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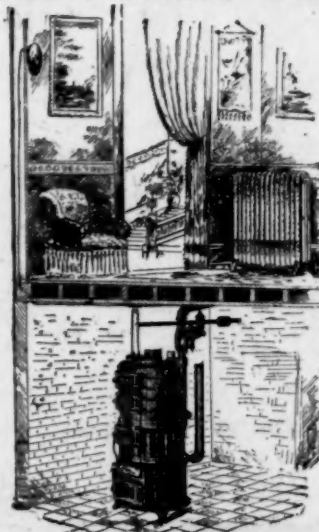
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VOL. XXXV.

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FEBRUARY 20, 1892.



SUMMARY:—

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THE Boston Board of Fire Underwriters has this year been public-spirited enough to take the lead in urging upon the attention of the Legislature the improvements in the building-laws proposed by the Commission of 1889. This Commission consisted of Messrs. William Minot, Jr., who manages, either for himself or his family, or as trustee for others, a very large amount of real estate in the city, as the representative of the property-owners; Mr. John G. Stearns, of the firm of Peabody & Stearns, as the representative of the architects; and Mr. William H. Sayward, the Secretary of the Master Builders' Association, and himself a builder of great experience, as the representative of the contractors. Three men better qualified for the task of modifying and improving the building statutes in a way to satisfy all the interests represented could not have been found anywhere; but they took the precaution of calling in Mr. John E. Cheney, of the City Engineer's office, and Mr. Edward T. Cabot, as counsel, for advice upon certain points. Mr. Minot went abroad to study the foreign building codes, and their operation, and the Commission held more than sixty meetings, which resulted in the preparation of a code which, although very favorably received by architects, builders and underwriters, has not had much public discussion, and has, we think, as yet hardly obtained from professional men the credit which its remarkable merits deserve. As our readers know, we dislike to thrust our opinion, unasked, upon the people who are entrusted with the decision of any question; and, as the Commissioners' report has not yet been officially received by the city and State authorities to whom it was made, there would be a special discourtesy in any attempt to forestall their discussion of it; but there is no harm in mentioning what appears to us to be a feature of very great value,—the division, by the proposed code, of all buildings into three classes, one of which shall be built in a specified way, the second in another specified way, and the third in still a different way. The consequences of this classification are not obvious at the first glance, but architects, acquainted with the working of the present laws, will not have to study it long to perceive how admirably adapted it is to meet the two worst defects in the present statutes,—their confused character, and the difficulty of preventing their evasion.

A FEW examples will serve to show how irrational and inefficient a law is apt to be which is formed, like the present statute, and those which have preceded it, by an

accretion of suggestions, all, perhaps, good in themselves, but put together with very little regard to their judicious connection with one another. In the law which was only recently modified, it was ordained that buildings might be constructed with light wooden beams, wood furrings, etc., to a height of eighty feet above the curb, but that every portion above that height, if the owner choose to carry it higher, must be of incombustible material. Under this singular regulation, a building might be a mere tinder-box, eighty feet high, surmounted with a heavy iron and brick cap, which, when the tinder-box beneath it took fire, was sure to fall with tremendous force through it to the cellar. In fact, it may have been an occurrence in New York, where a costly stock of goods was totally destroyed, under the eyes of the firemen, because, having carried lines of hose through the adjoining buildings to the roof of the one on fire, they found it impossible to break through the iron beams and brick arching of the incombustible roofing to pour water on the flames, which suggested the modification now in force, under which buildings more than eighty feet in height must be of incombustible material throughout. Another curious inconsistency, which is still retained in the law, is the provision that all floor-timbers shall have the ends resting in the walls cut on a bevel, so that, if they are burned off, and fall, they shall roll out of their places without prying over the walls; which is accompanied by another provision, requiring that floor-beams shall be anchored to the walls, every ten feet, by strong iron anchors, built into the walls, and secured to the top of the beams. The obvious effect of this way of anchoring is that, if the beams carrying the anchors burn off, and fall in, they pull the walls with them, by means of the anchors. It would be perfectly easy to anchor the beams to the walls, by means of anchors applied to the side, or to the underside of the beam, which is much better. Architects building in the country, or where they are not hampered by the law, often do so, and thereby secure just as good anchorage to the walls, with the advantage that the beams, if burnt off, roll out of the anchors, without shaking the walls in their fall; but this much safer and better construction is not countenanced by the present statute.

IT would be easy to multiply examples of similar inconsistencies and oversights in the present statute; but, after all, they are unimportant in comparison with a much greater defect, which the Commissioners' classification scheme is also adapted to correct,—that of the difficulty with which they are enforced. As the present law is nothing but a collection of miscellaneous rules, the deputy inspectors are compelled to search in every building for violations of each rule. Practically, it is impossible for them to detect one-fourth of the violations that are committed. For example, the statute requires mortar fire-stop belts at the top and bottom of each story, around all furred walls. These are put on just before lathing, and are usually lathed over in a few hours after they are put on. After the lathing, only close inspection will show whether they have been put on, and most architects have seen plenty of cases where a mere apology for a fire-stop has been daubed on in the more conspicuous places, and expeditiously lathed over, and covered with the first coat of plastering before the inspector's next visit. The same thing is done with the fire-proof stopping of stairs; while, as to the asbestos paper, which, under the present law, is supposed to be laid between the upper and under floorings, it is notorious that a couple of smart floor-layers can make a few yards of paper do duty for a whole floor by disposing it judiciously when a visit from the inspector is announced. Under the Commissioners' scheme of classification, inspection would be greatly simplified. Each class would have its own set of details, and familiarity with these would enable an inspector to detect a variation far more readily than where, as now, he has to deal with various classes of construction in the same building.

AT the same time, we do not think that even the Commissioners' scheme goes far enough in the direction of assisting the enforcement of the law. It is plain that a house which has fire-stop belts a quarter of an inch thick, or discontinuous, and shavings daubed with mortar, for "pugging"

between the stair-stringers, and asbestos paper between the floors only at those points where the inspector was present at the laying, is very little more fire-resisting than one in which no pretence at all of compliance with the law has been made; and it is with these structures that it is desirable to deal. At the risk of repeating what we have said several times before, we will express our conviction that a thoroughly efficient building law can never be enacted which does not contain a principle of self-enforcement. It is interesting to contrast in this respect the building statutes and the regulations of the various city Boards of Health. Except so far as plumbing-work is concerned, the latter make a very slight inspection, but their rules are obeyed to the letter without it, for the simple reason that the Board can prevent the use of buildings which do not please them. We once saw a house built on made-land of questionable character. One of the officials of the Board of Health happened by, and looked at, and smelt the soil. As he departed, he remarked, "We do not wish to dictate how you shall build your house; you may build it as you like, so far as we are concerned; but unless you have a thick bed of concrete over that stuff, we shall not allow it to be occupied after it is done." It is needless to say that the cellar of the house was provided with a flooring of concrete six inches thick, with an inch of rock asphalt on top of that. So with the New York health regulations, which forbid covering more than sixty-five per cent of any lot, not on a corner, with a building; while little is done in the way of inspection to ascertain violations, even the most greedy landlords, who count a day lost in which they do not commit some transgression of the building-law without detection, keep scrupulously within the sixty-five per cent limit, in terror lest some rival should discover and report a violation, and the Board should forbid the occupation of the structure. In regard to the building-laws, the obvious and long-tried mode for making them self-enforcing is, as we believe, to apply the principle which has always been maintained in all Continental countries, and make owners and tenants responsible for losses caused to their neighbors by fires originating on their premises. The Commissioners, in their report, dwell earnestly on the fact that rates of insurance in Paris are less than one-fiftieth the average rate in Boston, and that, while about ten fires occur a day, a serious one is almost unknown; but they attribute this to the "high point of excellence" which has been attained in the Parisian building-laws. With all deference to the superior knowledge of the Commissioners, we cannot agree with them on this point. No doubt the French regulations in regard to building are good, but ours are also good, if they were enforced, and we do not think, from our own observation, that the Paris regulations are better enforced than ours. On the contrary, the worst building work we have ever seen done was in Paris. Of course, it was contrary to law, and if an inspector had seen it, a heavy punishment would probably have been inflicted on somebody; but inspectors are not omnipresent or Argus-eyed there, any more than they are here. There is an important difference, however, between the violations of the law which we have seen there, and those common here, in that, in Paris, whatever else a speculating builder may do, he never omits any of the usual precautions against fire. He knows that, each tenant being responsible by law for the consequences of fire spreading from his own apartment, his house would never have an inhabitant so long as there was the slightest suspicion in regard to its fire-resisting qualities; and, although the rear and side walls may be built of masses of cobble-stones, stuck together anyhow, and plastered over, and the rear windows may be, as we have seen them, mere openings in the rubble mass, without a semblance of an arch, or lintel, or anything else except some bits of old scaffold poles to hold up the superincumbent wall, everything is sure to be daubed and stuffed and choked with mortar rubbish and plaster, through which no fire can possibly make its way. Otherwise than in this respect, French construction is far inferior to ours. The unprovoked fall of a wall, which is almost unheard of here, is by no means uncommon there; and the quick destruction by fire of the unprotected iron-work of the great "Printemps" dry-goods store, which astonished the French, was probably predicted mentally by every American architect who ever went into it. The only difference is that in the United States owners have no interest in protecting themselves, still less their neighbors, against conflagrations originating on their premises, and the administration of the building-laws is a constant struggle with the attempts of owners and builders to evade them; while

in France, owners and tenants have to look out for other people as well as themselves, and mutual protection is universal.

THE Government of San Domingo has generously granted what is practically the entire area of the town founded there by Columbus, the first Christian settlement in the Western hemisphere, as a site for a monument to be erected to Columbus by an association of Americans. The monument, which is now being designed by Professor George Hopson, of the State Normal Art School, in Boston, is to be of granite, surmounted by a colossal figure of Columbus, in bronze.

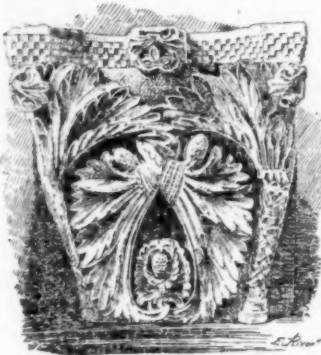
A COMPETITION of artists was recently held for designs for the decoration of the banquet-hall in the new Hôtel de Ville at Paris. Ninety-six artists competed, sending in, naturally, sketches of the most various kinds. The decision was made by a committee of the city council, assisted by a jury of experts, and the designs of MM. Victor Prouvé, Jules Ferry, and Sinas were selected. Judging from the lively description which M. de Cleuziou gives of them in *La Semaine des Constructeurs*, the designs submitted by these gentlemen were not particularly distinguished by their novelty of subject, or intensity of interest, but banqueters, so long as they are surrounded by agreeable coloring, perhaps do not care to have their minds harrowed by scenes of lofty dramatic or didactic power.

THE *British Architect* reports a curious discovery. A subway is now in process of construction between the terminus of the Great Northern Railway, in London, and the King's Cross Station of the Metropolitan Railway. While the excavation was going on, the contractors found their work interfered with by a huge block of concrete. The top of the concrete block was only two feet below the street, where a heavy traffic was passing, and it was therefore impracticable to blow it up with powder or dynamite, and nothing could be done but to cut it away with wedges and sledge-hammers. The most curious part of the affair is that, according to old maps, this concrete block had been in place for seven hundred years, and formed the foundation for one of the crosses built by Edward I, in memory of the "chère reine," Eleanor. Undoubtedly, the name of the locality, King's Cross, comes from this monument, the superstructure of which disappeared long ago, just as that of Charing Cross is derived from another one of the same sort, the last of the series, which stood nearer Westminster. The use of concrete, as is well known, was quite common in the thirteenth century, and its manufacture was well understood, so that Viollet-le-Duc even describes and illustrates an example of a huge block of artificial stone, dating from that period, which still does duty as a lintel; but, with the limited knowledge of cements which our forefathers possessed, it is remarkable that they should have been able to make a concrete waterproof enough to resist the moisture of the soil for seven centuries.

MOST of our readers have probably heard that the Egyptians, in cutting granite and other hard stones, used tools of bronze, which they tempered in such a way as to make them harder than steel. No specimens of the Egyptian bronze tools have, however, been found, so far as we know; and, although the fact that they used them is mentioned by ancient writers, the manner of tempering them has not been described, and remains one of the mysteries of antiquity. Within a few weeks, however, a discovery has been made, which promises to throw light upon this subject, which is obviously of great scientific importance. During the progress of some excavations in Rome, a case of tools was found, evidently belonging to a sculptor in bronze, and containing a variety of chisels and other instruments, all of which were of an intensely hard bronze. As the Romans were well acquainted with iron, a practical sculptor would hardly have gone to the expense of having tools made of bronze, unless they were superior in hardness or temper to those of iron, and it is proposed to test the quality of the instruments, and to have them analyzed, in the hope of discovering the circumstances on which the quality depends. Apparently, a part, at least, of the hardening must have been effected by a tempering process; for each tool has the name of its owner—Æmilius Faustus, engraved upon it, and the engraving could hardly have been done after the final tempering.

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

DECISIONS VARY AS TO NECESSITY OF CERTIFICATE.



Romanesque Capital from the Cathedral at Autun. From *La Construction Moderne*.

WHETHER the production of the architect's certificate, where that is made by the contract a condition precedent to payment, shall be in general indispensable to recovery of the contract price, unless fraud or collusion is shown, and, if the latter is alleged, whose fraud it must be which will relieve from the necessity of producing the certificate, and how the matter of the fraud is to be brought before the court, are all matters about which decisions vary, and it is

hardly possible to extract any rule from the reports.

A good view of the subject, showing both sides, may be obtained from the account of an important case² decided in New Jersey.

Here the plaintiff agreed to build a house for the defendant, "agreeably to the drawings and specifications by Oscar S. T., architect, within the time aforesaid, in a good, substantial and workman-like manner, to the satisfaction and under the direction of said architect, to be testified by a writing or certificate, under the hand of said architect," etc. It was further provided that in case of dispute arising as to the true construction or meaning of the drawings or specifications, the said architect was "to decide the same, and whose decision should be final and conclusive."

If the defendant requested alterations, additions or omissions, they were to be made, and a reasonable value was to be deducted from or added to the contract price. The defendant did order certain alterations, which were made, to the value of \$600, but it was alleged that the architect "wilfully and fraudulently" decided that the alterations were within the true construction of the drawings and specifications referred to in the contract, and that the plaintiff was not entitled to be paid the fair and reasonable value thereof, and wilfully and fraudulently withheld from the plaintiff, and refused to sign, the certificate required by the contract for the last payment called for thereby; and that the defendant had not paid the \$600.

The counsel for the defendant claimed that the production of the architect's certificate being, by the contract, a condition precedent to payment, and this condition not having been complied with, the action could not be maintained. The allegation of fraud on the part of the architect did not dispense with the necessity of performance of the condition precedent. The builder might compel the architect to deliver the certificate, by a bill in equity, or might sue him for the fraud. He quoted the English case³ of *Milner vs. Field*, in which the court distinctly held that "Where by the contract itself, the certificate 'of a surveyor is made a condition precedent to the right to 'payment, even if it be withheld by fraud, that is only the 'subject of a cross-action. The non-suit, therefore, was right.' In the present case, the rule need not be so broad as this, since the fraud alleged was not charged against the defendant, but against the architect, who was not a party to the action. Under the most favorable rule for the plaintiff which the court could consider, the plaintiff must show, either, (1) performance of the condition precedent; or (2) that the defendant wrongfully prevented such performance of the condition precedent by his wilful or fraudulent act. The defendant's counsel referred to Addison on Contracts, where, in respect to building contracts, the principle is recognized that, where the certificate is withheld, there must needs be shown the collusion of the employer to entitle the builder to recover on the contract.

"Pleading fraud of A.," said the counsel, "as the ground of an action against B., without alleging B.'s participation in the fraud, is preposterous." In *Bowery National Bank vs. Mayor*,

etc., it was admitted⁴ that the contract had been performed to the very letter, and that the only reason the certificate was not given was that the Water Purveyor was enjoined from giving actual certificates by reason of another suit. In regard to the decision given by a New York court in the case⁵ of *Thomas vs. Fleury*, where it was held that if the certificate was fraudulently or unreasonably withheld, the builder might recover under other proof of performance, the defendant's counsel said that the reasoning of a New York court could have no force in New Jersey. Two plain remedies, he said, were open; the architect might be forced to give the certificate; or he, or the owner, or both, might be sued in tort for the fraud.

It may here be remarked that the case of the *Bowery Bank vs. Mayor*, etc., which the defendant's counsel cited in support of his position, was decided, on appeal to the Court of Appeals, in quite a different sense. The court held that, although the Water Purveyor was prevented by injunction from issuing the actual certificate, the injunction did not prevent the "assent of the skill and judgment of the Water Purveyor that 'the contract has been fully completed, but that it only 'stays his hand from expressing that conviction;" as if death, or sudden insanity, should prevent him from signing the certificate; and the judgment of the court below, dismissing the contractor's case, was reversed.

Continuing with our story; the counsel for the plaintiff began his side of the case by citing⁶ with disapproval, Addison on Contracts, 2, Section 361, where it is said that "The employer is not responsible for any misconduct of the architect or surveyor in refusing to certify, not brought about by his instrumentality or interference"; and said, "The parties contract to be bound by the honest, and not the fraudulent decision of the arbiter, and his fraud relieves from the performance of a condition precedent requiring his decision or certificate." He quoted the decision in *Batchelor vs. Kirkbride*,⁷ where it was held that "fraud by the arbiters, though not in collusion with the defendant, entitles the plaintiff to recover"; and *Ormes vs. Beadel*⁸ (see page) in which it was decided that, "Where, by the contract, the award of the architect is final, and is fairly and impartially made, this court 'will not relieve against it, however severe may be its effects; 'but where the arbitrator is found guilty of unfairness or 'partiality, this court will relieve against his award." He cited also *Batterbury vs. Vyse*,⁹ where the court held that "the defendant, who employs the architect, does contract with 'the plaintiff that he will do his duty and act fairly."

The decision¹⁰ of the court on the case was delivered by the Chief Justice of New Jersey, who said:

"The case, in brief, is this; The plaintiff has done work 'for the defendant to the value of \$600, which work was 'additional to that specified in the written contract; the money 'was payable on the certificate of the architect, whose decision was to be final; such architect fraudulently decided that 'the work in question was not additional, but was embraced 'in the contract, and the defendant, being notified of the facts, 'refused to pay the demand. As the demurrer confesses the 'truth of this statement, it will be observed that the defendant 'stands now before the the court saying, 'I admit that this 'money is due for additional work; I admit that the architect 'fraudulently certifies to the contrary; and I claim that by a 'correct application of legal principles, I have the right to 'take advantage of the fraud, and to appropriate to myself 'the moneys that are its fruits.' The inquiry is: Does the 'law in reality justify this immoral attitude?' . . . "It was 'quite reasonable for these parties to say to their agent, 'decide honestly between us, and your decision shall be 'final'; but it was utterly unreasonable for them to agree to 'abide by such award if it were fraudulent." Judgment was ordered for the plaintiff.

¹ *Bowery N. Bank vs. Mayor*, etc., 63 N. Y. 336.

² *Thomas vs. Fleury*, 26 N. Y. 26.

³ *Clarke vs. Watson*, 18 C. B. N. S. 278.

