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THE most important decision which has yet been given in the matter of the damages due to architects for unjustifiable dismissal has just been announced in France. It is true that French precedents are not much regarded in American or English courts, but it is something to have the view taken of the subject by the inferior courts in which the American cases of the kind have hitherto been decided confirmed, on final appeal, by the Council of State of France. (Conseil d'Etat, 26 December, 1891. *Cassien-Bernard vs. Town of Montpellier*.) Several years ago, the distinguished architect, Cassien-Bernard, was selected as the architect of a theatre in the important provincial town of Montpellier. The plans were completed, the contracts made, and the building was well advanced, when the town authorities took one of those sudden prejudices against the architect which those experienced in public work know so well. M. Cassien-Bernard, who had kept a representative at Montpellier, recalled him, for reasons best known to himself. It often happens that a weak-minded young man in such a position, if found to be susceptible to flattery, is purposely led by unscrupulous committee-men into unwarranted assumptions of authority, and other disloyal actions, which they can use later against his employer; and, although we, of course, do not know whether this was the case in the present instance, it suited the Montpellier authorities to resent the change as a grievance to themselves. They next took it into their heads to demand that the architect himself should take up his residence in Montpellier; and, when this invitation was declined, they summarily dismissed him, and had his work completed by some one else. M. Cassien-Bernard sued the town for damages for his unjustifiable dismissal, and for the injury done by it to his reputation. The town authorities, as M. Ravon says, in *La Construction Moderne*, "exhausted the resources of legal trickery" against the architect, and met his claim with all the counter-claims they could think of, only, after years of litigation, to be defeated at every point, and condemned to pay the architect's claim for compensation in full, with compound interest, and all the costs. The claim of the architect for damages on account of injury to his reputation was rejected, as it almost invariably is in such cases, but in all other respects he was completely victorious. The town claimed, as a matter of course, that the architect had by his negligence and want of skill involved it in enormous extra expenses, and so on; but the court held that the extras complained of came mostly from supplementary work, which it was impossible to foresee at the time of making the plans,

or from modifications of the plans, made during the progress of the building, which had been regularly approved. As to the amount of the damages to be paid to the architect, the court held that, as the architect would have incurred some expense if he had continued to direct the work, the probable amount of this expense, which, of course, he saved by his dismissal, should be deducted from the total sum which would have been due him if he had completed his commission. This probable expense the court estimated at two per cent on the cost of the work remaining to be completed; and ordered the town to pay the architect four per cent on the cost of the work done up to the time of his dismissal, and three per cent on the cost of all the work remaining to be done at that time.

ALTHOUGH M. Cassien-Bernard thus won a complete victory, experienced architects do not need to be told that his victory cost him years of anxiety, and distraction from his business, besides, probably, a sum of money in lawyers' bills nearly or quite equal to the amount recovered from the municipality; while the town officials had simply to sign drafts on the public treasury for all the fees, costs and judgments, with, very likely, an additional compensation to themselves for their trouble, if not, indeed, some substantial sums for their legal services in the unsuccessful attempt to cheat the architect out of his pay. This is the usual character of the struggles between architects and corporations, and such will it continue until architects combine for mutual defence against the overwhelming preponderance which the law gives the richer party, through the delays, counter-suits, and other means of vexation which it puts in his hands. As a rule, the architect finds judges and juries fair and reasonable, when his case reaches their hands, but he has, so to speak, to wade through a sea of lawyers' bills before he can get it to that point, and there is no reason why a hundred architects, as is now the case, should pay a hundred lawyers for getting a point of law established, or a case won, which might equally well be managed by one lawyer, paid by contributions from the hundred architects. We hear occasionally that the American Institute of Architects is "about to act" or "has appointed a committee to take measures" in regard to this most important matter, but the years pass, and nothing whatever is done.

ONE of the most interesting electric-light plants in this country is that at Bristol, N. H., which is much less known than it should be. There are several large hotels in Switzerland, with the villages which cluster around them, which are illuminated by electric apparatus driven by some neighboring waterfall; but at Bristol the entire town, containing five or six hundred houses, two hotels, many stores and a dozen or more factories, is profusely lighted with incandescent lights, supplied by power from the Pemigewasset River, which tumbles in a series of cascades through the picturesque and pretty settlement. There are so many places in New England, and, perhaps, also on the Pacific coast, which might be cheaply supplied with light by similar means, that it is surprising that the system has not become common. A good-sized brook and mill-pond would furnish all the power needed for a considerable village, and there are comparatively few New England villages which are not provided with this; while nothing further is needed but to string the wires and hang the lamps.

A PARAGRAPH appeared in the newspapers a few days ago about a company which had been formed to "grind up coal," and form it into bricks with tar, as is done abroad. It is difficult to see what would be the use of "grinding up" coal for the purpose, as the smallest "nut-size" coal is worth much more per ton than the artificial bricks, while the latter, as used abroad, seem to be made of coal as large as the waste-heaps at the mines will afford, rather than of anything like "ground" coal; but there is a circumstance to be considered about the bricks of coal conglomerated with tar—that they emit an insupportable stench while burning. For locomotives, which consume large quantities of them, this is not a serious objection, and a close stove with a good draught might burn them without serious annoyance to the proprietors of the stove; but, if the fumes are drawn up the chimney, they are only distributed over the neighborhood, to the great annoyance of the people who happen to live near. If the coal

used for the bricks contains sulphur, as it often does, the case is so much worse, and the smell, after once entering a room, clings for months to the wall-paper and furniture. Of course, it is a good thing to utilize the waste product of finely broken coal, which accumulates in immense heaps around the mouths of the mines, but the process of utilization should be carried on with discretion.

THE *Thonindustrie-Zeitung* says that the "saltpetre" efflorescence on bricks is often, if not generally, caused by the presence of lime in the clay of which they are made, and it says that the efflorescence may often be seen on bricks while drying in the sun at the manufactory, before they are burned. Where lime in the clay is the cause of the trouble, it says that the efflorescence can be entirely prevented by dipping the bricks in dilute acid just before burning. Hydrochloric acid is the best for the purpose. If the clay contains much lime, the acid should be weak; if the proportion of lime is small, it may be stronger, the point being to keep the acid so dilute as not to injure the bricks by a rapid disengagement of bubbles of carbonic acid from the clay. With average clay, a mixture of one part commercial hydrochloric acid with forty of water answers well. Forty quarts of water are put into a cask, and one quart of acid added. This will give acid enough for dipping five hundred bricks. The bricks, when thoroughly dried in the air and ready for burning, are dipped for a second in the cask of acid, and then dried again and burned in the usual manner. After five hundred bricks have been dipped the liquid will be exhausted, and a fresh solution must be prepared. The bricks so dipped burn with a clear, even color, very suitable for face-bricks. In Germany, the operation adds only twelve cents per thousand to the cost of the bricks, but the expense would probably be far greater here. However, the idea seems a good one, and not only clay containing lime, but other clays containing various crystallizable substances, might, perhaps, be treated with acid before burning to great advantage.

