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SEPTEMBER 12, 1891.



SUMMARY:—

The Capacity of Flooring to resist Fire.—Experiments on Flooring by the Building Inspector of Hamburg.—Death of J. M. McElfatrick, Architect.—The New York Institute of Artist-Artisans.—A Southern Exhibition at Raleigh, N. C.—The Explorations at Delphi.—The Possibility of Mechanical Flight.—The Alleged Counterfeiting of the Stamp on German Iron.	157
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WE are glad to see that a scientific investigation has been made in Germany into the capacity of various sorts of flooring for resisting fire. There, as here, asbestos paper is often used between the boards of a double flooring, with the idea that it protects the floor from burning; and, as it appears, there, as here, some, at least, of the architects think that this application of the material has very little value. We do not wish to disparage asbestos paper or felting, which is invaluable for many purposes, and, when applied outside a combustible surface, will protect it against fire for a long time; but it has always seemed to us that the thin, fragile layer of asbestos paper which the law compels the Boston builders, at an enormous annual expense, to lay between the boards of double flooring, was about as poor an apology for a fire-resisting device as could be conceived. In itself, undoubtedly, the asbestos paper is incombustible, but between two thicknesses of board, curling and twisting under the heat of a conflagration, it must inevitably, as it seems to us, be torn to pieces long before the flames could reach it.

THE German experiments, which were made, apparently for his own satisfaction, by Building Inspector Wulff, of Hamburg, and described by him in a paper read before the Hamburg Society of Architects and Engineers, fully bear out this idea. The burning of a great storehouse at Freihafen led him to inquire into the best way of building floors so as not to be burned through by fire from above; and he prepared eleven pieces of flooring, each about five feet square, which were successively placed on four posts, under an iron roof, and covered with inflammable materials, which was set on fire, and kept burning until the sample floor was burned through. All the floors were of fir, unplanned. The first floor was of a single thickness of matched planks, one and one-half inches thick. This was burned through in thirty minutes. The second floor was double, of two thicknesses of matched boards, each one and one-fifth inches thick, with the joints running in the same direction, and with two layers of asbestos paper between, the total thickness of the asbestos paper being one-twelfth of an inch. This floor was burned through in an hour and five minutes. The third sample was the same, but with superator between, instead of the asbestos paper, the thickness of the superator being the same as that of two layers of asbestos paper one-twelfth of an inch. What the superator used was like, we are not quite sure. In this country, the name of "superator" is given to a fabric made by weaving asbestos into a wire cloth, but we find in the account a distinction made between plain superator, and superator with woven wire, so that the former may, in Ger-

many, mean simply a thick asbestos felt. However that may be, the third floor resisted the fire one hour and thirteen minutes, eight minutes longer than that with the asbestos paper between the boards. The fourth floor was also double, consisting of an under floor of square-joint planks, two and one-half inches thick, covered with an upper floor of matched boards, one inch thick. The joints of the upper flooring corresponded with those of the lower, and nothing was put between the floors. This sample resisted the fire for one hour and forty-four minutes. In the fifth test, a double floor, of two thicknesses of boards, each one and one-fifth inches thick, with nothing between them, and with joints corresponding, was burnt through in fifty-seven minutes,—a period only eight minutes shorter than that required in the second test, to burn through the same floor with two layers of asbestos paper between. In the sixth experiment, the same flooring was used as in the fifth, but the joints of the upper flooring crossed those of the lower at a right angle. This floor, with nothing between the boards, took an hour and twenty-two minutes to burn through, the crossing of the joints being thus far more effective, as a means of defence against fire, than either two layers of asbestos paper or one of superator. In the seventh test, the same floor was used as in the sixth, but one-twelfth of an inch of superator, with woven-wire foundation, was put between the boards, which lengthened the resistance twenty-one minutes, to one hour and forty-three minutes. In the eighth test, the same was used, but without the wire in the superator; and the time of resistance was one hour and thirty-seven minutes. The ninth experiment was with the same, but with two thicknesses of asbestos paper in place of the superator. This floor burned through in fifty-nine minutes, or twenty-three minutes quicker than a similar floor with nothing between the boards. The tenth floor had ordinary roofing-felt between the boards, and resisted for an hour and twelve minutes. The last sample had the upper floor of matched inch boards, and the under of planks two and one-half inches thick, with square joints, running at right angles with those of the upper flooring. This sample resisted for two hours and twenty-two minutes, although nothing was put between the floors. All the asbestos materials, as well as the roofing-felt, gave out a suffocating smoke when heated; and Herr Wulff draws the conclusion that all the materials interposed between the floors were, to say the least, useless, while their foul smoke might be injurious. In the discussion which followed, according to the *Deutsche Bauzeitung*, of July 8, from which we borrow this interesting and important account, Herr Hagn observed that the views of the insurance companies on the subject agreed with the conclusions arrived at by Herr Wulff.

AN architect of note as a specialist, Mr. J. Morgan McElfatrick, of the firm of J. B. McElfatrick & Sons, died recently in St. Louis. This firm, which had its principal office in New York, with a branch for Western business at St. Louis, devoted itself almost exclusively to designing and constructing theatres, and built probably more than half of the theatres which have been erected in the United States within the last fifteen or twenty years. Mr. Morgan McElfatrick was only thirty-eight years old, but he had been an active participant in the work of the firm for twenty years, and had studied his subject assiduously, both in this country and abroad.

WE have before spoken of the New York Institute for Artist-Artisans, and, learning from a letter in the New York *Times*, from the Rev. Heber Newton, that, although rapidly increasing in prosperity, it will still need for the coming year, the fifth of its existence, about three thousand dollars to make up the difference between its receipts and expenses, we hope that some of our readers may be disposed to help in providing for the deficit, and will communicate at once with the director, Mr. John Ward Stimson, 140 West Twenty-third Street, New York. If this can be taken care of by friends of the cause for the coming year, it is hoped that another year will see the Institute self-supporting. As our readers know, the object of the school is to make, not artists, but workers in various handicrafts, who shall combine with

skill in manipulation a knowledge of the most beautiful work of the kind which has been done, together with a cultivated appreciation of form and color, and a systematic training in drawing, and in the kind of design suited to their special branch. How urgently craftsmen of this sort are needed, architects know well, but every one does not think of the immense social significance of the development of the æsthetic sense in the people whose work is now simply that of machines, appealing to the imagination neither of the one who executes it, nor of him who beholds it. As William Morris, who is good authority on the subject, says, the first effect of teaching the workman to love beauty and beautiful work, and of educating him to execute such work, is to banish discontent and envy from his heart. The humblest craftsman, so instructed, can have roses growing over his whitewashed cottage, and train a myrtle around his kitchen window, and with these, and happiness and health in his family, and his work-bench near, covered with objects growing in interest and attractiveness under his skilful hand, he would not change places with a prince. One of the great evils of modern manufacture is the vacuity of mind in which it leaves the workman. His Jacquard loom is set for him by the foreman, and he neither knows nor cares what will be the pattern of the brocade which it will make; or, if he is a house decorator, his stencils, designed by the architect, or the "boss," are doled out to him in the morning, and he is told how many times each is to be repeated before night. No room is allowed for the exercise of his own taste, and, although this is reasonable enough, as his taste, under ordinary circumstances, is utterly bad, the result is that he cannot interest himself in what he is about, and drops his work with delight when the clock strikes the hour, to rush off and exercise his almost atrophied brain in socialistic discussions. The evil of this effect of excessive subdivision of labor is so strongly felt that the vast factories of former years are now rapidly giving place abroad to small "house shops," in which one or two men, or the members of a family, with a single machine, supplied with suitable power, work by the piece, in such way as suits them best. This gives them a certain degree of independence, and an opportunity for showing industry and care; but it gives little else; and the higher pleasures of design must be reserved for craftsmen properly fitted for them, and it is these, both men and women, whom the New York Institute is now training so successfully. It is fortunate, not only for his pupils, but for the cause, that Mr. Stimson combines so much enthusiasm for his chosen task with his very judicious selection of subjects and instructors. A work of this sort needs to be pursued with immense vigor to make an impression on the world; and zeal and discretion are not always so happily united.

WE have much pleasure in calling attention to the fact that a Southern Exposition is to be held at Raleigh, N. C., during the months of October and November next, under the auspices of the Southern Interstate Immigration Association, at which the industries of the Southern States will be shown, as they have never been shown before. A special department is to be devoted to exhibits of the work of the colored people, and the gentlemen in charge of the affair, who represent all the Southern States, hope that their efforts may do something, not only to remove the "preconceived prejudices," and "distrust engendered by long years of non-intercourse or partisan misrepresentation," in regard to the white people of the South, but to show the Northerners, by the spectacle of the colored people in friendly industrial rivalry with their white neighbors, the falsity of "the charges so strenuously urged, of injustice, oppression and cruelty," practised by the latter upon the former. Independent of the pleasure of a visit to North Carolina during the beautiful Indian summer season, the two exhibitions will have a great interest for all persons who care for the general development of the nation. So far as "preconceived prejudice," or "distrust," of the North against the South is concerned, we imagine that there is very little to be overcome, except in the imaginations of demagogues on both sides, but it is always rather touching to see how anxious the Southerners are for the good opinion of the North, and the more the harassed and busy Northerners can see of the South, with its soft climate, its interesting reminiscences, and its kind and conscientious people, the better it will be for them, as well as for the country.

THE French School of Archæology at Athens has gone vigorously to work at its task of exploring the remains of Delphi. The villagers of Castri have already been in part removed, and many of the houses demolished, and the ground will be entirely cleared before winter, while actual excavation will begin as soon as weather permits in the spring. According to the *Builder*, the preliminary excavation of a boundary ditch around the territory to be explored has already brought to light a statue—a female figure, of an archaic type, closely resembling those found on the Acropolis at Athens, and at Eleusis. This is certainly an excellent omen, and the next year bids fair to be an interesting one for the lovers of classical antiquity.

THE September number of the *Century* contains an interesting note by Professor Langley, of the Smithsonian Institution, on "The Possibility of Mechanical Flight," in which he expresses the opinion that it is possible, and even probable, "that before the century closes we shall see this universal road of the all-embracing air, which recognizes none of man's boundaries, travelled in every direction." As the century has only nine more years, Professor Langley's idea of the rapidity with which invention will progress in this direction is rather startling; but he is not a man to say such things at random, and the thousands of experiments which he has made within the last four years to determine the amount of force necessary to raise and propel heavy bodies through the air, make him perhaps the best living authority on the subject. As these experiments are described at length in a report published by the Smithsonian Institution, and an abstract of results is given in the *Century* paper, we will only mention that Professor Langley finds, by what seem to be most accurate and convincing observations, that one horse-power of force is capable, not only of sustaining in the air a weight of two hundred pounds, but of driving it along in a horizontal flight at the rate of fifty miles an hour. Engines are now made, which, with a supply of fuel for a short flight, and all needful accessories, weigh less than twenty pounds per horse-power, and Professor Langley finds that a structure in the form of a system of planes, strong enough to support such an engine, with its accessories, and suitably shaped for a journey through the air, need weigh less than twenty pounds more; so that every forty pounds weight of boat, engine and fuel, will carry more than one hundred and sixty pounds of cargo safely through the air. Certainly, as he says, this is a wide margin for contingencies, so wide, in fact, that there can be no possible doubt that we have within our hands the means of swift and secure aerial navigation, and need only learn to use them. To compare unfamiliar things with familiar ones, a locomotive will rarely pull more than four times its own weight over the grades of ordinary railroads, but, now that we have learned to use a locomotive, it seems to us one of the most reliable of machines. Professor Langley's light engines will lift more than four times their weight, and drive it at the speed of the swiftest express trains, as soon as we can make up our minds how to apply their power. Perhaps some of our readers may assist in solving the problem. It has been suggested that a structure, with propellers revolving in a horizontal plane at each corner, for lifting, and others revolving in vertical planes for propulsion, would serve the purpose, and this may be the first plan tried.

THE *Scientific American* says that the story about the iron manufacturer in Germany, who was said to have fabricated false dies for forging the stamp of the Government inspector on his rails, has been thoroughly disproved. The manufacturer in question showed conclusively that all the dies which he had made were ordered by his customers for their own use, and that no forgery was attempted, or even thought of; while the railway companies who have used his rails join in the assertion that no accident has ever been caused by the breaking of one of the rails, nor has any been broken, except in one instance, where a train ran off the track, and the locomotive struck a rail on a neighboring track. The account adds that the originator of the falsehoods, who seems to have invented them to escape punishment for a previous libel against the same parties, is now in jail, where, we should say, he might with advantage remain for some time. It is astonishing that such a slander should have gained such wide circulation, and we sincerely regret having done anything to spread it.

GERMAN ARCHITECTURE.¹—VI.
SOUTH GERMANY.—(Continued.)

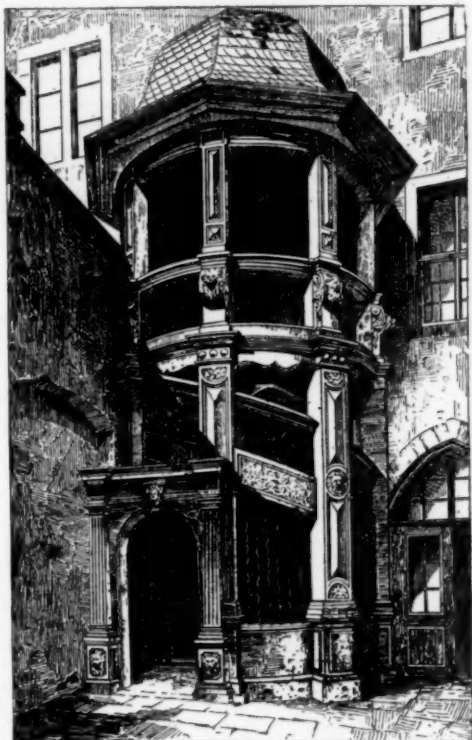


Fig. 31. Court of the Limburg Palace at Frankfurt.

BY the side of the episcopal cities of Mayence, Würzburg and Bamberg, and the monasteries and castles attached to them, the free imperial city of Frankfurt shone brilliantly during the sixteenth century; private architecture developed in a unique fashion and several of the residences of the burghers exhibit façades and courts with interesting motives (Figures 31–32).



Fig. 32. Doorway of the Römer or Town-hall at Frankfurt.

The margraves of Brandenburg erected the Plassenburg, one of the most imposing castles in all Germany; it dates from the second half of the sixteenth century, and contains some very charming bits of architecture (Figure 34).

¹ From the French of Lambert and Stahl, in Planat's *Encyclopédie de l'Architecture et de la Construction*. Continued from No. 819, page 144.

Franconia also contains a few remarkable small towns, whose picturesque houses and town-halls testify to an active municipal life; these are Wertheim, with an original fountain of 1574 (Figure 33), Schweinfurt, Lohr, Ochsenfurt and Markt-breit, all with pretty town-halls.

The lay princes built a few important edifices in Franconia; we have already noticed the castle of Offenbach; we will also cite the palaces of the family of Hohenlohe-Langenburg-Mergentheim, with its magnificent spiral staircases, and Weikersheim, which has a well decorated hall, and Neuenstein, with its beautiful portal of 1560.

We close our study of the Renaissance in Franconia and in South Germany with a brief description of the architecture of the two free cities of Rothenburg-on-the-Tauber, and Nuremberg. Rothenburg is a rare relic of the sixteenth century



Fig. 33. Fountain at Wertheim.

which has escaped the destroying hands of modernism. This little sixteenth-century stronghold is still absolutely intact; the walls, with all their towers and gates, form such a formidable line of fortifications that the railroad itself has deflected from its course and set up its diminutive station, out of the range of the old cannon slumbering peacefully in the loopholes. Figure 35 gives one of the city gates.

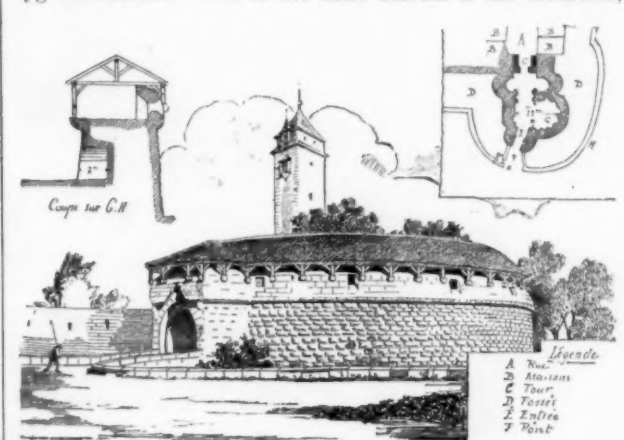


Fig. 35. Gate of Rothenburg.

constructed in 1572 (Figure 36). There are also several private dwellings with interesting courts and façades; a few among them have exceptionally fine interiors. The hospital and gymnasium are noteworthy structures, externally as well as internally.

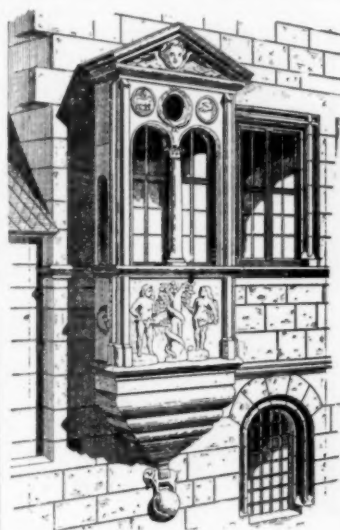


Fig. 37. Oriel Window from Tucher's House at Nuremberg.

Let us now cast a hasty glance at the queen of South German cities, the old free town of Nuremberg, which Rivius calls the German Florence, the mother of the sciences and arts.

