the Schedule is skilful and honest service on the architect's part.

THE death of Charles J. Liernur, which occurred in Berlin a few weeks ago, should not be passed by without remark, for, although he had not of late years been conspicuous, there was a time when Liernur's name was famous in engineering and sanitary science, and it will, at least, long keep its place in scientific history. Liernur was born in Holland, but few people in this country probably know that he was for many years a resident of the United States. He came here when very young, to seek his fortune, and was in the South when the Civil War broke out. He enlisted as a volunteer in the Confederate Army, and rose to the rank of Captain of Engineers. After the close of the war, he returned to his native country, and devoted himself to what was then the new science of sanitary engineering. In a comparatively short time he developed a peculiar system of house-drainage, which was adopted in the city of Amsterdam, and several other places. This "Separation System," as he called it, or "Liernur System," to give it the name by which it is more generally known, consisted in separating the house refuse from the rain-water and street-wash, and conveying it by itself to a distant place, where it could be dried into a valuable manure, without the enormous loss incident to precipitating the fertilizing portions from ordinary sewage. To accomplish the result intended, iron pipes were laid in the streets, with branches to every house, communicating with the water-closets and similar receptacles of refuse. At certain hours, the air was exhausted from the system, and the accumulations of refuse in the various receptacles were sucked into the pipes, and carried by atmospheric pressure to the outfall.

THE system was not very neat, according to our ideas, and it made no provision for the street-wash and storm-water, which are carefully included in most modern drainage systems, but in Dutch towns, where these highly diluted waters can be allowed to flow into the canals, without adding much to their offensiveness, and where a concentrated manure is much more easily and profitably treated than floods of sewage, it served a good purpose, although we believe that Amsterdam is already thinking of abandoning the system for a more modern one. In endeavoring to introduce his invention in other places, however, Liernur was not so fortunate. He made plenty of plans and propositions, which were, for a long time, seriously considered; but the event seemed always to turn against him, and his system was soon outgrown by the advance of sanitary science. According to a notice in the *Deutsche Bauzeitung*, Liernur's persistent and rather overbearing temper could not realize that his device had become antiquated, and, instead of joining in the development of a science in which his experience and natural intelligence fitted him to take a conspicuous part, he kept on with his unsuccessful plans for his "Separation System" to the last, a warning, as it thinks, to natures similarly organized.

PROFESSOR KERNOT, of Victoria, has recently made some important experiments on the weight of a crowd. It is a common idea among architects that people cannot, in practice, be crowded so closely together as to give more than about ninety pounds weight per square foot of the floor on which they stand, and there are traditions quoted in the professional books which would seem to indicate that, in order to get a load of a hundred pounds per square foot, it is necessary to lift up extra persons and drop them into the middle of a closely confined mass. Mr. Bindon B. Stoney, the distinguished author of a well-known book on bridges and roofs, once packed fifty-eight laborers, weighing, in all, 8,404 pounds, into the deck-house of a ship, the floor of which contained fifty-seven square feet. This gave a load of 147.4 pounds per square foot, each man, as will be observed, having a little less than one square foot of standing-room. On another occasion, he packed seventy-three men, weighing, in the aggregate, 10,948 pounds, into a wooden hut, inclosing seventy-seven square feet of floor-space. This gave one hundred and forty-two pounds per square foot average load, but Mr. Stoney thought that two or three more men could have been squeezed in. Professor Kernot tried a similar experiment with his class of young engineers, packing sixteen of them, weighing 2,455 pounds, into an area of eighteen square feet. This made the average load 134.7 pounds per square foot, but the youths agreed that "considerable vacancies" existed in the group, and that another man, if there had been one in the class, might have been put in. This would have given an average load of one hundred and forty-three pounds, and it seems to be settled that the weight of a dense crowd of men may easily reach this amount, and, indeed, in case of panic, might exceed it. Under these circumstances, the safe resistance of floors of public buildings, bridges, city railroad-stations and other places where dense crowds may collect, ought not to be less than three hundred pounds to the square foot, for it seems to be shown that the dead-load may be nearly, or quite, one hundred and fifty pounds, and the strain which would come on the floor by sudden movements of such a crowd would, according to the usual estimate, be double that due to the dead-load alone.

ARCHITECTURE OF THE LOW COUNTRIES.[1]— VI.

IN Belgium, the building art developed at some points with comparative rapidity. At Brussels, where Napoleon in 1810 ordered boulevards to be laid out on the site of the old fortifications, the city assumed a new appearance after the creation of the Léopold Quarter; this was soon followed by the construction of the Avenue du Bois de la Cambre, which led to the formation of the Louise Quarter.

The construction of the Galerie Saint-Hubert, in the centre of the capital, and, later, the piercing of the Inner Boulevards, partly built over the Senne and intersecting the entire town, gave an extraordinary impetus to building which was extended to the aggregations about the approaches to the railway stations. At Antwerp, the construction of the new ramparts and the removal of the old fortification and of the large fortress on the south gave this commercial metropolis a territory much exceeding that of the capital; this has occasioned the construction of broad boulevards, of new quarters of considerable size, and of important edifices. At Ghent, the city was very much enlarged by the demolition of the fortress. At Liège, the Ile du Commerce, joined to the great boulevards, formed a vast quarter, at the same time that the piercing of the Rue Léopold and the laying-out of the section in the vicinity of the central railway station opened up new arteries. The realization of the plan conceived a number of years ago looking toward the revival of the port of Bruges, which was so flourishing in the fifteenth and sixteenth centuries, will doubtless cause a growth of certain parts of the city. Meanwhile, the efforts of the street-commissioners and the enterprise of the inhabitants are directed toward the restoration of Bruges to its original aspect. Is this movement to be attributed to their fear of seeing other edifices built in the style of the new theatre, the heaviness and commonplaceness of which spoil an interesting corner of the curious Flemish town? It is true that, owing to the conscientious researches and studies of the architect Trugeois-Delaceuserie, the restorations and restitutions continue. The new edifices themselves seem to form a part of the old city, their decorations and dispositions being borrowed from the picturesque conceptions of the artists who, during the Middle Ages and the Renaissance, made Bruges one of the most artistic cities of the Continent. Among the finest of the new constructions, we will cite the Normal school, the new hospital and the Government buildings, to which the new post-office is attached. Why is it that the new railway station, which was not designed by the Bruges architect, has the defect of being but a combination of more or less well-connected motives, the slight homogeneousness of which becomes more apparent as one goes through the badly-aired and poorly-lighted apartments, whose distribution meets the needs neither of the administration nor of travellers?

It is to Suys that the honor of having revived the architectural art in Belgium belongs. Born at Ostend, in 1785, he spent much time in the Academy of Bruges and then went to Paris, where he entered the *atelier* of Percier. In 1812, he won, at the Imperial École des Beaux-Arts, the great architectural prize and became thus a pensioner of the Academy of France, at Rome. He studied the edifices of Italy and Sicily with especial care, and it was from his designs that Normand engraved the remarkable monograph of the Massimi palace. A conscientious artist, Suys was able to take advantage of the influence that his careful researches won for him to bring the building art back to its true principles, and it was due to his tireless efforts that the various craftsmen connected therewith were again initiated into all the secrets of their business. Among his great productions we note, at Brussels, the magnificent hot-houses in the Botanical Garden, an important part of the Arenberg palace, the peristyle of the old Palais de Justice, which has been recently removed, the villa of the Marquis de Cazeau, the church of St. Joseph and several houses and private residences; all these edifices, in Italian style, bear witness to the great erudition and the perfect taste of the architect. For many years Suys directed the teaching of architecture in the capital, and the chief architects whose works we shall be called upon to mention were among his numerous pupils.

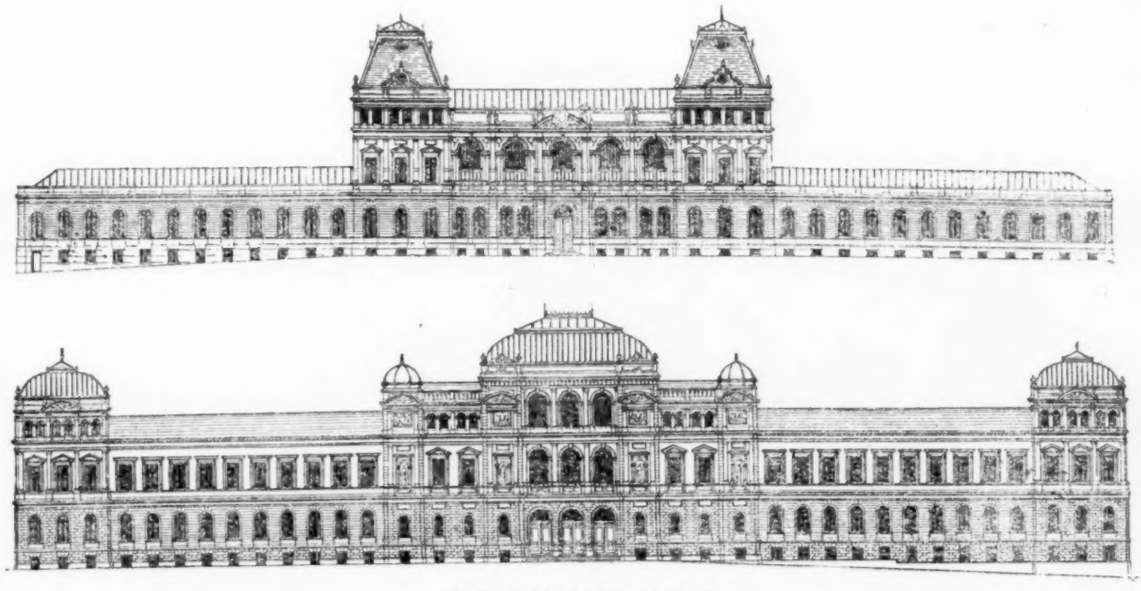


Fig. 28. Institut des Sciences, Ghent.

It was also while drawing inspiration from the Italian Renaissance that Bourla and Roelant, contemporaries of Suys, constructed the theatre of Antwerp and the Palais de Justice and theatre at Ghent. Most of the notable works directed later on by the architect Pauli at Ghent — particularly the Institut des Sciences (Fig. 28) recently inaugurated — are likewise interpretations of this style; but the most perfect specimen of it is unquestionably the splendid Palais des Beaux-Arts, at Brussels, erected after Balat's plans. This noble edifice is isolated on three sides; the blue-and-white blocks of stone, of which it is built, are combined with perfect taste and set off the beautiful lines of the monument. The main façade, 246 feet in length, has a peristyle at the centre composed of four decorative Corinthian columns of Scotch granite, with bronze bases and capitals; it is also adorned with two white marble bas-reliefs and four bronze statues — Architecture, Painting, Sculpture and Music — on the tops of the columns; there are busts of Rubens, John of Bologna and Van Ruysbrouck above the entrances, while two allegorical groups in bronze — the "Coronation of Genius" and the "Triumph of Art" — stand in front of the two wings at the extremities of the façade. The *ensemble* is remarkable for its nobility and elegance. The interior arrangement shows a perfect understanding of the uses to which the different apartments are to be put; simplicity

[1] From the French of J. van Ysendyck, in Planat's *Encyclopédie de l'Architecture et de la Construction*. Continued from No. 902, page 20.

and grandeur are everywhere united. The large central hall, the ground-floor of which is reserved for sculptures, has a rich colonnade in the first story opening on spacious exposition-galleries. The eminent architect of the king also designed the celebrated hot-houses at Laeken and the elegant and splendid dispositions forming the complement to the royal château.

The Palais de Justice at Antwerp is likewise deserving of mention; but it is to the Palais de Justice at Brussels (Fig. 29) by Poelaert that the first rank among Belgian monuments must be assigned both from the standpoint of decorative effect and imposing combination of masses. It was erected under the supervision of Inspector-General Wellens, and covers an area of 270,000 square feet; the foundations, on the side toward the Rue des Minimes, are nearly 70 feet high. The gilded cross surmounting the dome is 400 feet above the street; the cost of the entire structure amounted to fifty million francs. As it stands on one of the highest points of the city it can be seen from a great distance and produces a most striking effect. The main porch forms a colossal building of itself; the entrance bay is 80 feet high; the arrangement of the huge open entrance peristyle with two massive staircases leading to the

Fig. 29. Palais de Justice, Brussels.

Court of Cassation is most impressive; within, the Salle des Pas-Perdus is designed on a vast scale, presenting a majestic *ensemble*, whose boldness and massiveness awe the beholder. The halls of the Court of Assizes and the Court of Cassation possess a richness and soberness of character which is obtained by the great lines of the decoration and the harmonious severity of the coloring; on the side toward the Rue des Minimes is a monumental staircase in the arrangement of which Poelaert endeavored to combine all the originality and individuality of conception which characterize his grand productions.

The column erected to commemorate the Congress by which Belgian independence was established was also executed after the plans of Poelaert.

The National Bank of Brussels, designed by the architects Beyaert and Janssens, is, like its important dependencies, decorated in the Louis XVI style; the same is true of the great work undertaken and executed with wonderful success by Balat at the royal palaces of Laeken and Brussels, the main aim of which was the reconstruction of the staircase of honor and of the spacious banquet and reception halls. It was likewise in the style of Louis XVI that the halls of the Chamber of Deputies were restored after the fire of the 6th of December, 1883, when a portion of Guimard's magnificent production was partially destroyed.

[To be continued.]

ARCHITECT, OWNER & BUILDER BEFORE THE LAW.[1]—XXX.

QUANTITIES.

A POINT of serious importance in the interpretation of contracts is often that relating to quantities. Every architect knows that it is common abroad to have schedules of quantities of the labor and materials which will be required for the construction of a proposed building made out from the plans and specifications, and that bidders for the work, or any part of it, are usually allowed to use these schedules.

In England, these bills of quantities are usually made up by a quantity-surveyor, independently of the architect, and, in any case, the work of making them is paid for as a matter quite distinct from the architect's five per cent. Sometimes, the owner pays directly for the bills of quantities, but it is more common to stipulate that the successful bidder shall pay for them, the owner thus paying for them indirectly, as, of course, the bidders add the amount of the quantity-surveyor's commission to their bid. This system has not worked very satisfactorily in England, although the custom of furnishing bills of quantities is of very long standing. Repeated decisions have established the fact that neither the quantity-surveyor, nor the owner, nor the architect is responsible for the correctness of the bills of quantities, which are always held to be simple estimates, not guaranties. Moreover, as quantity-surveyors are human, and do not wish to get themselves into trouble with the builder who pays their bill, it is said to be customary among them, where there is any uncertainty or difficulty about the plans and specifications, to add a substantial margin for contingencies to their estimate, so that the actual work performed under the contract is often much less than that provided for by the bill of quantities, and the builder, consequently, profits, at the owner's expense.