WE mentioned a few weeks ago that an attempt was being made to secure the adoption by the German Government of mechanics' lien laws something like our own, giving to persons actually working on a building a preferred claim, secured by a lien on the estate, for their wages. Last month, a deputation of delegates from the building workmen of Berlin was received by the Secretary of State, Dr. Bosse, for a discussion on the subject. One of the representatives of the workmen handed to the Secretary a communication from the Consul-General of Germany at New York, describing and explaining the mechanics' lien laws of the United States, and another set forth the unhappy condition of the Berlin workmen. The Secretary listened with attention, and then assured the delegation that the Government would endeavor to meet the wishes of the workmen in this matter, but that there were great difficulties in the way, and he had himself found no possible means by which such privileges could be secured to workmen, at least, in the form proposed in the petition. There was no doubt of the unhappy condition of the building industry, and of the necessity, especially in Berlin, that some aid should be extended to workmen. The Prussian Government had already taken measures in regard to securing by law the precedence of debts to workmen, but the other German Governments had as yet found no occasion for doing so, and he thought that the matter might, perhaps, for the present be treated by municipal and local regulations.

THE London School Board has just had a struggle with a builder, in which it came out second-best. Some six years ago, a school-house was built in London, from the designs of Mr. E. R. Robson, then architect to the Board, by Mr. H. L. Holloway. Mr. Robson's arrangement with the Board was that he should not superintend the building of the school-houses which he designed, but that the superintendence should be confided to professional inspectors in the service of the Board. As most architects know, such an arrangement is almost always productive of dissatisfaction, recrimination and unhappiness all around, and the present case was no exception to the rule. Mr. Robson having been expressly and absolutely excluded by his contract with the Board from the supervision of the workmanship and materials, naturally made no investigation of them on his visits to the building, but devoted himself to observing whether his plans

had been carried out; and issued his final certificate, as had been expressly provided, on the certificate of the Board's superintendent that the workmanship and materials were in accordance with the contract. There was a clerk-of-works of the usual sort, constantly present on the work, in addition to the inspector, but he confined himself to reporting to the architect from day to day, and appears to have been considered much inferior in rank and dignity to the inspector, who took upon himself, in direct violation of the contract, to order changes made, and authorize the omission of certain works required by the specifications. When the building was completed, the inspector certified that the workmanship and materials were in accordance with the contract, the architect certified that the plans had been carried out to his satisfaction, and the contract price was paid. Two years later, a new School Board was elected, and it is hardly necessary to say that the members at once began to show their zeal and knowledge by investigating and upsetting as much as possible of the work that had been done by their predecessors. Among other things, it occurred to them to accuse Mr. Holloway of fraud, and demand damages from him, on the sole ground, apparently, that they found that a drain had been laid without a bed of concrete under it. It would have been wise, in such a case as this, to have consulted the architect of the building as to the facts of the case, before appealing to the law; but the Board preferred not to do so, and went into court apparently without having made any inquiries about the matter. On the trial, it appeared that the concrete bed under the drain was left out by express order of the inspector of the Board; and as no other evidence of "fraud" appeared, the jury, without waiting to hear the argument for the defence, rendered a verdict for the defendant.

MR. T. CLAXTON FIDLER recently read an interesting address before the Dundee Institute of Architecture, Science and Art, upon the scientific knowledge of the ancients, as shown in their works of architecture and engineering. It will be remembered that a set of sculptor's tools, of bronze, hardened by some unknown process, was lately dug up in Rome; and it seems from Professor Fidler that the hardened bronze was preferred to any other material for such tools by the Egyptians, and probably by the Assyrians, thousands of years before the founding of Rome. It has generally been thought that the hardened bronze of the Egyptians was used because iron was unknown; but it is now well established that the Egyptians, Assyrians, Greeks and Romans were well acquainted, not only with iron but with steel. An iron implement has been discovered in one of the chambers of the Great Pyramid, and a steel cross-cut saw was excavated at Nineveh by Layard; while Dr. Schliemann found iron objects on the ruins of Troy; and extensive slag-heaps still remain in the Sinaitic Peninsula, showing that the extraction of iron from the ore must have been carried on there from the earliest antiquity. Apart from the use of metal, however, the Roman engineering works still existing prove that those who built them were consummate engineers. The aqueduct which supplied the city of Nemausus, the modern Nîmes, with water, is built in a very circuitous course for a distance of thirty-five miles, several immense stone bridges, one, having two hundred and fifty-six arches, being a mile and a quarter long, while another, the famous Pont du Gard, is nearly one hundred and sixty feet high; yet the whole structure is adjusted to give a uniform gradient of about one inch in two hundred and fifty feet, this gradient just sufficing to raise the aqueduct through the sixty-one feet difference of level between the city reservoir and the spring which formed the source of supply. It is not every modern engineer who would like to undertake to set out an aqueduct thirty-five miles long at such a gradient; yet the Romans appear to have thought nothing of the task, and nearly all the Roman aqueducts fall uniformly, although inverted siphons of lead pipe, several specimens of which are still in existence, were used on occasion. Even in driving tunnels, both the Greeks and the Romans were very expert. A Greek tunnel in the island of Samos, which is described by Herodotus, has been rediscovered by the Greek clergy, and partly explored. It is found that the tunnel was excavated from both ends at once, in the modern way, and, although it is about two-thirds of a mile long, the headings meet with tolerable accuracy. In Italy, the Lacus Fucinus was drained, under the Emperor Claudius, by a tunnel nearly three miles long, driven through a mountain whose summit is a thousand feet above the tunnel.

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

VERBAL AND WRITTEN CONTRACTS.—WRITTEN CONTRACT EXCLUDES VERBAL VARIATIONS.

Doorway of the Maison des Halles, Neuchâtel, Switzerland. From *La Construction Moderne*.

It has been before observed (Page 181) that a written contract is not legally more binding than a verbal one, but that, in view of the greater formality attending the signing and delivery of a written document, the written paper is presumed in law to contain all that the parties to it intended to agree upon, in its final and mature shape, casting aside all merely verbal propositions and suggestions; so that evidence of the latter is not received in court, where it tends to contradict or modify the terms of the written contract. In an Illinois case,² which finds a good many parallels elsewhere, the contractors claimed that it was understood that certain changes should be made in the specifications attached to the contract, but that at the time of signing the contract these changes had not been made, and that therefore the contract was never perfected. The Supreme Court ruled that all prior agreements, understandings and arrangements must be regarded as merged in the contract as signed, and evidence of parol variations must be excluded. So in the case of *Stuart vs. Cambridge*, described at length in Page 148 and the following, where parol evidence was offered that the plaintiff made his estimate from a section showing the foundations extending only fourteen inches below the cellar floor, and that other bidders did the same, it was held that the evidence was inadmissible.

A somewhat similar, but still more instructive case³ is to be in the Minnesota reports. A firm of architects and builders furnished plans and specifications, and contracted to build a mercantile building on a certain lot. The specifications gave widths of footings, etc., but no other particulars about foundations. When the matter of building was talked about, the question of draining the subsoil of the lot was mentioned, and the owners said that they did not think it would need draining,

but if any draining should be needed, they would do it. The contract, as finally entered into, was under seal. In it the contractors agreed to build, erect and complete a three-story business house on a certain lot, in accordance with plans and specifications, which formed part of the contract. On uncovering the subsoil, after the signing of the contract, quicksand appeared, which the contractors had no previous knowledge of and could not have known anything about. The defendants' pleading averred that, on the discovery of the quicksand, the owners, finding that the subsoil would not, unless drained, sustain the proposed building "promised that they would cause

DRAINING QUICKSAND.

the land to be well and thoroughly drained; but that they wholly failed and neglected to drain the land or any part thereof." The contractors went on with the building, without seeing that the subsoil was put in proper condition. When it was nearly completed, it fell, the quicksand beneath having become saturated with water. The contractors began to rebuild, and had nearly completed the building a second time, when it fell again, from the same cause as before. They then refused to proceed further with the work under their contract, and the owners brought suit to recover back the money which they had already paid on account of the contract, with damages for loss of the use of the lot during the unsuccessful attempts to build upon it, and for injury caused to the adjoining building, also owned by them, and to the goods in it, by the fall of the new structure.