Nuremberg was one of the first cities to take a prominent part in the Reformation movement; in 1523, the chronicle says: "We bid adieu to the pope and the papacy, for the old ceremonies are done away with." The Renaissance also found its way into Nuremberg at an early period; especially is this true in private architecture which, moreover, includes the most important constructions in the town: the character of the streets is due to the quaint residences with their numerous irregular projections, lofty gables and generally well-designed details.

The limits of our work do not permit us to expatiate upon their beauties. We will simply give, as an example of the early Renaissance, an oriel window from Tucher's house dating from 1533 (Figure 37). Rupprecht's house contains a hall of which Figure 38 offers a partial reproduction. It was constructed in 1534 by Hirschvogel, and constitutes one of the finest interiors in Nuremberg. Peller's house (now Eysser's) is a typical patrician dwelling of a late Renaissance type (Figure 39).

The general disposition of the Nuremberg houses includes a vaulted entrance leading to a court surrounded by galleries, in wood or with arcades; the services are grouped about this court and the galleries serve as passageways.

The town-hall is a noble structure in the Italian style. We note, in closing, a fragment of military architecture, which is

In 1877, the well-known architect, Arthur Gilman, sued² Mrs. Marietta R. Stevens for a balance of \$832 due for professional services in completing and building an addition to an apartment-house on the corner of Fifth Avenue and Twenty-seventh Street, New York, and also for a commission of 2½ per cent on the estimated cost, "according to the schedule of the Institute of Architects," for making preliminary studies, general drawings and specifications for a proposed building on Thirty-seventh Street, which was not carried out. The estimated cost of this building was \$425,000, and the commission claimed amounted to \$10,625. In regard to this charge, Mrs. Stevens claimed that the plans were merely an adaptation of some made for another person, and that the service was volunteered, Mr. Gilman having told her



Fig. 36. Town-hall at Rothenburg.

represented at Nuremberg by numerous and beautiful examples; this is the Frauenthor, one of the most curious of the gates of the old imperial city (Figure 40).

[To be continued.]

ARCHITECT, OWNER & BUILDER BEFORE THE LAW.¹—VIII.

TWO MORE NEW YORK CASES.

BESIDES the last two cases, two more may be given, both from New York, which will illustrate what seems to be the difference in the way of looking at such matters in the same State, between an inferior court some fifteen years ago, and the highest court in the State ten years later.

¹ Continued from No. 819, page 147.

that the plans "should cost her nothing," and she set up a counter-claim against Mr. Gilman for \$20,000 for negligence in his work on the Twenty-seventh Street house, alleging that, "in consequence of negligence and want of skill and attention on the part of the plaintiff, the said building was not constructed in a strong and substantial manner. . . . The materials used in and about the construction of the same were not of the best character, and the work and labor upon the same were not faithfully performed, and that, in consequence thereof, the said building is less in value by the sum of \$20,000 and upwards than it should be if the plaintiff had performed his agreement and discharged his duty in the premises."

The defendant's son-in-law testified that "certain arches over the store-windows in the first floor were weak, so that he

² Gilman vs. Stevens, 54 N. Y., P. R., 197.

saw the bricks bulging out over them," and two builders testified in her behalf that, in their opinion, the material used was not of the best quality, and the work was inferior, and that the value of the building was very much less on account of these facts. On the part of the plaintiff, five builders testified to having made offers to put the building in good condition for sums ranging from \$1,000 to \$2,000, and that the need of

for the building of the Twenty-seventh Street house on fifteen certificates. Fourteen of these were shown; the fifteenth was not produced, although it appears to have been given, and Mrs. Stevens claimed to have paid the contract-price in full.

As to Mrs. Stevens not having asked for the plans for Thirty-seventh Street, Mr. Gilman produced letters from her, asking him to "hasten those plans," and suggesting that Jones

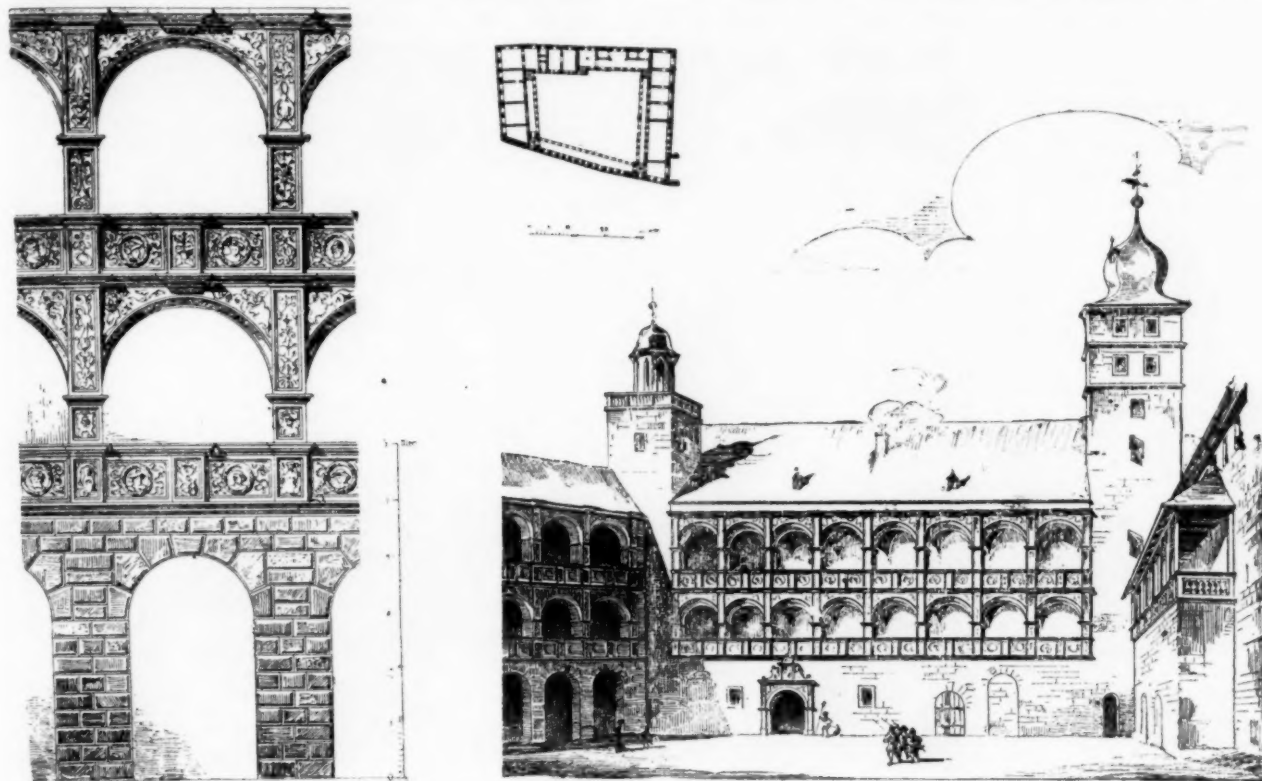


Fig. 34. Court of the Plassenburg.

repairs was largely due to the fact that the building was erected in winter, and without the heat which the defendant had agreed to furnish, and that such repairs were usually required.

It seems to have been also shown by the evidence that the builder, Jones, was introduced or recommended to Mrs. Stevens by Mr. Gilman, and that he was intemperate, and otherwise misconducted himself; and Gilman admitted that, before the Twenty-seventh Street house was completed, and

should "excavate under" a florist who occupied the lot, and "tumble him in" if he did not get out of the way. The contract with Jones for the Twenty-seventh Street building stated that "the work was to be done in a good, substantial and workmanlike manner, to the satisfaction and under the direction of the architect, Gilman, to be testified by a writing or certificate under his seal."

The judge made a rather cloudy charge to the jury, in which he at first adopted fully the popular interpretation of

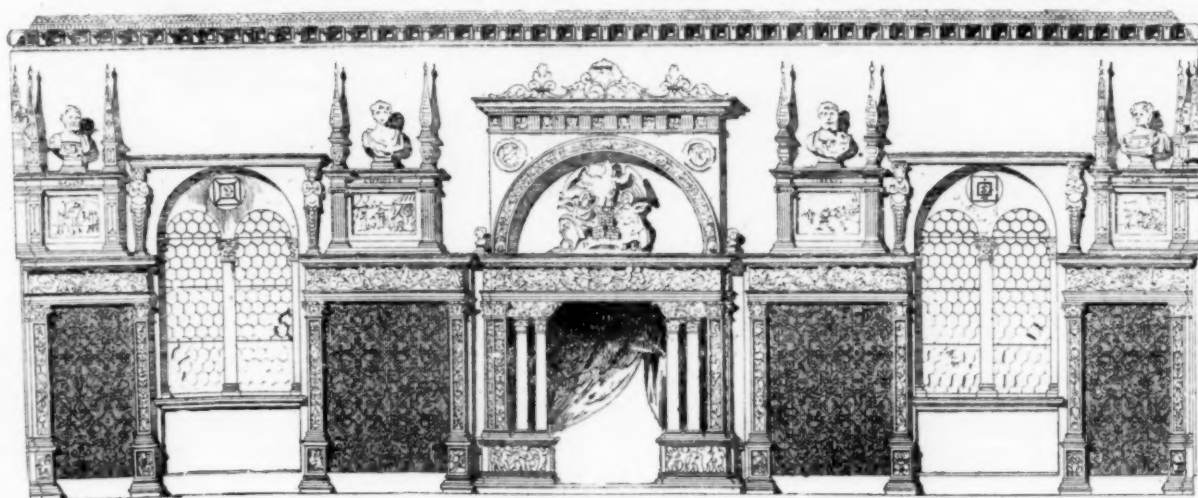


Fig. 38. Hall in Rupprecht's House at Nuremberg.

while the Thirty-seventh Street house was in contemplation, he received certain sums of money from Jones, as "advances and loans, to enable him to employ a staff of draughtsmen on the Thirty-seventh Street plans." Payment was to be made

such a clause, saying: "Now, gentlemen, by the contract 'under which this building was erected, the contractor, Mr. Jones, undertook to complete the work on or before the first 'of January, 1874, and the contract, which is in writing, states

"that the work was to be done in a good, workmanlike and substantial manner, to the satisfaction and under the direction of the plaintiff, the architect, to be testified by a writing or certificate under his seal. These are significant words, gentlemen, and, doubtless, you will not lose sight of them. The duty of the plaintiff, therefore, it is quite clear, was to see to it that the building was erected, having reference, now, gentlemen, to those terms that I have suggested to you as being significant. The work had to be done in accordance

"the evidence, what the facts are in these regards, and, if the work and materials were defective, then whether such defects are in consequence of or owing to the negligence of the plaintiff in any regard. In determining this, you will doubtless consider, and it would be your duty to consider, the obligations and the duty the plaintiff assumed, and the manner in which he has met those obligations and discharged the duty, and whether the defects are of such a character as, by the exercise of the ordinary skill and attention of a

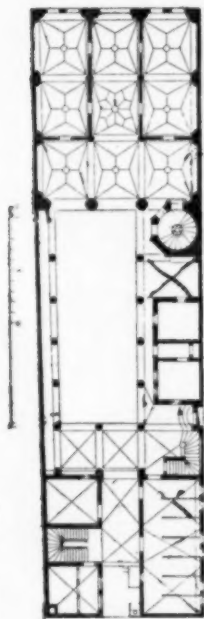
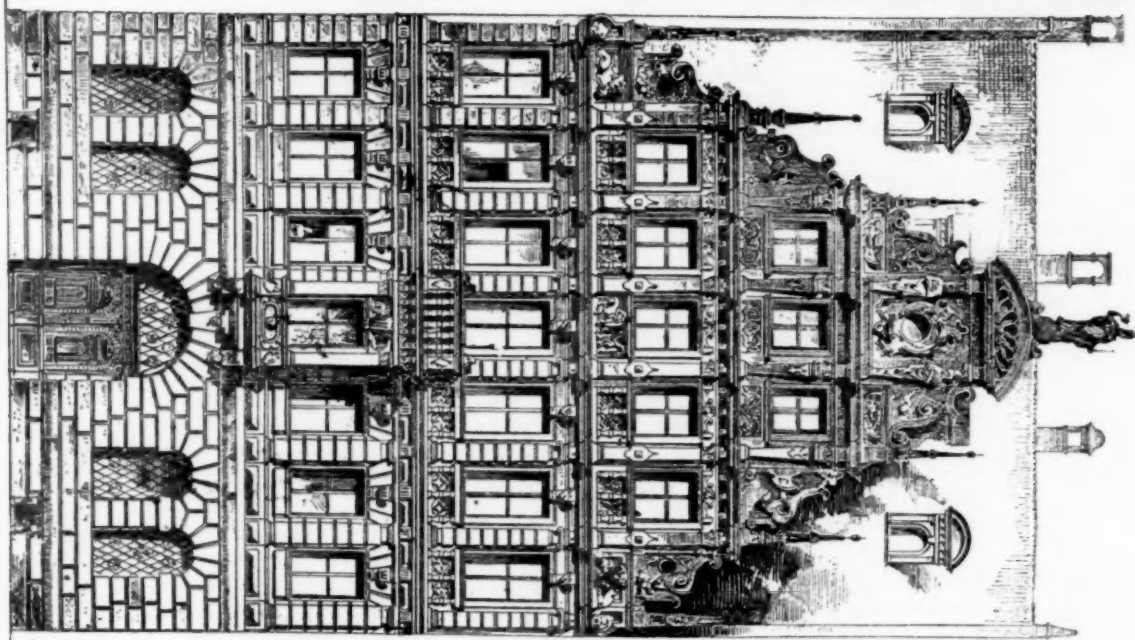
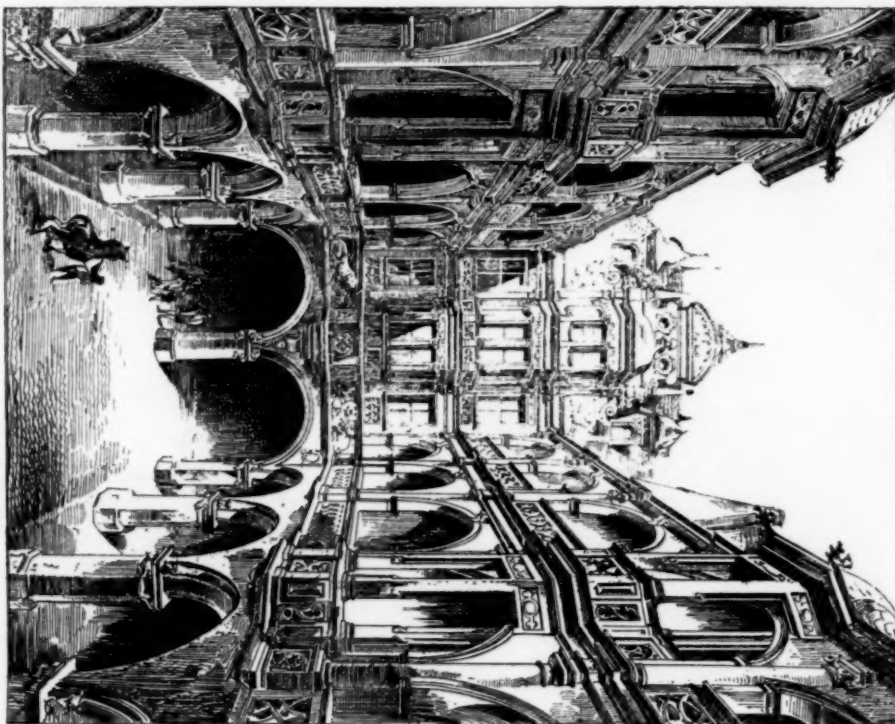


Fig. 38. Pellet's House at Nuremberg.



"with the plans, elevations, sections and specifications furnished by the plaintiff, and to his satisfaction, and the payment to the contractor for the work as it progressed, which was to be paid in fifteen instalments, was dependent, in each instance, upon a certificate in writing, to be obtained from the plaintiff, that the contractor was entitled to the specific payments. Of course, the giving of those certificates contemplated that the contractor had done the work in conformity with the plans and specifications, and to the satisfaction of the plaintiff." The judge then mentioned the claims of defects, and said: "But, gentlemen, you will determine, under

"person of his profession and in his relation, they could have been guarded against and prevented."

It will be observed that the two portions of the judge's charge on this point would hardly be understood in the same way by an ordinary jury. In the earlier portion, he said, like Judge Leonard in his dissenting opinion in the case of *Petersen vs. Rawson*, that the "obligation" of the architect was to

WHAT DOES "SEE TO IT" MEAN?

"see to it" that the work was done "in a good, workmanlike and substantial manner." Most persons would interpret this

to mean that the architect warranted the contractor's work, but the judge said farther on that the architect was to "see to it" that the contractor did his work properly, only so far as "the exercise of ordinary skill and attention" enabled him to do so. There is a very important difference between the two things. If the architect warrants that the builder has carried out his contract, as is the view of ordinary lawyers, he is jointly liable with the contractor for all the defects in the building, and the appearance of a defect at once entitles the owner to collect damages either from him or from the contractor, as he may prefer, the case being assimilated, in their minds, to that of damage caused by a gang of robbers, in which each robber separately is responsible, under the law, for the whole of the mischief done by the entire gang. On the other hand, if the architect is liable only for "the exercise of the ordinary skill and attention of a person of his profession," it is for the owner, if his house is unsatisfactory, and he desires to get redress from the architect, to prove that his plans or specifications were defective, or that he did not visit the building at proper times, or that he overlooked defects which an architect of ordinary skill would not have overlooked; and not for the jury to infer these things from the mere fact that the defects existed. The judge himself charged, farther on in this very case, that "the burden of proof is upon the defendant to establish that the plaintiff did not exercise ordinary care, diligence and skill in the superintendence of the building;" yet the defendant did not, according to the report of the case, do anything of the kind. On the contrary, all she proved was that some bricks were "bulged." Her son-in-law, presumably

AN EQUERRY AS A BUILDING EXPERT.