⁴ *Batchelor vs. Kirkbride*, 27 Fed. Rep. 899.

⁵ *Ormes vs. Beadel*, 2 Giff. 166.

⁶ *Batterbury vs. Vyse*, 32 L. J. Ex. 177.

⁷ *Chism vs. Schipper*, 22 Vr. 1. See also, *Cook Co. vs. Harms*, 108 Ill. 151. *Taylor vs. Wrenn*, 70 Ill. 181. *Coe vs. Lehmann*, 79 Ill. 173. *Lull vs. Korf*, 84 Ill. 225. *Starkey vs. De Graff*, 22 Minn. 431. *Neenan vs. Donoghue*, 50 Mo. 493. *Lynn vs. B. & O. R. R.*, 60 Md. 26. *B. & O. R. R. vs. Polly*, 14 Gratt. 447. *Wilson vs. York*, etc. R. R., 11 G. & J. 58. *B. & O. R. R. vs. Resley*, 7 Md. 297. *Hudson vs. McCartney*, 33 Wis. 331. *Fetz vs. Butterfield*, 54 Wis. 242. *Barney vs. Giles*, 2 N. E. Rep. 206. *Snell vs. Brown*, 71 Ill. 183. *Schenke vs. Kowell*, 7 Daly, 286. *Martin vs. Leggett*, 4 E. D. Smith, 255. *Scott vs. Liverpool*, 1 Giff. 206. *Herrick vs. Belknap*, 27 Vt. 673. *Nolan vs. Whitney*, 88 N. Y. 648. *Doyle vs. Halpin*, 33 J. & S. 352. *Anderson vs. Meislahn*, 12 Daly, 149. *Smith vs. Alker*, 102 N. Y. 87. *Woodward vs. Fuller*, 80 N. Y. 312. *Bannister vs. Patty*, 35 Wis. 316. *Bentley vs. Davidson*, 74 Wis. 420. *Brunsdon vs. Beresford*, 1 C. & E. 125.

¹ Continued from No. 842, page 102.

² *Chism vs. Schipper*, 22 Vr. 1.

³ *Milner vs. Field*, 5 Exch. 829.

The lay reader will observe that the point of the question lies in the relation of the architect to the two parties to the contract. The counsel for the plaintiff says: "The parties agree to be bound by the honest, and not the fraudulent decision of the architect"; and the Chief Justice strengthens this by assuming that the parties say to the architect: "Decide honestly between us, and your decision shall be final"; but it is at least conceivable, if not reasonable, that the architect is agreed upon as the final arbiter by the two parties for the express purpose of shutting off on both sides all claims of fraud; and because both parties are willing to accept without question his honesty, as well as his judgment. It is difficult to understand how the architect, in this case, could have been really guilty of any fraud in refusing to certify a claim for extras. Without collusion with the owner, which was not alleged, he could have derived no possible advantage from his refusal to give the certificate, and he certainly knew better than any one else what work was really included in the contract. Moreover, even if there was a preponderance of evidence that work which he believed to have been included in the contract was really extra, there was still nothing fraudulent in his insisting on his own opinion.

One of the justices, Magie, dissented from the opinion of the court, and said: "A count on such a contract must show 'performance of the condition precedent, or a valid excuse for non performance. . . . It is insisted, however, that an impossibility of performance, occasioned by the death of the architect, would excuse performance; and that, on similar grounds, an impossibility occasioned by his fraud will also excuse. It is a familiar doctrine that one who has contracted 'to do an act will be excused, if performance has become impossible by the act of God, or of the law. But this doctrine has never been extended to impossibilities not created 'by *vis major*. . . . Where the parties expressly stipulated 'for an architect's certificate, it is obvious that they had in 'contemplation his conduct, including his ability to do the 'act; his willingness to do it, and his honesty in doing it. . . . That the inability or unwillingness of the architect to make 'the certificate will not excuse its production has been established in the analogous case of insurance contracts, where 'the insurers' liability does not arise until the production of a 'certificate by some person designated or described in the 'contract. . . . It is urged that the architect in such cases 'occupies a position like that of an arbitrator, whose award 'may be set aside for fraud. But it is settled that an award 'cannot be thus dealt with except where the submission has 'been made a rule of court, in which case the court exercises 'an equitable jurisdiction." . . . The judge cited 2 Langdell, 1087; Addison on Contracts, Section 336; Buller, N. P., 164; Hotham *vs.* East India Co., 1 L. T. R., 638; 1 Benj. Sales, 105, and note¹; and went on to say: "If, therefore, the owner 'has procured or induced the architect to fraudulently withhold the required certificate, his liability will arise without 'its production, for his act has thus prevented performance, 'and he will not be permitted to thus defeat his liability." . . . "There has been some vacillation in the English decisions with respect to this doctrine." In Milner *vs.* Field, 5 Exch. 827, the withholding of such a certificate by fraud and 'collusion with the owner was held only to give a right to a 'cross-action. In Clarke *vs.* Watson, 18 C. B. N. S. 278, it 'was intimated that if an owner colluded with a surveyor to 'withhold such a certificate, he could not shelter himself from 'liability under such wrongful act. But in Batterbury *vs.* Vyse, 2 Hurlst. & C. 42, a declaration on a building contract 'which stipulated for the production of the architect's certificate before liability should attach was held to be good, 'because it averred that its non-production was caused by the 'neglect of the architect in collusion with and by the procurement of the owner. The doctrine of the case last cited 'must, in my judgment, prevail, for it imposes a just obligation

on the owner, and prevents his gaining advantage from 'his own wrong. . . . It is proper to point out that the case 'before us does not show the relation between the owner and 'the architect. When the latter is so employed as to become the agent of the owner with respect to the building, a 'new element is introduced, which may require a different 'result. The adverse cases in other courts show, in some 'instances, the existence of such a state of affairs."

The uncertainty in regard to the conclusive authority of the certificate² which is shown in the account of the preceding cases may, and should, be avoided by a special provision in the contract itself. It is, of course, important to the interest of architects and owners that the certificate should be regarded simply as an expression of the architect's opinion that the contract has been complied with, and not as a guaranty, or a decree of absolution to the contractor for all the sins which he might have succeeded in hiding temporarily from view. Under the first aspect, the certificate is open to correction, if subsequent discoveries should reveal the hidden defects, and the owner is not obliged to pay for work omitted, or improperly done, no matter what the architect may have certified in regard to it; while, under the second view, the certificate cannot be called in question, except on the ground of fraud on the part of the architect, and the owner must pay the certified amount, and trust to getting damages from the architect if the latter should be proved to have been guilty of negligence or gross want of skill in making his certificate. It seems to be the tendency of the law to regard the certificate, where the contract leaves its authority in doubt, as an opinion merely, but it is best to define its force precisely by providing in the contract that the certificate shall not exempt the contractor from making good any work which may afterwards be discovered to have been improperly done, or not in accordance with the plans and specifications; or, more briefly, by describing the document as "the written certificate of the architect that the work to the stage in question has, in his opinion, been done in the manner herein agreed."

It occasionally happens that, under the contract, certain deductions are due from the contract price, at the completion of the building, which are uncertain in amount, or which the owner, as the architect supposes, may not wish to claim. For example, it happens, in perhaps the majority of cases, that the building is not completed on the day appointed in the contract, and if, as is usually the case, a forfeiture is provided by the contract for every day's delay, it becomes a delicate matter for the architect to decide how much deduction shall be made from the last payment to the builder. As will be seen later, the owner is only entitled to deduct from what he had agreed to pay the builder the actual loss which he has suffered by the delay, in the shape of the extra house-rent which he may have been obliged to pay, or something of the sort, no matter what the contract may have set as the forfeiture; and it is next to impossible for the architect to fix this damage, even if he is entitled by his position to do so. The consequence is that if

UNCERTAINTY OF DEDUCTIONS TO BE MADE.

he gives his certificate without taking such deductions into consideration, he incurs the enmity of the owner, who finds it more difficult to make terms with the contractor, after the latter has been fortified with the architect's certificate; and if he makes his deductions on these accounts too large, he gives the builder a just right to complain, and perhaps finds that the validity of the entire certificate has been destroyed.

Some of the griefs which arise from the failure of the builder to follow the exact proportions of the drawings are even more difficult to adjust. The rule is that the owner, in such cases, is entitled, if he does not choose to insist on having the error corrected, to deduct from the contract price the difference between the market value of the house as it actually is, and that which it would have had if it had been carried out in strict accordance with the drawings. There is some doubt whether the architect is the proper person to make this estimate, and it has been held in one case that a real-estate agent should be the one to make the valuation; but the architect is,

¹ Stadhard *vs.* Lee, 113 Eng. C. L. 369. Packard *vs.* Van Schaick, 58 Ill. 79. Fowler *vs.* Deakman, 84 Ill. 130. Walsh *vs.* Walsh, 11 Bradw. 199. Byrne *vs.* Sisters, 16 Vr. 213. Mayor *vs.* Ackers, 16 L. J. Ex. 6. Moffatt *vs.* Dickson, 13 C. B. 543. McAndrews *vs.* Tippet, 10 Vr. 169. Kirtland *vs.* Moore, 1 Cent. Rep. 466. Wells *vs.* Calman, 107 Mass. 514. Roumagne *vs.* Ins. Co. 1 Gr. 110. McMahon *vs.* N. Y. & E. R. R. 20 N. Y. 463. Barton *vs.* Hermann, 11 Abb. Pr. N. S. 378. Waugler *vs.* Swift, 30 N. Y. 38-45. Kane *vs.* Stone Co. 39 O. S. 1. Vandewerker *vs.* Central R. R. 27 Vr. 130. Baasen *vs.* Baehle, 7 Wis. 516.

² McCarran *vs.* McNulty, 7 Gray, 139. U. S. *vs.* Robeson, 9 Pet. 319. Leonard *vs.* House, 15 Ga. 473. Smith *vs.* Boston, 36 N. H. 458. Dingley *vs.* Greene, 54 Calif. 333. Sutherland *vs.* Morris, 45 Hun. 259. Downey *vs.* O'Donnell, 92 Ill. 559. Ely *vs.* Ely, 80 Ill. 240. Butler *vs.* Tucker, 24 Wend. 447. Trustees *vs.* Lynch, 5 Gilm. 521. McAvoy *vs.* Long, 13 Ill. 147. Atkins *vs.* Barnstable, 97 Mass. 428. Hanley *vs.* Walker, 79 Mich. 607. Langdon *vs.* Northfield, 42 Minn. 464. Dinsmore *vs.* Livingston, 60 Mo. 241. Munroe *vs.* Butt, 8 E. L. & B. 738. Wadsworth *vs.* Smith, 6 L. R. Q. B. 332.

³ Richardson *vs.* Mahon, 4 L. R. C. P. 486. Sharpe *vs.* St. Paul's, 59 L. T. N. S. 9. Dobson *vs.* Hudson, 1 G. B. N. S. 632. Kimberley *vs.* Dick, 13 L. R. Eq. 1. Pawley *vs.* Turnbull, 3 Giff. 70. Owens *vs.* Beadel, 2 Giff. 166. Milner *vs.* Field, 5 Exch. 829. Clarke *vs.* Watson, 18 C. B. N. S. 278. Poussard *vs.* Spiers, 1 Q. B. Div. 410. Stover *vs.* Gordon, 3 M. & S. 308. Worsley *vs.* Wood, 6 T. R. 710. Martin *vs.* Leggett, 4 E. D. Smith, 256. Baron de W. *vs.* Mellier, 16 L. R. Eq. 554. Morgan *vs.* Birnie, 9 Bing. 672. Clark *vs.* Pope, 70 Ill. 123. Mills *vs.* Weeks, 21 Ill. 561. Cent. Mil. Co. *vs.* Spruck, 24 Ill. 587. Wallace *vs.* Holmes, 36 Ill. 156. Ewing *vs.* Fiedler, 30 Bradw. 202.

apparently, bound to call the attention of the owner to the fact that such defects exist, for which a deduction may lawfully be made.

FINAL CERTIFICATE REALLY PROVISIONAL.

Hence the final certificate is, to some extent, provisional, and the architect should be careful to reserve in it the rights which the owner, under the contract, may insist upon if he chooses.

CASES OF QUANTUM MERUIT.

Where a contract partly executed is abandoned by agreement of the parties, or by the fault of one of them, or where such alterations and changes have been made as to obscure totally the original agreement, it sometimes happens that the contract is treated by a court as no longer existing, and the builder is held to be entitled to recover *quantum meruit* for his work and materials; that is, what they can be proved to have been really worth, without regard to the contract price for them. In such a case, it becomes important to know whether it is still necessary to produce the architect's certificate, in order to recover payment on the new basis. The law appears to be that it is not necessary,¹ in such cases, to produce the certificate; but it has been held, even in a suit on *quantum meruit*,² where the architect had pointed out certain defects, and the builder claimed to have remedied them, that he must show the architect's certificate to the effect that they had been satisfactorily corrected.

Where certificates are to be based on measurements, as is frequently the case with interim certificates,³ the contractor, if he wishes, is entitled to be notified, and to be present when the measurements are made; and, in general, anything like an appearance of disingenuousness or partiality should be avoided. In cases where either the owner or contractor has some fancied grievance against the other, it is particularly necessary to preserve an attitude of judicial fairness; and it has been held that,⁴ "Where the architect knows that there is a misunderstanding between the parties, it would be well for him to give notice of the time and place where he will render a decision."

Like all the other conditions of a contract,⁵ the one requiring the production of the architect's certificate as a condition precedent to receiving payment, may be waived by the party for whose benefit the provision is particularly intended; and the waiver may be express, by agreement between the parties; or implied from certain acts or conduct on the part of the one entitled to make the waiver.

WAIVER OF CERTIFICATE.

As it is often very much for the interest of the builders to be able to dispense with the architect's approval of their work, waiver of it on the part of the owner is very frequently claimed, and sometimes sustained. It has been held,⁶ for example, where a building had been completed and occupied, apparently without objection from the architect, although he had not given his certificate, that the occupation of the building was evidence that the owners were satisfied of the completion of the contract, without the evidence of the certificate, and that payment was due; and in a New York case,⁷ even where the architect had refused to give a final certificate, by the direction, as he said, of the owner, the fact that the owner had moved into his house, and had given other reasons for believing that he considered the contract as completed, was held to constitute a waiver of the condition requiring the architect's certificate, so that the builder was entitled to recover payment without it.

MERE OCCUPANCY NOT WAIVER.

It would be, however, quite incorrect to suppose that mere occupancy of a building constituted a waiver of any of the requirements of an ordinary contract. Many examples will be given hereafter to show that this is not the case; and the implied waiver of the certificate in *Smith vs. Alker* depended upon circumstances additional to simple occupancy.

Where certificates for payments on account are to be given, as well as the final certificate, it has been decided⁸ that

if interim certificates in a form not strictly according to the contract have been accepted without question, and payments made on them, a final certificate in a similar form is valid; but where the interim certificates have not been given at all, but payments have been made without them, it has been held⁹ that this did not waive the necessity for procuring the final certificate, or set aside one which had been procured, but which was not in accordance with the contractor's wishes.

[To be continued.]

CONSTRUCTION.¹⁰—II.

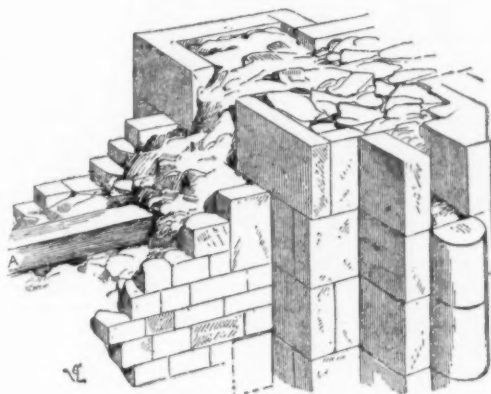


Fig. 2.

WHO consider the builders of the Middle Ages as barbarians, because they gave up building by Roman methods, is to be unwilling to take account of the state of the new society,—is to despise the profound modifications introduced into their customs by Christianity, founded upon the genius of the Western nations: it is to efface several centuries of slow but persevering toil, which was taking place in the bosom of society; toil which has developed the most active and the most vital elements of modern civilization.

No one admires antiquity more than we do, no one is more inclined than we to recognize the superiority over the modern arts of the noble art epochs of the Greeks and Romans; but we are born in the nineteenth century, and we cannot ignore the fact that between antiquity and our own times there has been a great birth of ideas, of needs, of means unknown to the ancients.

We must take account of the new elements, of the tendencies of a new society. Let us regret the disappearance of the social organization of antiquity, let us study it scrupulously, let us have recourse to it; but let us not forget that we live under neither Pericles nor Augustus; that we have no slaves; that three fourths of Europe are no longer plunged in ignorance and barbarism to the great advantage of the other fourth; that society is no longer divided into two unequal portions, the stronger absolutely controlled by the other; that our needs are limitless; that the machinery is complicated; that industry analyzes incessantly all the means placed at the disposal of mankind and transforms them; that tradition and formulas are replaced by reasoning, and that, in short, art in order to exist, must recognize the environment amid which it is developing. Now in the Middle Ages, the construction of buildings had entered upon this entirely new path.

Lament it, if you will; but the fact does not the less exist, and we cannot hinder yesterday from being the eve of to-day. What is better, then, it seems to us, is to seek in the labor of yesterday what is useful to us to-day, and to see whether this labor has not led to the work of the present. This is more rational than to despise it.

It has often been maintained that the Middle Ages is an exceptional epoch, having nothing in common with that which preceded it nor with that which followed, foreign to the spirit of our country and to modern civilization. That is perhaps tenable from the political point of view, although such a state of affairs is unique in the history of the world, where everything is part of a series; but the party spirit entering, there is no paradox which does not find supporters.

In architecture, and above all, in construction, there is not possibly room for party spirit, and we do not see that the principles of civil liberty, that modern laws, under the régime of which we have the good fortune to be born, are in any way attacked, though it may be shown that the builders of the twelfth century knew how to construct well, that those of the thirteenth century were very ingenious and free in the employment of means; that they sought the most simple and least expensive processes to carry out the programme which had been imposed upon them; that they reasoned correctly and knew the laws of statics and the equilibrium of forces.

¹ Yeats vs. Ballantine, 56 Mo. 530.

² Hanley vs. Walker, 79 Mich. 697.

³ McMahon vs. N. Y. & E. R. R., 20 N. Y. 463.

⁴ Korf vs. Lull, 70 Ill. 420.

⁵ Clark vs. Pope, 79 Ill. 128. Vermont St. Church vs. Brose, 104 Ill. 207. Haden vs. Coleman, 73 N. Y. 567.

⁶ Blethen vs. Blake, 44 Cal. 117. Bannister vs. Patty, 35 Wis. 316.

⁷ Smith vs. Alker, 102 N. Y. 87.

⁸ Bloodgood vs. Ingoldsby, 1 Hilt. 388. Mercer vs. Harris, 4 Neb. 82.

⁹ Crumleach vs. Wilmington R. R., 5 Del. Ch. 270. Barton vs. Hermann, 11 Abb. Fr. N. S. 378.

¹⁰ From the "Dictionnaire raisonné de l'Architecture Française," by M. Viollet-le-Duc, Government Architect, Inspector-General of Diocesan Edifices, translated by George Martin Huss, Architect. Continued from No. 838, page 41.