The Supreme Court of Minnesota decided in favor of the owners on all the points brought up. In regard to the alleged promise made by them, before the signing of the contract, to drain the land, the Court said that evidence of this was inadmissible to vary the rights and obligations of the parties under the subsequent sealed contract. As to the subsequent promise of the owners, made after the discovery of the quicksand, to "cause the land to be well and thoroughly drained," the Court said that this mere promise, being without consideration, was *nudum pactum*, on which the contractors had no right to rely, and which was inoperative to vary the sealed contract. In regard to what the agreement required the contractors to do, the Court held that the defect in the soil did not excuse the defendants from the performance of their contract; that for their failure to perform it they were liable in damages to the owners, and that it was no defence to the action that the building, so far as it was erected, was constructed in accordance with the plans and specifications.

During the trial of the case, the defendant's counsel offered to prove that on the discovery of the insufficiency of the land to sustain the building, unless drained, the owners agreed to keep the land well and properly drained during the construction of the building; and in consequence thereof the defendants did not drain it themselves; that the owners kept the land drained until just before the fall of the building, when they neglected to keep the same drained, by reason of which neglect the soil became saturated with water, and the building fell. The Court held that this evidence was inadmissible, the facts offered to be proved not being pleaded in the defendant's answer, and being inconsistent with the facts therein pleaded. The Court was of opinion, however, that the facts offered to be proved would, if pleaded, constitute a good defence to the action.

THE RESPONSIBILITY FOR THE FAILURE OF LEGAL STRUCTURES.

It may not be out of place to remark here that, while the unfortunate builders were compelled to bear the expense of repairing the damage caused by a defect which they could not have foreseen when they signed their contract, a very different rule seems to have been applied to their counsel. The latter, to whom was committed the responsibility of the case, appears to have erected, with a full knowledge of the facts, a fabric of defence which collapsed in a moment on the application of well-known legal principles. It was shown that he had a good foundation for a successful defence, if he had chosen to avail himself of it; yet he contented himself with basing his case on a parol agreement made before the signing of the written contract, and not mentioned in the latter, and on a promise which was obviously without consideration. A more insecure foundation for a legal structure it would be difficult to conceive; yet, having chosen to use this, instead of the substantial one which lay close at hand, we do not find that he

¹ Continued from No. 851, page 38.² *Coey vs. Lehmann*, 79 Ill. 173. *Lane vs. Sharp*, 3 Scam. 566, 7. *Pearce vs. McGowan*, 35 Minn. 507. *McCormick vs. Wilson*, 39 Minn. 467. *Taylor vs. Fox*, 16 Mo. App. 527. *Stuart vs. Cambridge*, 125 Mass. 102.³ *Stees vs. Leonard*, 20 Minn. 494.

was even asked to indemnify his clients for the collapse of their interest under his care, while they were compelled, apparently as a result of his ineffectual championship, to suffer enormous loss on account of a defect in the foundation of their structure, which they could not possibly have known anything about, and which, on its discovery, some one else had agreed to remedy.

However, it has been already observed that the law is made by lawyers, not by contractors, and the latter must content themselves with studying legal matters as they are, not as they would like to have them.

PAROL TESTIMONY ADMISSIBLE TO SUPPLY DEFICIENCIES IN WRITTEN CONTRACT.

There is an apparent exception to the rule that parol testimony is not admissible to vary a written contract, in cases where the verbal testimony, instead of varying the written agreement, merely supplies deficiencies in it. A mason named Daegling once made a written agreement with a general contractor, Donlin¹ "to do the mason work" in rebuilding a certain court-house which had been burned, "according to plans and specifications to be furnished," and "under the supervision and to the entire satisfaction" of a superintendent to be appointed by the county authorities. No plan or specification showing how much work was to be done on the outside walls was ever furnished, but Donlin showed Daegling on the spot the lines to which he wished the walls to be taken down and rebuilt. Daegling took them down accordingly, but, when they had been taken down to Donlin's line, the county authorities wished to have more taken down, and the architect directed that this should be done. Daegling said that this would be extra work, and Donlin said he would pay what it was worth. Afterwards, he claimed that it was not extra, on the ground that the verbal conversation about the line to which the walls should be taken down was superseded by the written contract, and that testimony in regard to it was not admissible. The Supreme Court of Illinois, however, held that the testimony was admissible, as supplying the omission in the written contract of any description of the amount of work to be done; and that the taking down of the wall beyond the line which he had given was really extra work.

So, where there is only a written memorandum of a contract,² which does not purport to be a complete expression of the entire contract, or where a part only is reduced to writing, the matter omitted may be supplied by parol evidence.

Where fraud was used in obtaining a signature to a contract, evidence in regard to it will be admissible, even though the fraud may have consisted in verbal representations in regard to the matters subsequently covered by the written contract. It is a familiar rule of law that fraud vitiates all contracts, and if this is alleged in the pleadings, the evidence necessary to sustain the allegation will be received.

One Strimple³ agreed with Emily Brown to build for her a house, for a certain sum, to be completed on a certain day, with liquidated damages for delay, which were fixed at \$3 per day. The house was to be completed October 15. It was not done until December 5. Mrs. Brown paid the contract price in full, and then sued to recover back \$500 as damages for the delay. Strimple claimed (1) that the lot was represented as unobstructed, whereas there were old buildings on it, which had to be removed, and that this caused twenty days delay; (2) that the plaintiff represented that there was a water-main in the street, whereas there was none; that it was the duty of the plaintiff to afford facilities for obtaining water; and that, on her attention being called to the absence of a water-main, she promised to attend to it, but failed to do so, whereby a delay of four weeks was caused; and that all the representations of the plaintiff in regard to the water were false and fraudulent; (3) that the plaintiff requested the defendant not to lay certain parts of a pavement until she had completed certain terrace steps, which she proposed to build in front of the house; (4) that during the construction of the house, the planing-mill was burned, causing a delay of thirty-five days. The defendant also claimed that there was a custom, when old buildings were to be removed, to mention this fact in the specification. It was proved that, in regard to the planing-mill, the defendant made a written claim on the architect for an extension of the time of completion, and that the architect allowed

it; but no claim was made or allowed in regard to any of the other alleged causes of delay. The contract provided that the forfeiture for delay should be due from the contractor, provided he was not kept back by an unavoidable accident or hindrance, over which he had, or could have, no control; and that no such accident or hindrance should be credited as an extension of time for the completion of the contract, unless the same should be claimed under a written request by the party of the second part, and approved by the party of the first part, or by the superintending architect, in the week that any accident or hindrance should occur.

The court held that the evidence of the custom of builders in regard to specifying about old buildings on a lot was inadmissible, as the plaintiff was not a member of the class in which this custom existed. The defence on the ground of the burning of the planing-mill was admitted; but, as to the other defences, the court said that, if sustainable at all, they rested on the ground of false representations made, and orders given by the plaintiff. There was no evidence whatever of either of these, or of any written application to the architect for extension of time on account of them. Judgment was therefore ordered against the builder.