Lord Alfred Paget, equerry to the Queen of England, was allowed to testify that this phenomenon was due to "the weakness of the arch" under them—a matter, obviously, not of



Fig. 40. The Frauenthor, Nuremberg.

fact, but of expert opinion, as to which an equerry's judgment would be about as valuable as that of one of his horses. The defendant's other testimony, that of two builders who thought that the materials and workmanship of the Twenty-seventh Street building were defective, and that the building was worth twenty thousand dollars less in consequence, did not particularize the defects, except that they thought the plastering and painting were poor, and appears to have been simply the usual running-down of other people's work indulged in by such witnesses; while Gilman's five men, who offered to put the building in good condition for less than \$2,000, presented the strongest possible testimony as to the true value of the defects. Moreover, it was testified, and not denied, so far as the report shows, that the defects were due to the fault of Mrs. Stevens, who failed to keep her promise to furnish the necessary heating, without which a winter-built structure, in the climate of New York, cannot possibly be as good as it would be if properly warmed.

BUILDER ALONE RESPONSIBLE FOR HIS OWN MISFEASANCE.

But, even if the defects were not due in any way to Mrs. Stevens's failure to keep her promise, the rest of the testimony, on both sides, simply showed the contractor's fault, not the architect's, and no attempt was made to prove that the architect's neglect or unskillfulness caused the imperfection of the plastering or painting, or the "bulging" of the brickwork; so that the judge himself charged the jury that "for any mis-

feasance of Jones in the matter of the contract, Jones himself, or Mrs. Jones, or her surety, alone is responsible." This would appear to dispose entirely of the painting and plastering claims against the architect, leaving the equerry's bulge the sole circumstance from which the jury could even infer any fault on the part of the architect, although even here they were forbidden by the judge to infer such fault without direct testimony of the connection of the architect with the alleged defect.

As to the payment of money by Jones to Gilman, which might naturally prejudice a jury against an architect, the judge told the jury that the fact of Gilman's having taken "loans" from Jones, unless fraud or collusion were charged, which was not the case, "was not to be considered as a question in the case." He charged also that "the mere fact that the plaintiff introduced or recommended Jones to the defendant, or recommended the defendant to employ Jones, does not make the plaintiff responsible in this action for the intemperance or other misconduct of Jones."

In regard to the fees for the drawings and specifications for the unexecuted Thirty-seventh Street building, the court charged thus:

THE A. I. A. SCHEDULE IN COURT.

"I charge you that the fees, if payable at all, are two and one-half per cent upon the contemplated cost of the building. There seems to be no controversy that those are the rates that architects are entitled to recover in cases of this character." The schedule of the American Institute of Architects was read in court, and the judge charged that Mrs. Stevens knew the standard and regular rates of architects' fees, because it appeared that she had been charged the same rates by Mr. Gilman on several previous occasions.

The jury awarded Mr. Gilman \$3,000; a very singular result from the instructions and the evidence. That the jury must have considered that something was due Mr. Gilman for his services on the Thirty-seventh Street plans is obvious from their having awarded him anything beyond his claim for balance due on the other building, amounting to only \$832. Yet the judge charged them that if anything was due on account of the Thirty-seventh Street plans it must be two and one-half per cent, or \$10,625. This, with the balance due on the Twenty-seventh Street building, would make a total claim of \$11,457, from which the jury deducted \$8,457, as what the architect ought to pay for making good defects which five men offered to make good for less than \$2,000, which the judge charged that the contractor or his surety were alone responsible for, and the only evidence of which consisted in the loose assertions of a couple of builders, which they were not even called upon to justify or explain, and the opinion of an equerry upon the weakness of an arch. It is surprising that such evidence as that produced in Mrs. Stevens's behalf should have been admitted at all, but, even with that evidence, it is impossible to see how the jury, under the instructions given them by the judge, could have found for Mr. Gilman in less than nearly or quite the whole amount claimed. The explanation probably is that his case was badly managed, as architects' cases often appear to be, and that the jury, who, although forbidden to take that point into consideration, were probably unfavorably impressed by Mr. Gilman's pecuniary relations with the contractor, simply threw aside all the evidence, and the law, as explained in the judge's charge, with it, and pitched on three thousand dollars, by pure inspiration, as about what Mr. Gilman ought to have.

Twelve years later, in 1889, a decision in a somewhat similar case¹ was rendered in the New York Court of Common Pleas. Here, as in the previous case, the architect's side of the controversy appears to have been very imperfectly presented, but the law was stated by the court upon the evidence as it stood, with a precision and clearness which mark a considerable advance in the understanding of the subject.

Messrs. Hubert, Pirsson & Co., were architects of a building called the Mt. Morris Apartment-house, in New York, for Mr. John W. Aitken. The total cost of construction was \$118,000. The action was to enforce a lien for the architects' services. The defendant set up a counter-claim for alleged negligence on the part of the plaintiffs, resulting in defects, omissions and mistakes of contractors and workmen.

The case was tried first before a referee, who found for the plaintiffs, for the full amount claimed, and an appeal was taken to the full court.

¹ Hubert vs. Aitken, 15 Daly, 237.

THE SIZE OF BOILER-FLUES.

In announcing the decision of the court, Judge Van Hoesen said, "The learned referee, in answer to the request of the defendant, has found that the sectional area of the boiler-flues" [probably tubes] "for the building was 404 square inches; that the sectional area of the chimney-flue designed to receive the smoke and gases from the boiler-flues was, at its base, where it was entered by the boiler-flue, 272 square inches; that the area provided by the said chimney was inadequate for the service of the said boiler-flues; that by reason of the inadequacy of the said chimney-flue, the proper combustion of the coal in said boiler fires could not be secured; that to supply the deficiency of chimney-flue the defendant will necessarily and properly be required to build a new chimney-flue on the outside of said building; and that the necessary cost and expense thereof will be \$1,000. But the learned referee was of opinion that the plaintiffs were not liable to the defendant for the expense of supplying the deficiencies of the chimney, because, though architects by profession, they are not experts in steam-heating, and, to use the referee's language, 'all that was required of them was that they should confer with whoever became the contractor for the steam-heating, and ascertain what dimensions were required for the chimney-flue, to afford a draught for the heating system. This they did, and Tudor, the contractor for the steam-heating appliances, gave the dimensions. While it is obvious that this chimney was insufficient, the responsibility should rest upon the person who committed the fault.'

"I am unable to agree with the referee in his conclusion. The plaintiffs are architects of standing, who assume to be able to plan and superintend the construction of first-class apartment-houses, to be heated by steam, and to be provided with every convenience demanded by the luxurious tastes of the day. They are not architects in a rural community, but in the first city in America. Steam-heating is, as we all know, common, if not a necessity, in all apartment-houses of large size, and of a high class. It is true that houses of this description are of recent introduction, but they are now a very important part of our system of economics, for in some of the new streets they are more numerous than private residences, or tenements of the kind that formerly was in vogue. The architect who undertakes to construct a house that is to be heated by steam is groping in the dark unless he knows how large a chimney is required. It is as necessary that the architect should know what is needed to make the steam-heating apparatus serviceable as it is that he should know how sewer-gas is to be kept out of the house.

"No one would contend that at this day an architect could shelter himself behind the plumber, and excuse his ignorance of the ordinary appliances of sanitary ventilation by saying that he was not an expert in the trade of plumbing. He is an expert in carpentry, in cements, in mortar, in the strength of materials, in the art of constructing the walls, the floors, the staircases, the roofs; and is in duty bound to possess reasonable skill and knowledge in all these things; and when, in the progress of civilization, new conveniences are introduced into our houses, and become, not curious novelties, but the customary means of securing the comfort of the untentious citizen, why should not the architect be expected to possess the technical learning respecting them that is exacted of him with respect to other and older branches of his professional studies? It is not asking too much of the man who assumes that he is competent to build a house at a cost of more than one hundred thousand dollars, and to arrange that it shall be heated by steam, to insist that he shall know how to proportion his chimney to the boiler. It is not enough for him to say, 'I asked the steam-fitter,' and then throw the responsibility of any error that may be made upon the employer who engages him, relying upon his skill. Responsibility cannot be shifted in that way. . . .

"I am of opinion that the defendant should be allowed to deduct from the plaintiff's demand against him the cost of correcting the defects in the chimney — \$1,000.

"I have read the appeal book through with care, but find nothing that warrants us in allowing a further deduction from the judgment."

The case was subsequently reargued. In announcing the decision, which confirmed the former one, the Chief Justice, Larremore, said, "The point upon which chief stress was laid

"in the re-argument of this appeal was that of the entirety of the contract between the parties. The plaintiffs are architects, who agreed to draw the plans for, and also, according to the custom of the profession, supervise the construction of the building referred to in the complaint. It appears that there was one grave fault in said plans, and that there were some quite serious departures from the specifications and from the best workmanship in the erection of said building. The learned counsel for the appellant therefore argues that the architect has not completely performed his contract, and that as said contract was an entire one for professional skill and services, and not a divisible or apportionable one, no recovery can be had, and the complaint should have been dismissed. But a very simple analysis will show that this construction is founded on a misconception. With regard to the plans, it appears that the contract was completely performed. Drawings for the whole building were furnished, and it was actually constructed in accordance therewith. After the building was finished, it was discovered that the chimney-flues, connecting with the boiler-flues, were not large enough for the purpose for which they were designed. These flues were not omitted from the plans; on the contrary, they were set down with the same fulness of detail as the other parts of the building. It cannot therefore be said that the plaintiffs did not entirely perform their contract in this respect; they completely performed it, but they performed it negligently.

ARCHITECT NOT INSURER OF PERFECTION OF WORK.

"Similar considerations apply to the other branch of the case. The learned counsel would not claim that an architect is bound to spend all his time at a building which is going up under his professional care, so that no fraud or negligence can be committed by any of the contractors. The counsel would not contend that the architect is an insurer of the perfection of the mason-work, the carpenter-work, the plumbing, etc. He is bound only to exercise reasonable care, and to use reasonable powers of observation and detection in the supervision of the structure. When, therefore, it appears that the architect has made frequent visits to the building, and in a general way has performed the duties called for by the custom of his profession, the mere fact, for instance, that inferior brick have been used in places, does not establish, as a matter of law, that he has not entirely performed his contract. He might have directed, at one of his visits, that portions of the plumbing work be packed in wool; upon his next return to the building the pipes in question might have been covered with brickwork in the progress of the building; if he had inquired whether the wool packing had been attended to, and had received an affirmative answer from the plumber and the bricklayer, I am of opinion that his duty as an architect, in the matter of the required protection of said pipes from the weather, would have been ended. Yet, under these very circumstances, the packing might have been intentionally or carelessly omitted, in fraud upon the architect and owner, and could it still be claimed that the architect had not fully performed his work? The learned counsel for the appellants

ARCHITECT NOT A MERE WATCHMAN.

"is, in effect, asking us to hold that the defects, of the character above-named, establish, as a matter of law, that the plaintiffs have not fully performed their agreement. An architect is no more a mere overseer, or foreman, or watchman, than he is a guarantor of a flawless building; and the only question that can arise in a case where general performance of duty is shown, is whether, considering all the circumstances and peculiar facts involved, he has or has not been guilty of negligence. This is a question of fact, and not of law.

NEGLECT OF ARCHITECT A QUESTION OF FACT, NOT OF LAW.

"Upon reconsideration, I am more firmly convinced of the correctness of our conclusions reached after the former argument. The defect in the plans which led to the construction of too small a chimney was something for which the plaintiffs, and no one else, could be held responsible. For the reasons so cogently stated in Judge Van Hoesen's opinion, the plaintiffs were, as a matter of law, guilty of negligence in falling into this grave error. In analogy with the rule adopted in ordinary contractors' cases, we deducted

"from the sum due under the contract the amount of damages caused by such negligence, and directed that the plaintiffs either take judgment for the balance, or suffer an absolute reversal. As to the conceded facts of malconstruction and use of inferior materials, the referee has decided, on sufficient evidence, that the same were not properly attributable to the plaintiff's negligence, and we can discover no reason for disturbing his findings.

"The order entered after the former argument must in all respects stand."

In this very recent and important case, the duties of the architect, and the distinction between them and those of the contractor, are laid down with great clearness and precision, and, on the facts as presented, even architects will probably acknowledge that strict justice was done; but, so far as the report indicates, the facts were presented with a singular carelessness of the interest of the plaintiff. The referee's finding, based, of course, on the evidence offered him by both sides,

THE RULE FOR PROPORTIONING BOILER-FLUES.

made it appear that the scientific rule for proportioning boiler-chimneys, which the architects ought to have followed, was to make this area of the chimney-flue equal to the combined area of the boiler-tubes, and, as it was easily proved that the area of the flue was less than that of the tubes, he assumed, and the judges, of course, followed his conclusion, that the architects had neglected to comply with a scientific rule which they ought to have known and followed. Now, in point of fact, there is no such rule. It is not uncommon for ordinary mechanics, of the sort that the judge contemptuously called "steam-fitters," to use such a proportion, which is easy of application, and gives a flue which, if too large, can be reduced by partly closing the damper; but this practice has no scientific basis whatever. On the contrary, the rules given in the books usually concern themselves only with the ratio between chimney-flue and the grate-surface, without any regard to the area of the boiler-tubes. It is obvious that the amount of coal consumed, and the volume of smoke to be carried off by the chimney, are strictly limited by the grate-surface, and the proper capacity of the chimney is that which, taking into account the proportion of openings to solids in the grate, and the resistance offered to the passage of air by the coal, as well as the height of the chimney, and the estimated velocity of the flow through it, will carry off the products of combustion freely.

In many cases, probably, there is an excess of tube-area in the boiler over that required by the grate-surface, so that most of the smoke passes through a portion of the tubes; but the chimney can evidently draw only so much air as the grate-surface supplies, whatever the tube-area may be. What the grate-surface in this case may have been, no one seems to have inquired, and, although it does not follow that the chimney was really large enough for its purpose, or that the architects may not have been at fault in some other way, the record

THE PENALTY FOR NOT OBSERVING A RULE WHICH DOES NOT EXIST.

represents them as having been fined a thousand dollars for having neglected to observe an imaginary rule, which is unknown to science, and has no foundation in reason or authority.

Moreover, the court reproached the architects for having deferred to the judgment of "the steam-fitter" in designing their flue, instead of following the guidance of their own "technical learning." So far as the facts were presented to the court, this point was well taken; but it does not seem to have been anywhere suggested, in behalf of the architects, that Mr. Tudor, far from being a mere "steam-fitter," was one of the most accomplished experts in steam-heating in the United States. If the architects had felt any doubt about the proportioning of their chimneys, or in regard to any other point in the heating of their building, it would have been their duty, in their client's interests, to consult exactly such an expert as Mr. Tudor, and to follow his advice, in preference to their own opinion, and they might justly have been accused of negligence if they had failed to do so; while Mr. Tudor's position as the contractor for the heating-apparatus, gave his opinion the additional weight to be derived from special familiarity with the problem, and a personal interest in the successful working of the apparatus.

It seems hardly possible to doubt that these considerations

would have had a very important influence in modifying the decision of the court, if they had been brought to the attention of the referee, and, through him, to that of the judges, but there is no indication in the report that they were presented at all. On the contrary, the referee thought, although the court did not agree with him, that it was the duty of the architects to "confer with whoever became the contractor for the steam-heating," and that if they did this, their duty was fulfilled, no reference whatever being made to Mr. Tudor's exceptional position as an expert of the highest rank.

Another point which seems to have been neglected by the counsel for the architects was the proof of the necessary cost of remedying the deficiency in the size of the chimney, if it really existed. Every architect knows that the insufficiency of a flue, in cases where heating-systems are changed, is often remedied by connecting another spare flue, perhaps a ventilating-flue, or one intended for stoves, with the boiler, so as to give the boiler two flues instead of one. This arrangement works perfectly well in most cases, and costs only a few dollars; and the architects, even if their negligence were proved, could only be held

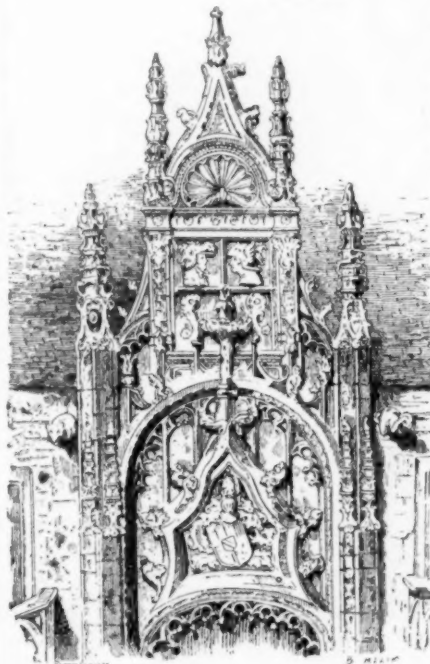
THE MEASURE OF DAMAGES FOR NEGLIGENCE.

liable for the cost of the cheapest reasonable method of remedying the defect due to their fault; but no attempt appears to have been made, on behalf of the architects, to devise such a method, and the defendant's estimate of the probable expense of remedying the alleged trouble appears to have been accepted without question.