The result of these uncertainties is that the great contractors,

[1] Continued from No. 902, page 22.

not wishing to rely for their information as to the exact amount of work to be performed on the average quantity-surveyor's estimate, even with such deduction as experience has shown that they can safely make from his figures, generally make their own measurements and estimates, and throw aside entirely the surveyor's quantities, although they pay him for making them; and the owner consequently pays, in the end, for making both estimates.

In this country, although efforts are made from time to time by the contractors in the great cities to require owners or architects to furnish them with bills of quantities, the custom has never obtained any real foothold. There are, however, cases in which, for one reason or another, quantities are taken out, and most of our large cities possess one or more professional quantity-surveyors, who find enough to do, either in estimating quantities from plans, or in measuring work after execution, to give them a living, and it is probable that, in cases of controversy, the courts would apply to them the rules which are applied to their brethren across the water by the English courts.

In one of the English cases,[1] the Court was of opinion that, "it is not a usual course for architects to prepare specifications of the exact quantity of work to be performed by contractors, but, if they do prepare such specifications, they ought to be in detail, to enable parties to judge, not only of the gross quantities, but also of the quantity of labor to be employed." In this case, the quantities prepared by the architect turned out to be inadequate, and the contractor endeavored to make the owner responsible for their correctness, but failed, the Court holding that the architect was not acting as the owner's agent for warranting their correctness.

In another case,[2] the architect had prepared quantities, and represented to the builder that they were correct, and the latter made a tender in accordance with them, which was accepted, and a contract signed. When the work came to be done, the quantities proved to be too small, and a much larger amount of work was done than had been contemplated. The builder sued the owner for additional pay for the extra labor and materials which he had been obliged to provide, but lost his case. The Court held that his contract was for the erection of the building, including everything reasonably necessary for its completion, not for furnishing the materials and labor estimated in the bill of quantities. In regard to the claim that there was an implied warranty on the part of the owner of the quantities taken out by his architect, the Court held that there was no evidence that the architect acted as the owner's agent in taking them out, or that the owner guaranteed their accuracy, and decided that the builder could recover nothing more than the contract price.

In another case,[3] the Court said that the builder was presumed to understand his business, and to know, independent of estimates made by the architect, what quantities would be necessary to carry out the work, and that he therefore undertook the work at his own risk, notwithstanding the bill of quantities.

"SPECIFICATIONS HERETO ANNEXED."

As a rule, the specifications are referred to in the more formal part of the contract as constituting a part of the agreement, and it is very common to refer to them as "the specifications hereto annexed," or "the specifications signed herewith." In such cases[4], it is of interest to know that actual annexation of the specifications to the contract is not necessary to their validity as a part of it, and that a court, on ascertaining what were the specifications intended by the parties, will consider them as constructively annexed to the agreement.

So with signatures. Although the contract may refer to the specifications as being signed, the actual signature is not required, if the documents meant can be otherwise sufficiently identified.

A curious case,[5] involving the interpretation of a rather obscure specification, was decided in Massachusetts a few years ago. A written agreement, signed by a firm of builders and the agent for the owner of a piece of land, contained only a promise by the builders "to furnish all stock and materials of every name and nature mentioned in the specification, or necessary for the proper performance of the work so shown or described, and under the superintendence of X., architect, and identified by the signatures hereto." Reference was also made in the agreement to "the apartment building to be erected" on the land, to the beginning and pushing of the "work" to

WARRANTY OF ROOF.

completion, and to payments estimated on "the value of work and material," to be made by the owner's agent to the builders upon the architect's certificate that "the terms of this contract are complied with." The specifications, which were identified, said in one place, "The work to be left clean and whole and warranted tight, including roof, for two years"; and in another place, after describing the roofing, gutters, etc., said, "All to be guaranteed for one year from completion of the building." After the completion of the building the roof leaked, and four hundred dollars' worth of damage was done to the decoration, which the owner insisted that the builders should repay. Suit was brought on this claim, but decided by the Supreme Court against the owner. The ground for the decision seems to have been purely technical. The Court said that, according to the strict reading of the written contract, the only promise of the defendants was "to furnish certain stock and materials." The specification, although referred to in the contract, must be considered as qualifying it only for the single purpose of showing what the stock and materials were to be. The agreement was the same as if the description in the specification of the stock and materials had been incorporated in the signed contract, but no part of the specifications, except the description of the stock and materials, formed a part of the contract. Apart from the specifications, however, certain expressions in the agreement, such as those relating to payments, referred to "work," and the Court said that, "While "the promise of the defendants is meagre in its language, enough "appears in its language to show that they were to erect a "building"; but the Court thought that this was not enough to bind them to special provisions of the specifications, such as those requiring warranty of the roof. "If the expressions of the specification," the Court said, "in regard to warranty of the roof, etc., had been contained in the contract, they might have been held to be a collateral express warranty which would continue in effect, one for one year and the other for two years, after the completion of the building." "The trial" (in the court below) "proceeded on the theory that, collateral to "the stipulations as to the nature and quality of the roof, there "was an express warranty that it should continue in good con- "dition for at least one year. In this, we think, there was "error. Using the specifications merely to show what kind of "work and materials were called for, their effect in this part is "to bind the defendants to construct a roof of such a sort as "would remain tight for two years. When the building was "completed and the plaintiffs took possession of it, the defend- "ant did not remain under a contract of continuing warranty "that gave them any rights, or created against them any lia- "bilities as to the care or condition of the roof during that "period; but if the roof was not such as was called for in re- "spect to materials and workmanship which could be relied "upon to prevent leaks for two years, the plaintiffs might "recoup from the contract price, as damages, the difference "between the value of the building as constructed and what "it would have been if the house had been built according to "the contract"; or they might bring an action to recover back the difference. . . . The principle is, "How much less is the building fairly worth than it would have been if the contract had been performed?"

It is to be observed that this singular release of the contractors from the obligations laid down in the specifications appears to have been due entirely to the slip in the written contract, which made only a part of the specifications applicable to the agreement.

Occasionally, however, the clause in the specifications requiring the contractor to warrant a portion of the work is so carelessly drawn as to fail of its intended purpose, even without any obscurity in the contract. An agreement was once made, in which, instead of stipulating that the contractor should warrant the roof tight, and should be responsible for all damage that might be caused by leaks during the term of the warranty, provided that the contractor should warrant the roof "to stand well and resist the water, and make a tight roof for the term of five years." The roof did not "stand well," but leaked, and the interior of the building and articles stored there were injured. The owner claimed damages to the extent

[1] Kemp *vs.* Rose, 4 Jur. N. S. 919.
[2] Scrivener *vs.* Pask, 1 L. R. C. P. 715. Ellis *vs.* Hamlen, 3 Taunt. 52. Stevenson *vs.* Watson, 4 L. R. C. P. D. 148.
[4] Williams *vs.* Fitzmaurice, 3 H. & N. 844.
[5] N. E. Iron Co. *vs.* Gilbert, 91 N. Y. 153.
White *vs.* McLaren, 151 Mass. 553.

of his loss, but the Supreme Court of Massachusetts[1] held that he could recover nothing for the injury to his goods or to the interior of the building, but only the cost of having the roof put into a satisfactory condition.

Another case[2] illustrating the extent of the responsibility of a contractor under a warranty clause is to be found in the Maine reports. A man slated a church roof, and warranted it tight for ten years. Before the ten years expired, several leaks appeared. One of these leaks was acknowledged to be due to the fault of the owners, and the contractor, on a claim being made against him for damages, resisted it, on the ground that, as the injury was partly due to the fault of the owners, he ought not to be held responsible for the remainder of the damage, under the doctrine of "contributory negligence," so familiar in its application to accident cases, which holds that, in order to hold a person responsible for injury to another by negligence, the person injured must himself have been exercising due care. The Court, however, rejected this application of the doctrine, and held that the contributory negligence of the owners did not preclude them from recovering damages caused by leaks not due to their fault, for which the contractor was responsible under his agreement.

TINNING.

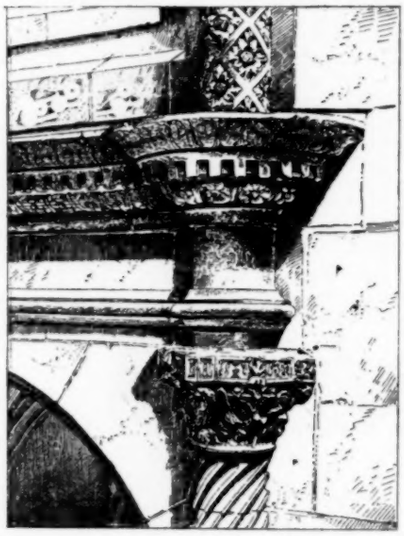
It may be of interest, before leaving the subject of roofs, to know that in New York, where a contract[3] was made for "carpenter-work and materials," it was held that the tinning of the roof, not being specified under this head, should not be regarded as being, by implication, a part of the "carpenter-work and materials" agreed upon.

[To be continued.]

UNIVERSAL MERCANTILE SCHEDULE.[4]—II.

EDITION, JANUARY, 1893.

APPLICATION OF SCHEDULE.



Detail of Doorway, Hotel Lallemant, Bourges, France. From *La Construction Moderne.*

THE following example will illustrate the application of the Schedule:

Let us assume that a building is to be rated in a given city, and that, starting with the charge for basis-rate of a standard building in a standard city of..... **25 cts.**
the following additions thereto are to be made for variations of the city from standard:

Water-works, direct-pressure-system pumps, by steam-power, in duplicate	(No. 5)	4 cts.
Absence of stand-pipe or intermediate reservoir, affording a supply in case pumping machinery should not work	(No. 7)	2 "
No fire-marshal	(No. 22)	2 "
No building-law	(No. 25)	3 "
Brought Forward		**11 cts. + 25 cts.**
Electric-trolley railroad	(No. 26)	2 "
Natural gas for fuel	(No. 28)	2 "
		15 "
TOTAL		40 cts.
From this, if auxiliary steamers are provided, a deduction would be legitimate of 5%		2 "
Leaving the *key-rate of the city* in which risk is located		**38 cts.**

Let us assume that to this key-rate should be added, for deficiencies of the building to be rated from standard construction, as follows:

Walls not according to standard	(No. 38)	2 cts.
Slate roof	(No. 48)	2 "
Floors, ordinary	(No. 54)	5 "
Area,	(No. 59)	3 "
Stairways	(No. 72)	10 "
Lighting, by kerosene	(No. 86)	2 "
Heating, by furnace	(No. 87)	3 "
		27 "
Result, *Rate of Building Unoccupied*		**65 cts.**

(Subject to deductions for any exceptional features, page —.)

If at this point, for example, we desire to obtain the rate on a stock of retail dry-goods, for which the charge in the second column of the table is 50 cents, we deduct therefrom 25% of the deficiency charges contained in the unoccupied building-rate of 65 cents (65 — 25 = 40), or 10 cents, leaving 40 cents to be added to the 65 cents, making 1.05 as the rate on the stock. If the risk be entitled to no other deductions contained in the list, page —, it may safely be assumed that, under the encouragement of the deduction of 10% for casks and pails, they will be introduced, and the stock-rate, therefore, will be 10 cents less, or 95 cents.

If, instead of being in a single-occupancy building, a stock of wholesale drugs with compounding is also in the building, the rate of the building and dry-goods will be increased 100 cents, which would make the rate of the building 1.65, or, deducting 10% for casks and pails, 1.49 net. The rate on the dry-goods would be computed as follows:

To the building-rate, as above	65 cts.
Add 50 cents less 25% of the deficiencies of building (65 — 25 = 40), 10 cents	40 "
Add for the amount which wholesale drugs increase the building and all other stocks therein	100
Total,	205
From which deduct, for casks and pails, 10%	20
Result, rate on stock of dry-goods	185

The rate on the wholesale drug stock would be computed as follows:

To the building-rate	65 cts.
Add amount named in second column for drugs, 185, less 10 cents (25% of deficiencies of building)	175
Total,	240
From which deduct, for casks and pails, 10%	24
Result, rate on wholesale drug stock	216

(N. B. The amount in the second column of the table includes the amount in the first column, and therefore the 1% for wholesale drugs added to the dry-goods rate does not have to be added to its own rate to get the rate on stock of wholesale drugs.)

Stated by way of formula:

$65 + 100 = 1.65$ = Building-rate.
$65 + 185 - (40 \times .25) = 240$ = Drug-rate.
$65 + 100 + 50 - (40 \times .25) = 205$ = Dry-goods rate.

Nearly one-half of the labor in the computation, it will be observed, is that of ascertaining the key or basis rate of the city, which, however, once obtained in this manner, does not have to be again computed. Every risk in the town can be rated by simply starting with the 38 cents basis or key rate obtained as above. Before half-a-dozen risks have been rated, the deductions which are provided for will be understood without checking-off the list for each risk; and the compilers believe that those who regard the application of the Schedule as an arduous task will be convinced that it is not.

SCHEDULE FOR FRAME MERCANTILE BUILDINGS.

Standard Frame Building. — A standard frame building may be described as one which does not exceed two stories in height, with a ground-floor area not exceeding 1,000 square feet — say 20 x 50. The building itself and all chimneys should rest on substantial foundations of brick or stone laid below "frost-line." The side-walls should be of clapboard finish on substantial hardwood studdings, either filled-in

[1] Goddard *vs.* Barnard, 16 Gray, 205. Pothier on Obligations, P. 1, c. 2, art. 3. Hadley *vs.* Baxendale, 9 Exch. 341. Fox *vs.* Harding, 7 Cush. 516.
[2] M. E. Parish *vs.* Clarke, 74 Maine, 110.
[3] Vadney *vs.* Person, 27 Hun, 226.
[4] Continued from No. 902, page 28.

with brick between studs (brick-nogged, so called), or, instead thereof, with "back-plastering" on inside of outside sheathing between studs. (These two forms of finish are usually intended as non-conductors of heat and as a protection against the weather; but they are, also, admirable provisions for preventing the rapid spread of fire, particularly when in connection with mortar fire-stops which cut off draughts from floor to floor.) If the building is veneered with brick or sheathed with metal, — tin or corrugated-iron, — see deductions. Wooden side-walls and roof should be painted with some fire-resisting paint. Roof should be of metal or tile, or shingles laid in mortar.

Note. — This description of standard is a high one, and intended to be educational as a description of proper building. Unusual features, however, are not charged for in the Schedule as deficiencies, but are provided for by deductions, so as to save the time and labor of applying the Schedule to the large majority of risks.

Application of Schedule. — Having ascertained the key or basis rate for a standard brick building in the city containing the frame building to be rated (see page — of preceding Schedule), quadruple it to obtain the key or basis rate for standard frame building in such city, not exceeding a total of 160.