[To be continued.]

ON THE OLDER FORMS OF TERRA-COTTA ROOFING-TILES. 4— IV.

SWITZERLAND.

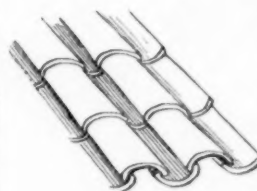


Fig. 67.

THE flat tile is everywhere common in Berne, Zurich and other parts of Northern Switzerland. In very old houses the normal tile (*imbr.*) is occasionally seen (Fig. 67), but even in these cases the newer additions to the roof are covered with a flat tile. In some instances the ridge is finished with wood or metal, instead of the usual ridge-tile. The tiles are often seen aligned instead of breaking joint; in this case the roof is first shingled. An elaborate structure of brick, stone and roofing-tile, held together by mortar, forms the top

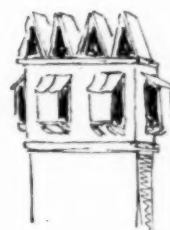
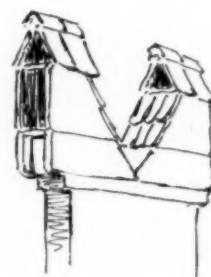


Fig. 68.

of most of the chimneys, and suggests the idea of a bird-house, or such an affair as a child might build with blocks.

¹ Donlin vs. Daegling, 80 Ill. 608.

² State ex rel. Yeoman vs. Hoshaw, 98 Mo. 358.

³ Brown vs. Strimple, 21 Mo. App. 338.

⁴ Continued from No. 850, page 27.

They are certainly picturesque and apparently durable, as none of them seem to be dilapidated. Figure 68 is reproduced from a rough sketch of a few chimney tops in Berne.

At the Historical Museum at Berne I found an interesting collection of roofing-tiles. I learned that the curator of this department was an architect, and this accounted for the extent of the collection, which was the best one that I saw anywhere in Europe. Among



Fig. 69.

the tiles was one from the Castle of Trachselwald with the date of 1300 on the label. This was a plain tile with pointed end. It was 34.2 centimetres long and 19 centimetres wide. A rude figure of a bear with rough bars below and above, enclosed in a circular panel, was impressed upon the tile near its lower end (Fig. 69). Another flat tile, also pointed at the lower end, had two many-rayed stars impressed upon it. The date 1666 had been incised with a small point across the middle of the tile, and at the square end the same date had been marked with the finger (Fig. 70). This tile was 36.8 centimetres long and 19.3 centimetres wide. In this collection was a curious glazed tile, evidently made for the top of a stove, but representing a sloping roof. This had alternate squares of brown and straw-colored glaze, representing the pointed flat tile. Its date was supposed to be 1300. In the collection were also ridge-tiles with foliated ornament (Fig. 71). These were green glazed, and labelled Castle Thurgau, Canton of Thurgau, city of Arbon. The specimen figured was 37 centimetres in length.

At the Antiquarian Museum at Zurich were preserved a few old flat tiles (Fig. 72). These far exceeded the dimensions of the other flat tiles described, one specimen measuring 46.8 centimetres in length and 17.2 centimetres in breadth. The nib was large and broad, and the lower end of the tile was roundly pointed. Another specimen of the same length, and having a breadth of 23.5 centimetres, was pointed, the pointed end being cut off square. The lower exposed portion was coated with salt glaze; the nib was small and recurved. These tiles were about 350 years old.

At Basle the buildings were somewhat mongrel in their appearance, partially losing their Swiss character without assuming their German character. The tiles were flat with rounded ends. On the old cathedral in this town the tiles were glazed green, red and white, and in the rebuilding of certain portions of the cathedral new flat tiles, glazed the same colors, were being used, the bright glaze of even the old tiles forming a startling and disagreeable contrast to the time-stained stone and other material of the structure. Some interesting ridge-tiles with green and brown glazes were found in a local museum. These had Gothic scrolls and leaves springing from their crests; in one case the finial was held to the tile by an iron rod, as a dowel. (The height of this tile was .67 centimetres.) These tiles were labelled Nicholas Chapel, fifteenth century (Fig. 73). At Interlachen, the flat tile was seen on some of the older buildings, the modern structure being roofed with modern forms of tiles, which seemed to have certain merits in securing a tight roof (Figs. 74 and 75).¹



Fig. 70.

The new arsenal at Berne had a tiled roof resting on battens, each tile so loose that it could be easily pushed up from within. There was no sheathing beneath, and here and there glints of light could be seen. Indeed, it was blowing a gale and snowing at the time I was there, and a little snow had blown in. That the roof was waterproof was implied by the fact that a new building filled with polished weapons had only this kind of a roof-covering for protection. From the behavior of tiled roofs in our country, we have certainly not yet learned the secret of a good tile.

FRANCE.

My information concerning French roofing-tiles is very meagre, being chiefly based on hasty notes made in Paris and vicinity, and observations from the main railways from Paris to Brussels and Calais respectively, supplemented by the examination of a few photographs.



Fig. 71.

The flat tile appears to be the dominant form throughout central and northern France, while the normal tile (*imb.*) is common farther south, and especially along the borders of the

Mediterranean. The flat tile is usually square at its lower end and smaller than the German or Swiss form. At the last Paris Exposition many forms of roofing-tiles were exhibited from French tileries, among which were large numbers of flat tiles.

The introduction of roofing-tiles among the peasantry must have been comparatively recent. Leslie (*Essays on Moral and Political Philosophy*), writing of Puy-de-Dôme, a central department of



Fig. 72.

France, says: "I saw many instances of a change which is the precursor of an elevation of the standard of habitation, namely, the substitution of tile for thatch roof." In Spenser's *Sociological Tables* a number of references are conveniently accessible concerning the roofing material in France in early centuries. Vitruvius, the famous Roman architect, in the first century of our era says: "The Gauls to this day build their houses of

boughs, reeds and mud, with roofing of oaken shingles or of straw. Even at Massalia we may observe roofs made without tiles, of earth kneaded, as it were, with straw." "It appears from Orderic's narrative (1090 A. D.) that the roof of the castle was covered with shingles of wood instead of slates or tiles. This is still the case with respect to many of the towers of the country churches in the Lieuvain and the Roumois."

"The working of plaster quarries, the use of tiles for roofing houses and afterwards the discovery of slate . . . entirely changed the appearance of houses. It was only in the fifteenth century that slate was used. In 1465 it was just begun to be known of." (Chéruel, *Dictionary of Institutions, Manners and Customs of France*.)

GREAT BRITAIN.

In England two kinds of roofing-tiles are in use—the flat tile, which is the form most commonly seen, and the pan tile, which is

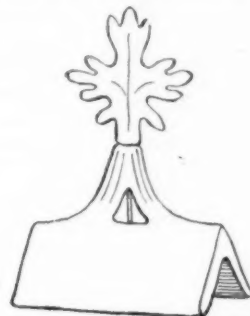


Fig. 73.

found widely distributed. This tile is also known as the Flemish tile, this name implying that it was first introduced from Flanders.

The cheapness and excellent quality of slate and its almost universal use has evidently checked the development of the roofing-tile. One sees no attempt at architectural effect in the treatment of the roof, but the tiling is done in that durable manner which characterizes English work in general. The head of the pan tile has two nibs instead of the usual single one, and the tiles are adjusted with greater care to the roof.