A custom may be odious and oppressive: abbots and feudal lords might, if you please, be dissipated, exercising an intolerable despotism, yet the monasteries or the castles in which they dwelt, might, nevertheless, be built with wisdom, economy and wide range in the employment of materials.

A building is not *fanatical, oppressive, tyrannical*—these epithets have not yet been applied to a mass of stone, wood or iron. A structure is good or bad, appropriate or devoid of reason. If we find nothing to take from the feudal code, that does not imply we have nothing to learn from the constructions of that time.

A parliament condemns unhappy Jews and sorcerers to be burned alive, but the hall in which that parliament sits may be a structure that is more appropriate and better built than that in which our magistrates apply wise laws with an enlightened spirit.

A man of letters, an historian, says, in speaking of a feudal castle: "This retreat of brigands, this dwelling of petty despots, tyrannizing over their vassals, warring with their neighbors . . ." Immediately every one cries out against lord and castle. In what are these edifices the accomplices of those who had them built, above all, if the masons and laborers suffered the employers' tyranny? Did not the Greeks show on many occasions the most odious fanaticism? Does that prevent our admiring the Parthenon or the Temple of Theseus?

It is high time, so we think, that we architects should no longer allow ourselves to be deceived by the talk of those who, strangers to the practice of our art, judge of works which they cannot understand, of which they appreciate neither the plan, construction nor utility, and who, moved by their feelings or their personal tastes, by secluded studies and a narrow spirit of party, hurl anathemas upon artists whose efforts, science, and practical experience, are to us, even to-day, of great assistance. Little does it matter to us that the feudal lords were tyrants, that the clergy of the Middle Ages were corrupt, ambitious and fanatical, if the men who built their dwellings were ingenious, if they loved their art and practised it with knowledge and care. Little does it matter to us that a prison has shut in living beings for years, if the stones of that prison were well enough laid to offer an unsurmountable obstacle; little does it matter to us that a grille has closed a chamber of torture, if the grille be well made and the iron well forged.

The confusion between the institutions and the products of the arts ought to have no existence for us, who seek our advantage wherever we may find it. Let us not, to our own detriment, be the dupes of exclusive doctrines: we may blame the customs of past times if they seem bad; but not proscribe their arts before discovering whether we have not any advantages to derive from the study of them.

Let us leave to enlightened amateurs the task of disputing about the preëminence of Greek architecture over Roman architecture, of the latter over the architecture of the Middle Ages; let us leave to them the discussion of these unanswerable questions; let us, if we have nothing better to do, listen to their discoursing of our art without knowing how a panel is drawn or a stone cut or placed—it is not allowable to practise medicine or even pharmacy without being a physician or apothecary; but architecture! that is another thing.

To understand the first efforts of the builders of the Middle Ages, it is necessary first to know the principles which they laid down, and the practical means then in use.

The Romans, masters of the world, having known how to establish a regular, uniform government in the midst of so many allied and conquered peoples, had in their hands resources which were absolutely lacking in the provinces of the Gauls, divided into little States and innumerable parts, by the establishment of the feudal system.

The Romans, whenever they wished to cover a country with monuments of public utility, could throw upon that point at a given moment, not only an army of soldiers used to the work, but would impress the inhabitants (for the system of requisition was practised on a vast scale by the Romans), and obtain, by the aid of that multitude of hands, prodigious results. They adopted, in order to construct promptly and well, methods which accorded perfectly with the social state.

Had the builders of the Middle Ages wished to employ these methods, where would they have found this army of workmen?

How obtain in a country without stone, for instance, the materials necessary for building, when the old Roman roads were destroyed; when money was lacking to buy materials and obtain beasts of burden; when the provinces were almost always at war with one another; when each abbot, each lord, regarded himself as an absolute sovereign, so much the more jealous of his power in proportion as the country over which it extended was small?

How organize regular levies of men where many powers quarrelled for preëminence, where the inhabitants were scarcely numerous enough to cultivate the soil, and where war was the normal condition?

How get together the enormous mass of materials necessary for the least extensive construction? How feed the workmen at one place? The religious orders were the first who could by themselves undertake important building: First, because they could assemble at one place a number of workmen sufficiently united by a single thought, subject to discipline, freed from military service, possessors of the land on which they lived; secondly, because they amassed property which grew rapidly under a regular administration; because

they joined in amicable intercourse with neighboring establishments; because they ploughed up and rendered wholesome uncultivated lands, laid out roads, acquired by gift or purchase the richest quarries, the best woods, built manufactories, offered to the peasants guarantees relatively certain, and peopled their lands thus rapidly to the detriment of those of the lay nobility; thirdly, because they were able, thanks to their privileges, and the comparative stability of their institutions, to form with their monasteries schools of artisans, subject to a regular apprenticeship, clothed, fed, maintained, working under the same direction, preserving traditions and recording improvements; fourthly, because they alone, at that time, extended their influence to a distance, in founding establishments subject to the mother abbey; because thus they continued to profit by all the partial efforts that were made in countries very diverse in climate, manners and customs. It is to the activity of the religious orders that the art of construction owes its rise from barbarism in the eleventh century.

The Order of Cluny, as the most important (see *Architecture Monastique*), the most powerful and the most enlightened, was the first which had a school of architects whose new principles were to produce in the twelfth century monuments freed from the last Roman traditions. What are these principles? How did they develop? This we must examine.

PRINCIPLES.

In order that new principles may develop, it is necessary in every case that new conditions and needs show themselves. When the Order of St. Benedict was reformed in the eleventh century, the reformers aimed at nothing less than an entire change in a society which, scarcely born, was already falling into decay. These reformers, being able men, commenced by abandoning the rotten traditions of ancient society; they set out with nothing, desiring to continue no longer those dwellings which, being at the same time sumptuous and barbaric, had until then served as refuges for the corrupt monks of preceding centuries.

They built themselves wooden cabins, lived in the midst of the country, taking life as men would when left solely to their industry in a desert. These first steps were a persistent influence, even when the increasing riches of the monasteries and their importance in the midst of the society brought them to change their huts for dwellings of a durable nature, luxuriously built. To satisfy the absolute need is always the first law observed, not only in the planning of the buildings but in the details of the construction; never to sacrifice solidity to a vain appearance of richness is the second.

Stone and wood are always stone and wood, and if one can use these materials in a structure in greater or less quantity their function is the same among all peoples and in all times.

However rich and powerful the monks might be they could not hope to build as the Romans had done. They endeavored then to raise solid and durable structures, with economy (for they intended building for the future).

To use the most ordinary Roman method, that is to say, in making their structures of masses of rubble, enclosed between facings of brick or ashlar, demanded more laborers than they had at their disposal. To construct by means of enormous blocks of hewn stone, carefully cut and placed, required means of transportation far beyond their facilities, lacking as they did firm roads, a considerable number of skilled workmen, many beasts of burden, costly tools or machinery difficult to obtain.

They pursued a middle course. They raised the principal points of support, employing for the dressings cut stone, as a casing, and filled-in with rubble; for filled walls, they adopted a thin facing of scapelled ashlar, or else stone blocks enclosing a mixture of pebbles and mortar.

Figure 2 gives an idea of this kind of construction. In order to bind together the different parts of the buildings, to bond the walls in their length, they sunk in the masonry at different heights, under the supports of the windows, beneath the cornices, longitudinal beams of wood, as we have represented in A. (See "Chainage.")

In these constructions the stone is economized as much as possible; no piece shows any gaps; all are set in the most economical manner; the faces are but just sufficient and yet are executed with the greatest care; not only are the facings tooled, but also the beds and the joints, and these stones are set on the earth without mortar, after the Roman arrangement.

This kind of building is shown in the great monastic structures of Cluny, of Vézelay, and of La Charité-sur-Loire (eleventh and twelfth centuries).

The materials employed by the monks are those which they could procure for themselves in the vicinity, in the quarries which they owned. They employed them in so far as their good qualities and their defects would allow. If these materials showed faults, if the stone was split by the frost, the monks not being able to obtain other, except at great expense, took pains to put it in the best condition, and, in order to protect these materials from injury by dampness and the effects of frost, they sought to withdraw them from atmospheric agencies, by covering them with projecting roofs, and by keeping them from the ground outside, by courses of stone, which they purchased from more distant quarries.

There is always in the works of men who only calculate their own resources, and their own forces for action, a certain amount of intelligence and energy, of great value in the eyes of those who can

see; even though the work is imperfect, and otherwise rough, it contains intelligence and energy not found in the works produced by men more civilized, but to whom industry furnished many elements, and who have no efforts to make to satisfy all their needs. The primitive seekers, then, often became masters, and their efforts a costly education, for more intelligence was obviously necessary to produce at that period, when all resources were lacking, than in our own, when they are within the reach of the most ordinary minds.

The Roman buildings, by reason of the absolute stability of their points of support and the perfect concretion of all the upper parts (a result obtained, as we have already said, by the means of immense resources), presented immovable, passive masses, as if they had been monuments cut from a single block of tufa. The Romanesque architects, not having at their disposal such powerful means, soon recognized that their buildings did not present a united and concrete whole, a perfectly stable agglomeration; that the pillars, formed by a veneering of stone, enclosing a mass of rough stones put together often with mediocre mortar, that the walls not bonded in all their height, suffered from unequal settling which caused ruptures in the buildings and in consequence serious accidents.

It was necessary then to seek for proper means of overcoming these effects. Beginning with the eleventh century, the Romanesque architects wished, for reasons elsewhere set forth (See "*Architecture*"), to vault most of their great edifices. They had inherited the Roman vaults, but they were debarred from the powerful means which the Romans adopted for supporting them. Their intelligence had to make up for this lack of power. The Roman vault can only sustain itself by having the points of support perfectly stable, for this vault, whether cradle, groin or half-spherical, forms a homogeneous crust without elasticity, which breaks to pieces if crevices occur unexpectedly in its curve.

Wishing to make vaults like those of the Romans, and being unable to give them perfectly stable supports, it was necessary for the Romanesque builders to find a new method of holding them firmly, with reference to the instability of the supports destined to carry and buttress them. The task was not easy to fulfil; moreover, the experiments, the endeavors, the attempts had been numerous; but nevertheless, from the beginning of these attempts, we see arising a new system of building, and this system is founded on the principle of elasticity, replacing the principle of absolute stability adopted by the Romans. The Roman vault, save for rare exceptions, is built of rough stones or rubble; if it is strengthened by arches of brick, these arches are buried in the thickness of the rubble, and become one with it. The Romanesque builders, instead of building the vault of rubble, constructed it of unhewn stones, sunk in mortar, but set like arch-stones, or of stones hewn and forming a small facing of masonry; and even these vaults showed a certain elasticity, if a movement was felt in the supports, in consequence of the joining of the arch-stones, and did not break like a homogeneous crust, but followed the movement of the piers. Yet this first modification did not entirely reassure the Romanesque builders; they fixed under these vaults, from point to point, at the height of the supports of greatest resistance, transverse arches faced in stone, under the soffits of the vaults. These transverse arches, a species of permanent, elastic centre, like every arch composed of a certain quantity of arch-stones, followed the movement of the piers, yielded to their settling down, and separating and supported thus, as a wooden centre would have done, the vaults of masonry built over them.

The Romanesque builders had taken from the Romans the groined vault, built on a square base and formed by the intersection of two half-cylinders of equal diameter. But when they wished to raise vaults upon piers, placed at the angles of parallelograms, the Roman groined vault could not be used; they adopted, in this case, the cradle-arch, or half-cylinder continued without intersection, and, at the height of the piers, they reinforced these cradle-arches by transverse arches of facing stones, upon which they relied to avoid the injurious effects of a longitudinal rupture in these cradle-arches, in consequence of a movement in the piers. Once again, and we insist upon this point, it was a permanent centering. Nevertheless, the obstacles and the difficulties seemed to arise in proportion as the builders believed that they had found the solution of the problem. The effects of the pressure of vaults, so perfectly recognized by the Romans, were almost unknown to the Romanesque builders. The first among them who had the idea of fastening a semicircular cradle-arch upon two parallel walls, thought that he had certainly avoided forever the disadvantages attached to visible timbers, and that he had combined a structure at the same time solid, durable and of monumental aspect. His illusion was destined to be of no long duration, for, the centres and planks being removed, the walls leaned outwards and the vault fell between them. It was necessary then to find suitable means of preventing such catastrophes.

At first they reinforced the walls by exterior buttresses and by piers erected in the interior: then, at the height of these buttresses and piers, they fixed transverse arches beneath the cradle-vaults. By imbedding timbers lengthwise, in the thickness of the walls, from pier to pier at the springing of the cradle-vaults, they thought it possible to check their thrust between the piers. It was never more than a temporary remedy; if some buildings thus vaulted, resisted the thrust of the cradle-arches, a large number fell to pieces some time after their construction.

But it is necessary that our readers have an exact idea of this kind of construction. We give (Fig. 3) the whole and the details. In A

we have the interior piers carrying the transverse arches E; in B, the exterior buttresses destined to resist their thrust; in C, the beams of wood holding the cradle-arch D, at its springing. In order to reduce the spreading of the transverse arches as much as possible, the constructors allowed a considerable projection of the capitals G.

If the vaults thus planned were fixed upon piers solidly enough built in materials well joined or very heavy, if the walls were thick

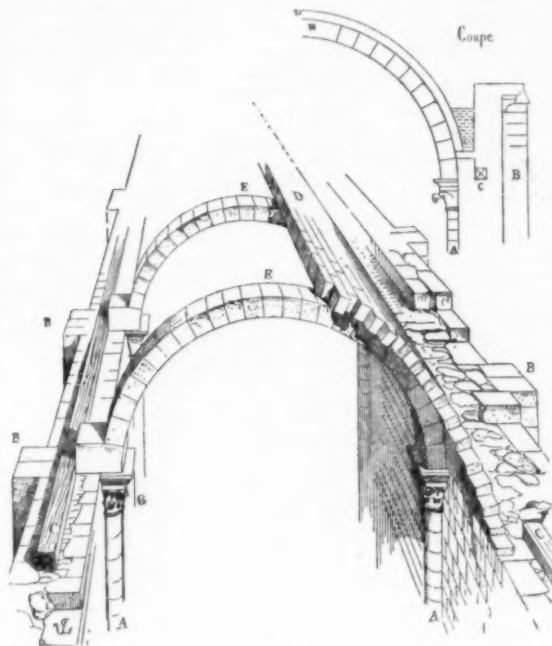


Fig. 3.

and massive from top to bottom, if the buttresses jutted out sufficiently, and if the transverse arches and consequently the piers were not too far apart, these cradle vaults, reinforced by secondary arches, might be maintained.

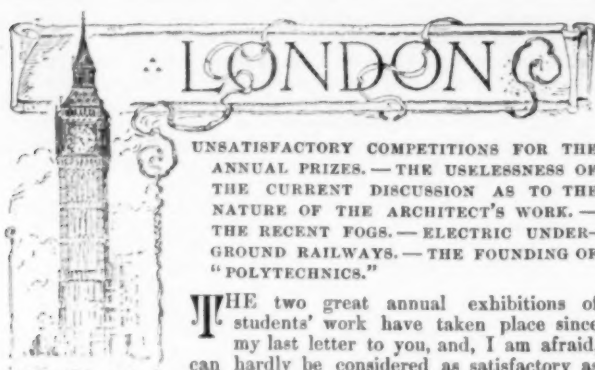
But, if, as happened in naves bordered with aisles, the walls rested upon the archivolts and the detached piers; if these detached piers which they tried always to make as slender as possible in order not to obstruct the circulation of air and the view, did not present a surface sufficient to receive the exterior buttresses rising above the vaults at the lower sides, then the upper cradle-vault, in spite of its transverse arches, or with its transverse arches, little by little bent the walls and the piers outward, and the whole structure fell apart. So early as the end of the eleventh century, many churches and halls thus vaulted, built half a century before, fell in ruins, and it was necessary to reconstruct them. These accidents were a lesson to the builders; they gave them a chance to observe certain phenomena in statics of which they had not the least idea; it made them recognize that these beams of wood sunk in the masonry and deprived of air, speedily became rotten, and that the void they left could only hasten the destruction of the buildings; that the walls having begun to bend, the pressure of the vaults increased in direct ratio with their separation; that in short, if the cradle-vaults were built over naves with aisles, the disorders caused by the spreading of the high vaults were such that it was impossible to maintain the piers and the walls in a vertical position.

Nevertheless the moment had not yet come when the builders were to solve exactly the problem of the stability of vaults raised upon parallel walls; they had still to make attempts to avoid the effects of the pressure upon the lateral walls. The Romanesque builders knew that the groined vaults presented the advantage of exercising pressure and thrust only upon the four supports receiving their abutments. Recognizing that the cradle-arches exerted on the tops of the walls a continual pressure, they sought to do away with them, and to replace them by groined vaults, even in the naves composed of oblong compartments, in order to bring all their weight and their pressure to bear upon the piers that they hoped to render stable. But, as we have said above, the Roman groined vault can be built only over a square space; it was necessary then, to find a new combination of groined vaults adapted to the form of a parallelogram.

It was not practicable to lay out these vaults geometrically, and it was only by experiment that they succeeded in constructing them.

Already, during the eleventh century, the builders had constructed vaults which partook of both the dome and the groined vault, in that these vaults, instead of being formed by the intersection of two cylinders at right angles are produced by four semicircular arches joining the four piers, and two diagonal arches which are themselves semicircular, and hence present a longer radius than those of the first four.

[To be continued.]



UNSATISFACTORY COMPETITIONS FOR THE ANNUAL PRIZES.—THE USELESSNESS OF THE CURRENT DISCUSSION AS TO THE NATURE OF THE ARCHITECT'S WORK.—THE RECENT FOGS.—ELECTRIC UNDERGROUND RAILWAYS.—THE FOUNDING OF "POLYTECHNICS."

THE two great annual exhibitions of students' work have taken place since my last letter to you, and, I am afraid, can hardly be considered as satisfactory as usual. The subject for the Royal Academy gold medal and £200 travelling-studentship competition was a large town house on a plot of land, seventy feet frontage, and lighted only from the front and rear, special attention being given to the proper lighting of pictures and statues. The competition attracted a fair number of competitors, but the designs, as a whole, were disappointing. The successful competitor was Mr. Alfred H. Hart, whose design was chiefly remarkable for its clever plan. The elevation was distinctly poor. It professed to be in the François I style, and exhibited most of the defects, without the compensating merits, of that style. It, indeed, was an excellent example of the method of applying architecture to a building like so much mural decoration, which has been preached against so much lately, and which is fatal to an architect if he ever hopes to do much in his art.

A word of passing notice should be given to the work exhibited as actually having been executed within the Academy schools. This was of a regrettably low standard indeed. I never remember having seen such inartistic work produced in the schools before. Admitting that the subject, a music-pavilion, was difficult to treat in a really satisfactory architectural manner, yet we do expect some thoughtful designs from the students of the Royal Academy. The most obvious and, perhaps, the true reason is the imposition of the new rules. The requirements are now so unreasonable that most of the good men are excluded, and, unless I am able to chronicle some relaxation of these rules, I very much fear that the deterioration is not of so transitory a nature as people think here.