The whole story shows how extremely technical cases concerning architects usually are, and how difficult it is to have their side properly placed before a court, even in a community so familiar with professional work as New York. In other places, where architects are little employed, the temptation to confuse their functions and responsibility with those of the builder is still strong.

(To be continued.)

STAIRWAYS, ELEVATOR-SHAFTS AND DIVISION-WALLS.¹



Pinnacles, from the Ducal Palace at Nancy, France. From Havard's "Dictionnaire de l'Architecture."

THE public, generally, is slow to understand that a fire-loss is a public loss, and that the loss falls directly upon the public, and that if the losses are so great as to occasion a reduction in profits to the underwriters, the underwriter will simply raise the rate of insurance. We must remember that the underwriter is not a philanthropist, and is not doing business for fun; he is here to make money, no matter if the losses are great or small. Unfortunately, the public has no way to discover if the rates on the several classes of property are equitably placed, and I have an idea many reforms could be

be brought about if the insurance companies were compelled to make their loss-experience on the various classes of risks public, so that this combined information could be used to properly rate the various classes of risks and the quality of the structures. Under the present system no credit is given for substantial buildings, as against a poorer grade, and the insurance will be placed on all alike. This is the bad feature in underwriting, and is a cause for so many flimsy structures, but it is hardly fair to lay the blame at the door of insurance, for the real object of insurance is "to charge for the risk as it

¹ A paper by H. A. Goetz, of New Albany, Ind., read at the Nineteenth Annual Convention of the National Association of Fire-Engineers.

is found," but the great competition for business has caused the growth of practices which are condemned, without much effort at correction.

Our remarks, therefore, shall be confined strictly to such faults in construction as affect the fire-loss. As regards these faults, I assert that a fireman has more right to complain, condemn and suggest than any one else concerned. You may say that the underwriter is equally concerned; I say he is not for he is simply making a wager for a stated amount that a certain building will not burn within a specified time. He makes his bet, gets his premium and cares no more, except that he hates to see it burn; while the fireman, being employed by the public, tries to prevent the fire. The one is making a profit upon the occurrence of losses, while the other is trying to prevent their occurrence. Many think it the province of the insurance companies to put out fires, but in this they are mistaken. Underwriters simply run the risk of damage by fire for a certain premium, and if such premium should turn out to be too small, it will be increased in proportion to the fire-loss, plus expenses and profits. It is, therefore, self-evident that it is to the interest of the public, more so than to the underwriter, to keep down the fire-loss.

Any chief, therefore, that knows of any defect in a building, or can improve the protection against fire, or can prevent a possible loss, and does not inform the owner or make an effort to improve the situation, is neglecting his duty.

I assert that while the owner may at first feel that you are too officious, or that you are meddling with his private affairs, still, after you are out of sight, he will think the more of you. You must remember, gentlemen, that ignorance is the prime cause of nearly all the faults in construction and the faulty provisions against fire.

The inspection, building and fire departments in every city should work hand in hand, for each is dependent on the other, and all of them were organized for the sole purpose of preventing loss by fire. At the eighteenth meeting of this Association the executive committee was appointed to confer with the National Builders, the National Building Inspectors, American Institute of Architects and the National Board of Underwriters, with a view of improving the methods of building, and at this meeting special codes were adopted that are of universal application throughout the country. Any chief whose city needs a building-law should obtain the printed suggestions that Secretary Hills will gladly furnish.

I have divided my subject into three divisions, namely, stairways, elevator-shafts, and division-walls, and my honest belief is, that these three have more to do with the fire-loss and the conflagration-hazard than any other causes that may be mentioned, and for that reason every fireman should be well posted on the subject.

We will first discuss the proper location of stairways, because it concerns the safety and life of the occupants, as well as the fire-loss. No subject seems to have been more neglected than this. If you thoroughly go over your own city you will find regular fire-traps everywhere; indeed, our many fire-escape laws are a proof of this, they being a direct result of this neglect, for, if the stairways upon the interior were properly placed there would be no need for the escapes.

A chief, in looking through property occupied by many people, should especially notice the situation of the stairways, and, in his mind, he should select the best place for a fire to start, one that would cremate all the occupants. He should then go to the owner, and illustrate how such a calamity might come about, and also show him how another stairway in the opposite end of the building would prevent such a possibility. I know one mill, where a fire, if started under the only stairway it has, would cause 500 persons to either jump out of the windows or else burn to death. Gentlemen, please pay special attention to this defective stairway arrangement, and do not be backward in telling the owner your fears in case of fire. Talk to him pretty strongly, for he thinks you are a crank anyhow on the subject of fires, but after you are gone he will see that you have attended to your duty and finally decides that you are right. While on this subject, I will describe some ideas on stairway construction.

The State should require in all factory buildings, over two stories high, stairways at opposite ends of a building, for, if but a single stairway exists the fire will always travel towards it, shutting off every avenue of escape, while if the building had two exits at opposite ends it would be impossible to burn both at once.

In all the larger factories and mill buildings the better class of architects provide one stairway built entirely of iron or stone, and enclosed in brick walls, forming a sort of tower with openings to each floor, these openings being covered with fireproof doors. You can readily see that such a stairway is perfectly safe for all those who can reach the tower.

Any mill or factory owner who is so penurious as to object to building such a safe stairway should be prevented from running the factory. This diagram shows a mill arranged with a tower; in most cases the openings for doors are upon the side toward the mill, but one cute arrangement that struck me as being good was this: the doors from the tower open to an exterior platform that connects with an exterior door to each floor of the mill; in this arrangement the stairway is cut off entirely and absolutely from the building, giving it no chance of creating a draught or being filled with smoke; the roof of such towers should always be covered with thin glass and wire netting.

Many architects pay no attention to the fire-hazard, and while they put in a tower with incombustible stairways they overlook the

fact that even these may be inoperative in case of fire. Here is a fireproof stairway in which an elevator is located next to the doors that open directly into the tower. In case of fire the flames would at once make for the elevator, effectually shutting off the chance of reaching the stairway. This building, especially, is poorly designed, for while it has two stairways, both are subject to being shut off by the same fire. A much better plan would have been to have located one stairway in the rear of the building, leaving the other in front where it is now. Now this may be a small matter to the architect or inconvenient to the owner, but it will be a serious matter some day to 300 people who are employed there day and night, if the place takes fire in any part or on any of the lower floors. Gentlemen, you cannot be too energetic in showing these faults, for upon it may depend many lives.

Elevator-shafts.—Who has not cursed or discussed them; they are the most fruitful source for the spread of fire. Can we close them up and nail the door? No; for they are a necessity. We have use for them; we need, we want, and must have them. For how could we make use of our top floors, in Chicago especially, if we had to close up the elevators. It is a necessary evil, and all we can do is to mitigate it.

Elevators can be divided into two classes—the open shaft and closed shaft. A majority of the buildings make use of the open shaft, and you know from experience that the draught will usually carry the fire beyond all intermediate floors and stop at the ceiling of the top. Indeed, every fireman here can call to mind many fires in which the bottom and top floors were the only ones affected. Judging from this, then, an owner, if he will do nothing else, should at least continue his elevator through the roof, and cover the same with a single strength of glass skylight, protected underneath with wire netting. In case of fire the chief will have two chances, first, if fire is small there will be no extradraught; second, if fire produces much smoke he can send a man to the roof with an axe to break the glass, so as to clear the building of smoke, thereby giving the fireman a chance to get at the root of the fire. Then, again, if the fire of its own accord is severe enough to break the glass roof, it will do less damage if it can get out than if it was forced to spread over the entire top floor. Many devices are in existence to close hatchways; those that close by automatic action in case of fire are especially to be recommended; with this arrangement the doors are held open by an electric contrivance, and this in turn is controlled by fusible links placed in exposed positions all over the building. In case of fire, the parting of any link will close every hatchway all over the building.

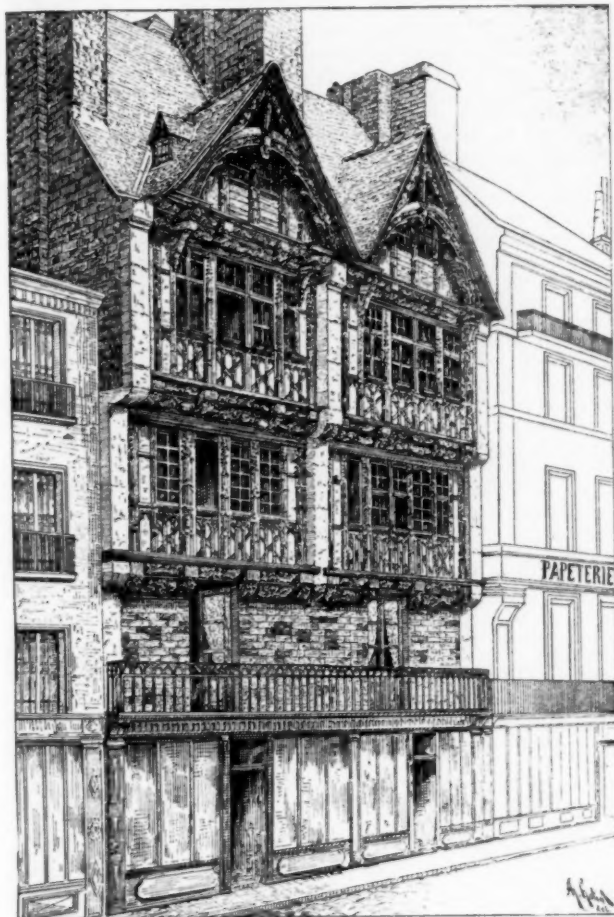
But all these contrivances are subject to neglect and may fail to do their duty; in case of need, therefore, wherever it is possible to do so, an enclosed elevator-shaft should be used. Those enclosed by brick, tiling or incombustible material, are the only ones that could be recommended. On each floor the opening into the shaft should be protected by a wooden door covered with tin. With such a shaft there would be no draught and the fire would be confined to the floor in which it started; such a shaft would continue through the roof and should be covered with a thin glass skylight. Many owners object to this closed elevator-shaft, but where large areas exist and the buildings are high, they should be insisted upon.

Division-walls.—In buildings where large areas are in use the division-walls should be made heavier in proportion to the extra width of the area. Division-walls are probably the most important item connected with the fire-loss. Could the walls remain standing during fire, so as to confine the fire to its own premises, it would wipe out the conflagration-hazard. For many years the most important subject connected with building has been neglected. I allude to the method by which it is held together. A frame house is nailed and fastened at every point or angle, each joist is securely nailed to the sill and stringer, while in a brick building only every sixth joist, or those at intervals of eight feet apart, are fastened to the wall. Then, again, the methods generally used are very faulty, for the joists are fastened to the wall by a metal strap, and in case of fire the joist burn through, and in falling the strap cannot free itself and must pull the wall along. Therefore, underwriters and firemen should insist that methods of anchoring be used that will free themselves from the wall in case of fire.

You have experienced often the great danger in handling a fire where material is massed in great heaps, with hardly room to get around and no division walls of brick. Such large areas should not be allowed unless special provision is made to prevent the starting of fire, such as automatic sprinklers, fire-alarms or watchmen. — *Fire and Water.*

THE LATE PIETRO ROSA. — The death of Pietro Rosa, Italian archaeologist and Senator, is just announced. He was born at Rome in 1815, of a family related to the great painter of the seventeenth century, Salvator Rosa. Until 1848 he was the architect of Prince Borghese. Napoleon III confided to him several works, notably, the restoration of the famous Pretorian camp at Albano, in 1860, and the excavations in the ruins of the palace of the Caesars in 1861. His greatest work, the topographic map of ancient Latium, involved the topographical restoration of all the tombs of the Appian Way, and innumerable archaeological and geographical explorations in the Roman Campagna. He was elected, in 1863, a corresponding member of the Académie des Beaux Arts and a Knight of the Legion of Honor. — *New York Times.*

REPORT ON THE ACCIDENT TO THE SHOREHAM APARTMENT-HOUSE.



The Maison Dieu, St. Lo, France. From Havard's "Dictionnaire de l'Ameublement."

WASHINGTON, D. C., August 26, 1891.

HON. LEVI P. MORTON:—

Dear Sir,—The Board selected by you to advise upon the plan and method for reconstructing the interior of the Shoreham Apartment-house, in this city, and to maintain a constant oversight of the materials and workmanship with which that object was accomplished, having performed that duty, now have the honor to present the following report:

The occasion for this reconstruction arose almost solely from fundamental and unusual, if not unique, defects in both the principle and manner of constructing the floors, but in no way affecting, even temporarily, the strength or stability of the walls, interior supports or partitions of the building, all of which are as good as is usual in such structures, and have, moreover, never exhibited any sign of crack, displacement or weakness.

"The Shoreham" was erected only two years ago, being completed in the fall of 1889, but, proving at once to be one of the most desirable apartment-houses in the city, it was immediately occupied to its full capacity, and so continued with all of its machinery and apparatus in active operation. The temperature thus maintained throughout the house from the start exerted a baneful influence upon the peculiar nature of the flooring, hastening its decay. The building is of eight stories, with a frontage of one hundred and twenty-five feet on Fifteenth Street, and one hundred and ten feet on H Street, to which an extension of twenty-eight feet was added during the past year, but with a safe and double flooring, instead of the perishable kind in the original building. Standing upon good ground, with a concrete and stone foundation, the superstructure consists entirely of brick walls and iron columns, girders and plates, which carry all of the light partitions, and, with the brick walls, furnish the bearings for the wooden joists of all floors. All partitions not formed by the main brick walls, extending up through the building from the cellar, consist of hollow fireproof blocks. The stairways are entirely of iron, with marble treads, and the building contains two first-class passenger-elevators in fireproof shafts. With the exception of the floors, therefore, all structural parts remain as originally built, being evidently proportioned and put together on good principles of construction, and requiring no alteration or reinforcement.

It was quite otherwise, however, with the floors of the main building, which were supported, as stated, by the iron beams of the main framework and the brick walls. The joists were of slender size,

generally 2 x 10 inches, frequently without bridging, and of a poor quality of Virginia pine. This is one of the most inferior building pines in the country, open-grained, chiefly sap-wood, and, as it generally comes to this market, unseasoned and ready to ferment rapidly, unless in a dry situation and well aired. On the bottom edge of each joist a 1 x 2 inch longitudinal strip was nailed on each side, carrying patented hollow ceiling-blocks, 4 and 5 inches in thickness, of plaster and ashes, moulded and cast on the premises. The ceiling-plaster was rendered directly on these blocks, but did not adhere well, and became loosened or detached in many places. On top of the ceiling-blocks, the whole space between joists was filled with loose ashes of all sorts, apparently gathered up about the city, and, though principally coal-ashes, doubtless containing much wood-ash and quite heterogeneous, as the sequel shows. This filling must have been more or less dampened in the building operations, especially where mortar was mixed on the floors and water dripped from story to story, and where cement was used in laying the marble tiling. Its surface was smeared over with cement or plaster, flush with the tops of the joists, thus completely embedding them in solid ashes, and on this the floor-boards or tiles were directly laid. The unnecessary dead weight of such a floor was enough to condemn it, even if all other elements of self-destruction had been absent. All apartments and minor passages, except private baths, above the first story, were thus floored with wood, and all public rooms, halls and corridors were tiled with white marble in 10 by 20 inch slabs. The private bath-floors were underlaid with asphalt.

Thus, with the usual ramifications of steam and hot-water pipes, etc., the building was finished, and its extensive apparatus put to immediate service, so continuing until the 17th of last April. On that day, hardly two years after the floors were laid, an alarming decay in the joists was revealed by the sudden fall of a small section, about 4 by 6 feet, of the stair-hall floor in the fifth story. The accumulating debris, striking successively the similar sections of the several floors below, knocked them out until the mass rested on the ground-floor. Providentially, nobody was hurt, and the warning through your prompt action and the immediate examination of the building served to forestall an imminent calamity, because the building was quickly vacated, and its repair and reconstruction entered upon three days after the accident.

It was seen at once that the joists of the tiled floors were all in such an advanced state of decay that little or nothing was left of their substance above the top surface of the ceiling-blocks, and frequently below; while the joists of the board-floors were but slightly and superficially affected, in a great many cases not at all, and very rarely below the top of the ceiling-block. We ascribe this result directly to confinement from air and contact with deleterious elements in the ashes, greatly aggravated by heat, and, especially in the tiled floors, by moisture from washing-water seeping through the tile joints. The large size of the tiles used must have made those floors especially air-tight. Subjected to such conditions, joists of any wood must sooner or later have rotted, but most speedily poor, unseasoned Virginia pine, as should have been expected by the builders of "The Shoreham." We are informed that this experiment of filling with ashes to produce a slow-burning structure has heretofore been tried in New York, but has proved destructive to the timber.

Ordinary fungus, or dry-rot alone, could not have developed so rapidly under almost any circumstances, and there is no doubt in our minds that the ash-filling was the chief cause of the very active destruction observed in this case. This view is borne out by the peculiarly dry, brown ashes into which the fully-destroyed wood was converted, and the singed appearance of surfaces, on which the action had evidently but just commenced. Surgeon Howard E. Ames, U. S. N., of the Museum of Hygiene, who has carefully examined the wood, finds no appearance of fungus, and states that the wood was dehydrated by the direct action of the damp ashes; that is, the life of the wood has been burned out, as by the action of acids and alkalis. The fibre and wood structure is seen, under the microscope, to remain quite perfect, with no sign of spores or fungoid growth, but without cohesion or strength.

We, therefore, feel doubly sure that the incipient surface-action noted on some of the apartment floor-joists, from which the ashes have been thoroughly and permanently removed, cannot now proceed any farther.