		CHARGE.
	Basis-rate (Key-rate of city multiplied by 4), not exceeding a total of 160.	— cts.
	Add thereto for deficiencies from a standard building as follows:	
225.	*Foundation.* — If on wooden posts, instead of as per standard	25 cts.
226.	*Roof, Shingles.* — Ordinary pine, cypress, or cedar not laid in mortar, add	15 "
227.	" If ordinary pine, cypress or cedar laid in mortar,	5 "
228.	" If redwood not laid in mortar,	10 "
229.	" If basswood laid in mortar, add	30 "
230.	" If basswood not laid in mortar, add	50 "
231.	" If approved composition covered with gravel,	3 "
232.	" If slate,	5 "
233.	*Ceiling.* — If of wood or strawboard instead of plaster, charge for each floor	5 "
	(If side-walls so finished, charge additional 5 cents.)	
234.	If cloth or like combustible material, charge for each floor	25 "
	(If side-walls so finished, charge additional 25 cents.)	
235.	*Area, Ground-floor.* — For each 1,000 square feet or fraction in excess of 1,000 square feet, charge	10 "
236.	*Height.* — For third story, charge	10 "
237.	" For fourth story, charge	25 "
238.	" For fifth and each additional,	50 "
239.	*Heating.* — If by furnace, charge	5 "
240.	" If by stoves, charge	3 "
	(No charge if charge has been made for furnace.)	
241.	" If stovepipes through floor or hollow partitions with double thimbles or safely protected, charge for each passage	2 "
242.	" If stovepipe through floor or partition not protected, charge	50 "
243.	" If stovepipes through windows, roofs, etc., protected by double metal chimneys, charge	50 "
244.	" If stovepipes through windows and roofs not protected by double metal chimneys, charge	100 "
245.	" If stovepipe enters bottom of flue vertically, charge	25 "
246.	" If stovepipe enters chimney in attic or unused room, charge	25 "
247.	" If natural-gas or oil used for fuel, with approved pressure-regulating appliances, charge	5 "
248.	*Chimneys.* — If not built from ground, but resting on beams or brackets, charge for each	10 "
249.	" If chimney rests on attic-floor beam or roof-joist, charge	25 "
250.	" If constructed of poor bricks or mortar, charge	25 "
251.	" If cement or terra-cotta, charge	50 "
252.	*Street.* — If street on which building is located is unpaved, or otherwise inaccessible, especially during wet season, for fire-department, charge, according to hazard, not less than	10 "
	Note. — If no fire-department, no charge for this.	
253.	" If less than 60 feet wide from building to building (*i. e.*, including sidewalks), and not less than 50 feet, charge (unless opposite side of street is vacant)	5 "
254.	*Street.* — For each 5 feet less than 50 feet in width (unless opposite side of street is vacant), charge	5 cts.
255.	*Overhead Wires.* — Telegraphic or other wires on poles in front of building sufficient to interfere with operations of fire-department, charge (according to quantity) not less than	2 "
256.	*Number of Tenants* (other than office and dwelling tenants). — For each tenant in excess of one, add	2 "
	Brought Forward	cts.
257.	*Weather-boarding.* — If side-walls not clapboard or shingled, but "balloon" frame or board finish, from 25 to	50 "
258.	*Condition.* — If not in good condition, not well painted, etc., from 5 cents to	25 "
259.	*Age of Building.* — If over fifteen years, charge, according to condition, not less than	5 "
260.	*Lighting.* — If by kerosene or by electricity, system and installation in compliance with Underwriters' rules	2 "
	TOTAL,	

DEDUCT FROM ABOVE TOTAL, FOR EXCEPTIONAL FEATURES OF CONSTRUCTION.

262.	If oak or other hardwood frame, deduct	3%
263.	If "back-plaster" between studs	10%
264.	If "brick nogged," *i. e.*, filled-in with brick between studs	15%
265.	If side-walls and roof painted with fire-resisting paint	3%
266.	If metallic instead of wooden lathing	10%
267.	If brick-veneered	15%
268.	If iron-clad or covered with metal — tin, corrugated-iron or metal shingles	5%
269.	*Rate of Building Unoccupied* ..... *Occupancy.* — Add for occupancy the rate for the stock contained in first column of table, page 36	
270.	RESULT. — Rate of building *occupied* and *unexposed*.... Subject to any deductions to which the risk may be entitled in the list, pages, 25, 26, 27	
271.	RESULT, *Net rate* of building, *occupied unexposed*.....	
272.	*Exposure.* — Add according to hazard. If building is in frame row, see rule below.	
273.	RESULT, net rate building *occupied* and *exposed*..... Subject to deductions for coinsurance (see rule page —).	
274.	Deduct for % coinsurance. — On bdgs. in fire-dept. towns, for 80% 15% of above total " " in non-fire-dept. towns " 7½% " "	
275.	Rate of building *occupied with coinsurance.* *Note.* — To secure deduction for coinsurance the percentage coinsurance clause, page 31, must be attached to policy.	
	Add for Adverse Legislation, taxation, etc., 136, etc., p. 22.	cts.
	" " Faults of Management, if any, Nos. 141 to 154 p. 23.	"

FRAME BUILDINGS IN FRAME ROWS.

276. *Rule for Frame Rows.* — Rate each building with its occupancy by the foregoing schedule as it would rate if detached, and for each frame building in the row (a space double the height of the highest building being necessary to break the row) add 33⅓% of what would be the occupied rate of each other building in the row if it stood detached. For example: In a frame row of six buildings, A, B, C, D, E, F, A being occupied as retail drugs, B candy, C furniture-store, D carpets, E dwelling and F stoves. Let us assume that the unoccupied unexposed rate of A is 1.90. In this way A, adding 10 cts. for retail drugs, according to the occupancy table on page —, would have an occupied (unexposed) building rate of 2.00.

From which, supposing it to be entitled to deductions in list, page —, of say 20%, its net rate unexposed would be 1.60

B, occupied for candy, which adds 15 cts., would have an occupied-building rate of say 1.65

C, occupied as furniture-store, which adds 50 cts., would have an occupied-building rate of say 2.00

D, occupied for carpets, which add nothing, would have an occupied-building rate of say 1.50

E, occupied as dwelling, would have an occupied-building rate of say .50

F, occupied for stoves, which add 10 cts., would have an occupied-building rate of say 1.60

Making a cumulative occupied rate for all of 8.85

The difference between this 8.85 and the occupied-building rate of each building would give a figure 33⅓% of which should be added to its own unexposed rate, and building A, for example, should have added to its occupied rate of 1.60 33⅓% of 8.85 minus 1.60 equals 2.41, making 4.01 as the rate on building A. The following table illustrates the method of working out the rate on each building in the row:

A	*B*	*C*	*D*	*E*	*F*
Retail Drugs.	Candy.	Furniture with Upholstery, etc.	Carpets.	Dwelling.	Stoves.

For example, taking the foregoing occupied building rate of each

of the buildings in above row the following would be the computation of exposed, unoccupied rates of the different buildings in the row:

	Rate Bldg. Unoccupied.	Rate Bldg. Occupied Detached.	Exposure Charge.	Rate Exposed.
A.	150	+ 10 = 160.	$160 + \left(\frac{885-160}{3} = 241\right)$	= 4.01.
B.	150	+ 15 = 165.	$165 + \left(\frac{885-165}{3} = 240\right)$	= 4.05.
C.	150	+ 50 = 200.	$200 + \left(\frac{885-200}{3} = 229\right)$	= 4.29.
D.	150	+ 0 = 150.	$150 + \left(\frac{885-150}{3} = 245\right)$	= 3.95.
E.	50	+ 0 = 50.	$50 + \left(\frac{885-50}{3} = 278\right)$	= 3.28.
F.	150	+ 10 = 160.	$160 + \left(\frac{885-160}{3} = 241\right)$	= 4.01.
TOTAL.....				885

(N. B. 7% may be regarded as a maximum rate for any frame row.)

RATE ON STOCKS IN FRAMES.

277. *Movable Grade-floor Stocks.* — Stocks on the grade-floor which can be easily moved in case of fire, such as clothing, boots and shoes, etc., may be rated at same rate as building occupied, No. 273, unless in frame row, but, if in frame row, at 15% less than the occupied, exposed-building rate, No. 273.

278. *List of Movable Stocks.* — Agricultural Implements, Boots and Shoes, Carpets, Carriages and Wagons, Clothing, Cutlery, Dry-goods, Furniture, Flour in Barrels, Gents' Furnishing Goods, Groceries, Guns, Harness and Saddlery, Hats and Caps, Plated-ware, Sewing-machines, Trunks.

(Jewelry and cigars are not included; although portable, they might be moved too far.)

279. *Non-movable Stocks*, not included in above list, on grade-floors in frame row, 10% less than building. All stocks, whether movable or non-movable, if above or below grade-floor, same rate as building.

DEDUCT FOR COINSURANCE ON STOCKS IN FRAMES.

In Fire-dept. Towns. — ¼ of 1% of rate for each per cent of coinsurance in excess of 50%, not exceeding 7½% in all.

On Risks Not Under Protection of Fire-department. — Deduct ¼ of 1% of rate for each per cent of coinsurance in excess of 50% on stocks, not exceeding 15% in all. (In non-fire-department towns coinsurance is more important on movable stocks.)

If Insurance is Less Than 50% of Value. — Add 1% of rate for each per cent that insurance is less than 50% of value.

280. *Brick Building in Frame Row.* — If construction be other than standard, charge 75% of what would be the rate for one of the frames in the row, counting the brick as one.

(*Note.* — A standard building would probably survive a sweeping frame-row fire, but one that is not standard, especially where the frames project beyond the front or rear of the brick, is almost certain to burn. Probably no class of risks to-day pays rates so generally inadequate as brick buildings of ordinary construction in frame rows.)

SCHEDULE FOR "FIREPROOF" BUILDINGS.

Standard Building. — Walls not less than 16 inches for the upper 25 feet portion, thence increasing 4 inches for each 25 feet to the bottom; not exceeding five thousand square feet of ground-floor area; height not over eight stories; floor-beams and girders to be supported by masonry. (If "skeleton" construction, floors carried entirely by iron framework, see No. 286.) Not to be occupied above seventh floor for storage of merchandise or other combustible material whose burning would injure the iron-work, see "Deficiencies," No. 297. All iron beams, girders and pillars or story-posts to be protected by approved fire-resisting material, except in office and hotel buildings, in which no charge for absence of covering. If wrought-iron or steel is used in construction, that portion of the masonry in contact with the metal should be free from cement or plaster-of-Paris, and only lime-mortar should be used. At least one stairway to be fireproof.

Note. — Cast-iron will not rust to a dangerous point, but wrought-iron, and, possibly, steel, especially where constructed on the "Z" iron method, with riveted joints, are specially liable to rust in the joints. Cement and plaster-of-Paris are absorbents of moisture from the atmosphere, and should never be in contact with iron or wood. Lime-mortar is not injurious.

		cts.
285.	*Key-rate of the City*, as ascertained by schedule.	
286.	*Walls.* If "skeleton" construction, *i.e.*, thinner walls and floors carried by riveted wrought-iron or steel posts or columns, charge	5 "
	(*Note.* — No charge if the upright or vertical supports, pillars or story-posts be of cast-iron. The beam-bearing brackets should be cast in one piece with the pillar, and not secured by rivets, which are liable to rust, especially if of steel.)	
287.	" If the average thickness of the two side or bearing walls (or either of them) be less than 20 inches (obtained by adding the thickness of the various stories and dividing by the number) charge for each inch of deficiency	2 "
	If any portion of the wall be less than 12 inches, double the charge. The growing practice of lessening the thickness of the walls of fireproof buildings in "skeleton" construction is calculated to lose, in the way of vertical fire-stops, all that is gained in the horizontal fire-stops of separating fireproof floors, so that while a building may be protected from a fire spreading throughout its own floors it will not be safe from fire in an adjoining building.	
288.	*Stone Fronts or Side-walls.* — If of stone or stone ashlar, plain or "axed" finish add 1 cent, if carved or ornamental, add	2 "
289.	" If the brick are not hard-burned and of good quality, or if the mortar be of poor quality for want of sharp sand, etc., an additional charge should be made of not less than	20 "
	(This charge very necessary in a large portion of the South and West.)	
290.	" If the columns and the lower flanges of beams are unprotected with approved fire-resisting material, charge	5 "
	Note. — No charge for this in hotel or office-buildings in which there is not enough combustible material to destroy the ironwork.	
291.	*Wooden Ceiling.* — If ceiling of wood or strawboard or other combustible material, add, according to hazard, not less than 1 cent for one story, and ½ cent for each additional story	
292.	" If side-walls ceiled with wood or other combustible material from floor to ceiling (no charge for dados), charge for one story 1 cent and ½ cent for each additional story	
293.	*Area.* — If ground-floor area exceeds 5,000 square feet, up to 10,000, charge for each 1,000 or fraction thereof in excess of 5,000 ¼ of	1 "
	(If building occupied above grade-floor for offices or dwellings, no charge for area.)	
294.	" If ground-floor area exceeds 10,000 square feet, charge for each 1,000 or fraction thereof in excess of 10,000	4 "
	(If building occupied above grade-floor for offices or dwellings, no charge for area.) If mercantile building exceeds 10 stories double charge.	
295.	*Height.* — For each story in excess of eight, up to twelve, charge	1 "
	Office-buildings may be ten stories without charge of 293 or 294.	
296.	For 12th and each story over 12 up to 15, charge	3 "
297.	For 15th and each story over 15, charge	10 "
	If merchandise be stored above 7th floor charge 15 cts. and add 2 cts. more for each floor over 7th up to 10th, and 5 cts. more for 10th and each floor above 10th. For example: an eleven-story building would have 29 cents added.	
298.	*Iron Fronts.* — If iron front is not backed up solidly with bricks and mortar, charge	3 "
299.	*Elevators.* — If not in shaft, according to the standard, but in hallway, or enclosed court	1 "
	" If mercantile building	3 "
300.	" If open from floor to floor and varying from above, charge	3 "
	" In mercantile building	6 "
301.	" If shaft is sheathed or lined with wood (unless covered with tin or galvanized-iron, or enclosed as above) charge (one-half charge for office-building.)	10 "
	If elevator and stairway are combined and contained in the same shaft or opening, make only one charge for the two. For each additional elevator not cut off add 2 cents.	
302.	*Stairways.* — If not enclosed according to the standard, but in separate hallway or shaft enclosed by lath-and-plaster partitions with self-closing spring-doors at each floor, or trap-doors in floors, charge (no charge in building occupied above grade-floor exclusively for offices or dwellings)	3 "
	(If charge has been made for 299 or 300, one-half charge.)	
303.	" If the enclosure is of wooden partitions instead of lath and plaster, with self-closing doors at each floor charge	5 "
	(If charge has been made for 299 or 300, one-half charge.)	
304.	" If open staircases from floor to floor throughout building, charge not less than 1 cent each floor, not exceeding a total of	7 "
	If office-building, not exceeding total of	2 "
	(If charge has been made for 299 or 300, one-half charge.)	