In the collection of building material at the South Kensington Museum may be seen a great variety of roofing-tiles. In the catalogue of this material, published by this museum in 1876, these roofing-tiles are variously recorded as plain tiles, red, green and brown; plain tiles colored to match old tiling; terra metallic; single,

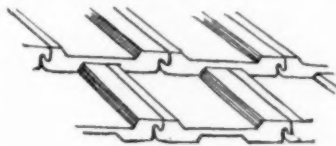


Fig. 74.

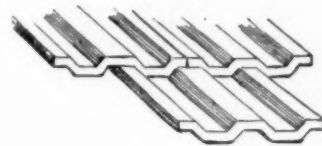


Fig. 75.

double and treble channelled tiles; flat or Roman ornamental roofing-tiles; ridge-tiles with ornamental crests, and many others. As most of these tiles are modern productions (many of them the result of England's awakening which followed the World's

¹ A modern interlocking tile is made at Allkirch village, Canton of Berne, by Gilardoni Brothers. I found it on many houses at Berne, and, if I remember rightly, it was the tile used on the new arsenal at Berne.

Fair of 1851, and the renewed impulse of the French Exposition of 1855) their consideration does not properly come within the scope of this paper. One tile, however, figured in the catalogue above referred to, appears interesting as well as serviceable (Fig. 76). It is a French tile known as the tile Courtois, from the name of its inventor.

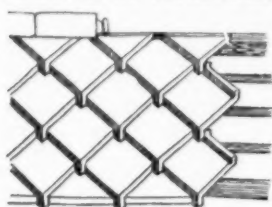


Fig. 76.

and, curiously enough, at Stockholm. This tile might be regarded as a variety of the pan tile with three equidistant folds, the side lap being made as in the pan tile.

From various sources one may gather a continuous history of the introduction and successive appearances of the various forms of roofing-tiles in England. The early British houses were circular, with low stone walls and conical shingle roofs. With such a form of roof the use of terra-cotta roofing-tiles was well nigh impossible, and a square house with the ordinary sloping roof must have preceded the use of roofing-tiles.

Before the introduction of pottery tiles, rough stones were used for roof coverings. "In localities which supplied laminated stones such as Gloucestershire and Hampshire in Britain, the Romans often roofed their buildings with stone tiles fastened on with iron nails," (See tiles, *Encyclopædia Britannica*). Lieutenant-general Pitt-Rivers in a communication on an ancient British settlement excavated near Rushmore, Salisbury (*Journal Anthropological Institute*, Vol. XVII p. 190), records that "tiles of Purbeck shale with nail-holes to fasten them by, were also found more frequently in the rich quarter than elsewhere and terra-cotta tegulae were also found there, but only in fragments and used as pavements, for which purpose these tiles were frequently employed elsewhere. The absence of imbrices which are a necessary adjunct in the formation of a Roman tiled roof confirms the opinion that the roofs of the Romano-British village were not tiled in this way. Although the fragments of the tiles show that they had certainly been originally constructed for roofing; their use for a second-hand purpose conveys the impression of poverty, although too much stress must not be laid upon the circumstance."

It would be interesting to ascertain whether any fragments of these tegulae had traces of cement upon them, for we have seen that in Japan, the tegulae well bedded in clay or pointed with mortar may be used without imbrices.

It was customary in the Middle Ages and up to within recent centuries to use rough-stone tiling. At Broadway, near Worcester, England, one may see a village in which many of the cottage roofs are tiled with small flat stones of the roughest description. These are held to the roof by oaken pins which suspend them on the battens placed across the rafters for the purpose. Figure 77 shows the appearance of one of these cottage roofs and the manner in which even the small roofs of dormer windows and hips may be neatly covered by this rough material.

Figure 78 shows the appearance of a portion of the roof from within. The stone tile (Fig. 79) used for this purpose measures roughly, .22 centimetres in length by .14 centimetres in breadth, with a general thickness of .02 centimetres. It is made of some fossiliferous limestone. I learned that these houses were over three hundred years old. I also observed on one of the oldest houses in Oxford

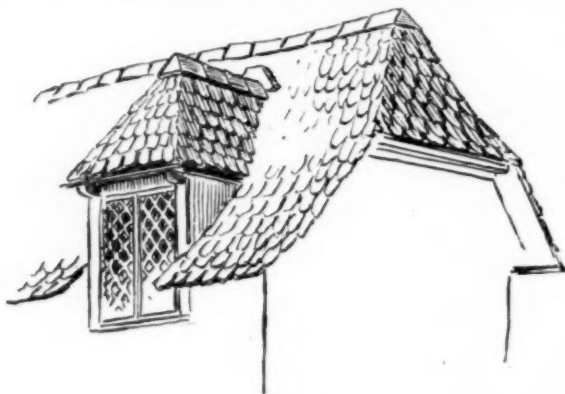


Fig. 77.

similar rough-stone tiles, and doubtless, they occur in many other places.

In an interesting work by Thomas Wright on the "*Homes of Other Days*" many reproductions of old drawings of Saxon and Norman times are given from which some hints of the kinds of roofing tiles in use may be found. From the Harleian MS. dating from the ninth

century, a picture is given of an Anglo-Saxon house; in this picture a variety of roofing-tiles are shown, the most conspicuous of which is the normal tile. The flat Roman tile is also given, and another form resembling round-ended plain tiles, though these may be wooden shingles. Flat Roman tiles again appear in another drawing of the tenth century, and in another picture of this epoch the flat tile with round end, and the normal tile are represented. A picture of a town of the tenth century shows only the normal tile. In an Anglo-Saxon MS. of the Psalms, the normal tile is indicated, and what appears to be an imbricated ridge of tiles. In a roof shown in the Bayeux tapestry the normal tile is seen. In an early Saxon illumination a large normal tile is shown. In early Norman times the normal tile is depicted in the drawings. In all the above cases the normal tile (*imb.*) is the one indicated. A complete view of a house is shown in a MS. of the fourteenth century, and this represents the flat tile rounded at its lower end. In the same MS. flat tiles are shown arranged in a form often seen in the arrangement of slates in England to-day, where an interspace of an inch or more is left between contiguous slates in a horizontal line. From this time on the flat tile is the only one shown in the various drawings given. It would seem by this that the pan tile was introduced from Belgium within recent centuries.

In consequence of the frequency of fires it was enacted in the first year of Richard I (1189) that the lower story of all houses in the City of London should be built with stone and the roofs covered with slate or tile (*"Pictorial History of England,"* Vol. II, p. 230). In the fourteenth century London houses were generally roofed with tiles.