It was evident, as shown, that the apartment floors would have been quite safe for several years longer. Nevertheless, under your wise and liberal orders, that nothing whatever should be neglected, nor expense spared, to make the building permanently safe and strong in every part beyond all doubts, every floor in it, from cellar to roof, has been either entirely renewed or reinforced, and all of the original cause of decay removed, in the following manner:

Every tiled floor has been bodily removed from wall to wall, and rebuilt with heavy joists of Georgia pine—one of the most durable and suitable woods in the country, instead of the poorest—the marble tiles relaid in the usual way, ceiled with iron lathing and "Acme" cement-plaster—an exceedingly strong and refractory material, and without any filling whatever between the joists.

All of the wooden floors have been stripped of the boards, the ash-filling thoroughly cleaned out and removed, a complete new set of Georgia-pine joists inserted beside the old ones, with independent wall and iron-beam bearings, and the flooring relaid thereon, leaving the interspaces all clear and free for ventilation. The old ceilings

were also permanently secured with new iron lathing, overlaid and very strongly spiked to the joists, and then plastered with "Acme" cement.

A usual, old and well-tried, method of making floors, involving no new nor dangerous features, has thus been substituted for the novel and faulty one, and the floors are reasonably fireproof. . . .

Some four months' time and a constant force of about 250 workmen, all employed by the day, have been required for the extensive operations described. None of the work, to our knowledge, has been done by contract, and the whole has been done under the energetic management and unremitting personal supervision of Col. Robt. I. Fleming, well-known as one of the most capable, experienced and thorough architects and builders of this city.

In our opinion, the building is now permanently strong, substantial and safe in every respect.

Very respectfully,
(Signed) JAS. H. WINDRIM, *Architect*,
Director, Dept. of Public Works, Philadelphia.
BERNARD R. GREEN, *Civil Engineer*,
Superintendent and Engineer,
Building for Library of Congress.
THOS. B. ENTWISTLE,
Inspector of Buildings, District of Columbia.

FIVE FAMOUS DOMES.—I.



Statue of Danton, Boulevard St. Germain, Paris: Unveiled July 14, 1891. August Paris, Sculptor. From *La Semaine des Constructeurs*.

MR. PRESIDENT AND GENTLEMEN:—It would be an invaluable acquisition could we now obtain an account of the methods used in constructing some of the most celebrated domes of antiquity, where the principles of construction are neither simple nor apparent. It is strange to observe how little has been handed down to us of the history of domes. From the so-called tomb of Agamemnon, some eleven centuries before the Christian era, we have scarcely any certain evidences of their history till we arrive at the Pantheon, from which the fashion for building domes seems to have originated; and although the earliest, it still remains both internally and externally the best. An account of their proceedings, of their difficulties, of their elucidation, correction and completion from the pens of the architects of such buildings as the Pantheon and St. Peter's at Rome, Sta. Sofia at Constantinople, the Duomo at Florence and our own St. Paul's, would effect more for the attainment of canons of construction than a thousand theoretical treatises unconnected with such data and incontrovertible facts. It was the knowledge of the science of stereotomy, added to that of design, which elevated the architects of such domes as I have mentioned higher than their compeers; without it they would have run the risk of designing impossibilities, and of surviving their own tottering fabrics; the knowledge of construction connects the art with the science of architecture; and adds to its beauties and necessities. Yet a want of constructive knowledge in the workmen would be no less decisive of instability; ignorance of the workmen caused much

¹ Paper read by Mr. F. W. Marks, A. R. I. B. A., at the Monthly Meeting of the Sydney (N. S. W.) Architectural Association, on Monday, July 6, 1891.

of the misfortune which dome-construction has suffered; more of the dilapidations of modern buildings are occasioned by these deficiencies of knowledge, than by the slower operation of the insidious enemy—Time.

"The dome," says Mr. Fergusson "is the noblest feature which man has conquered from nature, for building purposes. There is a fascination about domes, this creation of the architect, which is susceptible of and demands the highest artistic treatment and greatest mechanical skill. Is it, that we are afraid of them? and have never fairly tested their capabilities, that we have to deplore their non-existence in our more modern architecture; or is it because of this age of iron, that no great dome of masonry will ever be built again? Yet we must remember that there are modern domes that have excited no such interest as is still felt in the comparatively unscientific fabrics of the Pantheon, Sta. Sofia and Sta. Maria del Fiore."

The great and beautiful cupola of the Pantheon at Rome is, from the extent of its diameter, its marvellous preservation and the remote epoch of its execution, with its history veiled in mystery, one of the most precious subjects of study that antiquity has transmitted to us. Plundered by mediæval popes and Eastern emperors of its rich covering inside and out, it yet preserves in its nakedness the secret of its creation, whilst producing an impression of solemnity which St. Peter's, with all its grandeur, fails to effect. The Pantheon is probably the first great example of advanced domical construction; the representative of a long series of antecedent domes, progressing from the crude idea onwards to this—the very highest developed form of the simple dome. It is raised on a circular apartment or drum—"as were all the earlier domical tombs of the Etruscans and Romans"—about 142 feet in diameter (internal), the wall being about 20 feet thick and about 72 feet high to the springing of the dome: above that the dome is buried in the wall to about 28 feet more, so that the dome, as an external feature, is far from conspicuous. Internally, however, it forms a covering of the noblest character. Its internal surface is divided into a series of sunk panels (lacunaria) of four orders in depth, dividing the circumference into twenty-eight parts, and its height up to about two-thirds of the distance "from the springing of the crown," into five parts, the upper portion being plain. These vast panels or coffers, the larger range of which exceed 12 feet in diameter, are curiously arranged as to their sectional recessing, so as to appear perfectly symmetrical to the eye of a spectator standing beneath the centre of the dome. It is interesting to study carefully all connected with the composition of these coffers, for it appears that after having been planned by the necessities of the building they became a means of decoration, and from this last point of view can be considered as fresh evidence of the ability with which the ancients investigated all that could contribute to render the effect of the details of their buildings more complete. To further explain the construction adopted in this cupola it is necessary to extend our inquiry beyond the dome. The walls which have been described as 20 feet thick are so only in theory, for practically they are hollowed out into innumerable cells, some of them forming beautiful architectural recesses, and others merely constructional hollows; these hollows, of which there are eight, are repeated three times in their height (two only are accessible, the rest are enclosed and hidden); the lower ones are 15 feet in diameter, rather beyond the semicircle on plan, and 19 feet in height, to the springing of their hemispherical heads. The second tier is on the level of the inner cornice, and the third is entered from the second cornice on the outside; the upper parts of these chambers are divided into three small compartments, or rather consist of one compartment divided into three by means of flying-buttresses, which the architect thought fit to erect at this level; so urgent was the necessity, in his eyes, that he divided equally into two parts, the small semicircular compartments, and thus formed around the whole circumference of the building a succession of buttresses which, although they do not correspond with the divisions of the coffers as regularly as could be desired, still form none the less a circle of great solidity, and must tend forcibly to the excellent preservation of the dome. Isabelle, in directing attention to this system of buttresses says, "it is only at the Pantheon that these buttresses have been included under cover of the general building, and thus have realized conditions of strength and solidity vainly sought for in another system. It seems, therefore, that in this, the greatest and noblest of domes, we have the essentially Gothic principle of security by abutment and not by a tie."

The construction of the dome is explained differently by various authorities, but it has probably never been sufficiently exposed to allow of anything like complete information being obtained. Professor Middleton, one of our latest authorities, affirms that it is cast in one solid mass, and is as free from lateral thrust as if it were cut out of one block of stone, and though having the arch form is in no way constructed on the principle of the arch. Taylor and Cressy are of opinion that the dome is constructed in the same manner as the walls, viz:—built of *opus incertum*, strengthened every three feet in height with a layer of tiles, the weight over each opening being discharged by arches formed also of tiles, diminishing by degrees to the thickness of 5 feet at the top. Mr. Hayter Lewis believes that this dome is formed of several ribs of brick, which appear to have been built quite distinct from the filling work between them; just as in early Gothic vaulting the various ribs were first formed and set in their places, and then the intermediate light chalk

panels added to complete the whole. Sir George Gilbert Scott, evidently agreeing in some particulars with the former opinion, says, "As far as I can ascertain, it seems to be in two thicknesses; the inner thickness consists of the framework of the coffers which is of rubble or concrete; this would form the centring on which the outer shell was built, which is a curious tissue of arches, each rising from the crowns of those below it, and so disposed as to concentrate the pressure upon points in the wall which intervene between the cells." The late Viollet-le-Duc, in his valuable work, the "*Dictionnaire Raisonné de l'Architecture*," favors a like theory to that of Scott; and Piranesi, a clever investigator of ancient monuments, also supposed the same, yet he omitted to explain how the coffers were hollowed out. What does certainly appear evident is that coffers constitute the essential part of the construction; they must be in brick, as the ribs are throughout of the same size, whilst the dimensions of the coffers diminish in size as they approach the summit; a wide band, 23 feet in width, separates the last coffers from the large circular hypæthral opening (or eye) which illuminates this building; and if we look to this, we shall find it a further explanation for the necessities of good construction. The diameter of this opening is about 30 feet, and it was no doubt found necessary to have around such a large space a frame sufficiently solid to resist the thrust of the twenty-eight vertical bands which tend towards this point.

From the metal cornice round the eye having been gilt, it is supposed that the whole dome was once decorated in a similar manner, and it cannot be doubted that the dome, the very soul of the design, was embellished in a manner fully proportioned to the beauty of its sustaining wall. Pancirolo says that this temple was first covered with silver tiles, which were destroyed by lightning, and that the Emperor Hadrian, in the year 130, covered it with tiles of gilt bronze, which were stripped off in A. D. 663 by the Emperor Constans II., who was carrying them off to Constantinople, when he was intercepted and killed by the Saracens at Syracuse. The inner surface is now quite devoid of ornament, but was probably once decorated very richly with mouldings of the same material as the exterior. Some antiquarians have supposed that the aperture at the top of the Pantheon was originally closed by a huge "Figua," or pine cone of bronze, like that which crowned the summit of the Mausoleum of Hadrian, and this belief has been strengthened in some by the name of a neighboring church being S. Giovanni della Figua.

Whether the dome of the Pantheon was erected in the time of the Antonines or before the time of Augustus, as many suppose, it is evident that the Romans had conquered the difficulties of domical construction long before the transference of the seat of power to Byzantium; the Pantheon being up to this time the largest (single) dome ever constructed by the hand of man. Simple and grand as it undoubtedly is, it had several defects in its design, which the Byzantines set themselves to remedy. The first was that the amount of materials consumed in its construction was twice as much as was necessary; the second, that the mode of lighting by a hole in the roof, which also admitted the rain and the snow, was most objectionable before the invention of glass; the third, that a simple circular plan is always unmeaning and inconvenient; a fourth, that a circular building can hardly, by any contrivance, be made to fit on to any other buildings or apartments. Referring to the first defect—viz, "that twice the necessary amount of materials was consumed in its construction," we must not lose sight of the fact that the Pantheon is the most perfect dome that has ever been created, and the non-existence in the world of any very large and complete dome of moderate thickness has raised the impression that no such dome can exist, and that large hemispheres of masonry must either be enormously thick and heavy, or else must depend so much on ties that we may as well build iron domes at once. As to the third and fourth objections, it is evident that the inconvenience of the circular form was early felt, and an octagonal one was adopted, and then a square, the angles of which were cut off so as to form an octagon internally, and then the triangular blocks in the angles were hollowed out into great niches, so that very little space was lost. In course of time the head of the niche became an arch, springing from wall to wall, and so formed what may be called the Roman pendentive. We see it then as transferred to Byzantium in the celebrated Sta. Sofia, where it is clearly worked out between lofty arches and supporting the dome above, with an outside ring of arches added, shadowing forth perhaps the latter mode of the circular peristyle. Thrice did this great glory of domical structures, Sta. Sofia, fall a victim to its defective construction, aided by earthquake before attaining its present perfect ideal state, and where it now hangs with little apparent support, or, as Procopius (who witnessed its erection) describes it, "as if suspended by a chain from heaven." Following them through their many failures, we cannot but feel grateful to the Byzantines that they persevered through all the difficulties of domical construction, till they reached the wonderful perfection, the great glory of domical structures, Sta. Sofia: stripped of all its ornament, it is yet a beautiful object; and well justified was Justinian when he exclaimed, on contemplating his finished work, "I have surpassed thee, O Solomon." Neither the Pantheon nor any of the vaulted halls at Rome equal the nave of Sta. Sofia in extent or cleverness of construction or in beauty of design. The dome itself is only about two-thirds of the size of that of the Pantheon, but the whole unsupported expanse of the central aisle is nearly double that of the Roman temple, and owing to the judicious manner in which the parts are used is, in appearance, far more than double; indeed it may be safely

asserted, that, considered as an interior, no edifice erected before its time shows so much beauty or propriety of design as this; and well deserving is the architect who first erected an aerial cupola, to the praise of bold design and skilful execution.

Unfortunately, the ancient accounts, so clear and precise, are erroneous in one important particular: for while all state that the dome was finally re-constructed as it stands, of pumice stone, or light Rhodian bricks, Salzenberg informs us that no trace of these can be found, and that it is formed altogether of ordinary well-burned bricks; it appears that the four great piers, constructed of a kind of Peperino free-stone, at the angles of the square on the plan, were the only supports at first adopted, and that the pendentives and dome were formed on them; to fill-in the pendentives under the cupola, a whitish stalactical material, showing the impression of plants, was used in its rough state; the mortar being of a reddish color, apparently from the addition of pounded tile, is laid in thicknesses of one to two inches. The pressure of the eastern and western arches springing from the great pier was resisted by four walls, forming transepts running north and south. Against the eastern and western walls, respectively, abutted two semi-domes. The superstructures having given way towards the east, taking away the semi-dome on that side, the eastern pillars were strengthened, and the dome was again turned; but it again gave way before it was completed. Strong buttresses were then built to the east, and a dome (according to ancient account, of pumice stone) turned for a third time. But it became cracked and split, the arches under being so fractured that those on the north and south sides required to be filled-in with the three-storied arcades now forming such prominent features in the interior. This dome then stood awhile, but it was destroyed by an earthquake, and was subsequently rebuilt by Justinian in the tenth year of his reign, A. D. 537, through the genius of the celebrated architect, Anthemius of Tralles, assisted by Isidorus of Miletus, his colleague. Twenty years afterwards, a portion of the dome was again destroyed by an earthquake, but this damage was repaired by Justinian, and since that time, notwithstanding numerous earthquakes which have taken place at Constantinople, the bold system of construction employed at Sta. Sofia has lasted well, and but few extensive repairs are on record. During the thirteenth century it is probable that little was done to preserve the building. On the return of the Greeks, in the fourteenth century, the eastern angles were strengthened by works called by one author, pyramids. All this narrative shows that the substructure was the only defective part, the great arches not having sufficient abutment; and that whether the dome as first built would have stood or not, not one, however sound in itself, would have stood upon such a base; whether constructed of pumice stone or of light or heavy bricks, the recent dome seems to be of homogenous construction without separate ribs; answering in fact to our ordinary idea of a dome as typified by the internal brick dome of our own St. Paul's. The general thickness varies from about two feet to two feet six inches. It has strong buttresses as abutments (8 feet 6 inches thick) above the springing, and the walls under are excessively thick as compared with the thickness of the vaulting. Some of the bricks in the vaultings are 14 inches square by 2 inches in thickness. In the lower part of the great cupola some are 27 inches long 9 inches wide and 2 inches thick, and others are 27 inches square on the side. The principal cupola appears at first sight to rest upon four arches, each 100 feet wide, but in part only those on the east and west have that span, and on the north and south the real supporting arches are reduced in width to 72 feet, and only three-fourths of the circumference of these last arches has radiating joints, the parts next the springing being laid horizontally. Mr. Fergusson, in describing these arches, says, "the first requirement was to obtain four perfectly stable arches, on which the dome might rest. The great difficulty was with the two arches running transversely north and south. These are, as nearly as may be, 100 feet span, and about 120 feet high to the crown, and 10 feet on the face. Each of them has a mass of masonry behind for abutment, 75 feet long by 25 feet wide, only partially pierced by arches on the ground and gallery floor; and as the mass might have been carried to any height, it ought, if properly constructed, to have sufficed for an arch very much wider and more heavily weighted than that which it supports." These abutments mentioned by Mr. Fergusson were at first only carried up to the spring of the great arches, and were concealed beneath the roof over the side galleries, but after the fall of the dome they were raised by command of Justinian, so that they are now within 18 feet of the base of the cupola, and form the vast projecting masses called pyramids (previously alluded to); though necessary, perhaps, for the stability, they are certainly injurious to the external appearance of the building. The base of the cupola consists of forty piers resting on the internal circular cornice; they are 3 feet 5 inches wide inside, 8½ feet long in the direction of the radius, and, tapering on the outer face, have a medium height of 15 feet; and are connected together by arches which form windows (40 in number) 4 feet 9 inches wide, by which the dome is lighted. These windows pierce the dome immediately above the cornice, which crowns the pendentives, and which, by subdividing its lower part into narrow piers, increases the feeling of its being supported by its own buoyancy. The system of lighting domes possibly culminated at Sta. Sofia, where the flood of light is introduced without its ever falling on the eye of the spectator. The windows project externally, and now support metal plates, curved to correspond with the window-heads, but they probably once carried brick arches and

served as an effective tambour to the cupola. The piers are continued as ribs on the inside of the vault (which begins with a thickness of 29 inches over the windows); they project at first 6 inches, gradually decrease, and die away into the great central disk of the cupola. At the crown the cupola is only 24 inches thick, measured through the holes left for suspending lamps. The lowest inner faces of the piers are 104 feet apart, measured diametrically across. The highest point of the cupola rises 46 feet 9 inches above the gallery at the base; the vaulting of the cupola is therefore less than a semi-circle in section. The lofty centre, where a crescent has supplanted the cross, rises to the perpendicular height of 180 feet. It is evident, on close inspection of the dome, that many hard blows have fallen on it in the lapse of thirteen centuries, its regular shape being destroyed by many swellings and depressions, which however are not seen from the ground, while they prove the durability of a cupola vault so long as its supports remain firm. The cupola is covered with sheets of lead $\frac{1}{2}$ inch thick, fastened to wood laths resting directly on the vault. Just as the Pantheon had been among those with the simple dome the most perfect, so in after years did the great efforts of the Byzantine architects culminate in the perfecting of what are known as "pendentive domes," and as illustrated by the most wonderful of all its creations, the Church of Sta. Sofia or the Eternal Wisdom. Well might its imperial founder exclaim when, with pardonable exultation, he viewed the result of his costly aspirations: "Glory be to God, who hath thought me worthy to accomplish so great a work!"