The competition for the Institute prizes was a little more encouraging, but, with the exception of that for the Soane medallion, the designs submitted for the various prizes hardly seemed of average merit. The Soane medallion, which, as you know, carries with it a travelling-studentship of £50, has not been awarded for the past two or three years, and the Royal Institute of British Architects' Council have this year increased the value of the studentship to £100. This extra inducement has certainly produced a result above the average of recent years, but hardly surpassing the records of seven or eight years ago. The subject was a chapter-house to a cathedral, and the successful competitor chose a somewhat orthodox form of fourteenth-century English Gothic. He raised his main building on an arcade, ran an aisle round, with shallow, triple-sided bays projecting from each side of the octagonal plan. The grouping of the mass was good, though the author adopted the questionable expedient of perching his building on top of an impossible cliff, and so gaining an unreal and meretricious effect.

But a criticism of individual designs will be of little interest to you; the better plan will be to give you my general impression of the two exhibitions. The first idea that occurs to one is that the draughtsmanship of the present generation of students is undoubtedly good, many of the designs submitted showing a mastery of the pencil, pen or brush. The second is that the power of design is not equal to the skill of delineation. Several of the designs were certainly clever. That, perhaps, goes without saying in the national competitions. But I do not recollect one design that called forth sentiments of unalloyed admiration. Hesitancy was, perhaps, the key-note, rather than strength and vigor, and in many designs one wished that the composer had thought more over his initial idea and central guiding principles. I may, perhaps, illustrate what I mean by an example from an actual building. Standing on Westminster Bridge and looking at New Scotland Yard, we feel that we are looking at a masterpiece. We may not like the finish of this gable or the treatment of that window, but we feel instinctively that our criticism is one of detail, capable of easy amendment, and not depriving us of our sense of enjoyment of the building as a whole. Now the man who can produce this effect is an architect. The man who charms by prettily-drawn detail alone is not.

Some of the latest contributors to the eternal question—"Is architecture a profession or an art?"—have been Mr. H. Wilson, who read the paper on Sedding to the Architectural Association, and Mr. T. G. Jackson who read a paper upon "Architectural Education" some weeks later before the same body. With Mr. Jackson's paper as a whole there is little fault to find. It is an able exposition of the way in which an architectural student should pursue his studies, and its perusal would undoubtedly exert a beneficial influence on the mind of the reader, which is more than can be said of many contributions to architectural literature, but I doubt very much

whether it is altogether the most judicious course to encourage the tendency to divide into opposite camps, which is the fashion just now. All the writing in the world will not have the effect Mr. Jackson desires, and it would be far better surely to devote one's time to the production of beautiful and artistic work, and to an actual direction of the works of young students, than to this continual preaching and prating about what we ought to be. A man will never persuade others that he is a gentleman by argument, nor is the same means more effective if he desire to show his audience how to become gentlemen. His influence must be exerted in quite a different manner if he wish to see an improvement in the tone of those about him. So it is with architecture. The more really good work we see around us, the higher will be the artistic tone of the community. I hope—though not very sanguinely—that this will be the last time I shall have to chronicle the fact of the occurrence of these somewhat childish discussions.

From the Sunday before Christmas until Christmas Eve, London was enveloped in a fog of peculiar density and unpleasantness. London fogs are proverbial all the world over, but it is not every one who has actually experienced one. London is totally enveloped in a thick, murky atmosphere, sometimes almost as black as night and necessitating a continual use of artificial light. Soot, of course, forms the predominate ingredient in this obnoxious moisture, but acids are also found, and consequently the eyes and lips of the unfortunate inhabitants of London become sore and smart, and they are almost choked with the damp and particles of soot out of doors, while the continual use of gas causes the atmosphere of offices and houses to be almost insupportable. Trains and trams become blocked on the lines, and business is very much delayed and hindered. This sort of thing can be endured for a day, but when it extends for three or four days consecutively, and when our troubles are added to by the gradual combustion of all the available gas, so that some of our railway stations have to be lit by oil-lamps and candles, life in London becomes a misery. It seems odd that this sort of thing should be permitted to continue in the greatest city of the world, but when once the fog has lifted, people become strangely apathetic, and never think any more about it till the next fog comes round. Besides, the remedy is a most difficult one. It would be an easy thing to enact that all stoves should be constructed so as to consume their own smoke, but it would be most difficult and expensive to enforce such an enactment. English people are fondly in love with the open fire-side, and would, I think, prefer to endure the miseries of an occasional fog rather than the change to a closed stove. The thin edge of the wedge might, however, be driven in by dealing with the large chimneys of factories and workshops, and it is to be hoped that the Government or the County Council will take some steps in this direction during the ensuing session.

It is proposed to add to the collection of portraits of past Presidents of the Institute by one of Mr. Alfred Waterhouse, R. A., who held the position of President for three consecutive years. Mr. Waterhouse discharged the duties of the presidential office in a decidedly able manner, and the addition of his portrait to a row of worthy architects would be only a due recognition of the services he has rendered the Institute.

The success of the electric railway from Stockwell to the city has given rise to a number of proposals for new subways of a similar character in different parts of London. One proposal is to connect the transpontine Southwestern Terminus with the City by a subway passing under the river. Another idea is to extend the existing railway northwards as far as Islington. Of course, a large number of these proposals deposited in Parliament are never actually carried out, from want of funds or other reasons, and I have neither seen nor heard anything further of the Central London Railway which was sanctioned last year. The increase, however, in the number of applications of this nature seems to indicate the sort of traction that will be used in future on underground railways in large cities.

It is proposed to erect a morgue in London, near Charing Cross, for the reception of unidentified bodies. Although there are numerous mortuaries here belonging to the local vestries or district boards, nothing of a central character like a morgue has ever been attempted so far as I am aware. The idea is to construct the morgue on the most recent scientific principles, if possible, in connection with a coroner's court. Nothing has, however, been definitely decided at present.

A very successful supper was given by the Royal Academy students at the Criterion on the evening of December 21, about two hundred students and their friends being present. An architect, Mr. Reginald Blomfield, was in the chair this year, and a large proportion of those present were architects, as this year was considered an architectural year. Mr. Reginald Blomfield has a character here of speaking out plainly and not minding what he says, and it was, therefore, thought that he would seize his opportunity and make some criticisms of the way in which architecture is treated at the Academy. He did not, however, say what was expected, but confined himself principally to a consideration of the influence that a closer acquaintance with painters and sculptors would have upon architects—not a new theme, certainly. Sir Frederick Leighton made a capital reply in perfect taste, and among the other speakers were Mr. Alma Tadema, Mr. P. H. Calderon and Mr. Val Prinsep, who made, perhaps, the speech of the evening. This supper (a dinner, it really was) was arranged by the recently-formed Royal Academy Students' Club, which is doing capital work by encouraging

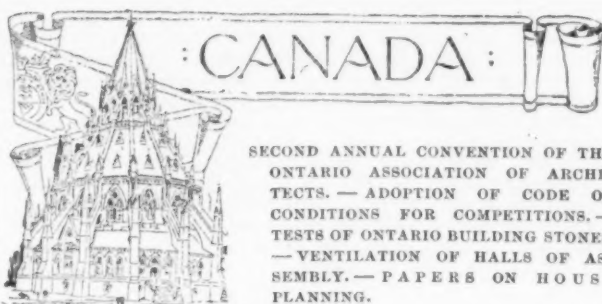
friendly intercourse between students of the various branches of art.

Mr. Horace Townsend, who has spent four years as an architect and eight as a dramatic critic in America, read a paper at the Institute on the 14th of December on "American Theatres." His practice as a dramatic critic evidently stood him in good stead in composing his paper, which, if nothing else, was interesting if regarded as a literary composition. He described briefly the history of the American theatre, and, taking the Madison Square Garden Theatre and Terry's Theatre as typical examples, instituted a comparison between American and English theatres.

A class of buildings of comparatively recent introduction into London is what is termed the Polytechnic. For many years there has existed in Regent Street an institution known by this name, which has had rather an eventful life. For many years it was a sort of collection of popular scientific entertainments. The Polytechnic diving-bell is probably familiar to you, and besides this there used to be a collection of electrical and magnetic appliances and sundry instruments of that nature. Lectures of a somewhat superficial character, generally illustrated with lantern slides, also used to be a feature at this institution. It was never, however, very flourishing and after some years it languished and was ultimately shut up. For some time it remained closed, until a rich well-known London philanthropist, Mr. Quintin Hogg, conceived the idea of turning it into a technical school for young artisans and clerks. Under his fostering care, the new school prospered and became a great success. Hundreds of young men joined the various classes, and the Polytechnic—for it retained its old name, became very popular. So much so, in fact, that a demand was made for similar "Polytechnics" in other parts of London. The foundation and growth of the People's Palace in the East End stimulated the cry, which ultimately resulted in the formation of Polytechnic Committees in various parts of London, for the purpose of satisfying the new-felt want. In some cases, old buildings were purchased and adapted to their new purpose, but in others entirely new buildings were designed, and two of these are now about to be erected in Chelsea and Battersea respectively. They are fairly extensive and are estimated to cost about £50,000 each. Their chief aim is the education of the young artisan, both physically and mentally. For the former purpose, a gymnasium and a swimming-bath are generally provided, and for the latter there are libraries, reading-rooms, lecture-rooms, shops for various trades to learn and practice their handicrafts. Electrical machinery and workshop, laboratory, rooms for drawing and modelling and a large meeting-hall for lectures and entertainments. There are also facilities for recreation, pure and simple, such as club rooms, social-rooms, refreshment-rooms and a small wing is generally set apart exclusively for the use of women. The whole subject of technical education is in fact receiving a considerable amount of attention here just now. The Government, in a fit of unusual generosity, set aside last Parliamentary Session the proceeds of a certain tax for the purpose of encouraging technical instruction and entrusted the various County Councils with the task of administering this windfall. The Counties have used it in various ways. Some of the agricultural counties have founded scholarships to Agricultural Colleges, while others have turned their attention to the encouragement of good cattle breeding. The London County Council has been alone, I think, in exercising the option left by the Government of applying the windfall to other purposes and has simply entered the sum as a credit against its general expenditure. The demand, however, was perhaps hardly as urgent in London, owing to the voluntary foundations of Polytechnics such as I have described. An interesting lecture upon the question was delivered by Professor Garnett, at the Architectural Association, and general interest is being shown upon the matter.

You will be glad to hear of the election of Mr. T. G. Jackson, M. A., as an Associate of the Royal Academy. Mr. Jackson is perhaps known the best in connection with his work at Oxford. The new Examination Schools, the additions to Brasenose, Trinity, Exeter and other colleges are excellent specimens of his work. Its character is very artistic and original, founded on the lines of old work, but treated in quite a modern spirit. He is one of the ablest advocates of architecture as a pure art and I have referred in an earlier part of this letter to his recent paper at the Architectural Association. He is a Fellow of Wadham College, Oxford, and took a prominent part in the National Art Congress of a year or so ago. This election is very popular among architects, and there is a wide-spread feeling that he will make his influence felt in the R. A. Architectural School.

CELEBRATING THE RETURN OF CRUSADERS.—On Tuesday evening the bells of all the parish churches of Brussels rang merry peals to celebrate the anniversary of the return home from the Holy Land of the survivors of the Brusselers who took part in the first crusade. They had left in 1095 with Godfrey of Bouillon, whom they left there, and for six long years no news had been received of them. They were given up for lost, and more than one of the forsaken wives was thinking of giving a successor to the absent one, when on the 19th of January, 1101, at dusk, the arrival was announced of a troupe of men-of-arms at the Treurenberg gate. Great was the joy in many houses, and the long-awaited for husbands were welcomed with the best of suppers, to which they did such ample honor that when bed-time came they were unable to move from their chairs, and their valiant wives had to carry them to bed. Until 1781 the Council of Brabant held no meeting on that day. — *The Belgian News.*



SECOND ANNUAL CONVENTION OF THE
ONTARIO ASSOCIATION OF ARCHITECTS.—ADOPTION OF CODE OF
CONDITIONS FOR COMPETITIONS.—
TESTS OF ONTARIO BUILDING STONES.
—VENTILATION OF HALLS OF AS-
SEMBLY.—PAPERS ON HOUSE
PLANNING.

THE Ontario Association of Architects incorporated on April 7, 1890, by Act of Parliament, held its second annual convention (since incorporation) on February 2 and 3, at the School of Practical Science, Toronto. There was not so large a number of members present as at previous conventions, but this was fully expected owing to the great amount of sickness that prevails; many town members being laid up, and many others, especially those at a distance, being hindered by the inclemency of the weather. A by-law enacts that the conventions shall be held in Toronto on the first Tuesday and Wednesday in February, a time when architects are perhaps least busy but when, in Toronto, the weather has proved to be most unpropitious. February is our worst month, the middle of winter, when in former years we have usually experienced our greatest cold and most heavy snow storms, but of late the first week of the month has been characterized by thaws and storms of sleet and rain, darkness overhead and slush under foot. The first day of the convention this year was a day of snow with no frost, two or three inches of slush on the sidewalks and ten to twelve inches of slush in the roads, but the second day was better, frost and sunshine, but both limited in severity and strength. However, the meeting was fairly strong and there was a marked increase in the general interest taken in the proceedings, the discussions were more general and every one seemed to have more to say than at previous conventions.

The President, Mr. G. W. Storm, in his opening address alluded to the work accomplished by the Association and spoke of the immense advantages now within reach of all the students of the profession to which impetus had been given by the objects of the Association. Such ample opportunities were now within reach of all students, by which they might prepare themselves for the practice of their profession, that the whole tone of the profession for all future years could not fail to be raised to a very high pitch. The President said that many contend that architecture is an art, and they were partly true. In these days of invention, building had become proportionally scientific.—Architects must be artists and could have no claim to the name unless they were, but they must also and to an equal extent be scientists. But there is another qualification necessary to an architect and that is that he must be a man of business. The training of the students must necessarily be one of the chief objects of the Association, and in the examination to be held in April next, students would find that their abilities in these three qualifications would be tested. It was not intended to make the examinations severe at first because the candidates coming up for their final examination had not had heretofore the advantages that are now at the disposal of students, but the standard of the examinations would be elevated by degrees. The President alluded to the work before the convention, and this being the end of the term of office to which he had been elected three years ago, he expressed his hearty thanks to all the members of the Council for their coöperation with him in all that he had endeavored to bring about for the advancement of the Association. He thanked the Association for having placed him in the presidential chair, his occupation of which had been one of the proudest events of his long professional career.

The Treasurer and Registrar followed with their reports. The report of the Treasurer was eminently satisfactory because it showed a large balance to the credit of the Association, the year having been one in which there had been very little opportunity for expenditure, but he warned the Association that it need not expect to see so large a balance another year as there would necessarily be an increase of expenses in connection with examination-fees, legal and other charges which would have to be paid. The Registrar reviewed the clerical work of the Association and reported on the establishment of the nucleus of a library for the benefit of students, the free registration of draughtsmen seeking occupation and the establishment of a permanent exhibition of architectural drawings, at the School of Practical Science, the primary object of which was the benefit of the students at the school, but to which all other students could have access. This exhibition was the work of Professor Wright, Professor of Architecture at the schools.

The committee appointed to draw up a set of conditions for the regulations of competitions then reported by submitting a draft, the clauses of which were gone over one by one, discussed and improved on and finally passed as a whole.

The conditions contain sixteen clauses of which the following is an outline, and I would especially call the attention of architects generally to these conditions, for uniformity in the conduct of competitions should be international and universal.

Clause 1. Announces the competition.

Clause 2. Appointment by Building-Committee of a professional adviser and of two other architects nominated by the Council of the Ontario Association of Architects to act as experts with him, to decide on the merits of the designs.

Clause 3. Designs must be made in conformity with the instructions issued.

Clause 4. Only such drawings as are enumerated in Clause 5 will be considered, but minor variations may be shown by means of flaps. Memoranda about design, etc., must be typewritten.

Clause 5. Enumeration of drawings required.

Clause 6. Drawings to be to a uniform scale of —, and finished "in line only without shading, with India ink, with the drawing-pen."

Clause 7. No brush-work, except solid blacking-in of windows and parts in section; lettering and figuring to be plain, and no explanations on drawings; the drawings to be on white paper of such-and-such size.

Clause 8. Omission of plans of floors identical with other floors; alternative elevations admitted.

Clause 9. Perspectives, in line only, no accessories.

Clause 10. Motto or cipher.

Clause 11. Name of author enclosed in sealed envelope.

Clause 12. Drawings to be sent in flat in portfolio, addressed to —, and handed over by him in the condition received to the experts.

Clause 13. Experts examine plans and place the first four in order of merit. They will also report on the other designs sent in, a copy of the report to be sent to all competitors.

Clause 14. "The committee will commission the author of the design placed first at the regular commission to carry out the work, provided the experts decide in consultation with them that the work may be safely entrusted to him. If the experts decide that it would not be advisable to entrust the work to the author of the design placed first, the committee may insist that some architect in whom it has confidence shall be associated with him as consulting architect. The author of the design placed second will receive as a premium one-half of one per cent of the estimated (or stipulated) cost of the building; the author of the design placed third, one-third of one per cent; and the author of the design placed fourth, one-fifth of one per cent."

[I have quoted this clause at length. It was the result of a prolonged discussion upon the draft submitted by the committee, who had left blanks for the amounts of the three premiums for filling-in by the promoters of the competition. It was considered absolutely necessary that building-committees should be made aware that the members of the Ontario Association of Architects would not leave themselves open to be offered \$15, \$10 or \$5 prizes, and that the amounts should in some way be settled beyond dispute. The discussion on this point was adjourned, and a committee of five appointed to consider it, the result being the proposition by this committee of the above percentages, which were unanimously adopted.]

Clause 15. Designs returned at expense of the promoters of the competition; no exhibition of designs without author's permission; no use to be made by committee of anything in any unsuccessful competitor's designs without consent of the author, and proper remuneration being made him, the amount of remuneration being decided by the experts.

Clause 16. Committee to print and send to all competitors answers to questions asked by any competitor, etc.

The committee appointed to procure tests of the building stones in use in the Province of Ontario reported that a great many experiments had been conducted, but that the tests were incomplete at present, as at the time tests were made the only machine available for the purpose had a crushing-power of 100,000 pounds, whereas many of the samples submitted endured that pressure without crushing. The experiments were conducted before a committee of the Council of the Association, under the direction of Professor Galbraith, at the laboratory of the School of Practical Science. The machine used was one of the first to be set up in this new institution, but a machine with a crushing-power of 200,000 pounds has been ordered, and will shortly be set up. By degrees, this laboratory will be fitted-up with testing-machines of all sorts. Many have been added during the past few months.

Mr. Billings, of Ottawa, then read a paper prepared by Mr. Thomas Fuller, Government architect, on the "Ventilation of Halls of Assembly." The author quoted a great many authorities on ventilation, and described the methods of ventilation of the British House of Commons and the House of Representatives at Washington. He was decidedly in favor of "downward" ventilation, and gave his reasons for this very pointedly. A few short extracts from the paper, which was very exhaustive, and, consequently, somewhat lengthy, will be interesting and instructive: "In supplying air for the upward ventilation of a hall containing an assemblage of people, it is absolutely essential that the direction of the current should be absolutely vertical; otherwise, that which has been breathed by one person would be given to another to breathe and perspire into." After making calculations with reference to the envelope of vitiated air surrounding a man stationary and in motion, the author said: "If we now assume a man standing upright of the average height of 5 feet 6 inches, and the velocity of the current at five feet per minute, the envelope of vitiated air that surrounds him being four

inches thick, and this envelope being drawn upward, it is clear that the nose and mouth will be always supplied entirely with vitiated air, no matter how pure it may be one foot away, while, if it is drawn downwards, those organs will be supplied with perfectly fresh air. . . . This consideration alone is quite sufficient to determine in favor of downward ventilation. There are, however, some other advantages in the downward over the upward direction. . . . In a hall, 36 feet from floor to ceiling, and the fresh air admitted through apertures well distributed in the ceiling, it has 30 feet to move before it comes in contact with the heads of the people on the floor. During the movement, all eddying currents induced by the increased velocity with which it is necessary it should pass through the apertures have become quiet, and the whole mass descends with a uniformity impossible to obtain in the vicinity of persons ventilated with upward ventilation, and one of the most important considerations to be kept in view in ventilating an apartment is to avoid perceptible draughts."