"In taking down part of a late Norman building in Southwark some years ago, to make the approaches to the present London bridge, some tiles were found built into the wall and may have formed part of the original structure. They were thirteen inches by eight inches and varied in thickness from five-eighths of an inch to an inch. Half of one side, which would have been exposed upon a roof, was glazed, and they were made with pin-holes in them, as is

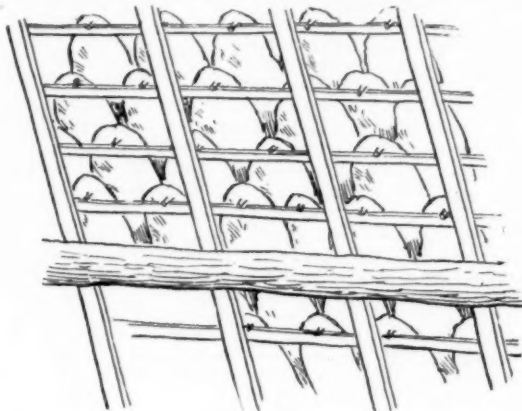


Fig. 78.

still the custom in some districts." (*Glossary of Architecture*, Vol. I, p. 463.) In the work above cited it is stated that in the fourteenth century "the manufacture of tile was one of sufficient importance in England to require regulation by statute . . . whereby the dimensions of plain tile is fixed at ten by six and one-fourth and half an inch and half-quarter thick, at least. Roof or crese tile at thirteen inches long, thickness same as other." Also, that in the Middle Ages, tiles were extensively employed in covering buildings though they seem always to have been considered an inferior material to lead. In the same work is given some remarkable ridge-tiles with figures, crosses, etc., modelled upon them. These were found at Great Malvern and London; the statement is also made that flat tiles only were used at that time.

From the above data we venture to suggest the following historical sequence in the introduction of the various forms of roofing-tiles into Great Britain: First, the large flat Roman tile and at the same time the rude stone tile probably devised by the Romans while in England. Second, the normal tile, probably introduced by monks. Third, the flat tile introduced from Normandy, and, finally, the pan tile introduced from Belgium. The flat tile is not only used for roofing but is also used in finishing the vertical walls of a gable end. In this case the tiles may be cut pointed, or otherwise shaped, as in Figure 80. Dobson's hand-book of "*Tiles and Tile-Making*" says that pan tiles were formerly made with holes in them for the reception of the tile-pins by which they were hung on the laths. The common method now is to turn down a couple of nibs at the head of the tile, which answers the same purpose. The roofing-tile is used for other purposes beside that for which it was originally designed. In flower-gardens the flat, round-ended tile is found very serviceable in separating beds or bordering paths, the tiles being partially buried in the ground vertically, forming a much better dividing-line than do strips of board, which soon decay. As a coping for brick walls the roof-shaped ridge-tile forms a good and picturesque top. The same form of ridge-tile placed in an inverted position may often

be seen on the steep slopes of grass-covered railroad embankments, as cheap and useful water-conductors.

UNITED STATES.

We have seen in the course of this paper that in all parts of the world outside of savage areas and under all climatic conditions people shelter themselves beneath roofs covered with terra-cotta tiles.

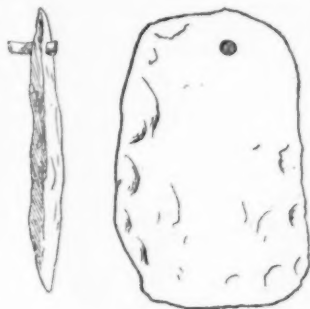


Fig. 79.

With this wide dispersion of roofing-tiles, however, there still remains a territory extending from the Atlantic to the Pacific, embracing Canada and the United States, which is virtually destitute of this ancient form of roof-covering. It is a curious fact that a material so cheap, durable and picturesque, and one so widely distributed throughout the world, should not have effected a lodgment in this country. It seems all the more singular when it is considered that the early colonists — Spanish, Dutch, French, English, German — all came from tile-using countries. This curious condition of things can only be accounted for by the fact that at the outset wood was so much cheaper than any kind of baked clay that it was used in the form of clapboards and shingles to the exclusion of other material, and thus the habit finally became ingrained.

That early attempts were made to use tiles in this country is attested by Mr. E. A. Barber, in his interesting article on the "Rise of the Pottery Industry in the United States" (*Popular Science Monthly*, December, 1891). In this article he shows that the flat roofing-tile was used in Lancaster County, Pennsylvania, as early as 1769, as tiles bearing this date scratched upon them have recently been discovered there. I am indebted to Mr. Barber for the following cut of this tile (Fig. 81). As the form of this tile and its dimensions correspond to the average flat tile seen in Germany, it is almost certain that the tile was introduced by the early German emigrants to that region. I am also indebted to Dr. Charles C. Abbott, of the University of Pennsylvania, for information regarding some pan tiles discovered by him on Burlington Island, Delaware River, New Jersey. These tiles were found associated with rudely made red and yellow brick, on the site of a house built by the Dutch in 1668, and shortly afterwards destroyed by the Indians. The outline of the specimen sent me by Dr. Abbott shows the typical Dutch pan tile of the roughest description.

Within recent years pan tiles and flat tiles have been manufactured and used in this country. Their use has been mainly confined to large structures, not for the sake of economy or utility, but for architectural effect. Such roofs have been far more expensive than similar ones in Europe, and judging from the trouble many of these roofs have given, it is quite evident either that the right kind of tile has not been made or that it has not been properly applied to the roof. From the frequent breaking of the tiles it has been supposed that our climate, with its rigorous changes, was the cause of this. I have observed, however, in Europe, that tiled roofs are quite as common in regions north of the line of frost and snow as below that line. In England the effect of frost is spoken of as being unfavorable to tiled roofs. Despite these drawbacks, it would seem that the terra-cotta tile, when properly made and adjusted, is one of the cheapest and most durable of roof-coverings, as it is certainly one of the oldest and widest distributed.

Acting as a non-conductor, the upper portion of the house is warmer in winter and cooler in summer. Slate roofs absorb and transmit a good deal of heat. Shingle roofs are a menace in times of conflagration. With the best tile clays in the world and an abundance of the rude labor usually employed in tile-making, there is no reason why roofing-tiles should not come into common use in this country, as they have in all other parts of the world.

INTERLOCKING TILE.

At the present day there are a great many forms of tiles made in Europe, especially in France and Switzerland, some of which are very ingenious. The object to be attained in an interlocking tile is to devise a form which shall by a series of ribs and corresponding depressions more thoroughly exclude water. In the United States tiles of this kind are being made besides the ordinary pan and flat tile. It is not within the purposes of this paper to speak of these in detail, as there are many kinds each possessing certain merits.

I cannot forbear, however, alluding to a remarkable exhibition of this material at the late Paris Exhibition which suggested what an extraordinary industry might spring up in this country if the merits

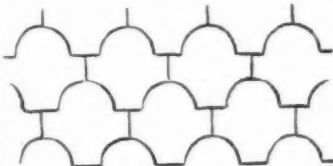


Fig. 80.

of terra-cotta roofing-tiles could be made more widely known. In this exhibition there were not only a great many displays of the ordinary flat tiles, but there were pan tiles as well as interlocking tiles made of pressed glass, by the use of which dark warehouses and attics might be made light. The tiles were made precisely like the

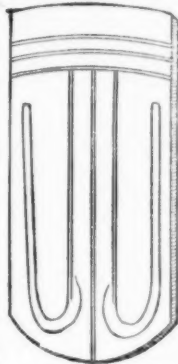


Fig. 81.

terra-cotta ones, so that here and there they could be introduced thus letting in gleams of light in usually dark places, or the entire roof might be covered with these glass tiles. There were also terra-cotta tiles perforated to admit little squares of glass. Graeber has called attention to ancient Greek tiles in the temples at Phigalia, Athens, and other places, in which the large flat terra-cotta

tile was perforated for the purpose, as he believes, of admitting light in dark places under the roof.

TILE-MAKING.