Brought Forward ..... **Charge — cts.**

For each additional stairway add one-fourth charge.

305. If at least one stairway is not fireproof (no charge for hardwood treads), charge as many times 2 cents as the building has floors.

306. *Well-holes, Hatchways, etc.* — If not provided with self-closing traps, add, according to size, for each floor pierced, not less than 1 "

(No charge for office-building.)

307. *Wooden Chutes, Dumb-waiters, Ventilating-shafts, Belt-holes* and openings through floors for steam and water pipes, etc., tend to the rapid spread of fire and smoke throughout the entire building, and should be charged for according to size, not less in any case, for each floor pierced, than one-fourth cent ¼ "

Note.— No charge need be made for openings for steam and water pipes if the space around the pipes is filled-in with mineral-wool, asbestos or other incombustible material, to prevent draughts.

308. *Skylights.* — If more than three feet square (nine square feet), add for each nine square feet or fraction thereof in excess (not exceeding a total of 10 cents) 1 "

(If metallic frames and heavy deck or prismatic glass, no charge.)

309. " If covered with approved wire-netting, one-half charge

310. *Streets.* — If street on which building fronts is less than 60 feet wide from building to building (*i. e.*, including sidewalks), and not less than 50, add (unless opposite side of street is vacant) 2 "

311. " For each 5 feet less than 50 in width, unless opposite side of street is vacant, add 2 "

312. *Overhead Wires, Telegraph, etc.*, on poles in front of building in sufficient number to interfere with operations of fire-department, charge, according to quantity, not less than ½ "

313. *Number of Tenants* (other than office and dwelling tenants). — For each tenant in excess of one, add 1 "

314. *Lighting.* — If by electricity, with system and installation in compliance with Underwriters' rules and specifications, add 1 "

(If not in compliance, see No. 388, page —.)

320. RESULT. — *Unoccupied-building Rate* .....

321. *Occupancy.*— Add *one-half* amount named in first column of table of occupancies, page —.

322. RESULT. — *Occupied-building Rate* .....

Subject to any deduction to which risk may be entitled, page —, Nos. 340, 341, etc.

Deduct for Exceptional City Fire-department.

323. *Exposures.* — Charge for exposures according to hazard, especially if "skeleton" construction, and even if the exposure is sufficient only to damage paint, glass, etc. (See note, p. —.)

324. RESULT. — *Net rate of building, occupied and exposed.* Subject to deduction for Co-insurance.

325. *Co-insurance on Fireproof Buildings.* — Deduct 1% of rate for each 1% of co-insurance (percentage co-insurance clause to be attached to policy) in excess of 15% of value.

For example, a building insured for 50% of value would be entitled to a deduction of 35%.

A coinsurance clause for some stated percentage to be in every policy, and the rate graded according to the percentage named.

No office-building to be rated below 5 cents, and no mercantile building below 10 cents, after deducting for co-insurance.

Note. — Fireproof buildings, from an insurance standpoint, can be properly compared with ordinary buildings only on a high basis of insurance to value. Twenty-five per cent of the value of a fireproof building is as damageable as an ordinary building. Where fireproof buildings are insured for less than, say, 20% of value, the probability of incurring total losses closely approximates those of ordinary buildings, and the same rules should govern both lines and rates. A small percentage of insurance to value practically means an insurance of the "trim" of the building, *i. e.*, wooden window or door frames, dados, floor-boards, etc., and the paint, fresco-work, plate-glass, etc. Where these alone are to be insured and paid for, it is needless to say the rate should not be based upon iron and masonry. The Schedule and Coinsurance rule above will adjust the rate to a proper basis.

326. RESULT, *rate of building with* % *coinsurance*.....

(To which add for any fault of Management. Nos. 380, etc., page —.)

TO OBTAIN RATE ON STOCK IN FIREPROOF BUILDING.

Unoccupied-building Rate, No. 320.

Add the sum named in the second column of the table of occupancies, page —.....

Add, in case there be any other occupancy of building which increases the rate of the building by a greater amount named for the first column of the occupancy table than the risk to be rated, the difference between such higher figure and that named for the risk (for example, retail drugs adding 10 cents to building, and a cigar-store adding 5 cents, the difference, 5 cents, should be added to the stock-rate on cigars).....

If merchandise is stored above the seventh floor, add to the rate of *each stock* in the building, *no matter on what floor located*, as many times 3 cents as the building has stories in height.....

If merchandise is *not stored above seventh floor*, add to the stock to be rated as many times 2 cents as the floor on which it is located is stories above the grade.....

(For example, in a ten-story building occupied throughout for mercantile purposes, 30 cents would be added; in an eleven-story building, 33 cents, etc.)

Merchandise should not be stored at a greater height from the street-grade than 85 feet, even with the best fire-department. At that height, it is liable to wreck the building and affect every stock in the building, as well as the building itself. See Note 297.

(For example, merchandise on the fifth floor should have 8 cents added; on the fourth floor, 6 cents added; if distributed over both, charge the average 7 cents.)

327. TOTAL,

(*Deductions.*— Subject to deductions, No. 357, etc.).....

Deduct for Exceptional Fire-department, if any.....

Add for *Exposure*, according to hazard.....

329. RESULT, *rate of stock, subject to co-insurance*.....

330. *Co-insurance on Stocks* in fireproof buildings. Deduct ½ of 1% of rate for each 1% of stipulated co-insurance in excess of 25% of value.....

No stock to be rated below 15 cts.

Note. — In rating stocks in fireproof buildings, it should be borne in mind that, no matter how fireproof a building may be, there is no more reason why the combustible merchandise or contents of any one of its stories once ignited should not be effectually destroyed than there is why the fuel in a stove should not be consumed. So far, therefore, as stocks in fireproof buildings are concerned, the only advantage of a fireproof building over one of ordinary construction is to protect its contents against outside exposures and to confine a fire to a single floor or room — a consideration which makes it exceedingly important to insist upon co-insurance, especially where the policy covers throughout the entire structure. Otherwise a company may be as effectually carrying a number of separate risks for one premium as if insuring the contents of a number of separate brick stores under one sum. Under some circumstances, merchandise in the upper stories of a fireproof building might be a poorer fire-risk than on the grade-floor of an ordinary building.

331. RESULT, *rate on stock with* —% *coinsurance*.....

Add for faults of management.....

Automatic-sprinklers. — Deduct on stocks, with 90% co-insurance included, 45%

" On buildings with 60% co-insurance included 60%

No office-building to be rated below 5 cents, and no mercantile building below 10 cents, and no stock below 15 cents, after deducting for co-insurance and sprinklers.

332. *Jewelry in Safes* with full co-insurance in fireproof buildings may be insured at double the rate of building occupied.

DEDUCTIONS FOR FIREPROOF BUILDINGS.

340. *Hydrants, etc.* — If building within 300 feet of one post or flush hydrant, supplied by 8-inch or larger water-pipe, deduct 4% of bld'g rate (322).

341. " If within 300 feet of two or more hydrants, supplied by 8-inch or larger water-pipe, deduct 6% " "

342. " If said water-pipe be fed at both ends by mains or sub-mains, deduct an additional 4% " "

343. For approved automatic fire-alarm telegraph signal, to a central or fire-department station, with thermostats, deduct 2% of bld'g rate (329).

344. *Stand-pipes, — External*, for use of fire-department, with Siamese or double connections, deduct 3% " "

Note. — This provision important, as it saves time of carrying hose to the top of a high building.

345. *Stand-pipes,—Internal*, supplied from tank, with hydrants and hose attached at each floor at landings, deduct 1% " "

346. *Basement and Sub-cellar Sprinklers.* — If perforated 2½-inch pipe be provided in basement and sub-cellar with attachment at street grade for fire-department, standard size of thread and coupling, and standard butt, and with waste-ways to sewer, deduct from total building-rate 2% " "

Brought Forward.....

347. *Automatic-sprinklers in Basement* and sub-cellars. If approved installation deduct (no deduction if allowance has been made for sprinkler throughout building) 5% of bld'g rate (329).

348. *Office Occupancy.* — If building occupied throughout exclusively for offices, deduct 20% " "

349. " If building occupied above grade-floor exclusively for offices, deduct 10% " "

350. *Roof Hydrants*, protected from freezing, deduct 1% " "

351. *Floors.* — If waterproof, arranged with waste-ways and scuppers and inclined to carry off surplus water thrown by department to sewer or street, deduct 5% " "

352. " If watchman (on premises) with watch-clock, deduct 10% " "

(N. B.—If automatics, No. 343, only one-half deduction for watchman.)

TOTAL,

DEDUCTIONS FROM STOCK-RATES, FIREPROOF BUILDINGS.

The following deductions for exceptional features may be made from the rate on stocks obtained by the rule explained on page —. The percentage to be deducted is the percentage of the said total stock rate (No. 327):

357. *Hydrants, etc.* — If building within 300 feet of one post or flush hydrant, supplied by 8-inch or larger water-pipe, deduct 4% of final stock rate (327).

358. " If within 300 feet of two or more hydrants, supplied by 8-inch or larger water-pipe, deduct 6% " "

359. " If said water-pipe is fed at both ends by mains or sub-mains, deduct an additional 4% " "

360. *Fire-patrol.* — For salvage-corps or fire-patrol, if supported by city, deduct 3% " "
If supported by the Insurance Companies, deduct nothing. (Having paid for it they are entitled to it.)

361. *Covers, Tarpaulins.* — If merchandise covered by tarpaulins or other waterproof covers each night, deduct 5% " "
(These covers may be made fire-resisting by fireproofing processes.)

362. *Proximity to Fire-engine House, etc.* — If risk to be rated is within 300 feet of a fire-engine house or hose-house, which should insure prompt response of skilled men to any fire-alarm, deduct, 2% " "
If next door or opposite side street 5% " "

363. *Basement and Sub-cellar Sprinklers.* — If perforated 2½-inch pipe be provided in basement and sub-cellar with attachment at street-grade for fire-department, with standard size of thread and coupling, and standard butt, and with water-ways to sewer, and merchandise be on skids, deduct 2% " "

364. *Automatic-sprinklers in basement* and sub-cellars. If approved installation, deduct 5% " "
(Unless deduction has been made for sprinklers throughout building, in which case no allowance for this.)

365. *Casks of Water* or filled pails on each floor, deduct 3% " "
Note. — To receive above deduction there must be at least 6 filled pails for each 2,500 square feet of floor-area.

366. *Tin-covered Cases.* — If merchandise be kept in tin-covered wooden side-wall and other cases, deduct 5% " "

367. *Office Occupancy.* — If building above grade-floor is occupied entirely for offices, deduct 5% " "

368. " If offices and dwelling 10% " "

369. *Watchman.* — If watchman on premises but no watch-clock, deduct 5% " "

370. " If watchman on premises with watch-clock or electric detector, deduct 10% " "
Note. — One-half deduction, if automatic alarm No. 374.

371. *Stand-pipes, — Internal*, supplied from tank, with hydrants and hose attached at each floor at landings, deduct 1% " "

372. *Stand-pipes, — External*, for use of fire-department, with Siamese connections, deduct 2% " "

Brought Forward.....

373. *Chemical-engines on Wheels.* — If one or more chemical-engines are available in case of fire, deduct 5% of final stock rate (327).

374. For approved automatic fire-alarm telegraph signal to a central station or fire-department station with thermostats, deduct 5% " "

375. If merchandise on skids or platforms, deduct 2% " "

376. *Grade-floor Stocks.* — Deduct for stock entirely on grade-floor 3% " "
If stock extends over only one additional floor, viz, second or basement, deduct 2% " "

ADD FOR FAULTS OF MANAGEMENT, IF ANY.

380. " If bottom of elevator-shaft is used for store-room, coat-closets or lamp and oil closets, charge 10 cts.

381. " Swinging gas-brackets unprovided with stops, or within 36 inches of woodwork overhead, or otherwise unsafe (ditto as to bracket-lamps), for one, add not less than 5 "
For each additional one, add 1 cent.

382. " Untidiness, as to rubbish, ashes, etc., especially in cellar, charge not less than 10 "

383. " Empty boxes, rubbish and barrels in rear yards or alleys 2 "

384. " Lights in show-windows, open or unprotected 5 "

385. " Sawdust spittoons or sawdust on floors, especially in drug and oil stores 5 "

386. " If kerosene is used on floors when sweeping 10 "

387. " Ash and waste cans to be of metal. If not, charge 10 "

388. " If lighted by electricity, with system and installation not in compliance with Board rules, or in unsafe condition, or if arc-lights be not provided with wire or metallic screens above and below, or tight globes to prevent fall of carbons, charge 25 "

STRAIGHT HEADS OR FLAT ARCHES.

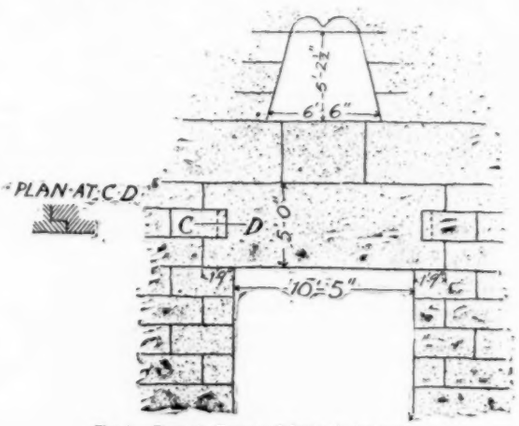


Fig. 1. From the Temple of Concord, Agrigentum.

NEARLY sixty years ago Sydney Smirke, who was afterwards a Royal Academician and professor of architecture, wrote an essay, which we are afraid is now forgotten, on the mode adopted by masons at various and distant periods in forming a straight head over an aperture. As attention is generally monopolized by arching of Eastern, Roman and Mediæval types, substitutes for lintels may appear to be obsolete, but there ought to be some interest found in arrangements of masonry which are evidence of the skill of the old builders. Mr. Smirke's observations on them are as follows:

It was remarked by the late eminent engineer, Mr. Milne, that in his tour through the classical regions of Europe he derived more professional benefit from an examination of the construction of ancient masonry than from any other subject that engaged his attention.

But it is not only on classic ground that this subject demands attention, nor is it upon works of the earliest antiquity alone that our examination of the artifices of construction can be advantageously bestowed. I am persuaded that if as much attention were paid to the substantial details of structure visible in our own old buildings as has been given to the contour of mouldings and other purely ornamental forms much light would be thrown upon the disputed chronology of these and similar works, and many data of general application might perhaps be established. This is a vein of inquiry to which I beg leave to invite the attention of intelligent and competent observers, and in the pursuit of which I think they may anticipate a profitable result.