The author concluded his paper with the following remark: "After many years of study and experience, I am strongly of opinion that the most efficient system of ventilation for halls for the assemblage of large numbers of people is by the introduction of fresh, pure air, heated by passing over steam or hot-water pipes in chambers, and driven and exhausted by the most improved appliances, introducing the pure, fresh air at the ceiling and exhausting at the floor, which may be termed the downward draught and plenum system." A discussion of the subject followed, and the proceedings of the first day terminated.

The meeting being called to order at 10.30 the next morning, various matters of business were brought up for discussion, after which experiments in the testing-machines were conducted by Professor Galbraith. Blocks of stone were crushed and timber of various scantlings broken, to exhibit the progress of fracture. This lasted until the adjournment for lunch, which was served in the building. At the afternoon session a draft of articles of indenture for students was brought up, discussed and adopted, and while this was proceeding, the Hon. G. L. Ross, Minister of Education arrived, and at the request of the President addressed the meeting. He spoke of the interest he took in the Association and the good work it was doing for the benefit of the public, in the education of young men for the practice of a profession, upon which public health and individual comfort were intimately concerned. The beauty of the city was in a great measure in the hands of the Architectural Association and it would be his great pleasure to do all in his power to further the interests of the Association, which were the interests of the inhabitants of the Province of Ontario, and he welcomed the Association very heartily to the use of the School of Practical Science, for the purposes of the convention and the objects desired to be obtained. A very hearty vote of thanks was passed to the Minister for his presence, for the kind and encouraging words he had spoken, and for all he had done and was proposing to do for the Association.

The next business on the programme was of a somewhat novel character, being a triple lecture on house planning, illustrated by a magic-lantern.

Mr. Townsend commenced with an outline of the development of house planning from Saxon days, with descriptions of the progress made in each century, illustrated by well-known models. He then presented a plan for a large country house, his ideal of what such a plan should be.

Mr. Burke followed with a plan of another country house, that was shortly to be carried out. His paper was headed "Aspect and prospect of a house," and he dealt largely with the importance and the possibility of so arranging the rooms that some sunlight should penetrate every room for a portion of every day, summer and winter. He exhibited a diagram arranged to show the direction of sunlight on the longest and shortest days of the year, by means of which in planning it could be easily discovered what were the angles of sunlight all the year round, and windows could be arranged accordingly.

Mr. Langton continued with some valuable suggestions and remarks on house planning and proceeded to describe the plan of a house already carried out, the author of which had requested Mr. Langton to speak for him. While the discussion on these papers was proceeding the lantern threw upon the sheet a great number of views of ancient and modern buildings, with a portrait of the President, which was greeted with applause.

Mr. Hutchison and Mr. Cliff, members of the Council of the Province of Quebec Association of Architects, were present during the afternoon and made some remarks, the burden of which was the advisability of forming a Dominion Association. It was felt that the day for this had not quite arrived, that the two existing societies were in their infancy and it would be to the advantage of both that they should grow and perfect themselves before attempting to join forces.

The elections were then proceeded with. By the constitution three members, elected for a term of three years retired, but were eligible for re-election. The election resulted in the return of Mr. Arnoldi of Ottawa, Mr. Burke of Toronto and the addition of Mr. Belcher of Peterboro.

While the scrutineers counted the ballots, the meeting formed itself into a mutual admiration society, and votes of thanks for everybody and everything, flew about wholesale. The Convention terminated in a very happy frame of mind, to meet again in the evening at the annual dinner.



PARIS:

MORTUARY CHRONICLE: M. ALPHAND, DIRECTOR-GENERAL OF THE EXPOSITION OF 1889; M. BAILLY, ARCHITECT; M. HENRIQUEL-DUPONT, ENGRAVER; AND M. C. L. MÜLLER, PAINTER.

M. ALPHAND, who died December 6 last, deserves a place in the mournful list of artists who have left us this winter. He was really the decorator of the city of Paris, all of whose urban services he controlled. Born in 1817, he began life as an engineer of bridges and ditches at Bordeaux. After he had passed through the École Polytechnique and the École des Ponts et Chaussées, he attracted the attention of Haussmann, the promoter of the embellishment of Paris under Napoleon III, who caused him to be nominated, in 1854, engineer-in-chief of promenades and plantations. Little by little, his merits earned for him the position of head of the service of water and sewers, then of architecture and departmental works, and finally of almost all the technical services of the city, which up to that time had each a special director. In spite of this accumulation of functions—which was the object of much criticism from the point-of-view of administrative control—M. Alphand always showed himself able to cope with his task. His was a vigorous nature both physically and morally, and his energy, his rectitude of character, the intelligence with which he knew how to choose his collaborators, converted him into a remarkable man, well esteemed, and one whose place it will be difficult to fill.

It was under the reign of Napoleon III that he carried out the landscape works at the Bois de Boulogne, at the Parc Monceau, at the Bois de Vincennes, and the embellishments of the Champs Elysées, the Avenue du Bois de Boulogne, the Buttes-Chaumont and at the Parc Montsouris. The embellishment of Paris and the organizing of its fêtes always afforded him an occasion for displaying the activity of his artistic genius. His last work was the Universal Exhibition of 1889, of which he was the director-general. A very humble co-worker on this festive occasion, some few remains of whose decorations still stand on the Champ de Mars, I was myself a witness of the indefatigable zeal of this man, then in his seventy-second year, who, in the work-yard from the earliest hour of the morning of each day, looked after everything himself, studied the merest question of detail, and animated the great army of workers then placed under his control. He was the man for great undertakings, great transformations. He was audacious and determined to conquer every obstacle, and honest beyond question. The highest distinctions had rewarded his labors, and the solemn obsequies conducted under the central dome of the Universal Exhibition, as if it were a last field of battle, have left to every Parisian a moving and impressive recollection.

Another death which has moved all artists, and most particularly all architects, is that of M. Bailly, who departed this life January 1 of the current year. The Société Centrale, in M. Bailly, has lost one of its most important, most devoted workers, one of its most esteemed and best-loved members. He had been a member of the Society since 1841, and at two different times was its President. He had in like manner been President of the Société des Artistes Français since its foundation in 1881. He was absolutely devoted to these two societies, and the Society of French Architects, of which he was an honorary counsellor, not knowing how to recognize his devotedness, awarded him at the time of its last congress a modest medal, to which the President, M. Garnier, and the director of the Beaux-Arts, gave its true interpretation of worth by comparing it to the military medal decreed to a general already clothed in all other dignities. He was nominated member of the Institute in place of M. Labrousse, and it is an interesting fact to know that, of all the members of that section of architecture, he was the only one who had not passed through the School of Rome.

Pupil of Debret and Duban, he entered the architectural service of the city, then later was charged with the duties of diocesan architect in the centre and south of France, at Bourges, Valence and Digne, whose cathedral he partly rebuilt. At Bourges, independently of the work which he executed on the cathedral, he restored the celebrated house of Jacques Cœur, and transformed it into the Palais de Justice. Between 1861 and 1865 Bailly built the Lycée de St. Louis (Ancien Collège d'Harcourt) and to him we also owe the Mairie of the Fourth Arrondissement of Paris. But the most important work to which his name attaches is the Tribunal de Commerce, which occupies 4,125 square metres in front of the Palais de Justice. This isolated building has four façades, the two principal ones of which stretch along the Quai aux Fleurs and the Boulevard du Palais. The design was approved in 1858.

Upon the site of the Tribunal de Commerce there used to stand the Churches of St. Barthélemy and St. Pierre des Arcs, some

remains of which were discovered while digging the trenches for the foundations of the new building. These ruins extended to a depth of seven metres below the surface of the ground, and then came a layer of quicksand $7\frac{1}{2}$ metres thick, so it was necessary to carry the foundations to a depth of $14\frac{1}{2}$ metres. Confronted with this difficulty, and in order to escape building such a mass of expensive masonry, M. Bailly laid over the area of the site a gridiron arrangement of oak lumber, which he covered with a layer of béton 1.65 metres thick. The thing that is particularly curious is that, in removing the ruins of the Church of St. Barthélemy, there was uncovered a reminder of a similar construction dating from the eleventh century, so well preserved that some portions of it could be used in the new work. One condition imposed by the programme on M. Bailly was that his building should have a dome which, placed on the axis of the Boulevard Sebastopol, must form a feature of the Boulevard for its full length. M. Bailly made use of the dome thus demanded as the chief decorative motif, and housed below it the grand staircase, which is considered one of the most remarkable in Paris. It is entirely of stone, of double revolution and 12 metres in diameter. At the level of the landing it is decorated with four niches, which shelter figures personifying Mechanical Art, Industrial Art, Maritime Commerce and Land Commerce. The shell of the dome is planted on an octagonal plan, and is supported by caryatides. The Tribunal de Commerce, moreover, contains two fine, large halls, that of bankrupts and the grand audience-room. The closed interior court should also be mentioned, as it forms a sort of atrium, upon which open two stories of the Corinthian portico. Above the first story, caryatides terminated by gables support the cornices and the iron framework of the roof.

By the desire of Napoleon III, the façades of the Tribunal de Commerce, so far as their general appearance and decoration were concerned, were drawn from the Hôtel de Ville at Brescia. The façade facing the quai is decorated with four statues, which represent Law, Justice, Firmness and Prudence; but it is not explained whether this last figure is placed there for the benefit of the judges or the suitors. The works on the Tribunal de Commerce lasted from 1859 to 1864, and occasioned an expenditure of 6,757,816 francs.

M. Bailly left several bequests of interest to artists. To the Société des Artistes Français he left the sum of 40,000 francs. To the Académie des Beaux-Arts 50,000 francs, to be invested in three per cent Government *rentes*, the income from which may be used in maintaining a prize of architecture. To the aid fund of the Société Centrale he left 10,000 francs for the benefit of those members of the society overwhelmed by misfortune befalling themselves or members of their families. And, finally, to the library of the École des Beaux-Arts he gave the magnificent album of drawings and original water-colors which had been presented to him by painters, sculptors and architects while president of the Société des Artistes.

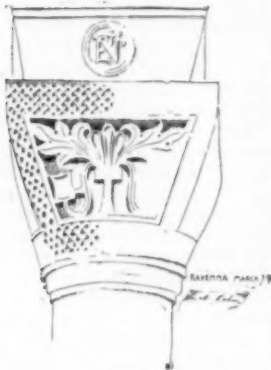
Henriquel-Dupont was an engraver of much notoriety among artists, who in fact considered him a master. He has just died at the age of 94 years. He was the pupil of Pierre Guerin in painting, and in engraving studied under Bervic. He was a most conscientious artist, and drew with the greatest precision. It was for this reason that he came to an understanding with Ingres and engraved for him the greater part of his portraits. His best known work is the engraving of the "Hemicycle" of the École des Beaux-Arts after Paul Delaroche, 1853. Amongst others can be named the "Pilgrims of Emmaus," after Veronese, "St. Jerome," and the "Mystic Marriage of St. Catherine," after Corregio. Henriquel-Dupont produced engravings up to very recent years, but in spite of his great ability the work which he has left us seems rather cold and monotonous. It is rather the outcome of art followed as a trade than of art for art's sake. He has never known how to do work adapted to different subjects, and originality was always lacking in his work. Since 1849 he was a member of the Académie des Beaux-Arts, and was nominated a professor in the École des Beaux-Arts in 1863. For several years back his place has been supplied by others.

The last departed artist of whom I must speak is the painter, Charles Louis Müller, who died in January at the age of 76. He also had been a member of the Institute since 1864, at which time he took the place left vacant by Hippolyte Flandrin. His was a very laborious career. Pupil of Gros and Léon Cogniet, he exhibited for the first time in 1837, while up to 1889 he never slackened in his work. He began with historical paintings, and in 1844 Louis Philippe ordered an "Entry of Jesus Christ into Jerusalem," which attracted the attention of the public. His chef-d'œuvre is well known, and for a long time hung in the Luxembourg. It is "Summoning the Condemned during the Reign of Terror." This was exhibited at the Salon of 1850 and obtained a great success. It is an enormous canvas, the setting being somewhat theatrical perhaps, but the emotions it awakens are very keen, and the painting is well lighted. In an entirely different vein, he left a little canvas which has become very well known, under the name "Un Moment Seul." Here is shown a baby who, having had his interest excited in the "little beast" which he hears ticking within a watch, profits by the chance when he finds himself for a moment alone, to pour a spoonful of milk into it from the nursing-bottle. The expression of the child is exceedingly amusing and the painting a most humorous conception. One can also recall Müller's "Marie Antoinette at the Conciérgerie," (1857) and a "Mass during the Reign of Terror," (1863.)

The Société Centrale des Architectes has elected its officers for the

year 1892. The new president is M. Daumet, member of the Institute, who takes the place of M. Charles Garnier. The two vice-presidents are MM. J. Guadet and Ach. Hermant, who held the same position last year.

THE STABILITY OF DOMESTIC CHIMNEYS.



IN the design of buildings, as in all structures of masonry, the relation of thickness to height is a very important matter. The architect designs largely by the eye. The visible qualities as expressed in his elevation and section are generally sufficient to enable him to dispense with those delicate computations of stability which the engineer so frequently calls to his assistance. The proportions of a well-designed structure give a full margin to stability, as they also satisfy the eye, which intuitively exacts a certain relation between height and width. Many of the proportions of brick buildings are regulated by bond, that is, the number of bricks and half-bricks. In the framing of the Building Acts the thickness of walls is thus regulated in the schedules. These thicknesses are sufficient for party-walls, which mainly sustain a vertical weight; but in the construction of chimney-stacks there is no clear rule. Under the 18 and 19 Vict. cap. 122, section 20, it is enacted that "Every chimney-shaft shall be carried-up in brick or stone work all round, at the least four inches thick, to a height of not less than three feet above the roof, flat, or gutter adjoining thereto, measured at the highest point in the line of junction with such roof, flat or gutter"; but it goes on to give the maximum height, which is that it shall "not be built higher above the roof, flat or gutter adjoining thereto, measured from the highest point in the line of junction of such roof, flat or gutter than a height equal to six times the least width of such chimney-shaft at the level of such highest point in the line of junction, unless such chimney-shaft is built with and bonded to another chimney-shaft not in the same line with the first, or otherwise rendered secure." This regulation applies to the Metropolis. The proportion thus given as a maximum height is safe under ordinary circumstances, and in positions where the full force of the wind is not experienced; but it is rather too much in situations exposed to high winds or hurricanes, such as that which visited these shores a week or two since, and which blew down numerous stacks on houses. When we take into account the age and decayed nature of some bricks, the perishable mortar used in the joints of the stack, each of which conditions considerably reduces the margin of safety, we shall have no difficulty in coming to the conclusion that a large number of chimney-stacks are in a very risky state, and that sudden gusts of wind render them exceedingly dangerous to the inmates, and also to persons who happen to be near the buildings.

The only rule to insure stability is to take moments about the centre of gravity of the shaft where the wind-pressure acts. The stability of a chimney-stack of course depends on the weight of the brickwork above the joint at the base, being such that it preponderates over the wind-pressure at the centre of gravity of shaft, to such a degree that the resultant of the two forces shall fall within the base of stack at the said joint sufficiently to prevent crushing of the material on that side, or tension on the opposite or windward edge. For the sake of stability, the line of pressure or resultant of the weight and wind pressure should fall within the shaft thickness at the joint level by at least one-quarter of the whole width of chimney. If we suppose an ordinary brick stack composed of nine-inch flues and four and one-half inches of brickwork on each side, the total width of stack would be eighteen inches, so that the line of pressure should come within the joint by at least four and one-half inches. The height of the chimney above the joint would be nine feet if the maximum statutory limit is allowed; and if we say there are five flues in width, the stack would be six feet wide. It is easy to find the weight of the brickwork above the level of joint, which may roughly be put at eighty hundred-weight. Then, if we multiply nine feet by six feet and by the wind-pressure, we shall obtain the total force which acts against the side of the chimney at its centre of gravity, and this force has to be counteracted by the eighty hundred-weight acting through the centre of the chimney's thickness. There are thus three external forces acting upon the stack exposed to the wind: the weight of chimney acting vertically, the wind-pressure acting horizontally, and the reaction of the resultant. By taking moments about the centre of gravity, and assigning definite values to each force, the actual stability of the chimney can be found. It will be found from this investigation that chimneys of this height scarcely fulfil the conditions of stability, especially when the tenacity of the mortar at the joint is small or impaired by age. Of course the tenacious property of the mortar has something to do with the question, as good mortar would increase the resistance to its overturning, but little dependence can be placed on this alone, as it would be extremely unwise to trust to the tenacity of a joint.

We frequently see chimneys which rise from the eaves-level to a height of ten feet or twelve feet above at the side of a house slightly inclined, partly by the action of the sun and moisture. These ought to be thicker or buttressed. Iron stays are abominations, and should not be tolerated. We think the only proper means of strengthening chimney-stacks of this height is to give them more base—to add, in fact, piers or half-brick projections between the flues on each side. The subject is one that demands attention from the London County Council, and from all local authorities who have the administration of building by-laws. Several fatal accidents from falls of chimney-stacks have been reported lately which call for some attention on the part of officials. — *The Building News*.

THE CUTTING OF THE DISMAL SWAMP CANAL.



trackless swamp has not yet been entirely explored, and the surveyor's chain has never been stretched across more than one-half of its 300 square miles. It is only occasionally that parties of hunters enter its jungles to shoot the game which abounds in numbers in the glades. The parts of the swamp that have been cleared and drained are only on the edges of the woods, or along the sides of the canal, which passes through the swamp. This canal is twenty-three miles long and six feet deep.

Half a century ago this Dismal Swamp Canal was one of the most important highways of Virginia, but the heavy competition of the Albemarle and Chesapeake Canal has forced it gradually into the background. It is one of the oldest canals in the United States and in the early colonial days there was no Eastern Virginian of any prominence who was not connected with it. The building of the canal was a great event, and afterward it figured prominently in the war of the Revolution. George Washington was connected with it in the capacity of Surveyor and Director, and his knowledge of it and the swamp through which it ran enabled him to obtain supplies that were greatly needed when he was contending with Cornwallis at Yorktown.

When the country around the swamp was first settled by the Virginia planters the swamp was one impenetrable mass of enormous trees and dense underbrush, but the black slaves soon began to penetrate the dark and gloomy wilds in search of juniper and cypress shingles. Nearly all the Southern homesteads were roofed with shingles of those trees, and a good part of the Virginia homes had their shingles out of the Dismal Swamp. The greatest difficulty with which these slaves had to contend was the soggy condition of the soil, which was not strong enough to hold the weight of a man, and the wheels of the carts sank deep into the mire. The farther they penetrated the swamp the greater this difficulty appeared to grow, until at last they resorted to the expedient of digging a water-course or ditch large enough to float the logs down. This ditch was only a few feet deep. At first it stretched from Deep Creek, a tributary of the Elizabeth River, to a short distance within the forest. Year by year the timber was cut away along the banks of the ditch, and as the demand for juniper and cypress increased, the ditch was extended farther into the almost impenetrable swamp. The logs were floated down the canal to Deep Creek, and from thence down the Elizabeth River to Norfolk.