[To be continued.]



BOSTON ARCHITECTURAL EXHIBITION.

THE Annual Convention of the American Institute of Architects is to be held in Boston, October 28, 29 and 30, and the Boston Society of Architects and the Boston Architectural Club have united to organize in connection therewith an Architectural Exhibition, to which architects and draughtsmen are invited to contribute. The exhibition will include all kinds of architectural drawings, sketches, plans, details, decorations, drawings of furniture, interiors, etc., as well as photographs of executed work, though it is quite desirable that the latter should be accompanied by sketch-plans, as far as possible. As the Exhibition will appeal primarily to the architects as a professional body, it is hoped that the contributions will by preference be largely such as will illustrate the actual office-work and study of the architect, not however to the exclusion of purely artistic rendering, or picturesque sketches. In order to be properly exhibited all contributions should be framed or mounted on stretchers. No Exhibition blanks are necessary, but each drawing should bear the name and address of the exhibitor on the back. When the draughtsman and the exhibitor are not the same, it is desirable that the draughtsman's name should appear on the front of the drawing. Arrangements have been made with the following firms to act as agents for the Exhibition:—

Cincinnati, Clendon H. Sheen, 166 Race Street;
Chicago, M. O'Brien & Son, 208 Wabash Avenue;
New York, Wm. S. Budworth & Son, 1 West 14th Street;
Detroit, Wm. O'Leary & Co., 236 Woodward Avenue;
St. Louis, George F. Heffernan, 1010 Olive Street;
Cleveland, J. F. Ryder, 239 Superior Street;
Washington, A. P. McElroy, 1001 Pennsylvania Avenue;
Philadelphia, James S. Earle & Sons, 817 Chestnut Street;
St. Paul, Stevens & Robertson, 31 East Third Street;
Buffalo, Hoddick & Co., 620 Main Street.

Contributions for the Exhibition can be sent to any of the above, but must be in their hands on or before Monday, October 12. After that date drawings may be sent to the Executive Committee, 6 Hamilton Place, Boston, but in order to appear in the Catalogue, must be received in Boston, on or before October 19.

The firms above mentioned will receive, pack, forward and return in proper order all contributions for the Exhibition, without expense to contributors, and will also call for any large or especially heavy drawings, if properly notified three days in advance. Upon arrival in Boston, a receipt for each drawing will be mailed to the individual exhibitors. The drawings will be properly insured and will be forwarded through our agents at the risk of the Executive Committee.

Drawings and contributions from other cities, or not forwarded through our agents as above listed, are to be expressed to the Executive Committee, 6 Hamilton Place, Boston, at the expense and risk of the exhibitors, but all return charges will be paid by the Committee. Such contributions must be despatched so as to reach Boston on or before October 19.

All contributions will be received subject to approval of the Reception Committee. The exhibition space at our command is so large that there need be no limit to the number of drawings receivable from a single exhibitor.

An illustrated Catalogue is to be published, and the committee will be glad to receive contributions for the illustrations of the same, from

which a selection will be made as far as the limits of space will permit. Drawings for the Catalogue should be made with black ink, and must be sent the Committee before September 20.

C. H. BLACKALL.

W. C. NORRIS.

Executive Committee.

AMERICAN INSTITUTE OF ARCHITECTS.

SECRETARY'S OFFICE, AUDITORIUM TOWER,
CHICAGO, ILL., August 24, 1891.

THE Twenty-fifth Annual Convention of the American Institute of Architects will be held at Boston, Mass., on Wednesday, Thursday and Friday, October 28, 29 and 30, 1891. As soon as the Committee on Arrangements shall have completed its work, information will be given as to the order of exercises, the arrangements made for railroad and hotel fares, headquarters, etc.

It is hoped that the attendance at this Convention will be an exceedingly large one, and that its social developments as well as its business proceedings will be the most interesting and successful in the history of the architectural societies of this country. With this end in view, the Fellows of the Institute are requested to make strenuous efforts to so shape their affairs as to be able to attend the Convention, and the Committee on Arrangements wishes to receive suggestions from individual Fellows and from Chapters as to matters of interest which they wish to bring to the notice of the Institute.

Papers upon artistic, scientific or administrative problems will be welcomed by the committee, and the papers themselves, or at least their titles, should be sent to the undersigned at as early a date as possible.

The Boston Chapter has instituted an exhibition of architectural drawings for the Convention week, and invites the Fellows of the Institute to participate therein. Particulars as to this will be given upon application to the Executive Committee, No. 6 Hamilton Place, Boston, Mass.

Yours very truly,

DANKMAR ADLER,
Secretary A. I. A.



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

CLUB-HOUSE OF THE ATHLETIC CLUB OF THE SCHUYLKILL NAVY, PHILADELPHIA, PA. MR. WILLIS G. HALE, ARCHITECT, PHILADELPHIA, PA.

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

A DESCRIPTION of this building was given by our Philadelphia correspondent in his letter for January 24, last.

THE ST. LOUIS MERCANTILE CLUB BUILDING, ST. LOUIS, MO. MESSRS. SHEPLEY, RUTAN & COOLIDGE, ARCHITECTS, BOSTON, MASS.

HOUSES ON LONDON COURT, OMAHA, NEB. MESSRS. WALKER & BEST, ARCHITECTS, BOSTON, MASS.

HOUSE AT ENGLEWOOD, N. J. MR. G. KRAMER THOMPSON, ARCHITECT, NEW YORK, N. Y.

DESIGN FOR HOTEL AND OPERA-HOUSE. MR. C. H. BLACKALL, ARCHITECT, BOSTON, MASS.

[Additional Illustrations in the International Edition.]

PORTIQUE LETAROUILLY FOR THE COLLÉGE DE FRANCE, PARIS, FRANCE. M. A. GERHARDT, ARCHITECT.

[Photogravure.]

THE Court Letarouilly at the Collège de France is one of the purest and best-conceived pieces of design that exists. Seen from the Rue St. Jacques one perceives that it has an air, a style, which causes the passing architect to halt involuntarily. The portico which encloses this ravishing little atrium has just been decorated by M. Gerhardt who was assisted in the color treatment by M. L. Hista, and M. V. Bourgeois, a former Grand Prix de Rome. The drawing which is here illustrated, together with the drawings which show the detail of the door and the decoration of the ceiling, were exhibited at this year's Salon.

DOORWAY UNDER THE PORTIQUE LETAROUILLY.

[Photogravure.]

DECORATIVE TREATMENT OF THE VAULTING OF THE PORTIQUE LETAROUILLY.

[Photogravure.]



[The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.]

THE CALVERT MEMORIAL.

BALTIMORE, MD., September 3, 1891.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—Referring to my communication to you in your issue of the 29th ult., and your comments thereon, I feel that I have no option, but must accept your invitation and produce my proofs in contradiction of your Baltimore correspondent's statement.

I do this with reluctance for two reasons. First, as I said before, I do not think religious controversy is the proper material with which to fill an architectural paper. I do not agree with you that your journal would be dreary reading if confined to professional matters, and I hope before you make a practice of filling-in with such extraneous matters you will canvass your subscribers to obtain their sentiments. Second, I can but badly spare the time for such diversions.

The matters to which I especially take exception in your correspondent's letter are his statements that "his [Lord Baltimore's] first charter was given to him while he was a Protestant and that the Calvert family soon returned to the church of their early allegiance."

These are the two direct statements I select to contradict, but I object to the whole tone of your correspondent's remarks on the matter, and his insinuations, which are unmistakably anti-Catholic, and most unquestionably penned with an intention of disparaging Catholics and exalting Protestants at their expense.

As I stated in my letter that these statements had been exactly contradicted in the public press, I shall confine myself to extracts from what had already been published for that purpose, taken from the very voluminous and able letters of "Senex," in the *Catholic Mirror* of Baltimore, June 13, and Colonel J. Thos. Scharf, whose name as an historical writer carries no little weight, (July 12, in same paper).

Bancroft, the historian, tells us "while Secretary of State he (Lord Baltimore) had obtained a special patent for the Southern promontory of Newfoundland, named Avalon."

Mr. Wm. T. Brantley, of the Maryland Historical Society, says that George Calvert did not resign his office as Secretary of State until February, 1625.

McSherry informs us "his (Lord Baltimore's) conversion took place in 1624, or at an earlier date, although his inclinations had been tending that way for some years."

King Charles speaks of his son Cecilius as treading in the steps of his father.

J. Thos. Scharf says that in 1624 George Calvert avowed his conversion to the Catholic faith, and eight years after, in 1632, applied for the patent of Maryland, but before it passed the great seal he died.

The patent was then made out in the name of Cecilius Calvert, his oldest son. There is no evidence that Cecilius Calvert was ever a member of any other church than the Catholic.

Bancroft says of Cecilius Calvert: "He was the first in the history of the Christian world to seek for religious security and peace by the practice of justice, and not by the exercise of power, to plan the establishment of popular institutions with the enjoyment of liberty of conscience, to advance the career of civilization by recognizing the right of equality of all Christian sects."

It seems to me this is a pretty good knock-down blow to the assertion that this grand charter was given to Calvert while yet a Protestant. Now to the statement that the Calvert family soon returned to their early faith.

The word "soon" is somewhat vague and perhaps elastic, but there are limits to which it cannot extend. Can any one believe that it applies to a period of *three generations, ninety years!* It certainly is intended to convey a very different impression, yet for ninety years the Calvert family remained Catholics, and this through persecutions, until one weak descendant, Benedict Leonard Calvert, in 1714 renounced his faith and joined the Church of England, but he did not live long enough to receive the profits of his change and died in April, 1715, leaving an infant son, Charles Calvert, who was then, of course, being educated a Protestant.

To this infant the king restored the government of the Province "To give encouragement to the educating of the numerous issue of so noble a family in the Protestant religion."

This shows how soon the Calvert family returned to Protestantism—in ninety years, and the manner of their conversion—not much to boast of.

As to the statement that most of them have remained Protestants ever since, even if true it would not affect the vital point, whether the grand spirit of toleration was due to one sect or the other, but as a matter-of-fact, the last Baron Baltimore died in 1771 without leaving any legitimate descendants.

Allow me now to refer to the romantic episode of having had to

borrow three cannon to protect them in their Protestant worship in the year 1700.

From the year 1692 to 1714 the powers of the proprietary government of Maryland were withheld *because of their adherence to the Catholic faith*, and it was during this time that the cannon episode occurred, it is claimed.

For myself, as I do not know what, if any, foundation there may be for the story, I do neither affirm nor deny it, but a remembrance of the fact I have just stated, certainly puts it in a very different light.

I have now referred to all the statements of your correspondent, that is, all having a sectarian bearing, and am,

Yours faithfully,

"CALVERT."

[As we half expected would be the case, "Calvert" makes a correction which is purely and entirely historical in its character and we regret to see that he still speaks of the difference of opinion which he seeks to remove as a "religious controversy," a phrase which should rarely be used, for the very reason that it is one of the symbols of all that is bitter and unyielding.—EDS. AMERICAN ARCHITECT.]



MORTALITY IN RELATION TO OCCUPATION.—One of the most interesting papers read before the recent Congress on Hygiene in London was that on "Mortality, in Relation to Occupation," by Dr. William Oyle, Superintendent of Statistics of the General Register's office. He grouped the causes of high mortality under seven general headings, (1) Working in a cramped or constrained attitude; (2) Exposure to poisonous or irritating substances, such as phosphorus, mercury or lead; (3) Excessive work, mental or physical; (4) Foul air; (5) Drink; (6) Dangerous processes of manufacture; (7) Inhalation of dust. Under this last head he remarks that stone dust appears to be more fatal even than metal dust, and then mentions the curious fact that the death-rate among coal-miners is not excessively high, in spite of the conditions amid which they work and their constant liability to fatal accident.—*New York Evening Post*.

THE SANCTITY OF THE TOMB.—Greek and Roman alike paid the greatest respect to the remains of the departed, and were very anxious that nothing should disturb the ashes or the bones of the dead or violate the sanctity of the sepulchre. Everybody will recall the lines on Shakespeare's tomb at Stratford-on-Avon, but for downright intensity of anathema the following would be hard to match in modern times:

"I give to the gods below, this tomb to keep, to Pluto and to Demeter and Persephone and the Erinnyes and all the gods below. If any one shall disfigure this sepulchre or shall open it, or move anything from it, to him let there be no earth to walk, no sea to sail, but may he be rooted out with all his race. May he feel all diseases, shuddering and fever, and madness, and whatsoever ills exist for beasts or men, may these light on him who dares move aught from this tomb."

This is from a tomb at Athens erected by a sorrowing wife to her husband, "most sweet," but similar expressions are very common. Sometimes, in addition, blessings are invoked on the man who leaves the tomb undisturbed, or who will make libations to the dead. Sometimes we meet the request that flowers may be thrown upon the tomb. In some cases the sanctity of the tomb is defended, not by supernatural terrors, but by the prosaic statement of the fine to which the offending person made himself liable. Sometimes the particular form of desecration which was most to be feared was mentioned with a simple directness which one may admire but dare not imitate.—*The Cornhill Magazine*.

BOSTON, ENGLAND.—Boston is one of the most interesting towns in England to all American visitors, as the parent of their own greater city, and they never fail to do justice to the extraordinary beauty and stateliness of that glorious tower, always called in Lincolnshire "Boston Stump," which our own countrymen scarcely know as well as they should do. A pleasing memorial of the connection between the towns is found in the restoration by American Bostonians of the Southwest Chapel in memory of John Cotton, the ejected Vicar of Boston, one of the leaders of the emigration to the new colony in 1633. The transatlantic Boston is generally thought to have been so named (in place of its hideous original name, Trimountain) in compliment to Cotton, but this is a mistake, the name having been adopted from the leading position of Boston men, especially Isaac Mountain, three years before Cotton's arrival. Boston Church claims to be in cubic contents the largest purely parochial church in the kingdom, though we are not sure that even in this respect St. Michael's at Coventry might not prove on accurate measurement somewhat larger, as it certainly is in area; St. Nicholas, at Yarmouth, also covers a somewhat larger area, but is absurdly low, and more like a collection of disjointed aisles. Boston, however, also loses enormously by the unhappy wooden vault, made in imitation of stone groining, which takes away no less than twenty-two feet of the much-needed height. Boston has a number of quaint corners with old buildings, especially along South Street, where the picturesque Guildhall, the Elizabethan Grammar School, the warehouses of the De Spaynes and other famous merchants, and a fine brick tower, a smaller copy of Tattershall, are to be found, every point of view dominated, of course, by the huge church tower, which rises straight from the river bank to a height, together with its beautiful lantern, of 288 feet 9 inches; that is to say, several feet higher than Lincoln tower or Grantham spire, and only a few feet short of the spire of Louth. All the other great western towers of England, at Taunton, Derby, Wington, Wymondham, and the like, seem dwarfed in comparison with it, and, like the dome of St. Peter's, the farther one goes away from the town the higher it seems to rise, forming one of the most conspicuous objects both from Lincoln Minster and from the

cliff at Hunstanton in Norfolk. Not that Boston is so entirely left to live on its old traditions as it was when Hawthorne (who was much fascinated by the place) wrote "Our Old Home." He says:

"The whole scene made an odd impression of bustle and sluggishness and decay, and a remnant of wholesome life; and I could not but contrast it with the mighty and populous activity of our own Boston, which was once the feeble infant of this old English town—the latter, perhaps, almost stationary since that day, as if the birth of such an offspring had taken away its own principle of growth."

But things are changing again now. A fine new dock has been made at a cost of at least £80,000, and a new channel cut to the sea; and, backed as it is by the Great Northern Railway, Boston being the only port to which that line has direct access, the trade is now again slowly increasing. But it is not at all likely to resume its thirteenth-century position, when it paid the highest *quinziesme* of any port except London, though it may develop a rising trade with Germany and the Baltic, and certainly now has more than "a remnant of wholesome life."—*The Quarterly Review*.