As an example of the sort of inquiry which I have suggested, I submit some sketches explanatory of the mode adopted by masons

at various and distant periods in forming a straight head over an aperture.

No. 1 is a representation, drawn from detailed memoranda taken by myself in 1825, of the lintel over the great doorway leading into the cella of the temple usually called the "Temple of Concord," on the site of the ancient Agrigentum, in Sicily. The date of this building, like most of the Greek remains in that island, is, unfortunately, unknown; Biscari and other Sicilian antiquaries consider it to belong to a period subsequent to the Punic war, because Diodorus states all the temples of Agrigentum to have been either burnt or wholly destroyed by frequent sieges, whereas this building is remaining tolerably perfect; but this does not appear to me conclusive evidence, for although the columns, entablature and cella-walls

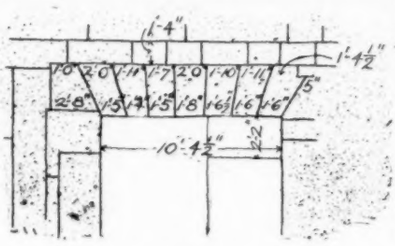


Fig. 2. From the Emissario, at Albano.

are certainly in better condition in respect to their masonry than most other Greek remains, yet this might fairly be classed among the *ædes sacræ exustæ* of Diodorus, inasmuch as every combustible portion of it is wholly destroyed. There is so much purity and genuine Greek character throughout this beautiful temple that I cannot consider it to be the work of any period later than the reduction of Sicily under the Roman power.

It is manifest that, to whatever period we attribute this work, the principle of the arch was still unknown to the builder, for it is not to be supposed that they would have taken the pains to quarry, convey and lift up so ponderous a block of stone as that which forms the lintel, nor would they have resorted to the singular contrivance here seen for relieving this stone from the pressure of the superincumbent masonry, had they known that with much less cumbrous stones they could have made equally sound work.

The opening in the masonry over this lintel appears to have been intended for the double purpose of relieving it from the weight above and of forming a passageway through the tympanum or gable, and above the level of the ceiling of the cella.

What the purpose or meaning may be of the two small curves at the top I cannot guess, nor have I ever heard any explanation proposed.

The joints of all this masonry are without cement, and nothing can exceed the beautiful precision of the work. You will not fail to observe the pains taken to preserve uniformity in the vertical joints without sacrificing too much of the bearing ends of the lintel; this minute attention to the appearance of the joints on the inside surface of the walls of the cella affords a satisfactory and, I think, conclusive proof that there was no painting nor any superficial finishing of any kind to the walls of the cella.

No. 2 shows the masonry of the square head of one of the adyts of the emissario to the lake at Albano. The blocks of stone composing it are of the dark-brown tufaceous substance commonly called "peperino"; the joints are very close and, apparently, without cement. These circumstances, according to the theory of Winckelmann, dis-

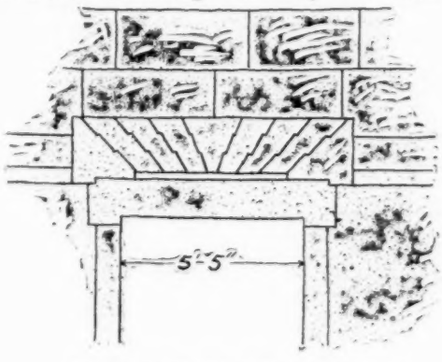


Fig. 3. From the Tomb of Theodoric, Ravenna.

tinguish works of a date prior to the commencement of the Roman Empire, but I cannot place confidence in the opinion that has attributed this work to a period before the siege of Veii. The evidence that has been adduced leads, I think, only to the conclusion that the Lake of Albano had at that time an emissario, but it is not, therefore, to be assumed that any part of the present masonry bears that early date. The evidence afforded by the construction of the work strongly corroborates the doubt above expressed. There is here an example of what workmen call a "skeme-arch," where, in fact, the principle of the arch is carried out less simply than in arches of ordinary form, and which, therefore, may be presumed to be rather a subsequent refinement upon a previously-known arrangement; but as there is the best evidence to prove that the arch was unknown in masonry at so early a period as that of the siege of Veii, viz, the fourth century before the Christian era, I would infer the great improbability of the date ascribed by some to this specimen of the straight-arched head.

In the third example we have another variety of the skeme-arch from the head of the doorway into the building at Ravenna known as "Theodoric's Tomb"; the rebate, or shoulder, in the radiating joints is a singular expedient quite unknown, to the best of my belief, in any work of Classic times, although, as I shall show below, it became somewhat prevalent in the ensuing ages. It seems to indicate a distrust of the principle of the arch, but its inutility will be readily recognized by any mason of the present day. The commencement of the sixth century may be regarded as the date of this example.

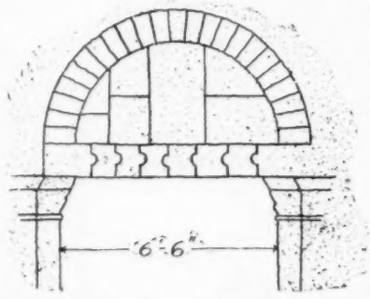


Fig. 4. From the West Front of Rochester Cathedral.

No. 4 presents us with a piece of masonry upwards of a thousand years later than No. 3; it is the straight lintel over the centre doorway at the west end of Rochester Cathedral. Here we have another elaborate contrivance showing but little science on the part of the artificer. The joints appear, externally, to be exactly vertical, although I presume that, within the surface and out of sight, they radiate like the joints of a skeme-arch; otherwise it is difficult to understand how these stones can support the weight imposed upon them; certainly the excrescences on the sides of the stones by which they are locked into each other, and which, in mason's language, would be called a "joggle," have but little effect in keeping them up. The face of these stones is, as you well know, richly carved, each with a separate device; they are irregular in size, the abutment-stones being very dissimilar; indeed, a great want of correspondence and regularity of structure prevails throughout not only this doorway, but the whole west front of the edifice in question, and it is difficult to believe that any working-drawing could have been prepared for the guidance of the masons in the execution of their work.

This fourth example brings us down to the commencement of the twelfth century, the date which I presume may be confidently assigned to the west front of Rochester Cathedral.

For the sketch No. 5 I am indebted to a friend. It is stated to be the representation of the masonry of a chimney-opening in an old kitchen at Edgcot, Northamptonshire. Although the capacious opening here shown is not covered by a straight head, as in the preceding cases, the Pointed arch, which spans it, is so nearly flat as to entitle it to our notice on the present occasion. I know not the age of this example, but I presume it to be of the later period of the Pointed style.

It is worthy of observation that the break, or shoulder, in the radiating joints is discernible in some semicircular arches at the Gothic tomb in Ravenna above referred to, and I have also noticed this singular contrivance in the engraved representations of an old building of the Pointed epoch at Cairo.

The occurrence of the same peculiarity of structure in localities so distant from each other — a peculiarity unknown to Classic art, and

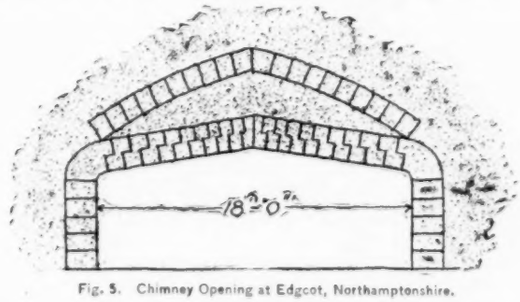


Fig. 5. Chimney Opening at Edgcot, Northamptonshire.

long disused in modern art — is a curious fact, and might perhaps suggest interesting reflections; but I forbear to indulge in any speculations on this subject.

The five examples here brought into juxtaposition to show the efforts of workmen to produce the same effect with the same material, at periods and in places so widely distant, serve to illustrate the condition of the arts at their respective periods.

Nothing can exceed the beautiful precision and masterly execution of the masonry in the first, or Greek, example; its excellence is indeed sufficiently attested by the comparatively complete state of the work, notwithstanding the lapse of more than twenty centuries, the

devastation of war, and the still more destructive earthquakes of which Sicily has been the scene. But art was still young, and the progress of mechanical knowledge not great; the arch was unknown, and the Greek mason had no resource but the obvious and inartificial one of forming his straight doorhead with a block of depth and strength enough to bear its burden, notwithstanding the trouble that necessarily attended the process.

The second, or Roman, example, has still much of the excellence that characterizes the workmanship of Classic times, and indicates, moreover, that since the date of the preceding example a stride had been made in the progress of the science of construction that was destined to effect a total revolution in architectural design, for cuneiform stones are here used to form a flat arch.

The third example, of what may truly be called the Gothic period, strongly marks the decadence of good art; although the masonry is executed with much precision, the rebate, or shoulder, in the radiating joint is a piece of mistaken construction that would not have been made in better times.

The fourth, or Norman, example, and the fifth, of a still later period, illustrate that elaborately artificial manner which, both in design and construction, characterizes the Mediæval architecture of Europe.

A FEW FACTS CONCERNING ROMAN MORTAR.

TWO architects and engineers Roman brickwork has long been a subject of wonder and admiration as well as a field of much conjecture, not on account of its beauty or the constructional manner in which it is built, but because of its great strength and durability. Of course, in many cases the joints are wider than the bricks and the mason-work generally rough, but, on the whole, it is really wonderful work, when one considers how well it has defied time and weather for more than fifteen centuries and still remains in as good a condition as when it was first laid-up.

Of course, to write a dissertation upon Roman brickwork founded upon a few weeks' casual observation would be absurd, after the volumes which have been written upon the subject by those who have made it a careful study, so I only want to note a fact or two which hitherto have not come under my notice and which I became acquainted with quite by accident during my last stay in Rome.

It happened the other day, as I was wandering around the Foro Romano, pondering over the immense creations around me in brick and mortar, that I was tempted in true tourist-fashion to steal a memento of the place, so I was soon hard at work with my walking-stick trying to pry from its peaceful resting-place one of the flat bricks in the wall of Constantine's Basilica.

My efforts were at length rewarded by the tile falling out and with it a large piece of mortar, which immediately attracted my attention by the fact of its having what appeared to be a great gray cinder protruding from the fine grain of its composition. This cinder, on closer examination, proved to be a piece of half-burned *coral*.

My curiosity excited by this, I immediately commenced a search for more and was in time rewarded by finding three more similar pieces in different parts of the work, all in the same half-burned condition as the first.

All doubts as to their being there accidently being cleared away by the finding of these other pieces, I began to wonder what function they could have exercised and finally came to the conclusion that the Romans used rough coral in the manufacture of lime for building-purposes and that these pieces were simply lime-material imperfectly burned.

Well, fortunately, there was an English civil engineer of much experience staying at our *pension*, to whom I showed my specimens, and found that he, also, only a few days before, had made the same discovery in the Baths of Caracalla, and had arrived at the same conclusion as I had as to the presence of the coral in the mortar. The fact itself is, of course, of no particular value, but as there have been so many theories advanced concerning Roman mortar and lime-making, I thought it curious enough to note down.

Of course, there is an abundance of coral formation of every kind all along the Italian coast, and, to my mind, it is not impossible that the Romans utilized this material for making their lime, shell-lime being by far the best and purest lime known for building-purposes. Our forefathers were well aware of this fact when they built their early homes along the New England coast a century or so ago. They, naturally, had no coral, but they substituted for it oyster and clam shells, preferring this material, which was so accommodatingly at hand, to the hard limestone, which would necessitate quarrying before being burnt.

So far, I have never heard this coral theory advanced regarding Roman work, but it certainly does not seem unlikely that this form of pure shell-lime was used by the ancient Italians in erecting their monuments, which have defied time and weather so well until the present day, and which could never have been built to endure so long with the lime now in use.

In the course of our conversation my friend volunteered another piece of information, which he had gleaned from his walks among the same ruins, and which I afterwards took notice of myself. This was, the substitution, in many cases, of pounded charcoal for sand in the mortar. He became aware of this fact some years ago, during one of his visits to Rome, when he carried several specimens of this mortar back to England, and submitted them to microscopical tests and quantitative analyses to verify the materials and determine the proportions. After some experimenting he utilized it in India, on constructional work, in a region where clean, sharp sand was a rarity, and found it to work admirably, the charcoal, mixed with a small quantity of sand to give it body, having all the characteristics of the usual material, being just as sharp and almost as durable and impervious.

If this scheme can be utilized in India in heavy constructional work, it almost seems that it might be to our advantage to give it at least a trial in some parts of our country where sand is scarce, and see how the mortar stands.

HOSPITALS AND ASYLUMS.[1]

WE have already had occasion to speak of the two admirable volumes on Asylums which form the first part of this great work, on which thirteen years have been spent by the most experienced writer who has ever treated of hospital arrangement. The publication of the last two volumes, and the portfolio of plans, which was intended to follow immediately after the appearance of the Asylum volumes, has been delayed until now by the misfortune of the printers of the earlier portion, who, when some hundreds of pages of the third volume were already in type, fell into financial difficulties, which ended in complete bankruptcy; so that Mr. Burdett, who was then engaged in examining hospitals in the United States, found himself on his return obliged to write over again portions of the book which had already cost him years of labor; and as the work which the insolvent printers had done could not be utilized, the whole of the third volume had to be reset by another firm.

Unfortunate as this delay has been for the author and his publishers, it has had no perceptible influence upon the book itself, and the chapters on Hospitals are as interesting and suggestive as those on Asylums. In fact, as asylum arrangement and administration form a very distinct branch of medical science, which few persons outside the medical profession know much about, most readers will prefer the volumes on Hospitals, in which every one will find information which may be useful to him.

The first portion of the third volume, after a brief but interesting review of the early history of hospitals in various countries, is devoted to a classification of hospitals, as distinguished from asylums, and an extremely valuable study of the sources upon which hospitals must depend for their revenues, and the modes in which these revenues can be most usefully expended. On such points Mr. Burdett, as a hospital superintendent and director of many years' experience, is perfectly at home; and his examination and tabulation of the expense accounts of nearly sixty hospitals, together with his observations on commissariat, and other points, are not only interesting, but will be found of the greatest use by trustees and other corporation-officers of the town hospitals which are being established in every direction throughout the United States.