The digging of the canal was thus slow and unpremeditated. It was extended only as the need of more timber made it necessary, and as such things as steam shovels were unheard of, the progress was slow. The towering cypress trees were felled by the negroes, and many of the trees were split up into shingles on the ground. The slaves had a certain amount of work to do each day, but over and above this they were paid extra for their labor. They lived constantly in the swamp, and though fever and disease abounded they appeared unmindful of it. The dismal place was never visited by persons other than the laborers and the overseers, and the surprise of the workmen was great one day when they heard the voices of other men far in the middle of the swamp. The wilds had not yet been penetrated beyond the head of the canal and nobody could guess how the men had entered the swamp ahead of them.

Investigations followed, and a peculiar coincidence of the work was discovered. The land-owners in North Carolina, on the southern boundary of the swamp, had also been using the cypress and juniper trees, and they had likewise adopted the method of digging a ditch to float the logs to market. Shingles and lumber had been transported for years down through the North Carolina district and the two sections of the canal had now nearly met. Only a short piece of the uncleared swamp intervened. The result was that a perfect canal running through the centre of the Dismal Swamp was completed, and in a short time small boats were seen carrying goods back and forth. The canal was continued as a watercourse for lumber and shingles, but it was also found to be of more value for other purposes.

In the course of time the State of Virginia took an interest in the canal, and a ditch was cut through the swamp to Lake Drummond, not for the purpose of boats, but simply to supply the canal with sufficient water at all seasons of the year to transport boats. The Dismal Swamp Canal Company was formed, and the stock of the company reached a very high figure. The swamp was one great woods of cypress and juniper, and this timber increased so in value

that the canal became a fortune to the men interested in it. Thousands of loads of shingles and timbers were floated down every year and shipped to all parts of the civilized world. This trade is not so extensive to-day, for the largest and best trees have been cut away, while the younger growth is not yet large enough to be of great service. All along the line of the canal, however, the forests have been sadly denuded of their timber. The wet, boggy swamp makes the early objection to timber gathering still strong, and it is a difficult task to haul the timber from the interior of the swamp to the canal. For this purpose, however, wide, flat wheels are used, and quite a business is still being carried on. Many thousands of feet of cypress and juniper timber are annually floated down to Norfolk. — *New York Times*.

BOOKS AND PAPERS

LACK of space in my last letter prevented my speaking of the book on the environs of Paris, just published by Quantin. I will speak of this presently; meanwhile, if you are willing, I am going to skim through a book published by the same house, which treats of the Palais de Justice.¹ The first portion of this interesting and illustrated volume is devoted to the history of the building itself and a description of its present condition. The two plans (ground-floor and first-story) of the group of buildings with the suggested modifications serve to guide the reader, and make it more possible for him to comprehend this considerable aggregation of buildings, whose contorted aspect, as one passes through its long corridors and numerous galleries, disappears when one perceives that it is all inspired by the most rigorous of methods. After an epitome of the successive transformations of the old Palais de Justice, the authors, who, for the most part, belong to the legal press, allow us to penetrate the interior of the present building, which comprises the Assize Court, the Cour de Cassation, the buildings of the Court of Appeals, the prisons of the Conciergerie and Detention, the rooms devoted to the bar and examining judges, the dependencies of the library, and the hall of the Council of Advocates, etc., to say nothing of the Ste. Chapelle, which at the centre of these multitudinous buildings dominates them by the whole height of its venerable nave and elegant fleche. It was in 1835 that the total reconstruction of the palace was resolved on, after numerous demands addressed by the Cour Royale and Cour de Cassation to the General Council of the Seine. Certain indispensable works had been undertaken in the time of Louis XVIII and Charles X, notably the restoration of the Ste. Chapelle, and the repairing of the vaults and piers which supported the great Salle des Pas Perdus. But what was demanded was the isolating of the building, that is, its complete transformation. M. Huyot, member of the Institute, brought forward a scheme which after long study was adopted August 18, 1836. It made necessary an expenditure of 3,591,617 francs for works which began in 1840; but Huyot having died in that year, the architects Duc and Domme took his place. Between 1843 and 1853 they underpinned the clock-tower, strengthened the upper stories and repaired the dial so splendidly decorated in the time of Henry III by Germain Pilon. Between 1847 and 1854, the building used by the examining judges and the archives of the Etat Civil were rebuilt, also the building containing the chambers of the Police Department, the gallery between the Cour du Mai and the Ste. Chapelle. The Police Court was provided for and the chamber for the advocates; and finally they actively pushed forward work on the court-rooms for the lower courts. These several departments occupy the buildings which front on the Boulevard du Palais. In 1854 they began the construction of the Assize Courts and the House of Detention near the Prefecture of Police; and between 1856 and 1857 work was carried on on the Cour de Cassation, which comes next to the Conciergerie on the Quai de l'Horloge, and when the war of 1870 broke out all that was needed to finish the works was the completion of the buildings of the Court of Appeals and the women's quarter of the Conciergerie. But the fires lighted by the Commune in 1871 destroyed a portion of the building and the just finished restorations. The Salle des Pas Perdus had to be rebuilt.

At the death of M. Duc, in 1879, M. Daumet, his distinguished collaborator—since that time become a member of the Institute—continued the gigantic work of the restoration of the Palais de Justice, and in succession he completed the buildings of the Court of Appeals and those of the Prefecture of Police—from that time on devoted to the service of the bar and the Procureur General—which stretched along the Quai des Orfèvres. Quite recently there has been inaugurated the first chamber of the Court of Appeals, decorated in a sumptuous manner, and containing works of art of great historical interest, besides two pieces of sculpture in wood, which are placed above the doors leading into the chambers of the Council, and which date from the time of Henri II. There can be seen behind the chair of the President the precious painting known under the name of the "Retable du Palais de Justice," which, from 1505 to 1793, was a feature in the great chamber of the Parliaments

of Paris. It measures 2.30 metres in height by 3.30 in width, and has furnished matter for numberless learned discussions. It is not known who was the author, but it is believed that it was ordered by Louis XI for the chapel which, in 1476, he built in the Grand Salle.

All these works called for in the enlarging and isolating of the Palais de Justice, which since the year 1840 have not cost less than 35,000,000 francs, will still require an expenditure of about 10,000,000 more.

This historical part of the book that I have epitomized in a few lines prefaces the very curious study which goes somewhat outside of our own proper domain to concern itself with the people and the judicial life both of former times and of to-day. Amusing and interesting details reveal in all their nakedness the wheels within wheels of that grand machine which is called justice, and this preface is signed by Alexandre Dumas fils.

"*Autour de Paris*"² is a book which is positively charming and written in an easy and interesting manner. Avoiding on the one hand the dry erudition of the guide-books, it takes us in the guise of artists through the fair countries of the Ile-de-France. We discover as we run through these pages picturesque beauties hardly suspected by us, marvellous horizons, delicate landscapes, fresh perfumes, and, in the midst of all, architectural *chefs-d'œuvre*, described with grace and lucidly explained by M. Fraipont, whose five hundred picturesque sketches from nature have been scattered through this book. The work is agreeable as well as instructive from the point of view of the history of those monuments, more or less important, which one may come across. In a word, and the title sufficiently indicates it, it is a series of artistic excursions in and about Paris, and all those who, after toilsome trouble, have gone out to take a run through the forests of Compiègne, Fontainebleau and Rambouillet, and sketch-book in hand have wandered through the fresh valleys of the Orge, St. Cheron, the Yvet, the Oise, the Yeres, etc., have visited Versailles, Pierrefonds, Chantilly, Fontainebleau, St. Germain, again find in this book a few of the emotions which they then experienced, and will feel a pang of regret because they do not find here such and such little jewel of sylvan or architectural environment. The great châteaux and palaces occupy an important place in this work, but the less imposing residences, and often some which are hardly known, are not neglected. Closed properties are all opened to us, and we no longer have to halt before an iron gate or a wall behind which we know there is something which should be interesting. "*Le Palais de Justice*" and "*Autour de Paris*" are not architectural books properly so-called, but they are books of gracious art, and are moderate in cost. It is for this that I speak of them in this book notice, where I endeavor to speak only of those works which are worthy of your attention. M. BRINCOURT.

It would seem as though there were already enough clever draughtsmen in the country to do all the work in the way of artistic drawing that this and the next generation of practising architects would need to have done, but yet they are being produced by the schools—professional, evening, free and private—by scores, while, contrary to expectation, they all, or most of them, at any rate the best of them, easily find good and fairly permanent positions where their peculiar talent has room to develop.

The really clever and sensitive American draughtsman stands as high in the artistic scale as the best of any other nationality, yet, at the same time, there is a simplicity and directness about his work which seems to suggest that the national aptitude for saving time and taking the shortest line between two points declares itself in his work. The draughtsmen of ability who give greatest evidence of this directness and simplicity of method are H. P. Kirby, Arthur Truscott—although he is really an expatriated Englishman, we believe—and David A. Gregg.

This latter gentleman, who, as we suppose is well understood, has been head-draughtsman to the *American Architect* for a dozen years, has during the last two or three years filled the position of instructor in free-hand architectural drawing at the Massachusetts Institute of Technology, and during this time—such is the thought-compelling action of the magisterial function—has crystallized his own unconscious methods into a systematic and rational method, which can be followed by other draughtsmen in the expectation of producing results which might, by the inexpert, be mistaken for the work of the instructor himself. Herein lies one of the disadvantages of the method of teaching by the "setting of copies."

At the end of his first year's experience as a teacher—which he only entered on at our urging—we suggested he should publish, for the use of the outside draughtsmen, the models he had prepared for his pupils. This he was unwilling to do, as he considered them crude, so far as a graded and progressive system of instruction went, and now that he has issued two parts of his "*Architectural Rendering in Pen-and-Ink*," we admit he was wise. No system of teaching is worthy of consideration that does not largely concern itself with the personal equation. The system which insists on the rigid following of the copy set will have but a stupid set of scholars, who will be as tame and lifeless as the work they produce. To a very undesirable extent, the system of instruction in vogue in the

¹ "*Le Palais de Justice de Paris*" son monde et ses mœurs. Quantin, publisher, Paris. Price, 20 francs.

² "*Autour de Paris*," par Louis Barron. Quantin, publisher, Paris. Price, 25 francs.

³ "*Architectural Rendering in Pen-and-Ink*." By D. A. Gregg. In four Parts. (Parts I and II now ready.) Boston, 1891. Ticknor & Co. Price, \$2.00 per Part.

¹ "*Le Palais de Justice de Paris*" son monde et ses mœurs. Quantin, publisher, Paris. Price, 20 francs.

public and normal schools is of this kind, and the annual exhibitions at which the scholars' work is shown, are usually inexpressibly tedious and uninteresting.

Mr. Gregg's simple, clean-cut and strictly architectural manner of handling is extremely easy to imitate and a really clever draughtsman can counterfeit it without much effort, so it was not surprising that there was a great sameness in the work of his classes the first year. The personal equation had not been enough regarded. But *experientia docet* and a little study wrought a very desirable change in the method. The pupil was no longer told to follow copy, but to treat his subject in his own way in accordance with certain broad principles which the copy merely served to illustrate. The pupil was encouraged to think and if possible to feel, and the change in system had a marked influence on the resulting work.

Now the laying down of principles, except in matters of exact science, is a very dangerous thing and we feel that, speaking broadly, art is so largely a matter of sentiment and feeling, that hard and fast principles are fetters that the artist sure of the correctness of his own instinct will be very unlikely to clasp about his wrist. Oftentimes the most telling and artistically satisfying results are obtained by disregarding precept, principle and precedent. Turner was not true to nature and we question if he knew whether or no he had any artistic principles. It is often possible to obtain as satisfying and truthful results by reversing as by following the process recommended by the teacher. Set a class to draw a hillside, of which a cave's mouth is a prominent feature, and the chances are that most will represent the cave by a dark hole, while one pupil with a spark of originality will conceive his subject as seen at dusk so as to preserve still the outline, while just within the mouth of the cave he places a group of explorers with their torches, that is, while he may not have exactly reversed the principles inculcated by his teacher, he has at least reversed the method of procedure recommended.

We do not intend to examine the principles stated in this publication, some we believe in, others we do not believe in at all, but it really does not much matter, for Mr. Gregg states them rather as recommendations and suggested possibilities than as indisputable facts.

But enough of generalities of this sort. The publication under consideration is distinct from every other of its kind because of one very ingenious feature. Recognizing that the teacher's highest function is to teach principles and methods, and that with intelligent pupils, such as architectural students are usually, the weary drilling in handling and manipulation can be left to the pupil himself to learn, Mr. Gregg has turned his attention to covering as much ground as possible, and so makes use of a labor-saving device, and furnishes his pupils with the outline of the subject to be treated printed in very pale ink. As the instruction given in his classroom and in this publication is purely in the *rendering of effects*, this simple device, which dispenses with the time and labor spent in getting accurate outlines, enables the student to make more rapid progress.

In this publication the student is furnished with three things: first, the subject he is to render—be it a gelatine print or a partly rendered subject, with suggestions and recommendations stated in the margin; next is a sheet of drawing-paper, upon which is faintly printed so much of the outline of the subject as is needful, and last—and this is the most ingenious feature—the same outline is given on coarse newspaper paper, which is an excellent material on which to sketch with a soft pencil. As to these prints, Mr. Gregg says: "The prints on gray paper are to be used in pencilling out a study as may be suggested, using a soft pencil; copy, then, *chiefly your own sketch*." That's it. A teacher never gave a more sensible bit of advice; and it is perfectly safe counsel, except when given to creatures of one idea, who, by the way, have no right to try to study architecture or architectural rendering.

In one respect this scheme, excellent as it is, is not carried far enough, since but a single "gray-paper" print and a single outline on drawing-paper are supplied for each subject. Naturally, the tendency is, with such limited supplies, to do as closely as possible what the teacher expects one to do, and this is done at the risk of throttling mental effort and the cultivation of innate artistic instinct. There are few, if any, fixed and inviolable laws of art, else all artistic work would be as tame and insipid as anything produced under the fixed and inviolable condition of machine-made manufactures of any kind, and he is the best teacher who cultivates and stimulates the artistic germ supposed to be in each student of art. Now there are, or may be, pupils of a reasoning frame of mind, who, while admitting that the method suggested may produce good results, are not entirely satisfied that another method might not result more satisfactorily still. If they are enabled to test the matter, the result will be good in either case, for a man can learn as much through having blundered as through having succeeded; so, if the variant is not a success, it but adds strength to the teacher's recommendation, while if it turns out well, the chief end of instruction—the stimulation of mental activity, has been achieved. So liberal-minded a scheme of instruction as this should be more liberal with its sheets of "gray paper," at least.

Since writing this we have looked over the drawings of one of Mr. Gregg's classes, and find them fully to bear out the deductions already made. There is a strong family likeness between the drawings, but there is neither identity of treatment nor sameness in understanding the teacher's recommendations.

The exhibit made by this class is analogous in effect to the narrative which might be given of the same occurrence by a score of observers looking from the same station-point. In every case the leading features of the incident would be stated, so that any one could recognize it; but beyond a general similarity in the framework, there would be enough difference in the words, accent and inflection to produce a slightly different impression on the listener, while there would probably be one out of the score such a master of language that his would be the tale that would be remembered above all the others.

Encouragement, not the suppression, of originality—so far as Mr. Gregg has adopted it—is the best feature of his work.



THE SKETCH-CLUB OF NEW YORK.

AT the regular monthly meeting of the Sketch-Club of New York, held at the Hotel Viana, February 6, 1892, the following officers were elected: Charles H. Israels, *President*; F. R. Hirsh, *Vice-President*; J. Nat. Hutchins, *Recording Secretary*; Frank H. Quinsby, *Corresponding Secretary*; W. L. Coulter, *Treasurer*.



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

ENTRANCE TO NEW ENGLAND SHOE AND LEATHER ASSOCIATION'S BUILDING, BOSTON, MASS. MESSRS. HARTWELL & RICHARDSON, ARCHITECTS, BOSTON, MASS.

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

A MORE general detail of this building was published January 16, last.

SKETCHES BY THE *American Architect* TRAVELLING-SCHOLAR, MR. ALBERT KAHN: THREE SHEETS.

[Issued with the International and Imperial Editions only.]

PROPOSED CITY-HALL, BOSTON, MASS. MR. E. M. WHEELWRIGHT, CITY ARCHITECT.

THERE is no question but that Boston stands in immediate need of a new City-hall as the old one has long been outgrown, and it is particularly fortunate that the present city architect is a man who is capable of grasping the possibilities of the occasion and producing so dignified and expressive a building as that which he has designed for the proposed site on Beacon Street opposite the Athenæum. As to this site it is in most ways vastly better than the alternative site opposite the Public Garden lower down on the same street where, in order to make it a feature of the landscaping to be done at that point in conjunction with the Charles River Embankment, the architect might be beguiled into designing a building which would be less quiet and appropriate to civic purposes than the one now laid before the public. Moreover the site opposite the Athenæum has the very great advantage of bringing the city officials into close connection with the officials in the State-house and in the County Court-house.

SUGGESTED METHOD OF ENLARGING THE CITY-HALL, BOSTON, MASS. MR. E. M. WHEELWRIGHT, CITY ARCHITECT.

THE enlargement exhibited by this design consists in reconstructing and enlarging what has been until recently the County Court-house and connecting its upper stories with the present City-hall by a bridge. If the architect could persuade himself to carry a still greater portion of his building on columns so as to give driveways from side to side he would probably earn the gratitude of a host of expressmen, one of whose haunts is Court Square.

THE *Times* BUILDING, PITTSBURGH, PA. MR. F. J. OSTERLING, ARCHITECT, PITTSBURGH, PA.

[Additional Illustrations in the International Edition.]

FIREPLACE IN THE HOTEL DE VILLE, COURTRAI, BELGIUM.

[Gelatine Print.]

THIS fireplace, which is to be found in the sheriff's hall on the lower floor of this sixteenth-century building, is decorated with the escutcheons of the town's allies, the cities of Ghent and Bruges, which are supported on either side by standard-bearers bearing the arms of Courtrai. The alliance between these towns is further typified by one of the wall paintings which represents the consultation of the Flemish leaders on the eve of the "Battle of the Spurs," in 1302,

so-called because the Flemish army, which consisted mainly of weavers, after the battle collected seven hundred golden spurs from the heels of the knights who had followed the Count of Artois from France.

THE ATLANTIC STEAMSHIP, "LA TOURAINE."

[Copper-plate Etching.]

We extract from *The Yacht* the following dimensions in metres of the Atlantic liner, "La Touraine": Between perpendiculars, 157.45; beam, 17.05; depth of hold, 11.30; draft, 7.20; displacement, 11,675 tons.

"La Touraine" was built under the special care of the Bureau Veritas in the ship-yard of the Compagnie Transatlantique, after the plans and specifications of the eminent engineer in-chief of the company, M. Daymard. Its rig is a three-masted schooner's, as in all the new transatlantic boats with two screws. One of the four masts, which existed in the former types, had to be suppressed, without loss, since the sailing-power is only an insignificant factor in steamships of these dimensions.