THE EMPRESS EUGENIE'S OPERA-HOUSE DESIGN.—*The Architect* gives the following more detailed account of the Empress Eugénie's attempt to design an Opera-house for Paris, recently mentioned in these columns: Among the curiosities of architectural history which are not generally known, is the part taken by the Empress Eugénie, in the competition for the Paris Opera-house. The circumstances are as strange as any which have been recorded in connection with such contests. Her Majesty took great interest in the project for the new building, but it was not until almost the last moment that she was inspired with the ambition to contribute a design. As not uncommonly happens with the attempts of amateurs, the imperial design bore a resemblance to an existing building, the favored one being the town-hall of Brescia, and the choice was creditable, for Palladio was an enthusiastic admirer of the edifice. But it was necessary to have the drawing worked up to competition pitch. First, one of the draughtsmen attached to the Tuileries operated on it, then it was handed over to M. Chabrol, to put in some finishing touches. But what amateur is satisfied with other people's endeavors to give definiteness to his beautiful, if hazy, conceptions? The Empress was annoyed, and the task of newly interpreting the sketch was confided to M. Charles Garnier, whose fate was depending on the same competition. But the architect, as became a courtier, was a diplomatist, and at his suggestion the aid of M. Louvet was invoked. At last the design appeared in a form that was considered presentable. Meantime the period assigned for the preparation of designs had passed with that celerity which is known to all competitors. The controller of the arrangements was fortunately the Count Walewski, and the conditions were therefore set aside. The design was admitted, and the motto suggested its history, "*Mieux vaut tard que jamais*." But with all their loyalty to Imperialism, the judges could not help selecting M. Garnier's design. The Empress, in return for her exertions, has had experience of that hope deferred which is familiar to most competitors, and Count Walewski was enriched by a drawing for which no parallel could be found, even if we go back to the days when Semiramis became her own architect.

THE OLD LIGHTS OF LONDON.—The history of lighting the city is a subject of much interest. In remote times the city must have presented a very curious aspect; there was no method of street-lighting at all; the narrow, unpaved streets were deserted when darkness fell, except by thieves, who found in the want of artificial illumination, a splendid confrère to help them in their nocturnal undertakings. Notwithstanding the ringing of the curfew-bell, and the order that all lights and fires were to be extinguished when its sound was heard, it was soon found that a city could not conclude all its business at 8 o'clock in the summer or when darkness came over the city in the winter. Kindly disposed citizens, as early as the fourteenth century, began to hang outside their doors a common candle made of rushes and coarse grease, and these gave a faint glimmer on moonless nights. We find that in the year 1416, in the reign of Henry V, the citizens were called upon as a duty to light the streets, and although some obeyed the injunction, the duty was very inadequately performed. It was the custom then for the ancient watchmen to carry lanterns containing burning candles placed on the top of a long pole, thus lighting, in some small way, the streets over which they perambulated. It was in the reign of Queen Elizabeth that the fear of a Spanish invasion drew attention to the dangerous condition of the streets at night. The darkness might hide foul conspirators; consequently, an Order in Council commanded every householder to do his part in the lighting of the city, on pain of death by the common hangman. This order seems to have excited some attention, for at the present day there are to be seen in the museum underneath the Guildhall Library, several of the candlesticks said to have been used at this period for street illumination. The candlestick consists of a rude bar of iron, having at its back a rack and a catch by which the socket holding the candle can be raised or lowered.—*The Builder*.

HIGH RENTS FOR CHICAGO ROOFS.—"It is not generally known," says the *Chicago Evening Journal*, "that the receipts from the tower of the Auditorium last year were \$71,000. The report to the Board of Management showed this to be the case. Those in charge of the Masonic Temple have received an offer of \$50,000 per year for the roof and are seriously considering it. The company making the offer is a local one and is backed by heavy capital. Recognizing the fact that the rush to the top of the building will during the first year not need any attraction, outside of what nature affords, and that during the second year World's Fair visitors will be numerous, the company proposing to rent the space, which is 6,000 square feet, will not present any outside attractions, if successful in leasing the roof, until the third year."

LORD SACKVILLE AND THE STRATFORD FOUNTAIN.—For some time past Stratford-on-Avon has been agitated over a contemptible demand

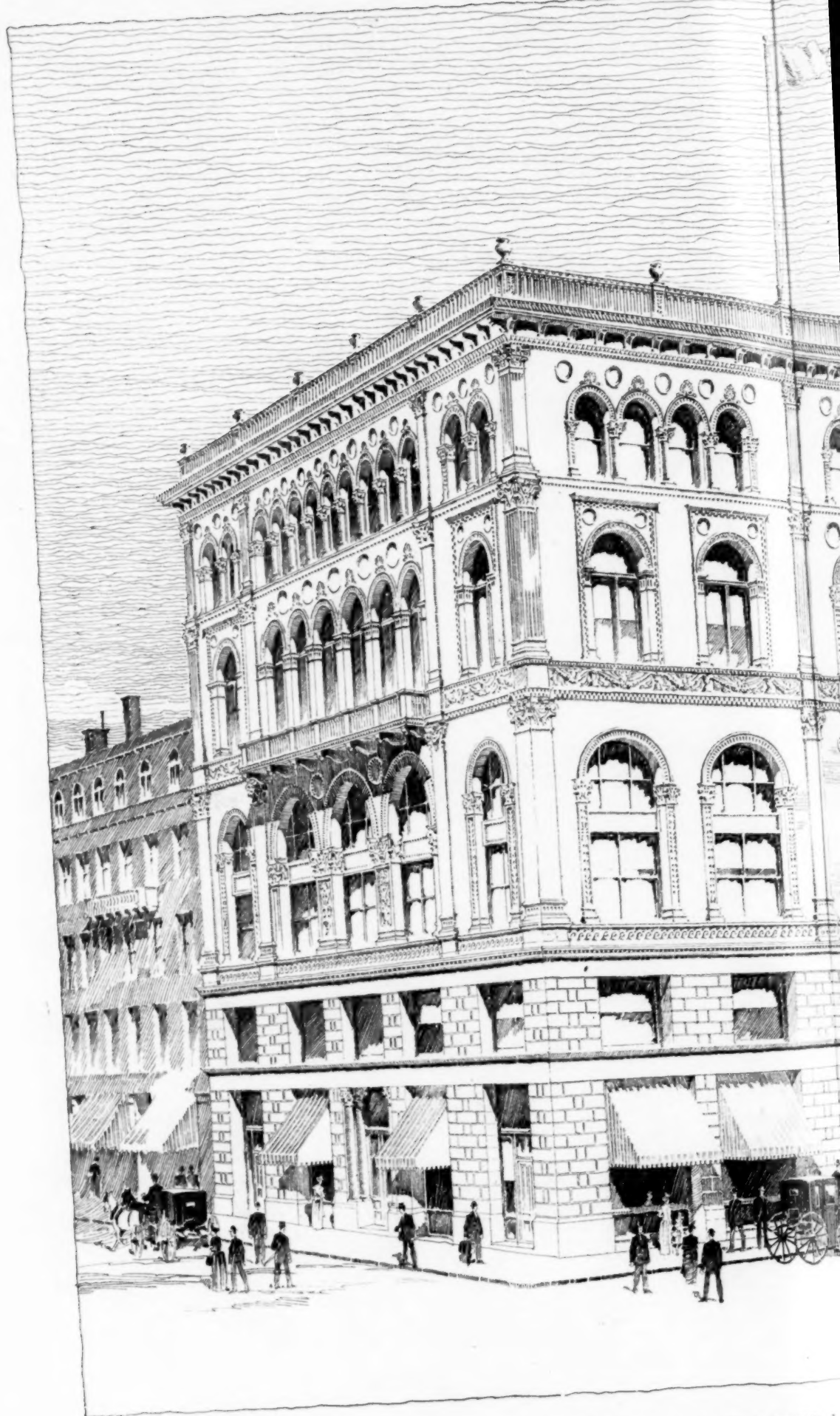
put forward by Lord Sackville, as Lord of the Manor, to a rent from the Corporation for the few inches of ground in the market-place on which stands the Jubilee Fountain erected by Mr. Childs, of Philadelphia. As far as I can understand the matter, Lord Sackville is not actually in want of the money, but is anxious to have it clearly placed on record that in civilized England, in the last decade of the nineteenth century, feudal rights have still enough force in them to prevent a municipal corporation erecting a monument in its market-place without paying tribute to the "lord" of the place. This preposterous claim would probably have been resisted *à outrance* had not the situation taken a new turn, owing to the Corporation being desirous of building a bridge over the stream called the Stour, which could only be done on land belonging to the Lord of the Manor. Lord Sackville has now made it known that if the Corporation will pay rent for the fountain, he will let them have land for the bridge, but not otherwise. Truly, in matters of this kind, *noblesse oblige*.—*New York Tribune*.

APPLYING CONCRETE UNDER WATER.—The difficulty of applying concrete under water can be overcome by filling a wooden pipe with the substance, and lowering it, end first, over the spot where it is to be deposited. By lifting the pipe from the bottom the concrete will spread out without mixing with the water. The precaution should be taken to have the pipe long enough to extend four or five feet above water when resting on the bottom, filling as required so as to retain the proper "head."—*Exchange*.

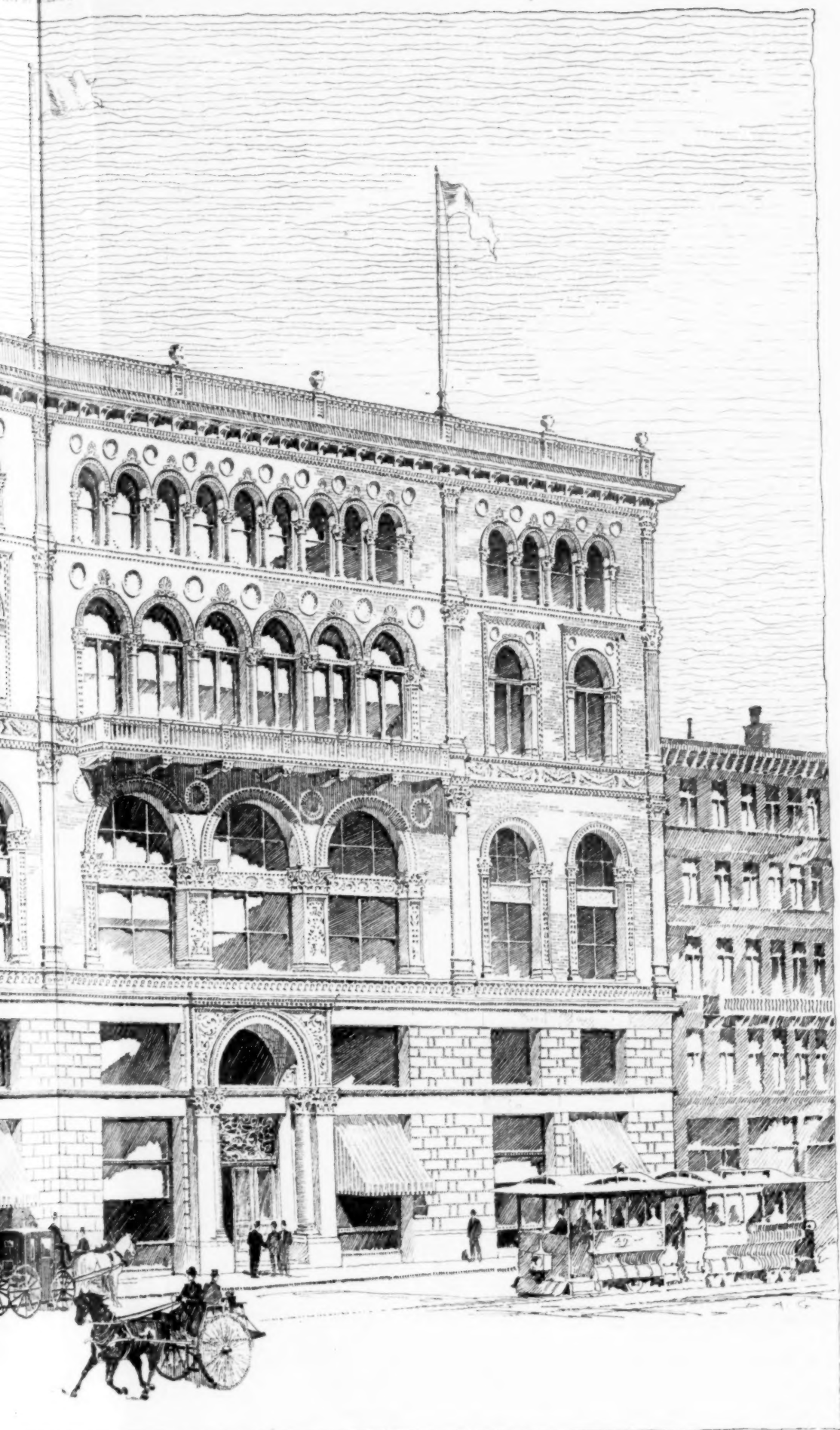


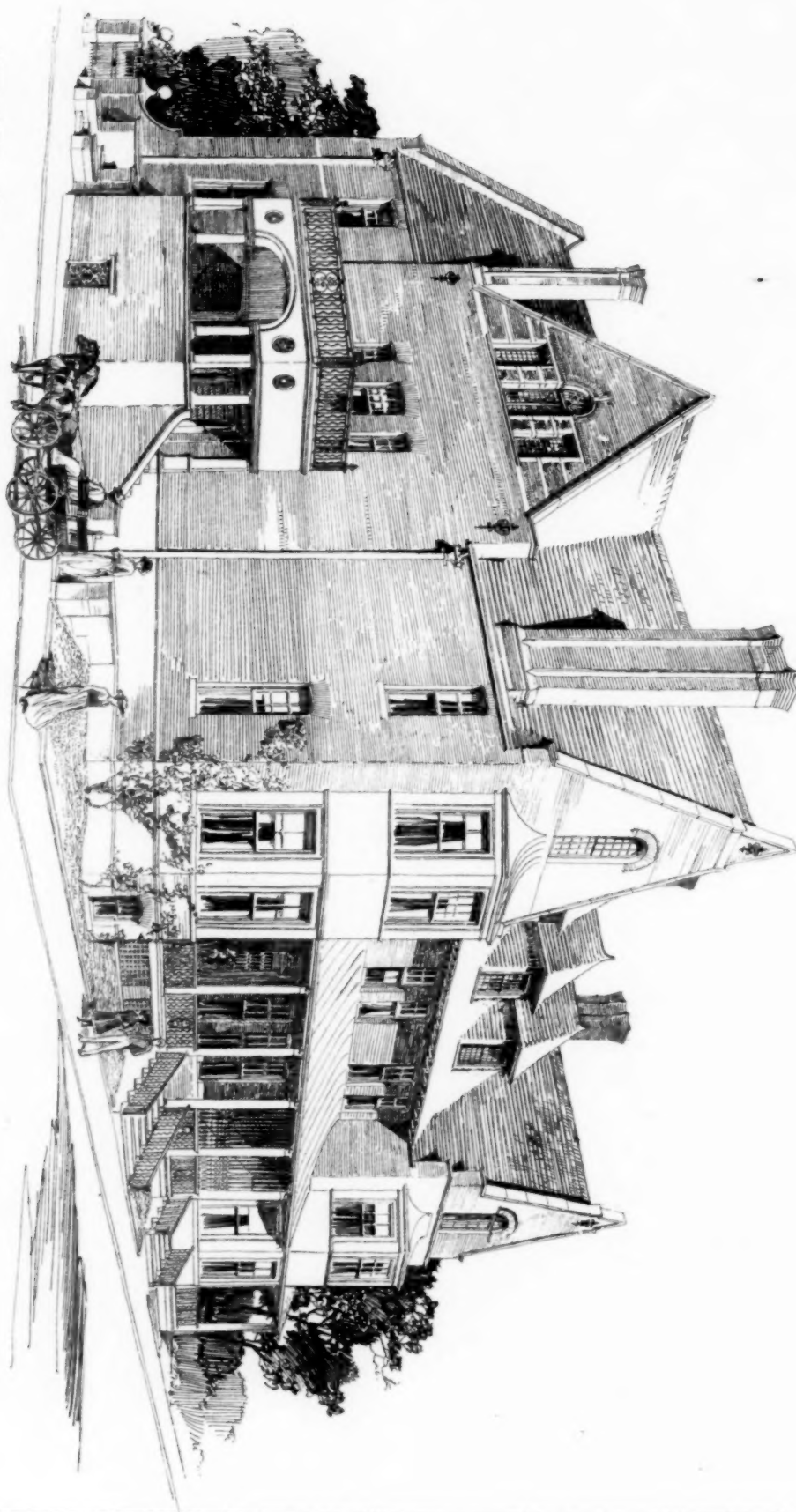
THERE is a general expectation among the business men of the country that the heavy crops on this side and the shortage abroad will result to the very great advantage of the United States during the next six or twelve months. All kinds of papers have been full of this anticipation for two or three months. The latest information from foreign authenticated sources substantiates much that has been anticipated. The action of the Spanish and German Governments will doubtless do much that will result to the benefit of American exporters and the country at large. The new reciprocity treaties being entered upon will in time contribute considerably to the development of our commerce with foreign countries. It should be kept in mind, however, that the expansion of trade is, after all, not spasmodic, but slow. An abundant European crop next year may result in depressed conditions at home. Artificial stimulus may be imparted to agricultural interests; it is not what one year may bring, but what we may rely upon for an average of five or ten years, that is to be considered. Undue importance is being attached to the present phenomenal conditions. Europe wants a few million tons of wheat and corn from America, but that is all. Dependence upon such a source of demand is ephemeral and uncertain; what is needed is a steady home consumption, and upon that we must ultimately rely. What we can do in foreign markets is uncertain; our efforts are being watched by Great Britain and Germany, and the government of those countries will leave nothing undone to checkmate us in any efforts to gain commercial supremacy in markets which have been heretofore considered as belonging almost exclusively to them. As a nation, we are new in the business of fighting for trade in foreign countries, and we have much to learn, and will learn it. British manufacturers have advantages in reserve which they have not yet used in the way of competition and imitation of American products. While reciprocity has a charm for us, and the making of new commercial treaties is to be commended, we might as well undeceive ourselves as to the magnitude of the importance of all this business. There is an enormous demand for money in all sections of the country. In one week the New York banks lost nearly four million dollars in loans. Increased activity is certain. The ability of the New York banks to meet the drain will be tested. The drain of money to the South and West is phenomenal; much of it is due to the movement of the crops. The cotton-planters are holding on to as much of the cotton as they can afford to, in hopes of still higher prices. The banks are obliged to watch their reserves, and to gauge their accommodations accordingly, rather than to consult the financial demands of the country. It is quite safe to assert that, if the New York banks had fifty million dollars more than they have at this writing, they could loan to advantage, not, perhaps, in strictly commercial centres, but to meet agricultural requirements, which are much more general and urgent than are generally supposed. There is hardly a farmer or a cotton-planter or a ranchman in the West but that wants and needs, and could make remunerative use of money, but they will have to wait a long time before their needs will be supplied. Our monetary circulation is seventy million dollars greater than a year ago, and it is figured out that it is increasing at the rate of six million dollars per month. If these figures can be relied upon, it is certainly gratifying, and the fact will be productive of good results. The treasury has two hundred and seven million dollars in net holdings, and its disbursements from September 1st to October 1st will net about thirty-five million dollars. The general business situation throughout the country is improving. Compared to last year, the volume of business this year is thirteen per cent less, but this percentage is deceptive. Casting out the three great centres, Boston, New York and Philadelphia, the volume of business throughout the rest of the country is very little below what it was last year. The meaning of this is that Atlantic commercial centres are transacting less of the business of the country. The great interior is doing its own business, and year by year it will do more of it. This is evident in the spread of manufacturing throughout the interior and in the building up of manufacturing trade and financial centres. The multiplication of banks is also worth noting, and the increase of large jobbing houses at many points in the interior. The question now agitating the business mind is: Will there be a sharp advance in values and an expansion of stock-speculation. Valuable railway securities are already improving. As to a general advancement in values, doubts may be well entertained. The producing-capacity of the country has been greatly increased of late, and has never been fully taxed. The railways will earn a great deal of money during the next six months, and the demand for manufactured articles will correspondingly increase. The agriculturists of the country are anxious to make improvements, and will do so to the extent of their ability. Money rules high in the West, but, notwithstanding this, every dollar that can be earned will be expended for improvements, and this will be the basis of the increased demand for all kinds of products which is soon to set in.