This portion is followed by a long chapter, scarcely less valuable and more interesting to the general reader, on nursing systems. In the United States, few people outside the great cities, and a comparatively small portion even of city people, know what inestimable service has been rendered by the training-schools for nurses, the first of which, in this country, was established at Bellevue Hospital in 1873. There are now about forty, and their work with their quiet, skilful and efficient graduates has done more to ameliorate the lot of the sick, within the last twenty years, than perhaps all the advance which has been made in the other departments of medical science put together. Although Sairey Gamp has not yet disappeared entirely from American sick-rooms, she no longer monopolizes them, and the trained nurse is fast becoming almost as indispensable to the physician as to the patient. It is curious to read, in Mr. Burdett's chapter, the history of the development of nursing. Before the Crimean War, such a thing as a good professional nurse was hardly known in England. The Continental countries had their Sisters, who combined zeal and unselfishness with a certain knowledge of

[1] "*The Hospitals and Asylums of the World*": Their Origin, History, Construction, Administration, Management and Legislation. With plans of the Chief Medical Institutions accurately drawn to a uniform scale, in addition to those of all the hospitals of London in the Jubilee Year of Queen Victoria's Reign. By Henry C. Burdett. In four volumes and portfolio. London: J. & A. Churchill, 11 New Burlington Street, West.

their secular duties, but, as an English doctor wrote, about 1840, nurses were then engaged without any character, "as no respectable person would undertake so disagreeable an office." It may be imagined that a profession which "no respectable person" was expected to enter was not eminent for the good conduct of its members. "Every vice was rampant among them," Mr. Burdett says, and they often hurried their patients purposely out of the world. Even in 1847, when Sir Edward Parry published a call for nurses for the Haslar Naval Hospital, there was not a single response; and it was not until 1854, when Florence Nightingale, who had been trained in the Institute of Deaconesses at Kaiserswerth, and, while acting as superintendent of an invalid ladies' home in London, had published her well-known "*Notes on Hospitals*," was called upon to organize the nursing service in the Crimea, that the care of the sick began to receive the attention which has since been steadily increasing.

On the Continent, for nearly a thousand years, hospital nursing had been in the hands of Sisters, the first Order, in France, that of the Hospitalières Hôtel Dieu, having been founded in 1097. These were Augustinians, and their organization still exists, or did exist a few years ago. Several other Orders, those of the Filles de Marthe, the Ursulines, the Sisterhood of St. Vincent de Paul and the Filles de Sainte Geneviève, were founded at various periods, from 1443 to 1633. In 1877, for the first time, an attempt was made to introduce lay-nurses into the hospitals, and the Assistance Publique opened two training-schools. Although there were then many successful lay training-schools in operation in various parts of the world, the Paris establishments seem at first to have been unfortunate in the material offered them. The first pupils were mostly discharged shop-girls or servants, and the manner in which they exercised their profession on emerging from the training-schools aroused anything but favorable comment. They demanded money from their patients, and appropriated the wine prescribed for them, and are even said to have invaded the medical museums and drunk the alcohol used for preserving the specimens. Although the physicians had themselves favored the change from religious to lay nursing, for the reason that the Sisters, notwithstanding what Mr. Burdett justly calls their sweetness and devotion, were subject to the authority of the Superior of their order, not to the hospital regulations, and could not receive the semi-medical instruction which it is the object of training-schools to impart, they were compelled to avail themselves again of convent discipline and virtue, and, in 1889, the Parisian hospitals were again opened to the Orders, the best of the lay-nurses being retained, but put under the same authority as the Sisters.

It would hardly be fair to Mr. Burdett to lend interest to our criticism by transferring to our columns any more of the curious details with which his volumes abound, and we must refer our readers to the books themselves, assuring them that everything that a layman needs to know about hospitals and asylums is to be found there. For architects, however, it ought to be specially mentioned that besides the plans given in the text, and the invaluable details contained in the fourth volume, which is entirely devoted to hospital construction, the portfolio, which forms the concluding volume, contains something like three hundred plans, all of actual buildings, all at scale, and all drawn in the most careful and accurate manner, often with even the drainage indicated.

A GERMAN ENGINEERS'-POCKETBOOK.

GERMAN engineers must have capacious pockets, judging from the dimensions of the fifteenth edition of the *Ingenieurs Taschenbuch*,[1] prepared at Charlottenburg by a commission of the great engineering society, "Hütte," and published in Berlin. The work is, however, in two parts, so that, by having it bound in two volumes, people with less roomy receptacles for such objects can accommodate it comfortably, and the persons for whom it is intended will find much satisfaction in doing so.

The arrangement of the book is extremely systematic. The first part is a most convenient storehouse of mathematical information. Little theory is given,—only just enough to refresh the memory of the practitioner whose knowledge has grown a little rusty,—but there is a wealth of tables, most conveniently arranged. For example, in twenty-two small pages is given every number from 1 to 1,000, with its square, cube, square root and cube root, five-place logarithm, reciprocal, its product multiplied by π — that is, the circumference of a circle of which the number is the diameter, and the area of the same circle. Next comes a table of natural logarithms, and then five-place logarithmic sines, cosines, tangents and cotangents. This is followed by a very convenient table, giving the length of arc subtended on the circumference of a circle with a radius 1, the length of the chord, the versed sine, and the area of the segment enclosed by the chord and arc, for every degree from 1° to 180°, the area of segment being given to five places of decimals, and the other dimensions to four places. After these tables follows the arithmetical, or, rather, the algebraical division, which consists of a collection of the formulas which we learn with so much difficulty at school, but forget so easily afterward, equations with two or three unknown quantities, with the familiar rules for elimination, and a great variety of similar helps to the forgetful mind, including even rules for computing interest.

In the same way, the chapter on Geometry and Trigonometry, which follows, is occupied by formulas without comment, and that on the Calculus, although a little explanation is given, consists almost entirely of equations, followed in some cases by solutions; while the chapter on Analytical Geometry gives the equations of the principal curves, followed by illustrations of the method of drawing them under different circumstances.

Statics and dynamics are treated in the same way, and then comes the practical part, in which almost every question that an engineer, either civil or mechanical, could ask, is answered. The diameters of pipes, with the thickness of their walls, in cast-iron, wrought-iron and brass; the strength of hooks, anchors, chains, ropes, belts, rods and shafts; the different kinds of shaft-hangers, with the advantages of each; the formulas for belt and rope transmission of power, with profiles of pulleys, and tables for hemp-ropes, cotton-ropes, wire-ropes, chains and belts; valve movements, governors, connecting-rods and their calculation, pumps, cranes, elevators, fans, water-wheels, boilers and engines. The chapter on Boilers furnishes a curious example of the ingenious care with which the utmost possible amount of information is compressed into the space. The description of each sort of boiler, including tubular, upright and various sorts of pipe boilers, is followed by a table showing the water-space, steam-space, dimensions in plan, and evaporating-surface of that particular sort, in proportion to the heating-surface, thus exhibiting at a glance the suitability or unsuitability of each sort to particular conditions. Many more details are given in regard to certain kinds of boilers, and a very useful table of heights and diameters of chimneys with directions as to form and stability is added.

It will be inferred from this description that the book is rather for engineers than for architects, and no attempt is made to substitute it for such admirable hand-books as the "*Baukunde des Architekten*," but every architect has occasional need of information belonging more strictly to the province of the engineer, and we know of no book in which an architect who reads German can be more sure to find just the information that he wants, brought down to the latest times, and most clearly and concisely expressed, than in this beautifully printed and illustrated volume.

[1] *Des Ingenieurs Taschenbuch*: Herausgegeben vom Akademischen Verein "Hütte." Fünfzehnte, neu bearbeitete Auflage mit über 1,000 in den Satz eingedruckten Abbildungen und 1 Tafel. Berlin, Verlag von Wilhelm Ernst & Sohn. 1892.

ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

REAR OF A. J. STONE BUILDING, MADISON ST. AND ASHLAND AVE., CHICAGO, ILL. MR. ALFRED SMITH, ARCHITECT, CHICAGO, ILL.

[Gelatine Print, issued with the International and Imperial Editions only.]

THE DOORWAYS OF THE ABBEY CHURCH AT ST. GILLES (GARD), FRANCE.

THE Abbey Church of Sainte Gilles, says Viollet-le-Duc, offers one of the most complete examples of the work of the Provençal sculptors of the time. The original plan, on too vast a scale for accomplishment, had to be abandoned after the foundations were laid by Alphonse Jourdain, son of Raymond IV, in 1116. Upon these a structure of much smaller dimensions was built, having now no very-well-defined character because of important restorations which have altered its appearance. "Of the primitive structure," says Merimée, "there still remains a very remarkable subterranean church, well lighted and divided into two naves [end of XII Century], considerable portions of the substructure of the choir and transepts and finally and above all, the portals, of which the admirable ornamentation, the delicacy of style and the finish of the details are above all praise. Upon this façade were exhausted every caprice, and the whole luxuriance of Byzantine ornament." The carvings about the central doorway represent Jesus Christ and the symbols of his Apostles: those about the lateral doorway present, on one side, the Crucifixion and on the other the Adoration of the Magi and the Annunciation. Behind the columns which stand between the doorways are figures of the Apostles and beside the columns are the lions between which the abbot took his seat when dispensing justice. It is hardly necessary to point out the kinship between these doorways and those of St. Trophime, at Arles, and how classic tradition has been preserved here better than in other places unpolluted by those influences which in other regions were turning Romanesque architecture toward entirely different destinies.

AUSTIN PRIMARY SCHOOL, DECATUR ST., EAST BOSTON, MASS. MR. E. M. WHEELWRIGHT, CITY ARCHITECT, BOSTON, MASS.

HOUSE FOR H. D. HARVEY ON LAKE MICHIGAN. MR. CLARENCE A. FULLARTON, ARCHITECT, NEW YORK, N. Y.

STABLE FOR DR. A. G. RUNYAN, SOUTH HAVEN, MICH. MR. CLARENCE A. FULLARTON, ARCHITECT, NEW YORK, N. Y.

PROPOSED FISHING-LODGE FOR MISS DUDLEY, OF DOUGLAS, LAKE CHAUBUNAGUNGAMAUG, MASS. W. J. H. DUDLEY.

NEW BUILDINGS FOR THE TEACHERS' COLLEGE, NEW YORK, N. Y. MR. W. A. POTTER, ARCHITECT, NEW YORK, N. Y.

The Board of Trustees announce that Mr. Geo. W. Vanderbilt, one of their Board, has given twenty lots to serve as a site for new buildings on One Hundred and Twentieth and One Hundred and Twenty-first Streets, between Amsterdam Avenue and the Boulevard; it is proposed to erect on this site two buildings; the main building for the college, containing, besides a hall and lecture-rooms, the School of Observation and Practice, the Gymnasium, the Bryson Library and the laboratories of the Departments of Psychology, Science and Domestic Economy; and the Arts Building for the Departments of Mechanic Arts and of Form Study and Drawing and their appropriate museums, exhibits and libraries. This Mechanic Art Building will be placed on One Hundred and Twenty-first Street and will be the first building of the kind erected in New York. The Trustees announce that this building, to cost $200,000, has been given by a lady friend of the college, and will be ready for occupancy in the fall of 1894. Contracts have been made to erect a part of the main building on One Hundred and Twentieth Street, together with the east wing, and it is proposed to complete this portion of the scheme in 1894; $85,000 have been subscribed for this building, $40,000 vested funds will be utilized, and about $75,000 more have been promised on condition that $200,000 are raised by July 1, 1893. These amounts will complete free of debt the section of the main building already begun. There still remains a most important portion of the buildings for which funds must be secured, namely, the western wing of the College building,— this contains the Gymnasium, the Kindergarten, Class-rooms, Reading-rooms; but most important of all the Domestic Economy deparment, with its Cooking and Sewing Rooms. It is estimated that this portion built and equipped will cost almost $150,000.

[Additional Illustrations in the International Edition.]

HOUSE OF FRANKLIN MACVEAGH, ESQ., SCHILLER ST. AND LAKE SHORE DRIVE, CHICAGO, ILL. H. H. RICHARDSON, ARCHITECT.

[Heliochrome.]

GATE TO PLACE OF H. A. C. TAYLOR, ESQ., NEWPORT, R. I. MESSRS. McKIM, MEAD & WHITE, ARCHITECTS, NEW YORK, N. Y.

[Gelatine Print.]

VILLA AT VILLERS (CALVADOS), FRANCE.

[Etching.]

HALTON, HERTS, ENG.: WINTER-GARDEN.

ST. PETER'S, BURNHAM, BUCKS, ENG.

The tower of this interesting church was, until lately, covered with plaster, upon the removal of which several Norman windows were found, which have now been opened out. The buttresses and upper portion date from the fourteenth century, the shingle spire being entirely new. The west and several of the aisle windows, which are good specimens of Decorated work, have, with the tower, been carefully restored by Mr. W. F. Unsworth, F. R. I. B. A.

SCREEN AND CHANCEL, ST. MARY'S, HORSELL, SURREY, ENG.

This church has been lately restored, and a new chancel built from designs by Mr. W. F. Unsworth, F. R. I. B. A. The sketch from which illustration is taken shows chancel screen and stalls.

PART OF THE CASTLE AT HEIDELBERG.

NOTES AND CLIPPINGS

An English View of the American Tin-plate Question. — Can America make her own tin-plates? This question — one of vital import to our Welsh manufacturers — has been hotly discussed during the last year or two. The official report of Mr. Michael Herbert, our first Secretary of Legation at Washington, on the effect of the McKinley tariff on the tin-plate industry in the States, will be read, therefore, with the greatest interest, and his conclusions will hardly fail to produce relief in the minds of those interested. The average annual consumption of tin-plates in the States reaches the enormous total of 678,000,000 pounds. On June 30, 1891, the day on which the McKinley tariff came into effect, there was a surplus in the country, over the normal imports, of 358,000,000 pounds. Naturally the imports for the next six months fell off and only came to 104,000,000 pounds, but subsequently they again increased and brought the total, for the fiscal year ended June, 1892, up to 422,000,000, against 680,000,000 for the year 1889–90, which was a normal period. Since then they have been again advancing, and for the fiscal year ending June, 1893, will probably not be far short of 800,000,000 pounds. From these figures and his researches Mr. Herbert draws the following deductions: That little American tin-plate of any kind has hitherto been offered in the market commercially; that the McKinley Act has advanced the price of tin-plate about a dollar a box, and has damaged the canning industry, and that the imports from the United Kingdom have not fallen off, but even show signs of increasing. Commenting on the probable future of the McKinley experiment as regards the American tin-plate industry, Mr. Herbert remarks: "Notwithstanding these facts, a new industry in the manufacture of tin-plates, as I have before stated, may be said to have been started in the United States. It may be looked upon as an experiment, it is yet in its infancy, and it is at present almost entirely confined to 'dipping' imported sheets. Still, coarser kinds of tin-plate of bona-fide American manufacture are being turned out, and there appears to be no reason why the present difficulties as to price and quality in the construction of fine black plates ready for tinning should not be overcome in course of time, provided the present duty be maintained. All the raw materials necessary in the production of tin-plate can be obtained. The rolling-mills in the United States are now producing nearly 250,000 tons per year of the heavier kinds of sheet-iron and steel, and it surely will not be long before American ingenuity, aided by a bounty of 2 2-10 cents per pound, will discover the mechanical process necessary for rolling, at a profitable price, sheets of a thinner gauge and a better quality, such as are required for the manufacture of fine tin-plates. But whether the industry prove to be a success or merely an experiment, it will, I venture to predict, be long before more tin-plate is produced than will be absorbed by the constantly increasing consumption in this country, and it will probably be years before the English product will be seriously affected by the McKinley Act or by the new industry under the best of circumstances."— *London Financial Times.*