The interior arrangements are made with great care, and nothing has been neglected to make things comfortable. There are thirty large state-rooms for families, and six even more desirable, since they are in connection with bath-rooms and toilet-rooms; eight state-rooms with two berths and four with three berths on the upper deck; four state-rooms with one berth, fifty with two, and three with three in the between-decks, all for passengers of the first-class. All these rooms are fitted up in the most comfortable manner possible, and the larger state-rooms possess an elegance and convenience which leaves nothing to be realized; and, thanks to a very ingenious arrangement of the passages and staircases, voyagers occupying state-rooms on the promenade-deck can go to any portion of the ship without passing out of doors. In order that passengers may keep their bearings with greater ease midst the numerous passages between-decks, the management has had the ingenious idea of giving them names. Thus in the between-decks of "La Touraine" we find the "Rue de Paris," "Rue de New York," the "Avenue des Machines," etc.

For second-class passengers, there are twenty-one state-rooms with two berths and three with three, large and well-ventilated. These state-rooms are simply but very conveniently furnished. The number of emigrants who can find places in the steerage is 600, so that "La Touraine" can carry 1,090 passengers; that is, 392 first-class, 98 second-class and 600 third. The saloons and spaces for promenading have been the object of particular care. The grand staircase, between the two smoke-stacks, by which access is had to the saloons and first-class state-rooms, is really grand in effect. It takes up the whole height between the promenade-deck and the main deck, and is lighted through a skylight overhead. Approach is had to it both from the promenade-deck and from the upper deck. Lounges arranged in different places make of it a regular saloon, decorated with luxuriance, but in perfect taste. A large mirror attached to one wall, and framed in with caryatides of carved wood, gives the companion-way a monumental appearance. Electric-lights are scattered about in profusion. At the level of the promenade-deck, this staircase gives access to the larger state-rooms at the level of the main deck, which communicates with the saloon. In each are a well-furnished library and a piano. Two passages extending towards the bow, and upon which open the state-rooms of the first-class passengers, are entered from one end of this hall, while from the other entrance is had to the grand saloon, which is about 17 metres square. The decoration in wood and gold is sober and delicate. First-class passengers have a large smoking-room, while the ladies' saloon at the rear of the larger room, decorated in the style of Louis XVI, is artistic and coquettish in the extreme. Children have a large dining-room on the main deck. The saloon for the second-class passengers, is on the upper deck, abaft the second smoke-stack. The electric-lighting of the "Touraine" is most satisfactorily arranged. Three dynamos are established in a little room on the upper deck, above the kitchens. They are kept in motion during the day for the lighting of the lower part of the engine-room, the boiler-room and obscure passages. For night service two other motors are brought into operation. Lamps are carried in twenty distinct circuits, which can be at any moment connected with any one of the dynamos. Thanks to these excellent arrangements, light is most abundant in every part of the ship. In the state-rooms the passengers have full control of their light, and so are secure of a convenience and comfort quite unknown in the days when oil was used. In short, "La Touraine" is from every point of view a magnificent vessel which does the greatest honor to the Compagnie Transatlantique and the engineers who prepared the plans and carried out the construction.

NO. 185 QUEEN'S GATE, LONDON, W., ENGLAND. MR. R. NORMAN SHAW, ARCHITECT.

THE HALL OF THE SAME (TWO VIEWS).

PLANS OF THE SAME.

"GENEVA." AFTER A DRAWING BY MR. SAMUEL PROUT.



[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.]

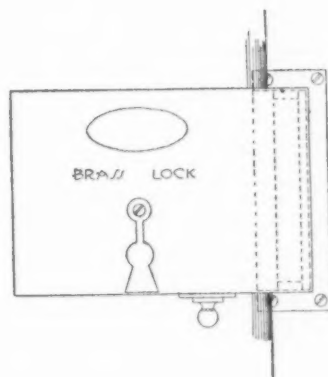
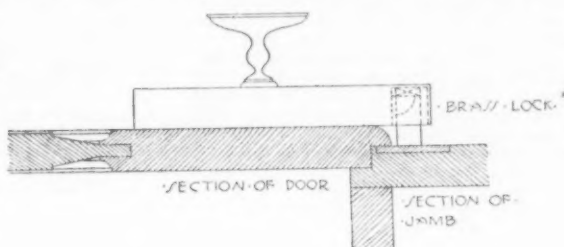
MORAVIAN DOOR AND FIXTURES.

WASHINGTON, D. C.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

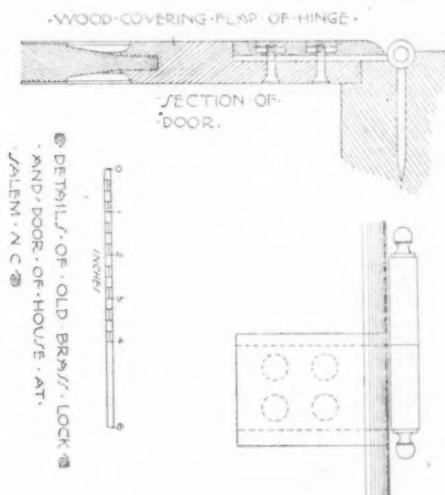
Dear Sirs,—I send you an interesting method of rebating door and jamb, adopted in the Bishop's house belonging to the old Moravian settlement in Salem, N. C.

This house was built more than one hundred years ago. The community manufactured their own locks, roof-tiles, with which all



the old buildings are covered, as well as cutlery, pumps and other articles of use.

It is worthy of note that in making a door by this method, it would not be necessary to have a close fit between door and jamb, thus avoiding binding, and its sequent planing, which is unfortunately



an everyday occurrence at the present day. On the other hand, a shrinking door would not show the gaping void between itself and jamb, which we too often see.

The method of putting on the hinge and concealing it with a wooden cover is quite novel. The lip of the lock coming over and concealing a projecting staple is also new to me.

The hinges, knob, moulding and general appearance are refined and interesting.

Yours truly,

GLENN BROWN.

NOTES AND CLIPPINGS

THE SPEED OF ELEVATORS.—The maximum speed of the fastest passenger elevators which have ever been built, the *New York Journal of Commerce* says, is 1,500 feet a minute, a rate of one mile in three minutes and a fraction. Before the fire in the Western Union building in New York City occurred, that Company had a machine which could run 1,500 feet a minute. It was the only one of its kind in the East. Mr. Thomas E. Brown, Jr., a consulting engineer of New York, thinks it possible there are few of equal speed in the West. These machines are of the water balance type—that of the original hydraulic elevator, the invention of Cyrus Baldwin. Owing to its expensiveness, and the fact that it could not be controlled automatically, it went out of use. The speed was regulated by the engineer, and it went fast or slow, as he pleased. With the modern elevator, almost any speed desired can be obtained; it all depends on the power used and the distance travelled. In a building which has a shaft of 250 feet, a speed of from 850 to 1,000 feet a minute can be attained. On a rise of 150 feet it is easy to get a speed of 750 feet per minute with a weight of 1,000 pounds aboard the elevator. In New York the fastest elevators are in the Union Trust Company's building on Broadway, near Wall Street. They shoot up or down, carrying 3,000 pounds at a speed of 600 feet a minute. When tested with lighter weights they have travelled from 800 to 900 feet in a minute. But the average speed of elevators in office-buildings in and around New York is 300 feet a minute. It is best adapted for work, and experience has demonstrated that more passengers can be carried daily in a car going at that speed in the ordinary large building than any other. The increase in the size of elevators is in keeping with improvement in other directions. The largest passenger cars in the world are now in course of construction at Weehawken. These elevators, of which there are three, are designed to carry 135 persons on each trip, and are equivalent to ten tons. They will be owned by the North Hudson County Railway Company. A viaduct 875 feet in length has been built out from the Palisades to a point above the ferry depot. From the rails on the viaduct to the river-level the distance is 150 feet. An elevator-shaft of that extent is now building, and passengers who cross the ferry will be transferred to the elevators and thence to the trains, instead of ascending to the Palisades by the inclined railway, as heretofore. The railroad company's contract calls for a speed of 200 feet a minute, but, as a matter-of-fact, the cars will be capable of going much faster. Each elevator will be worked by 200 horse-power. The entire plant will cost \$30,000. Elevators are gaining favor in private houses. The common elevators of small business buildings are worth at least \$3,000. From that they range up to \$13,000 in the same class of buildings. The American elevators in the Eiffel Tower were costly affairs. They are somewhat similar to those now constructing at Weehawken, but have not the same lifting-capacity. The journey to the highest platform, a distance of more than 900 feet, is done by three elevators. The longest run of any of them is 420 feet. Each can carry fifty persons. These elevators are remarkable because they do not go up in a straight line. Starting at an incline of 54°, they run for a distance of 250 feet, then around a vertical curve of 50 feet radius, and then at an incline averaging about 78°. From an elevator point of view, the new Masonic Temple building in Chicago will be the most important in the world. It will have twenty-four cars built in a circular shaft having a 250-foot rise. There will be express elevators, way and freight trains. The first will go to the top floor without stopping, while the others will stop either at every floor, or at the fifth, tenth, fifteenth, and so on. They will not run at full speed, probably because passengers do not like the sensation of flying. With the present safety devices it is just as safe to run fast as it is to run slow. Accidents are few, and invariably due to negligence on the part of the elevator attendants or the passengers. When accidents do happen, it is usually a case of the car catching persons as they step on or off. Passengers frequently try to board a car after it starts, with the result that if caught by the elevator between the car and the floor or ceiling they are killed in nine out of ten cases.

WET SCREENS FOR VENTILATING-DUCTS.—In a letter in the *Times* of January 26, in regard to the ventilation of the House of Commons, Sir Douglas Galton gives a description of the "wet-screen" in use at the Victoria Infirmary at Glasgow for the removal of dirt and fog from the air previously to its entering a building. He gives the following description of the process: "In this infirmary the air is renewed six times an hour. This volume of air before it enters the wards is filtered and washed by being passed through an air-washing screen of cords, formed of horse-hair and hemp, closely wound over a top rail of wood and under the bottom rail, forming a close screen, sixteen feet long by twelve feet high, affording nearly 200 square feet of surface. There is a constant trickling of water down this screen, by which it is kept wet, and the air, in filtering through it, has the dust and soot particles removed, and when once these have adhered to the wetted surfaces, a current of air of considerable velocity will not carry them through the screen, but the falling water floats them down into the drain. An automatic flushing-tank is fixed in a position whereby twenty gallons of water is instantaneously discharged over the surface of the screen every hour, to flush and remove any accumulation of wetted dust, soot, or germs which may not be removed from the screen by the trickling water over its surface." Sir Douglas Galton recommends this method as one which, among other advantages, will keep fog from entering into the ventilating chambers and hence into the building, and states that on very foggy days the air within the Infirmary was perfectly clear and pure.—*The Builder*.

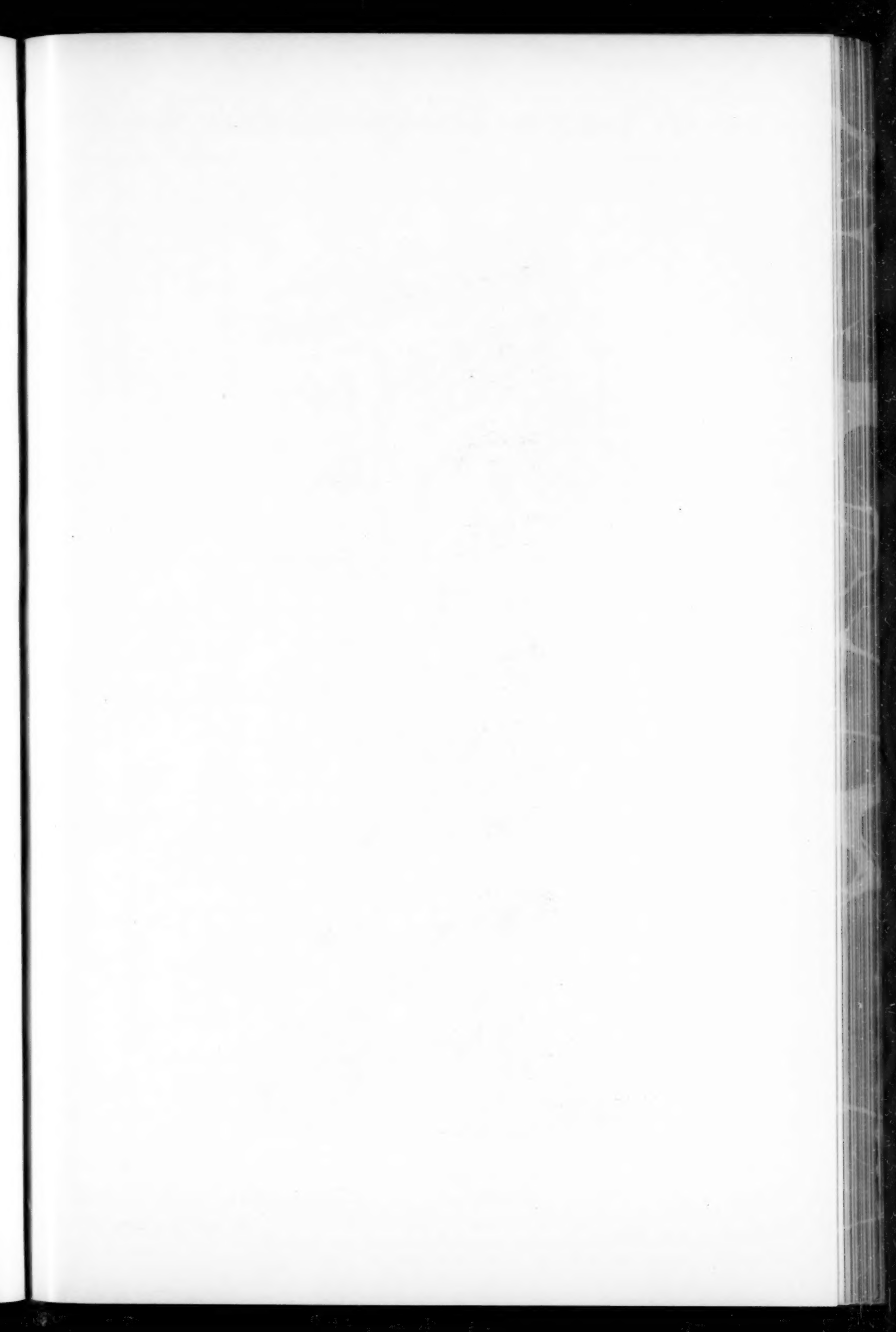
A NEW CLOCK FOR ST. PAUL'S, LONDON.—The Dean and Chapter of St. Paul's Cathedral have commissioned Messrs. John Smith and Sons, Derby, the well-known clockmakers, to make a new clock to

replace the old one in the southwest tower of the Cathedral. The old clock strikes the hours on the old "Phelps" bell, but the new one will strike upon "Great Paul," which is nearly seventeen tons weight, with a hammer weighing 680 pounds. The quarter chimes will be struck much the same as before, but provision will be made in the clock so that chimes on four bells may be added at a future time. The two dials, which are sixteen feet diameter, will be unaltered, except that the central part will be arranged for illumination at night. The clock movement will be a very large piece of machinery, designed by Lord Grimthorpe, and it is guaranteed by Messrs. Smith and Sons to keep time with very great accuracy. There will be special precision apparatus, whereby the first blow of the hours will fall within one second of Greenwich time, and the first blow of the three-quarters will also strike with the same accuracy. Some idea of the great size of this clock may be formed when it is known that the hammer which strikes the bell is 680 pounds, while the hammer which strikes "Big Ben" at the Houses of Parliament is about 450 pounds.—*Invention*.

A COMPETITION IN SNOW-MEN.—A Paris paper hears that the Burgomaster of Brussels has just inaugurated a new idea. He has instituted in the park a competition, open to all sculptors of the city, in which the material used is to be snow. A number of artists began one morning, and by the evening many figures were completed, including a colossal one representative of Charity. Some of the artists humorously placed a number of nurse girls and soldiers on the public seats. The park was lit up by the electric light, and opened to the public. The proceeds of the entrance fees charged are to be devoted to charitable objects.—*Invention*.

TRADE SURVEYS

CONGRESS is very wisely called upon by business men of New York to increase facilities for the distribution of mail-matter. It is rather surprising that this subject has been allowed to rest so long. We are in the habit of complimenting ourselves upon the magnitude of our mail-transporting facilities, which in the aggregate are, of course, enormous; but there has been and is a serious defect in many particulars, which cause indirectly a loss to business interests. An improvement is demanded throughout the entire country; faster trains are wanted in the first place; pneumatic tubes are needed in all large cities; electrical devices, of which there are scores, could be utilized for facilitating the handling of matter and for more satisfactory communication. In the matter of pneumatic tubes alone, there is room for and need of great improvement, great progress. Patents on this matter have been allowed to, if not die, remain pigeon-holed. There are systems of pneumatic transmission which, if brought into use, would accomplish wonders. Routine work is so crowding upon post-office officials that they have neither the time, nor have they any encouragement to step out of beaten paths to introduce new things. It is to be hoped the whole question of the transmission of mail-matter will come up and be thoroughly examined. The public at large may not have any occasion to complain, but the business interests of the larger cities certainly have, and it is to the more rapid transmission of mail from counting-room to central office, and from central office to counting-room, that special attention is to be given now. Another matter of importance to the travelling public is the putting on of faster trains; the railway managers of several companies have had this matter under consideration for some time, but no official announcements have been made, because all managers have not decided whether they will do anything, or can. A number of difficulties are in the way: the first is that of actual necessity for more rapid speed; the next is the question of locomotive engines; those now built are not built for a speed much above forty miles per hour, and the locomotive builders have not yet decided how an engine ought to be built to make fifty or sixty as a regular thing. Even in Great Britain, there is a wide difference of opinion as to how speed can be increased most economically; the subject will probably be satisfactorily solved in the United States, where the distances are longer and the necessity for rapid travelling more urgent. Then comes in the question of road-beds, and there is a serious defect in this. Our road-beds are quite enough for forty miles, but hardly for fifty or sixty. The necessity for quicker travelling is gradually increasing, but there is no doubt that faster trains would be put on now between sea-coast cities and some interior points if locomotives of proper construction and capacity could be furnished. The locomotive-builders are doing their best in this direction; the compounding of engines is only the first step; the travelling public will not have very long to wait before they will find themselves carried at an average speed of fifty miles—at least, the statement is made upon the authority of some locomotive-builders and railway managers who are determined that this shall be accomplished. The utilization of electricity in this direction is not very close at hand; the subject has been pretty well considered by both the expert side and the commercial side, but as yet the development of the application of electricity to motion has not gone far enough. The great body of electricians are devoting themselves to smaller and more easily solved problems. Business, in a general way, is backward; trade lags; confidence is not exactly lacking, but there is something which stands in the way of a steady development of business. All banks appear to be well supplied with money, and yet there are thousands of business men who are going without sufficient money to push business. The manufacturing interests are all prospering in a sort of way, but there is not that push and drive and thrift that there ought to be. Prices are low, and production is kept well in hand; the indications are not very promising for a heavy spring trade as yet, although middle-men, manufacturers and all others have confidence that a full volume of business will be transacted. Iron and steel makers are only moderately busy; coal-producers are mining the maximum output and selling it. The Reading combination has been the event of the month; what the outcome will be it would not be safe to predict. The combination has been made for the purpose of increasing earnings and profits, and not decreasing them. There has been a bitter competition between a half-dozen companies for traffic, and the result has been very moderate margins on coal, but large profits upon the carrying of it. It is probable that the anticipations of the public for cheaper coal will not be realized, and that the combination will use this increased power for increasing the profits on the coal itself. The lumber interests are all preparing for next season's business, and a national convention will be held at Washington, March 1, to protest against the free importation of Canadian lumber.