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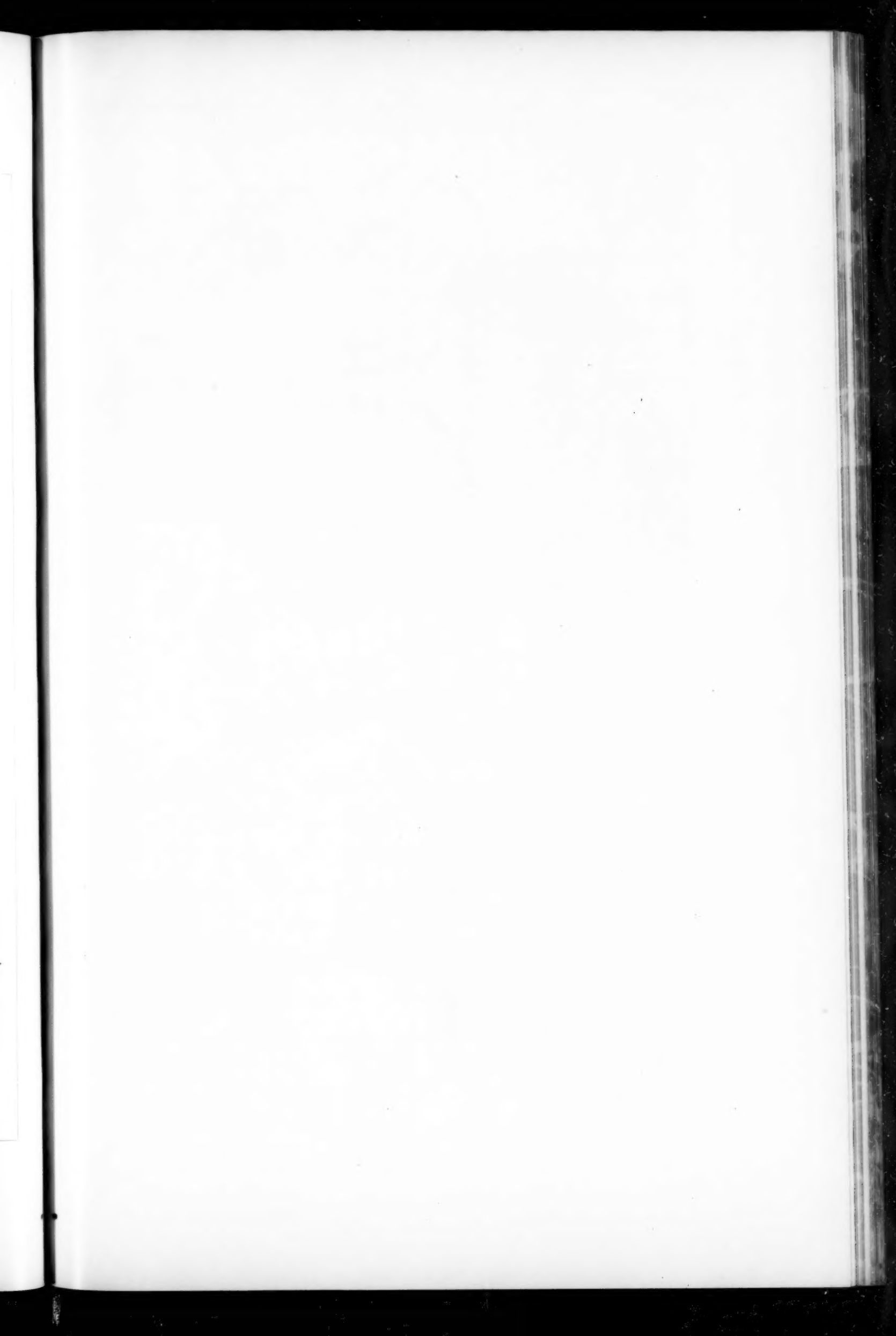
ST. LOUIS • MERCANTILE • CLUB, • ST. LOUIS, MO.





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HOUSES ON LANDON COURT, OMAHA, NEBRASKA
 FOR THOMAS SWIDE, ESQ.





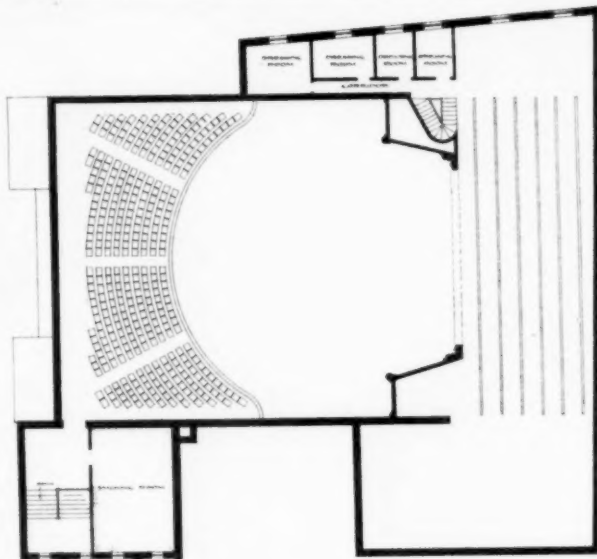
DESIGN
FOR
HOTEL AND OPERA HOUSE
C. H. BLACKALL,
ARCHT.
BOSTON, MASS.



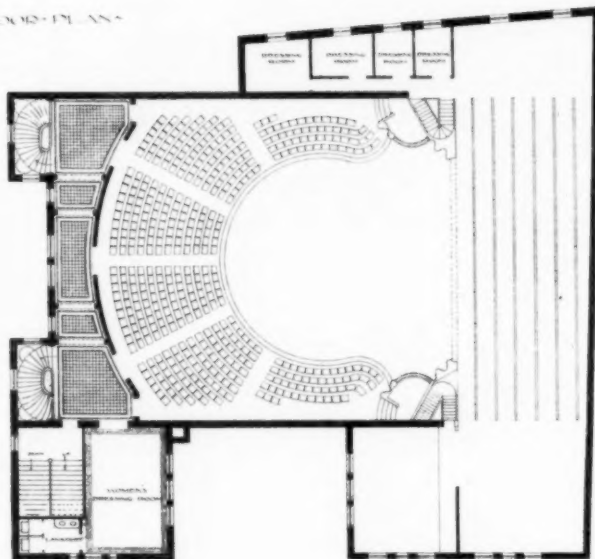
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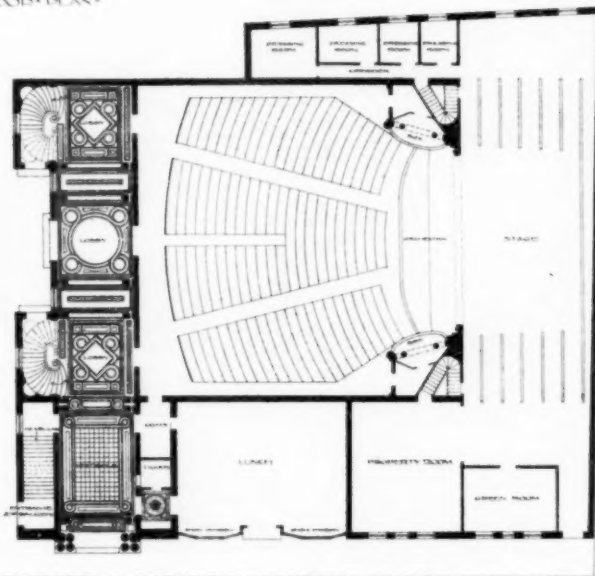
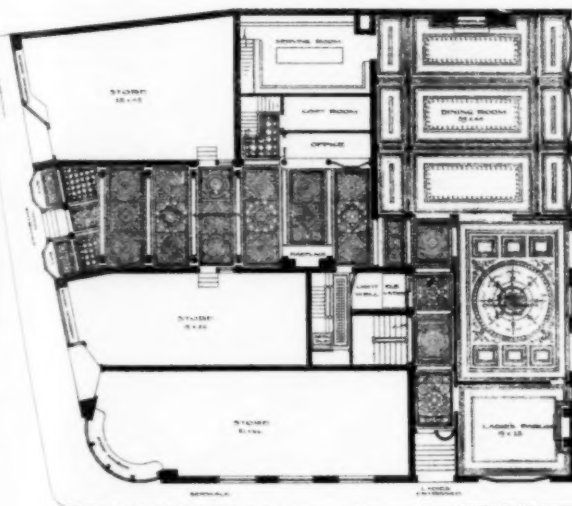
ENTRANCE TO OPERA HOUSE



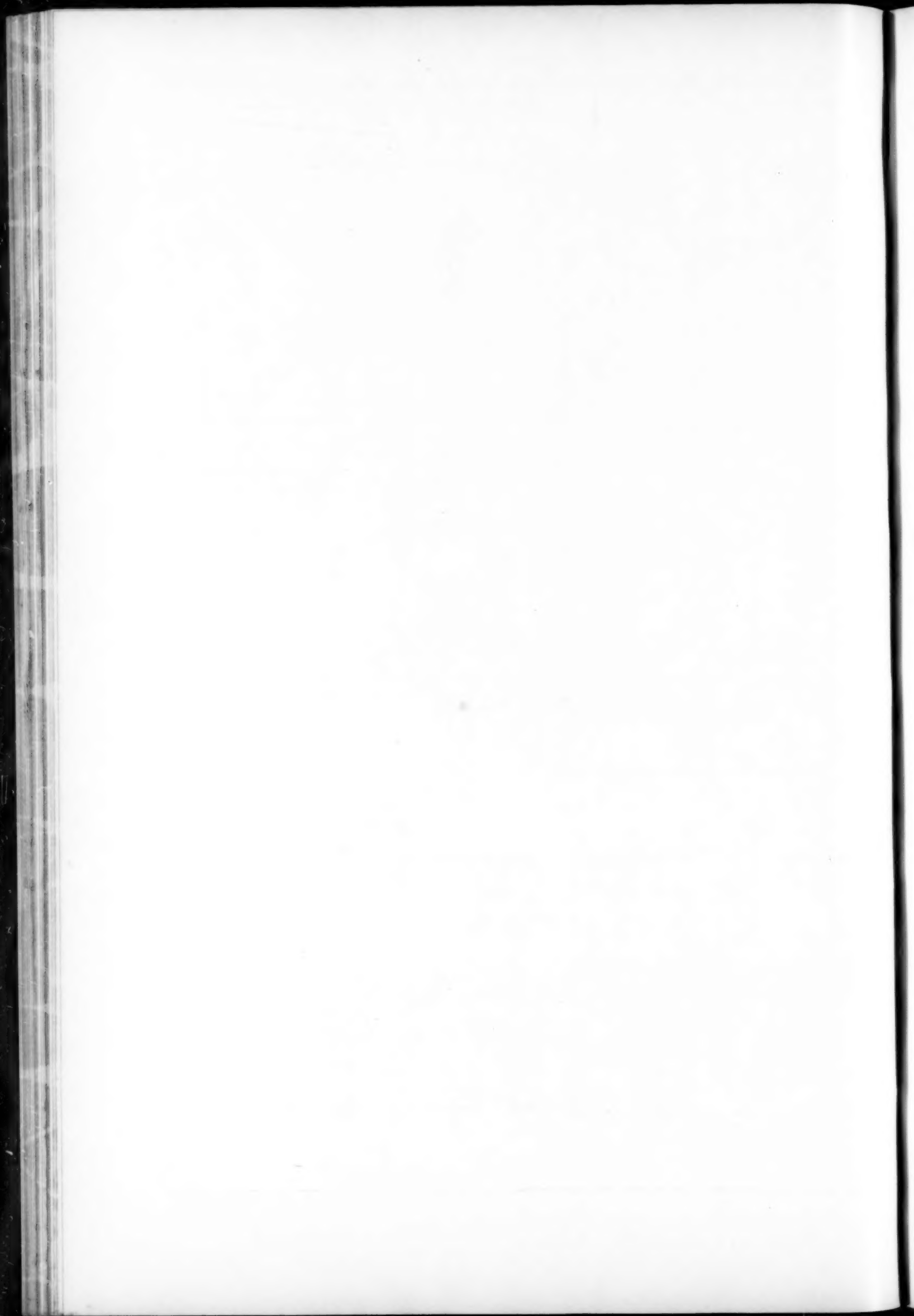
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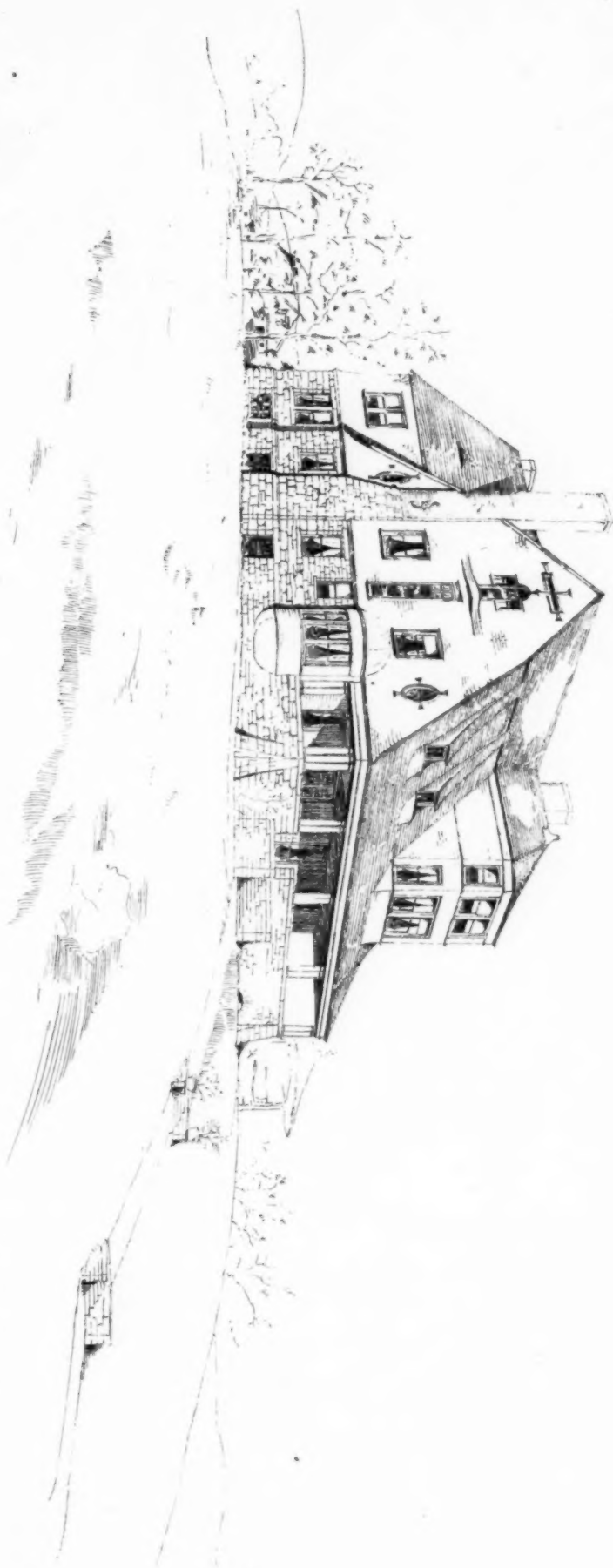
FIRST FLOOR PLAN



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HOUSE AT

ENGLEWOOD,
N.J.



G. KRATZ THOMPSON,
ARCHITECT.

315 MADISON AVE.
N.Y.