Flour-dust Explosions. — "Speaking of flour-mill dust," said Mr. E. M. Heston yesterday, "after an experience of twenty-five years as a miller, I am willing to go on record as saying that the dust is as explosive as dynamite and that it is not explosive at all. Think that's contradictory, do you? Well, it isn't. It is only my way of saying that, under certain conditions, which we do not yet understand, mill-dust has exploded with terrible results and that where those conditions do not exist there is no danger whatever. Such experienced men as John W. Smith and Alexander Kauffman will tell you that mill-dust will not explode, but when I asked Mr. Adams, the head-miller of the wrecked Litchfield mills, about it the other day, he simply said, 'I don't know, but here are the ruins.' So far as matters of public notoriety can be considered official, there are only three instances of alleged mill-dust explosions on record in this country. The first was the great Washburn mills in Minneapolis, three of them, which went up in 1878. A mill alongside was burning and the firemen played from the roof of the Washburn mills. There were three quick reports in succession, and even the blue-limestone foundations were shattered. The firemen were blown across the street and killed. The next case, and the one best remembered here, because nearer home, and also by reason of the loss of many lives, occurred in April, 1879, when the Becker & Underwood mills at Dixon, Ill., exploded. Three or four men were killed outright and twelve or fourteen so horribly burned that they were maimed for life. A curious incident of this explosion was that the men picked up were in such mortal agony that the by-standers put upon them the first thing that came handy, which happened to be paint, taken from an adjacent paint-shop. The third was that of last week at Litchfield. A paragraph in the *Republic* cited the Bain mills as another, but I think it was pretty well established that the Bain plant was struck by lightning. A company up in Michigan is now stocking the mills of the country with a dust-collector that removes all necessity for a dust-room and all question as to the danger of mill-dust." — *St. Louis Republic, March 27.*

The Fate of a "Boom Town." — Deserted towns are supposed generally to be the relics of the mining craze in far Western States and remote from centres of population. But, strange to say, there is such a town within ten miles of Denver. It contains large and once handsome brick buildings, rows of mouldering dwellings and hundreds of scattered frame huts. It is the collapsed boom town of Sullivan, started by the promoters of the great scheme of the old Denver Water Company to dam the subterranean flow of Cherry Creek and pump it into an enormous reservoir for the use of the people of Denver. The work was an engineering failure, and a financial one, as many Eastern bondholders found out. While the boom lasted thousands of men were employed, buildings sprang up like mushrooms, prices of corner lots soared, and there was even a bitter post-office fight. A year and a half ago operations stopped, there was an exodus of speculators, tradesmen and laborers, the post-office was shut up, and Sullivan's greatness was a thing of the past. Among the acres of building-materials, — sandstone, trusses, pipes, boiler-stacks and plates, etc., — abandoned when the crash came, the coyote sometimes picks his way now, and he is the only guest at the mammoth hotel that was once the sight of the place. — *N. Y. Evening Post.*

The Largest Plate of American Glass. — There was finished at the Diamond Plate Glass Works, Kokomo, Ind., March 25, the largest plate ever cast in the United States. It is 150 x 216 inches, or 12½ feet wide by 18 feet in length. This is by all odds the largest plate ever cast and ground and polished in America. Other plates as large as this have been cast here, but never before has one of this magnitude run the gauntlet of the finishing-rooms without breakage. — *Indianapolis Journal.*

A Remarkable Arizona Ruin. — Near Flagstaff, Ariz., and on the Upper Verde, there are the ruins of castles still in as good a state of preservation and much resembling many of those in the north of England and Scotland, the ages of which we may approximate with a considerable degree of certainty. One in particular that is very interesting stands near the head of the Verde River on a peak that constitutes the extremity of a spur of the Bradshaws. The peak is granite, and rises abruptly out of the valley on three sides, while the fourth is protected by the mountain spur, which is about one hundred feet higher and hangs an impassable precipice above the smaller. On this shelf or bench the building was constructed of stone and cement in such a position that one on the ruins can get a good view of the entire width of the valley and fully five miles either up or down it. Through the taller mountain a volcanic rift has allowed a perpetual stream of water to flow, though it was fully sixty feet beneath the base of the castle and back of it, so that the water came out underneath the cliff and flowed across the mesa into the river. In order to protect themselves against a water-famine in a time of siege the inhabitants cut a fissure through the solid rock fully sixty feet, and changed the course of the stream so that it flowed out on the opposite side of the rock and directly through the fortification, making it impossible to cut off the supply. This building was over 400 feet in length by 250 in width. One of the walls yet stands, four stories in height, though some earthquake has changed the surface of the mountain until the outer one has fallen and the one now standing leans considerably towards the north. This structure alone contained over 200 rooms, and could have easily accommodated a thousand people. Back of this is a cave, partly natural and partly artificial, that extends more than 100 feet, and through which they descended to the water. This was also cut up into rooms, each one of which was nicely plastered with some kind of cement that is now in a good state of preservation. There are niches in the walls, where they evidently kept their jewels and valuables, and I am informed that two small rush bags were found in one of them, though I did not visit it first and did not see them. A number of jars filled with parched beans were taken out, and one of these jars, or ollas, holding about a bushel, is in the possession of Mr Drew, who has a ranch near by, and is used all the time for holding drinking-water. It is of a very dark-colored material, thoroughly glazed, but, outside of the heat necessary to do the glazing, it has not been affected by fire. It has been cracked almost entirely around, but it has been mended with some kind of gum so deftly that though it had been in his possession for years, Mr. Drew had not discovered it until one day recently when we were examining it together. In this cave about twenty skeletons were found. The skulls of some of them had been crushed, while others appeared to have died natural deaths, though the bones were so badly decayed that had fatal wounds been inflicted on any other part of the body than the head it could not have been discovered when we made our examination. These remains were scattered about the inner rooms in evidently the same position in which they had fallen from starvation, or had been laid by the hands of their comrades after being stricken down by their foes. Around the bony necks were found the amulets and on the wrists the shell bracelets that protected them from evil, or served them as ornaments during life. This structure was built altogether different from the fortresses of Zuñi and Acoma, neither does it resemble any of the pueblo buildings in New Mexico. Judging from the mass of cement scattered about on the cliff, these walls must once have been fully six stories in height and the buildings almost as large as the Casa Grande in the Gila River Valley. — *San Francisco Chronicle.*

New England Clapboards. — The good New England people have their peculiarities. They want a short clapboard and a long shingle. But few of them will use a shingle under 18 inches in length, or a clapboard more than four feet long. It is not so difficult to understand why they desire an 18 inch, or longer, shingle, but there are millions of people in the world who, were they asked why the New Englanders invariably use a four-foot clapboard, could give no more intelligent answer than though they were so many benighted heathens. Throughout Michigan there are a good many mill-men who make clapboards for our New England friends, and the manufacture of them is something of a curiosity to a man not acquainted with the process. The log is hung as if in a lathe, being revolved the proper distance every time the circular saw takes off a board. Finally all that is left is the centre or the core of the log. Every board is perfectly quarter sawed, and as a consequence there is a minimum of warping and shrinking on the sides of the houses Down East. In shipping the clapboards they are tied in bundles. Another peculiarity is that New England carpenters, when covering a building with clapboards, begin at the top and work down. At first blush one might think they had learned this back-action way of clapboarding from the Japanese, who, as a rule, do things exactly as other people don't do them. Occasionally one will now see in a Chicago suburb a house being sided in that manner, and it is always safe to slap the carpenter on the shoulder and ask him how the people are back in New England. The other day a mill-man who caters to the New England clapboard trade was asked why down there they demand four-foot boards, and why the carpenters when putting them on went at it as though they stood on their heads, as it were. He said, for the best reason in the world — there was money in it. He said that a carpenter by boarding down could cover one-fifth more space than he could by working from the bottom up; and that four-foot clapboards cost the builders of the New England States $5 a thousand less than the same grade of stuff would in long lengths. This difference in price is due to the fact that manufacturers can get sound four-foot lengths from logs which otherwise would go into shingles. It is economy for the manufacturer to cut these short clapboards, and the Eastern buyer gets the advantage of it. — *Northwestern Lumberman.*

A Foreigner's Impressions of the World's Fair Buildings. — This impression [of unreality] was the predominating one on the first view of the great basin. It did not seem possible that all these beautiful creations were real, tangible nineteenth-century buildings, destined for uses which have at least as much prose in them as poetry. The more I saw of them the more was my enthusiasm strung up, until I had to laugh at myself. Here was I, a scoffer at monster expositions, a disbeliever in servile copies of styles of architecture evolved in different climes and in times gone by, an ardent believer in the beauty of sincerity in building and of truth of material, wrought up to a pitch of excited enthusiasm by the sight of a few hollow colonnades and a vast amount of plaster architecture, as perishable as it was alien to the true structural skeleton of the building. Yet the influence of these beautiful proportions was not to be resisted, and I soon forgot everything else, down to the very fact that I was at the World's Fair, in boundless admiration and enjoyment. I had seen it all before somewhere, and I soon knew where. It was the realization of an ideal southern harbor by Claude Lorrain, this splendid accumulation of classical buildings, colonnades, domes, parapets, obelisks, statuary, round a mighty basin, with the waters of the sea itself glittering between the shafts of the magnificent open colonnade. Or, perhaps, still more the realization of one of those imaginative creations on paper in which the great architects of the Renaissance loved to express their superb conceptions, unhampered by any minor considerations of money, place, and opportunity. How the old fellows would have revelled in the possibilities of "staff"! Perhaps they did know it, or something like it, and used it for the splendid improvisations in honor of some pope or prince of which we read; anyhow, they would have been the first to glory in it and the unbounded scope it would have given to their imagination. — *Cecilia Waern in the New York Evening Post.*

Glass as an Incendiary. — Attention has been directed of late to the necessity of considering, from a practical point of view, the part played by glass in disseminating solar heat — its importance, really, as a factor in ignition and, in some cases, of destructive consequences. In the transmission of solar light the absorption of heat by glass is scientifically stated as being ninety, to two of reflection; silver-plate, on the other hand, absorbing but three and reflecting ninety-seven, while lamp-black appropriates the total heat without, of course, any reflection. All radiators are absorbers in a greater or less degree, and, under specially favoring conditions, the capacity of ignition must at least be considered a jeopardizing condition, and this, in the opinion of the *Age of Steel*, is a point of weight in insurance risks; that is, a bottle or a carboy placed in position can so intensify solar heat as to start a bonfire in a pile of wood or paper, timber being set on fire by focussed rays at a distance of ninety yards, and broken quartz softened into a pulp by the same means. Broken bottles, too, in dry grass, have in some instances been suspected of kindling prairie or forest fires. — *New York Sun.*

The Smoke of Paris. — M. Goubert, at the Observatory of the Tour St. Jacques, is at work on the preparation of a smoke map of Paris (*Atlas des Fumées de Paris*). He determines the position of the chimneys, the extent covered by the smoke issuing from them, its destiny and the time it takes to spread. All these data are determined under varying conditions of the wind. M. Goubert has already concluded that there are too many factories near Paris. He urges that the 300 or 400 factory-chimneys in existence should be pulled down, and all chimneys should in future be built farther from the capital; otherwise he predicts that the Paris atmosphere will become as bad as that of London. — *British Medical Journal.*

A Quick-lime Foot-warmer. — A foot-warmer, says the Paris correspondent of an English exchange, depending for its action on the slacking of quick-lime, has been invented by M. Loison de Viviers, who divides the case into two compartments, one containing lime and the other water. The flow of water onto the lime is regulated by a valve, adjusted from the outside, so that it is possible to regulate the degree of heat by the quantity of water admitted to the lime. It is said that the temperature may attain the boiling point of water, and be maintained thereat for a considerable period, varying with the size of the foot-warmer. — *Metal Work.*

Sawdust Bricks. — Sawdust building-bricks are, we believe, a German invention. They are described in a German paper, at all events, and, according to that description, the sawdust is dried and screened, to remove the coarser particles, and is then mixed with cement, lime and sand in the following proportions: One part cement, two parts lime, five parts sharp sand and two parts sawdust. The sawdust is first mixed dry with the cement and sand. The final mixture is pressed into blocks, which are said to be cheap and useful. There is as much lime, and more than twice as much sand, as sawdust in them. — *Invention.*

Failures and Successes of Strikes in France. — A lately-published report by Consul Loomis of St. Etienne shows that France's experience with strikes has not differed materially from our own. In the thirty-eight years, 1852–1889, it appears that France witnessed 1,813 strikes. Of these only 163 resulted favorably to the workmen. In the two years, 1888 and 1889, 110 strikes are recorded, which resulted in a loss of 478,391 working-days and involved 24,134 workingmen. Only 22 of them resulted favorably for labor. A strike seems to be a costly luxury the world over. — *N. Y. Press.*

Gift from Mme. Schliemann. — Truxton Beale, United States Minister to Greece, Roumania and Servia, has informed the State Department that Mme. Schliemann, widow of Dr. Schlieman, the famous explorer of the ruins of ancient cities, has determined to present to the United States National Museum a portion of the relics unearthed at Troy by her late husband. Mr. Beale gives no intimation of the size of the collection to be sent to Washington, but says its value will be apparent on inspection. — *N. Y. Tribune.*

Unique Monuments. — "In nearly every cemetery of any importance," remarked a well-known vault and monument builder recently "there are two or three memorials to the departed that are eccentric in design and remarkable in construction. Strange to say, they are invariably erected by women, who seem to think that they are honoring the deceased by embalming his or her principal characteristics in stone or marble. One of the most prominent examples of this peculiarity can be found down on Staten Island. Some time ago a well-known broker died suddenly at his country place from over-exercise. His reigning passion during life was love of athetlic sports, and he himself was a frequent prize-winner in various amateur contests. After he had been laid at rest his widow went to a New York architect and submitted one of the most remarkable ideas for a mausoleum that ever emanated from a human brain. It was to be built of white marble, and every variety of gymnasium-implement, from dumb-bells to Indian-clubs, was to be reproduced upon it in bas-relief. Despite the objections of the other relatives, that mausoleum was erected and fills the visitors to the graveyard wherein it stands with awe and wonder. In one of the Boston cemeteries there is a reproduction of an old-time whaling-vessel done in stone and ironwork, which was placed over the remains of a departed sea-captain by his sorrowing relict. A granite "tile" tops the grave of a St. Louis hatter, and a pair of marble boxing-gloves adorns the tomb of an old-time New Orleans prize-fighter. The oddest monument that I have ever seen personally stands in the Church of St. Saviour's, London. It has been there for two hundred years, and it preserves the memory of a certain Dr. Taylor, who was famous for his pills. It represents that gentleman in a reclining attitude, with an expression of deep reflection upon his features, and in one hand he holds a scroll bearing a most enthusiastic eulogy of the pills before mentioned. As it stands near the pulpit where the congregation couldn't help seeing it, it must have been a very valuable advertisement for the doctor's successors." — *N. Y. Commercial Advertiser.*