In the course of this paper it has been shown that throughout the world with the exception of our country and Canada the use of terra-cotta roofing-tiles is universal. There is no reason why they should not come into general use in this country. There are large regions in the United States, like Arizona, New Mexico and certain western States and Territories where forests are scarce or altogether absent, yet having an abundant supply of coal suitable for the baking of tiles, and the best clays in the world. With the rapid destruction of our forests and the consequent increase in the price of wood, shingles and clapboards, the tile-making industry should spring up in many parts of the country.

A few brief notes, concerning the making of tiles, are here appended to call attention to the simple appliances and the rude character of the labor employed in the manufacture, in the hopes of encouraging the industry. If we have brick-kilns everywhere we should be able to sustain tileries also.

Edward Dobson's "Hand-book on Bricks and Tiles" in Weale's series, gives illustrations of the various machines used in the making of flat and pan tiles. From this we learn that in Staffordshire a workman may produce 1,300 to 1,500 flat tiles in a day. In Gwilt's "Encyclopedia of Architecture" it is stated that "clay from which tiles are made will make good bricks — the converse does not hold good, it requires tough clay to make tiles, on account of the thinness of the tiles. Much care is required in baking; if the fire be too slack, they will not burn sufficiently hard, and if too violent they glaze and suffer in form."

It is observed also that glazed tiles are not so much affected by frost. In Europe, as in Japan, old tiles are considered better than new ones. We learn from the same authority that an ancient custom was to bed tiles in hay or moss. When the roof is full pitch this suffices without mortar; with less pitch mortar is used to point the tiles in order to keep out snow or rain, in a high wind. We have seen that in Japan and Korea, and probably in China, also, mud or clay is used in which to bed the tile, and in these as well as in all other countries mortar is used in various ways to point the tiles, particularly at the eaves and ridge.

In Germany the making of flat tiles, as I saw it near Wurtzburg, was of the simplest description. An iron frame having the outline of the tile to be made was the only important implement involved in the process. This frame represented the mould. The table upon which this rested consisted of a thick piece of plank, over which

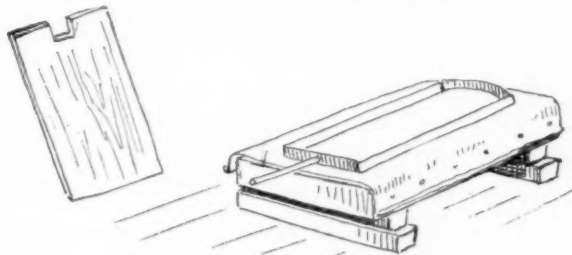


Fig. 82.

was spread a piece of woolen cloth, one edge of which was nailed to the lateral edge of the plank, while the opposite edge of the cloth had secured to it an iron rod, the weight of which kept the cloth drawn smoothly over the plank. The iron frame was now placed upon the cloth (Fig. 82) and clay was packed into it with

the hands, and then pounded down with a wooden mallet such as a moulder might use. A straight-edge was used to scrape away the superfluous clay, a little mass being left at the head of the tile which was afterwards shaped into the nib which was to hold the tiles to the laths or battens. This being done, a square piece of board notched at one end to admit the nib was placed on the frame. The workman then grasped the iron rod attached to the free end of the cloth, and with the other hand holding the board in its place, lifted the cloth and inverted the whole thing, transferring the soft tile to the board.¹ The iron frame was then removed, and the board with its unbaked tile was placed in the sun to dry. The workman informed me that he could make a thousand tiles a day. Figure 82 shows the iron frame resting on the flannel in position to



Fig. 83.

be filled with clay. The board upon which the unbaked tile is to be transferred is to be seen to the left. Figure 83 is reproduced from a hasty sketch of a Wurtzburg tiler at work.

Large dome-shaped brick ovens were used in baking the tiles. The structure was flat above, and leading down to the ovens below were small holes two or three feet apart. The fire having been started was afterwards fed by pushing into these holes at short intervals small quantities of fine coal or coal-dust. The utilization of coal-dust in this way struck me as an economical method of using this waste product. I was informed that ordinary bricks were baked in the same way.

Mr. Howard Walker informed me that in France he had seen a tiler at work first shaping a flat piece of clay into the proper dimensions and then bending it over the upper part of his leg, at the same time pushing up a nib of clay at the head of the tile with his thumb.

In Japan the tiles are made in moulds, dried in the sun, and baked with pine fagots and twigs for fuel. Figure 84 represents the appearance of a Japanese tiler near Tokio.

SUMMARY AND CONCLUDING REMARKS.

The older roofing-tiles of the world group themselves into three distinct types, the normal or Asiatic tile, the pan or Belgic tile, which is an outgrowth of the normal tile; and the flat or Germanic tile, which is an independent form. The normal tile, the earliest known form, covers by far the greater number of roofs to-day. With few exceptions it is the only form of tile used in Asia, Asia Minor, Greece, Italy, Sicily, Spain, the countries bordering the southern shores of the Mediterranean, and all the Spanish and Portuguese colonies and countries in both hemispheres. This tile is also found in areas contiguous to the countries above mentioned.

The treatment of the roof covered with this tile in the Orient and in the Occident differs widely. In China, Korea, Japan, and countries to the south of China the ridges are usually conspicuous for their elaborate structure. The tiles are aligned with great care, the

eaves-tiles have turned margins of graceful outline with ornamental designs upon them in relief. The roofs of the more important buildings have their ridges, hips and eaves in strongly curved lines and with this treatment the curved tegula is in harmony. In the Occident one sees but little attempt at architectural effect in the treatment of the tile. The ridge is rarely more than a single course of semi-cylindrical tiles, though in certain Swiss and English glazed ridge-tiles of a few centuries ago finials were moulded upon them. The eaves-tiles differ in no respect from those of the roof and the only attempt at decoration was by the introduction of stucco or white plaster between the courses, as occasionally seen in modern Grecian houses and mediæval Spanish ones. In ancient Greece the ridge and eaves tiles, the huge discs terminating the ridges, the anti-



Fig. 84.

fixæ, etc., decorated in polychrome, added greatly to the beauty of the roofs.

The discovery by Graeber, on the site of the earliest example of Greek architecture, of a fully developed normal tile with curved tegula, and disc-closed imbrex, identical with that of Eastern Asia, compels one to believe that from the far East came the roofing-tile. The curved tegula would naturally harmonize with the curved lines of the Eastern roof, while a straight-edged tile would be more in accordance with the straight lines of the Greek roof, and as a matter-of-fact, we find the curved tegula soon yielding to the broad flat tegula, which ever after became the dominant form for the monumental buildings of ancient Greece, Italy, Sicily and Etruria.

Successive invasions of the Asiatic tile, in a measure, supplanted the normal flat type which seemed at the outset to be associated

with monumental buildings, though this purely classic form has survived in the modern flat type seen in Italy to-day. The circular disc closing the imbrex points distinctly to Eastern Asia, and the subsequent decoration of the eaves and ridge tiles, while strongly suggesting an Eastern origin, is no sure criterion, as to whatever the Greeks touched they imparted a charm derived from their own matchless instinct for the beautiful.

It seems curious to see the antifixæ attached to the eaves-tiles, at Assos, as late as the Roman epoch, and yet 600 years before, at Selinus, these elements had already become detached from the roofing-tiles and were independent pieces, nailed to the top of the stone coping.

The historical sequence

in the development of the early Grecian, Etruscan, Roman and Sicilian tile, and the source of the first form—the *norm* as Graeber describes it—so common in China to-day must ultimately be cleared up. The material is indestructible and the character of a fragment, even, is easily recognized.