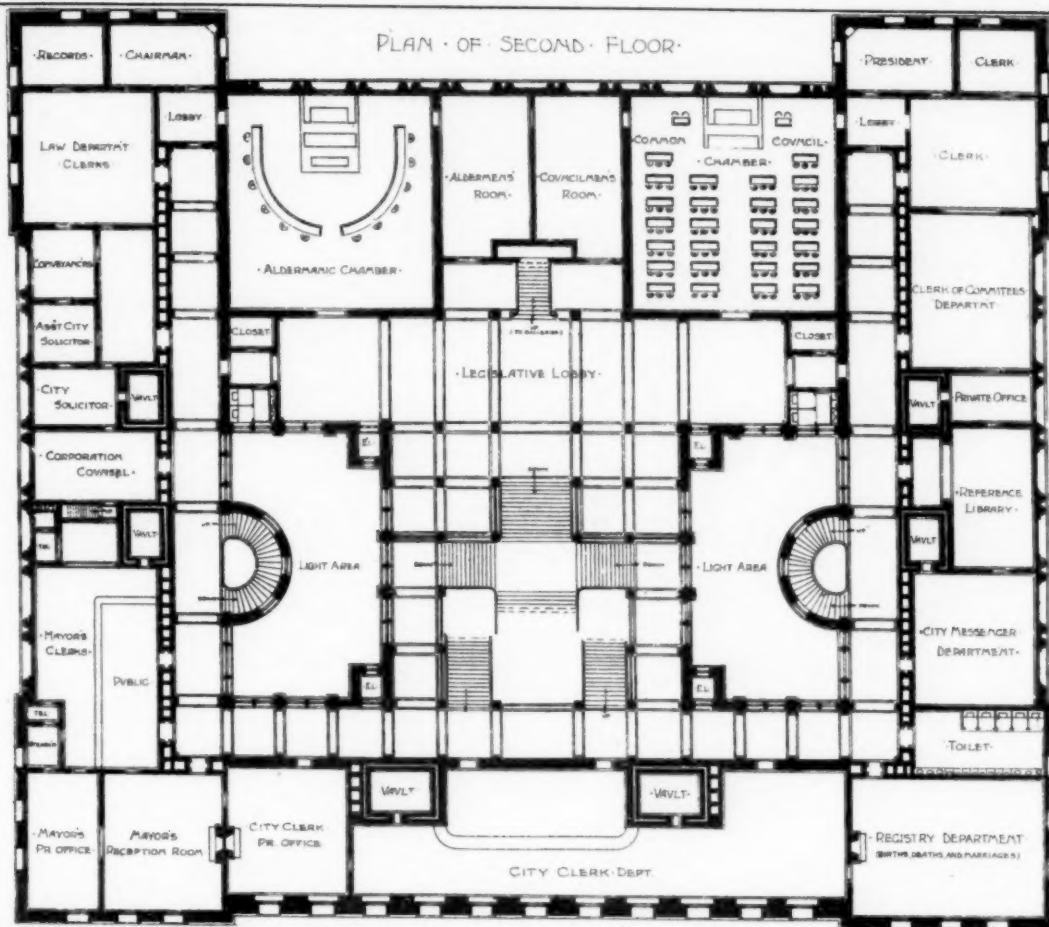


HELIOTYPE PRINTING CO. BOSTON

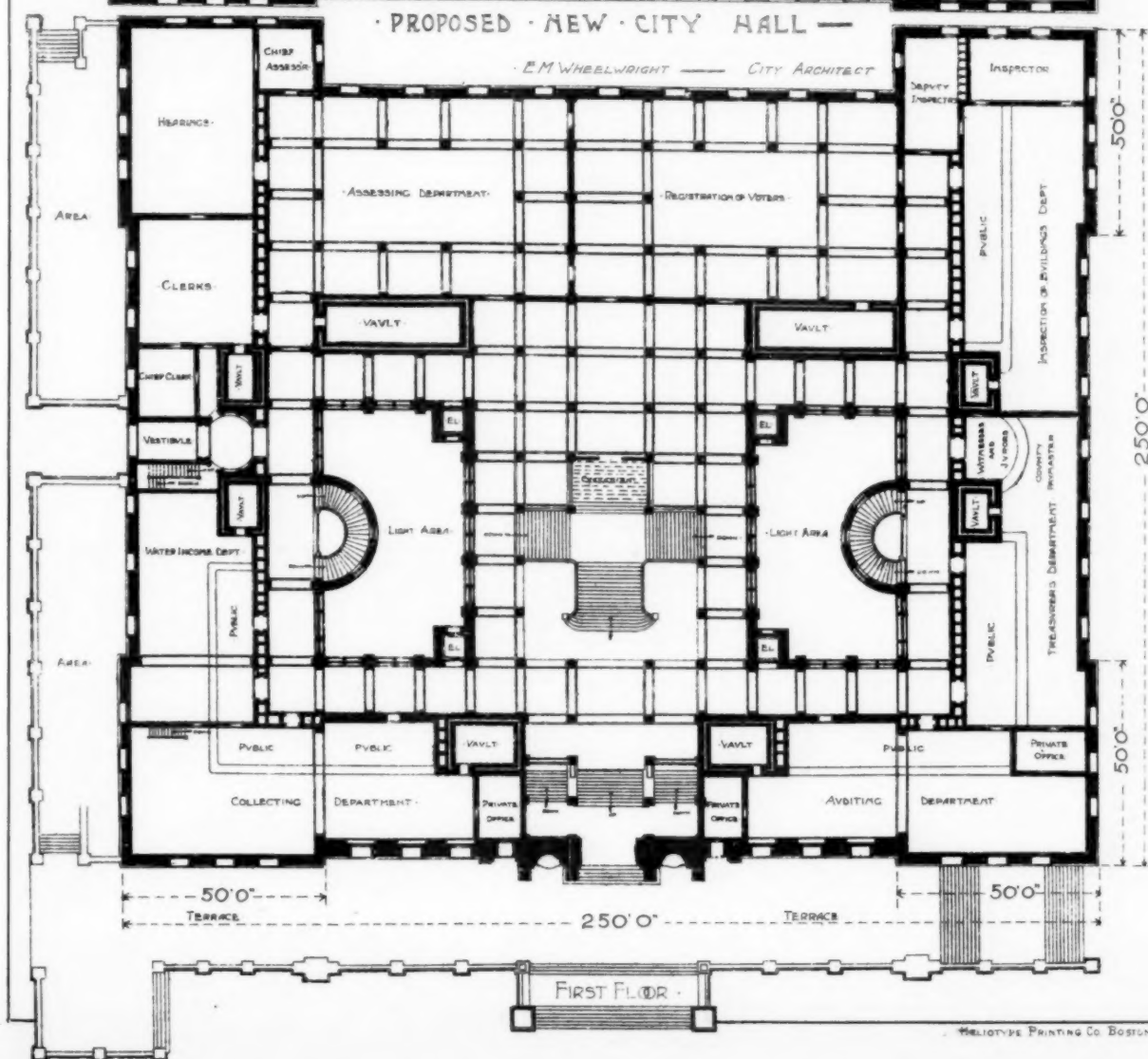
THE "TIMES" BUILDING, PITTSBURGH, PA.
F. J. OSTERLING, ARCHITECT.

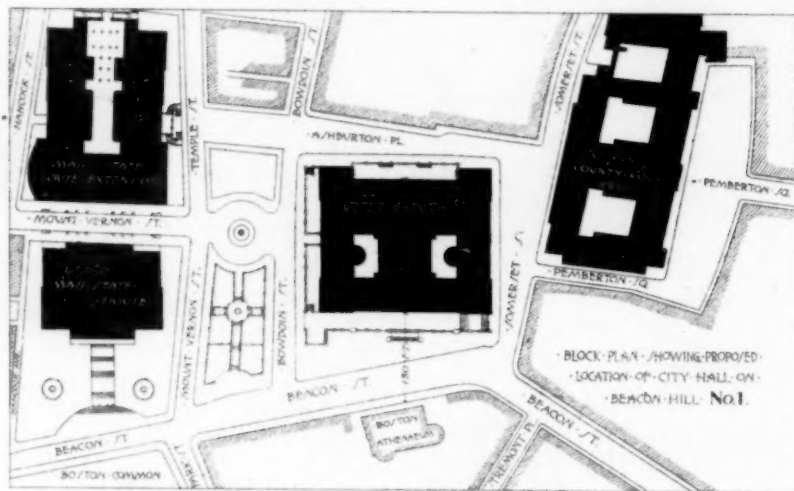
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PLAN OF SECOND FLOOR.



PROPOSED NEW CITY HALL —
E. M. WHEELWRIGHT — CITY ARCHITECT





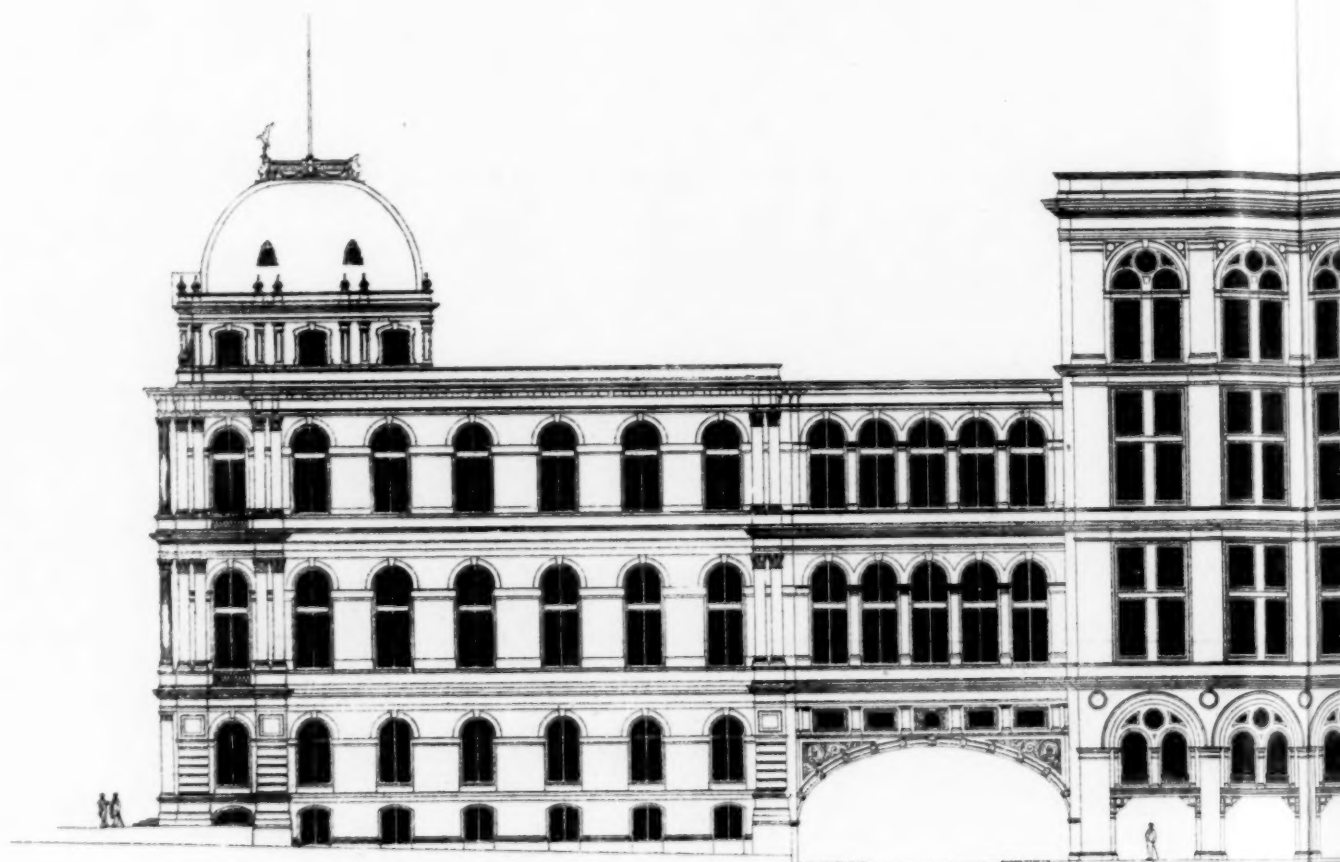
PERSPECTIVE VIEW
OF
NEW CITY HALL.

FOR BOSTON MASS.

-EDMUND M. WHEELWRIGHT-

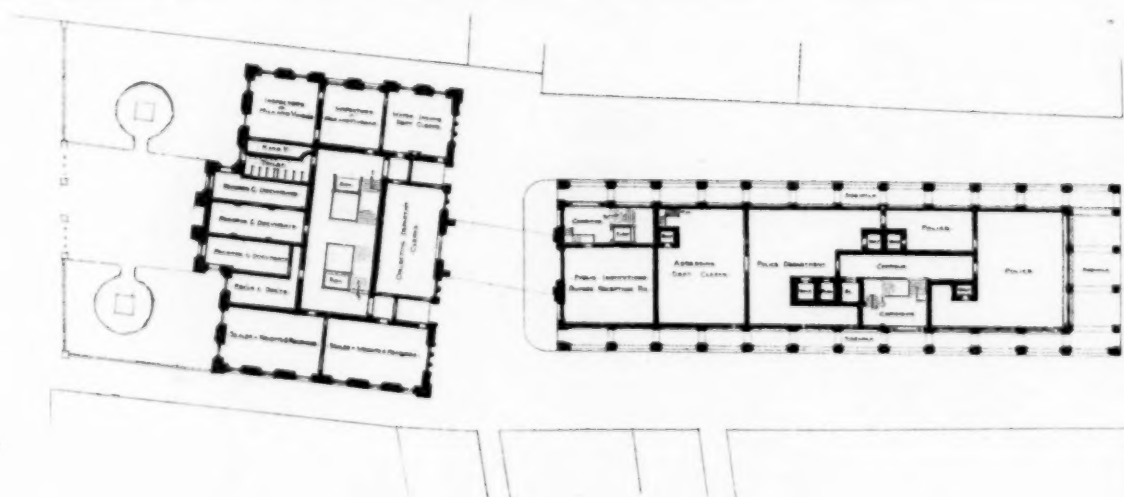
-CITY ARCHITECT-



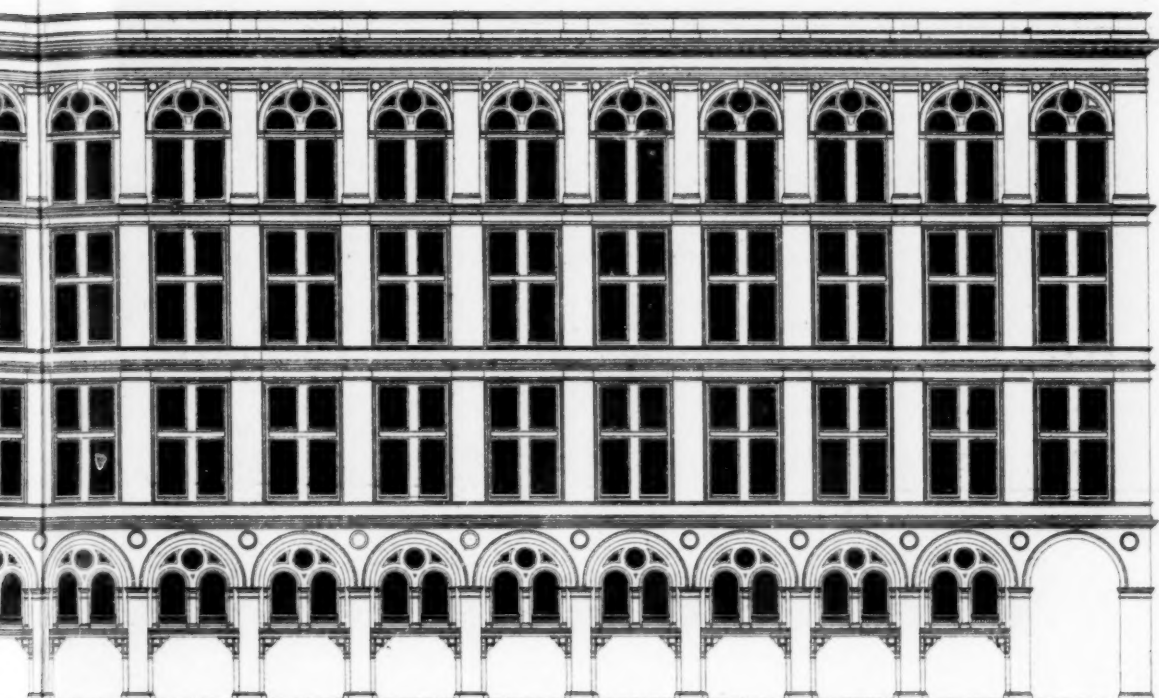


Elevation on Court Square,
Scale

CITY OF BOSTON
ALTERATION OF PRESENT CITY HALL AND CO.

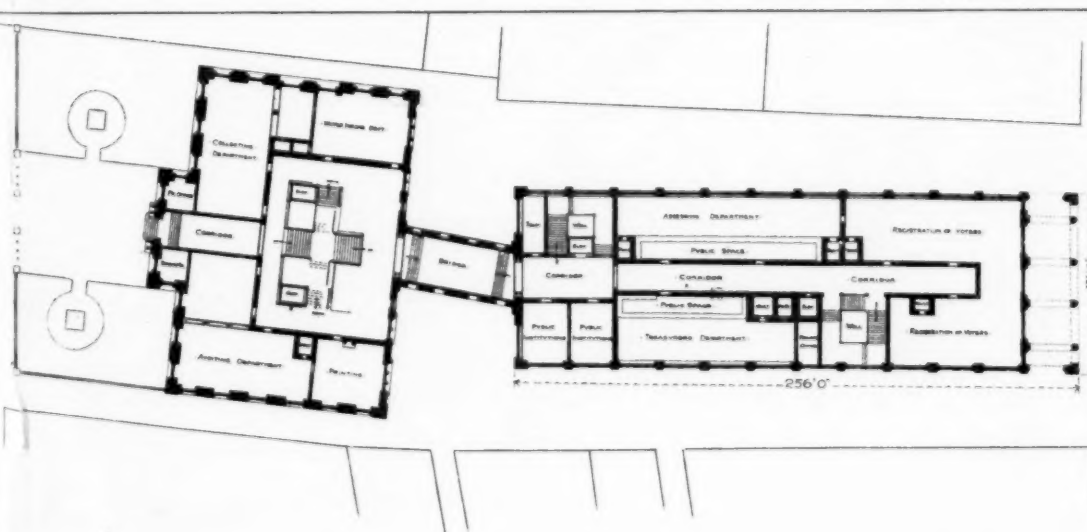


PLAN OF BASEMENT FLOOR



BOSTON.
COURT HOUSE EXTENSION.

Edmund M. Wheelwright,
City Architect.



PLAN OF FIRST FLOOR.