The Huge Cliff Mortars at Malta. — The most extraordinary great guns on record, as we may boldly assert, are those described by Brydone, whose travels in Sicily and Malta won renown well deserved towards the end of the last century. Many facts and stories he recounts that seem strangely Old World to us, though the date is little more than a hundred years ago — so grandly did the French Revolution transform Europe. Malta was full of wonders more or less droll while the Knights held it. But nothing equalled the stone guns, — perhaps it may be as well to say that our authority is unimpeachable. Everybody knows that the fortifications were cut out of the solid rock, but Brydone was right in saying that "a kind of ordnance" used to defend them was "unknown to all the world besides." As we understand his description, the Knights left a great block of stones where they hollowed out an embrasure in the cliff, which afterwards they shaped and bored in the form of a gigantic mortar. These engines contained a whole barrel of gunpowder. That shovelled in, they stopped it with a great piece of wood, fitted exactly to the bore, as "wadding," and loaded-up with "cannon-balls, shells and other deadly materials." About fifty of these remarkable guns commanded the spots which a hostile ship was most likely to approach. "The mouths of some are six feet wide, and they are said to throw a hundred *cantas* of balls or stones" — about 19,000 pounds. The range is not stated, but the falling projectiles covered an area of three hundred yards. Doubtless such an avalanche would "make dreadful havoc" among a detachment of boats, if all went right. It would have made havoc somewhere, probably, anyhow. But Brydone does not say that the experiment had ever been tried. — *N. Y. Evening Post.*

The Durability of Terra-cotta. — During the discussion following the reading of certain papers on terra-cotta before the Royal Institute of British Architects Sir Henry Doulton said: As to its durability, I may perhaps mention two examples which occur to me as within my own observation. The figure of "Britannia" on the top of the Exchange at Liverpool was made a hundred years ago at Lambeth, and also the figure of Sir John Crosby, which was made, when I was a little boy, at Lambeth. These, especially the figure of "Britannia," though exposed to adverse influences, are as perfect to-day as on that of their erection. There happen to be two large statues on the triangular piece of ground opposite St. Thomas's Hospital, brought there recently, also made at Lambeth, which are ninety-six years old, and which have been quite untouched by time. There is, of course, terra-cotta *and* terra-cotta; but there is no reason why terra-cotta should not be absolutely imperishable. — *The R. I. B. A. Journal.*

Metallic Tin on Cloth. — A new process, invented in Germany, allows a brilliant and flexible stratum of tin to be deposited upon cotton fibre. A paste is first made of the powdered zinc of commerce and white-of-egg and spread on the material by means of a brush. This is then coagulated after drying by a current of superheated steam and the tissue is then introduced into a bath of perchloride of tin. The metal precipitates on the zinc in a finely-divided state, and after rinsing and drying the cloth, it is passed through cylinders or calenders, which give brilliance to the coat of tin. Beautiful metallic designs may be obtained in this way. It is stated that the process may be substituted entirely for the ordinary method of ornamenting cloth with tinfoil. — *Scientific American.*

Lighting by Phosphorescent Tubes. — The *Electrical World* says that a commercial system of lighting by phosphorescent tubes is now being introduced into England. It is used generally where beautiful effects rather than brilliant illumination are desired. The light is sufficiently bright to replace ordinary incandescent lamps with an effect very much like intense, although soft, moonlight. From 50,000 to 100,000 volts are required.

Acoustic Properties of the Mormon Bee-hive. — From an acoustic point of view, the domed or "bee-hive"-shaped Temple, designed by Brigham Young, in Salt Lake City, is a very remarkable structure. It holds from 12,000 to 14,000 people, and even when packed, it is said that one can literally hear a pin fall. An officer of the church stood at the farthest end of the building and dropped a pin in his hat, and it is stated that its fall was most distinctly audible to all present. The scratching of the pin against the side of the hat was also plainly heard across the whole breadth of the Temple. — *Invention.*

The Dome for the Greenwich Observatory. — The dome of the new observatory now in course of erection at Greenwich will, it is said, be made of papier-maché. This roof, including the steel framework, will be over twenty tons in weight, but the whole will be so constructed that it can be revolved almost by the pressure of the finger. Papier-maché has been used before for roofing purposes, but never, we believe, on such a large scale. — *Invention.*

A Statue struck by an Aerolite. — An aerolite fell near Ossawatomie, Kan., on Saturday afternoon, April 8, striking the monument to John Brown, erected to him by private subscription, originated by Horace Greeley in 1863. The meteor broke off the left arm of the statue and passed through the dome of the crypt and through six feet of clay, just south of the crypt, stopping only at bed-rock. — *N. Y. Evening Post.*

The Clock of St. Paul's. — The celebrated old clock movement made by Langley Bradley for St. Paul's Cathedral in 1709 was stopped after Christmas and taken down to make room for the new one. The fact that, but for a new escapement, it has done its duty well for the greater part of two centuries is an indisputable testimony to its excellent workmanship. — *Invention.*

TRADE SURVEYS

An enormous volume of business has been transacted during the past two weeks. While manufacturers are pleased, they are anxious to know whether it is only a temporary or a permanent improvement. Evidence on this point is too scant at this time to warrant an expression. The only assured fact is that consumptive requirements have been kept at the lowest possible level for several months. It is also true that the investment of capital has been cautiously made in all directions. While this statement is correct, it is also true that the volume of projected work is in excess of former years. Much of it is in electrical channels. The developments of the application of electricity are opening up wider and wider avenues for the employment of capital. Schemes almost without number are asking for consideration, and capital in small and large blocks is not slow to seek this new and most promising field of employment. While these opportunities are increasing for new investments, there is of late a remarkable growth of combinations or associations of allied interests, not exactly in the shape of trusts, but in forms to serve their mutual interests more effectively. For a while this growth of industrial interests was checked, but it has again bloomed, and the tendency has gathered strength from unobserved sources. One of these sources, probably the chief one, is the greater intensity of competition. On this point, it is proper to observe that there is no improvement at present. Margins continue very narrow. Merchants and manufacturers have been living in expectation for months that the causes of the depression, or, at least, the causes of the severe competition, would disappear. One benefit of the situation, however, is that a great number of would-be traders and manufacturers have been prevented from entering the ranks of exchangers or producers. If the business world looked at this matter rightly they would be content with that severity that protects them from new-comers. The money markets are tight, collections slow and difficult. Large gold shipments are occurring. Intense depression prevails in some lines of industry in Great Britain. Continental industrial conditions are somewhat better. Governments are studiously giving attention to matters calculated to better the conditions of the daily life among the masses, recognizing the meaning of some ominous warnings from the lower strata of European society. From the tone of some foreign journals, it is evident British money-lenders are anxious for the full re-establishment of confidence in foreign countries, in order that opportunities for investment may be had. English ship-building interests are still depressed. Agricultural classes complain bitterly. Financial and commercial interests recognize that there are some stronger reasons for conclusions as to the use of silver throughout the world than existed a year ago. While England is largely a lending nation, its representative men are leaning more strongly to such policies as will strengthen and develop British dependencies and outside peoples. The latest summaries of results in the United States show enormous traffic. The railroads are hauling more freight than a year ago. The calls for money are more urgent. The distribution of merchandise, especially in the West, is in excess of last year at this date in most lines, especially in textile goods, hardware, wagon and carriage supplies, and in steam and electrical equipments. The industries of the New England States are crowded, with, perhaps, the exception of paper-making. In the Middle States, iron, coal and lumber production is increasing. The iron trade is stronger than a month ago, especially for merchant-iron, sheet, skelp and steel billets. Railroad-builders are asking for quotations. One large order for twenty-five thousand tons rails was placed recently. Other large orders are promised soon. A very large steel-works is projected in Wisconsin, large car-works in Georgia, and cotton-mills in Texas. Textile-goods interests are doing well, in spite of enormous imports. It is believed in many quarters that summer prices will be stronger, and there are signs in the iron trade of slight advances. In the lumber trade, poplar is already selling for better prices at wholesale. The shop people are quite busy everywhere. No serious labor disturbances are threatened, and organization of labor is at a standstill. It is safe to say the disposition to strike is not so apparent. Strike funds are low, and the remembrance of past drains without fruitful result checks enthusiasm.

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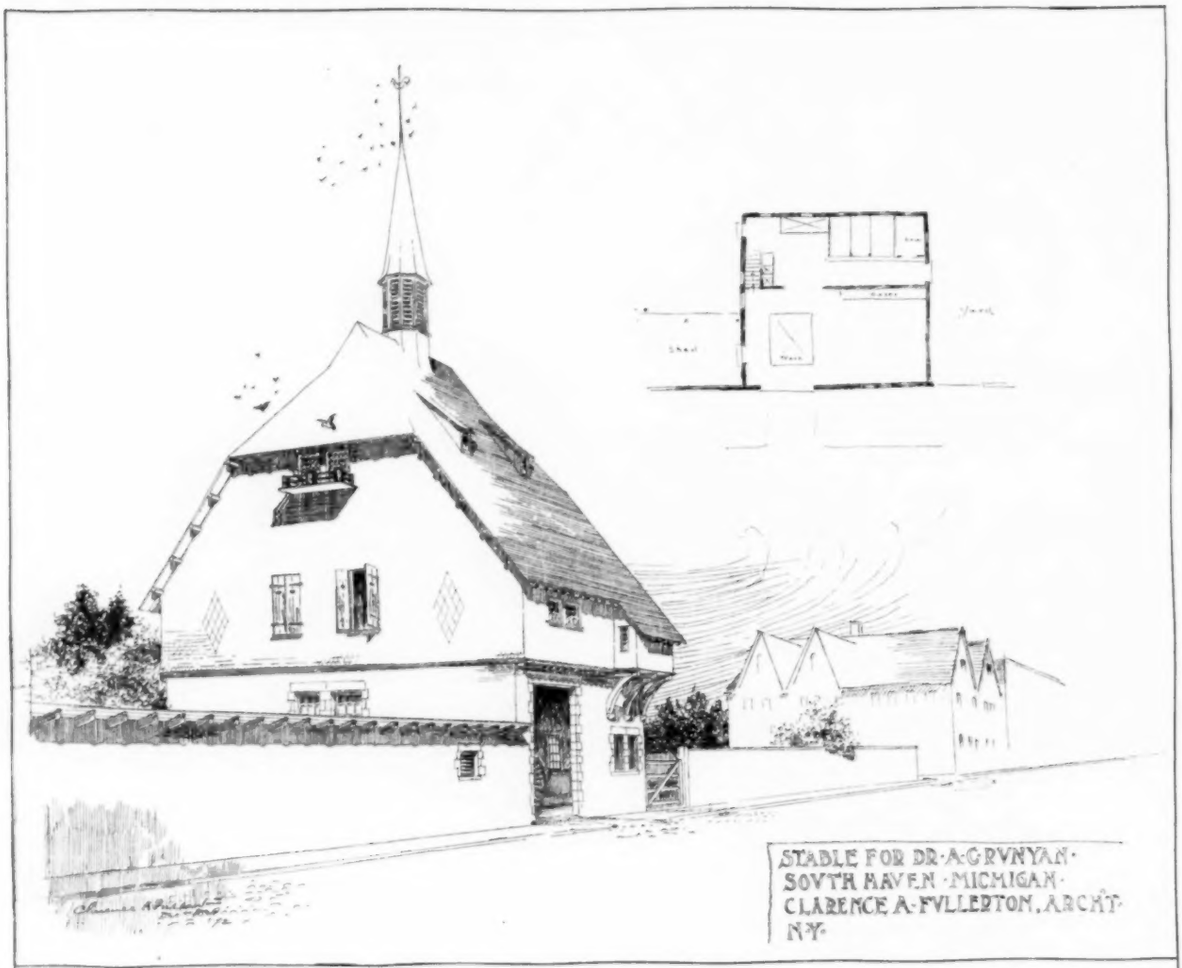

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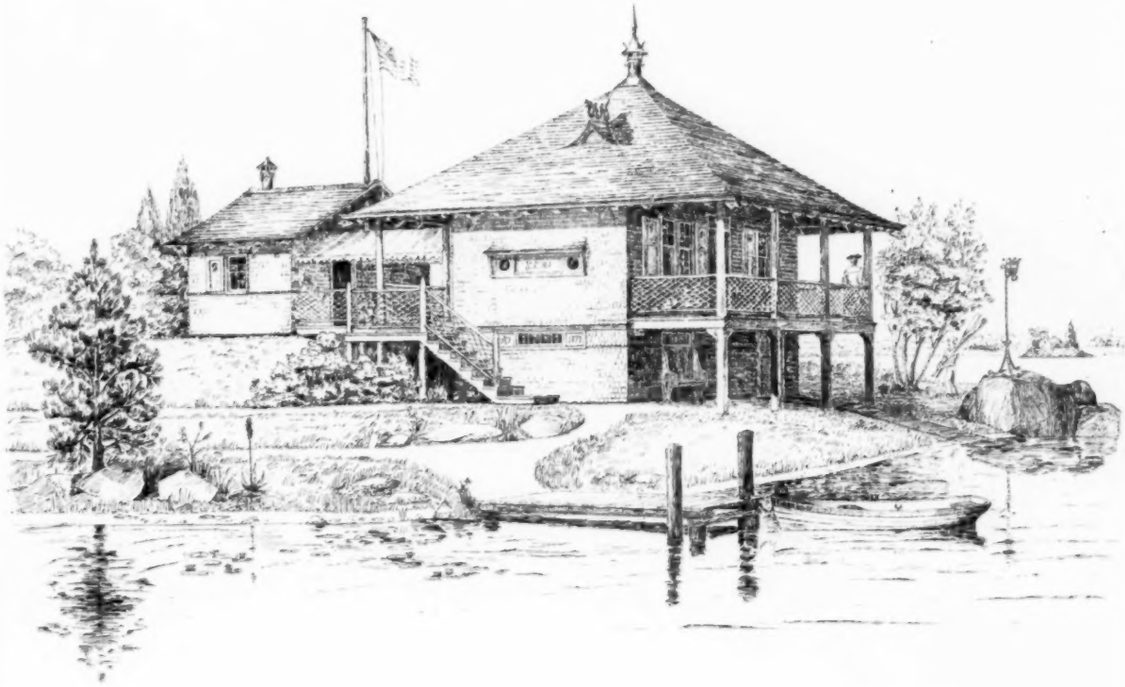

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