It has been impossible to find data indicating even approximately, the first appearance of the pan tile and the flat tile, though it is probable that these data exist.

The geographical distribution of these three types of tile to-day is a matter easily ascertained and I venture to present the following map of Europe (Fig. 85) upon which is indicated by conventional



Fig. 85.

¹ Many old Korean and Japanese roofing-tiles show on their lower side a cloth-mark impression, and doubtless similar methods were resorted to in their manufacture.

lines the regions where these various forms occur. These lines represent the appearances of the tiles in section and will be readily understood. The single curved lines represent the normal tile, the lines of double flexure the pan tile, and the short, straight lines the flat tile. As the normal tile is almost universally distributed in Asia it was unnecessary to represent this region of the world.

EDWARD S. MORSE.

THE CLECKHEATON CHIMNEY ACCIDENT.



ON Friday, March 25, the inquiry into the circumstances attending the death of the fourteen persons who were killed on February 24, by the fall of the chimney at Marsh Mills, Cleckheaton, was concluded. The *Leeds Mercury* gives the following account of the proceedings:

Mr. John Waugh, C. E., Bradford, read a report, in the course of which he stated that the chimney, with the exception of the base-course and the stone cap (the latter about ten tons in weight), was entirely a brick structure, circular in form, and of the following dimensions and particulars: Height about sixty yards; diameter at base—outside fifteen feet, inside six feet; thickness of walls—outside fourteen inches, inside fourteen inches. Four and a half inches of good firebrick formed part of the inside walls for some twelve or fifteen feet up from the base of the shaft, the cavity between the inner and outer shell at

the base being two feet two inches. Six midfeathers of nine-inch brickwork connected the inner and outer shell. There were no throughs from the outer to the inner shell across the cavity. The solid brick base was three feet nine inches in depth, and had two openings through, one for the main flue on the northerly side, the other on the easterly side, but not at right angles to the first, but immediately under the centre of the bulge, whilst the several cracks referred to were between the two openings—that is to say, the cracks and the bulge were on the north and east respectively, and the two openings in the base were on the north and east respectively. As to this examination of the debris and stump of the chimney, Mr. Waugh stated that in building a chimney it was customary to select bricks from the very best kilns in the district; and, further, to carefully inspect such when delivered, and reject the unsound ones. Had this latter course been adopted in regard to this chimney, a great proportion of those used in its construction would have been rejected. In fact, they were, with the exception of the firebrick, unfit for the purpose of building a chimney, even if constructed of solid brickwork. They were of various sizes, various material, and differed very much in the degree of burning. He was strongly of opinion that from some cause or another, bad as the bricks were in the first instance, they, along with the lime, forming about one-fifth of the volume of the bricks, had both undergone a deterioration. He could attribute this marked deterioration of bricks and lime to nothing less than moisture extending over a long period. He had examined chimneys which had fallen by accident, and some by design, but had never seen such a crushing to powder of the material of a structure as in this instance, and, where bricks appeared to be stuck together in any quantity, they could be separated by hand with no effort whatever. The stone cap at the top of the chimney, seven feet in internal diameter, weighing not more than ten tons, was composed of good ashlar, some of which were intended to be bound together by clamps run in with lead, but the lead had not been used. All that remained of the stump was little more than that below the ground, viz., the solid brickwork base resting upon good rag stone foundation; these were found to be level and very little disturbed. The brickwork of the main flue, opposite to the entrance to the chimney, and only ten feet from the structure, was found to be absolutely gone to powder from moisture—the work of years. Alongside the chimney, ten feet from the ground, was a cast-iron water-tank, four feet diameter, six feet high, to supply water to the grinders in Messrs. Thornton's mill. The pipe ran along the easterly side of the chimney, and was found repaired close to the foundation of the chimney. This tank when filled with water would weigh over three tons and a half. It was partly supported by an iron beam inserted in the chimney just above the bulge. The chimney appeared to have crushed down for sixty feet or seventy feet before falling onto the mill. This would indicate a giving way in the first instance towards the base of the chimney. Harrison, standing on the ground, felt the brickwork pressing against his knees. This would be on the east side, below the bulge. The total weight of the whole structure was about 500 tons, the weight of the two shells above the solid was 480 tons. The outer shell alone weighed 325 tons. The distressed area, including bulge and cracks on the easterly and northerly sides, was equal to half the circumference. Therefore, if the chimney had been vertical, the weight about the half the circumference would equal 162 tons, or 6.33 tons per square foot; but the chimney leaned

over on this side, and it was impossible to say how much the weight was increased by this fact without a knowledge of the amount of departure from the vertical. Given this crushing-weight above (apart from any lateral strains due to vibration) and a solid brick base and foundation below, with the weak places—bulge and cracks—in between, remembering the quality and condition of the brick and the nature of the structure, and the result should have been anything but a surprise. The chimney fell on the calmest day in the whole month from a combination of causes, and in the following order as regards importance: (1) Bad bricks, (2) weak construction, (3) deterioration by moisture, (4) the attempted repairs. Sooner or later, however, it would have fallen, apart altogether from the fourth head. The repairs were too late, and the chimney was a doomed structure before either Moulson or his man saw it. In conclusion, he would say this was the second inquiry he had assisted at in regard to deaths of persons from the fall of chimneys in ten years, making in those two instances alone a death-roll of sixty-eight. His earnest recommendation to the authorities was that such structures should be annually inspected, from top to bottom, inside and out, by competent persons, and that the owners should be possessed of a certificate as to the safety of the structure as the result of such thorough inspection, such certificate of safety to be produced to Her Majesty's Inspector of Factories when required.

The coroner, addressing the jury, said he thought sufficient evidence had now been given to enable them to come to some conclusion. He would remind them that the main issue before them was as to whether there was any criminal neglect in the matter. Certain persons had been named prominently in the case, and of course the jury would have to consider them in arriving at their verdict. First, there was Mr. Barraclough, the tenant of a portion of the mill, and though he had no legal liability to repair the chimney, as an employer of work-people it was his duty to protect them, and therefore, in his (the coroner's) opinion, Mr. Barraclough's liability—at any rate criminally—ceased on his drawing Messrs. Thornton's attention to the condition of the chimney. With regard to Messrs. Thornton, there was a slight discrepancy in the evidence, Mr. Barraclough stating that he called their attention to the state of the chimney five weeks before it fell; whilst Mr. Rawdon Thornton stated that it was on February 8, a fortnight before the disaster, and this was rather an important matter for consideration. Having reviewed the evidence as to Messrs. Moulson being consulted, and the subsequent examination of the chimney by Harrison, the coroner said that in the evidence as a whole there were several discrepancies, and to his mind it seemed a shocking state of things that a number of the witnesses should have given false evidence. Referring to Messrs. Thornton's conduct in the matter, he said it would be for the jury to consider whether they did their best in calling in Messrs. Moulson and relying upon their advice. In his own mind he did not consider they were criminally responsible. With regard to Messrs. Moulson, he alluded to the assertion of Mr. Moulson and his man Harrison that they had had no experience in the repair of mill chimneys. He contended that no man had any right to take up such responsible work who had no experience, at any rate without laying it very clearly before the persons for whom he was working. Otherwise he held that an inexperienced person who did such work would be criminally liable. But he should think that Messrs. Moulson were experienced, and he should advise the jury to think so too. Proceeding in detail to review the evidence as to what was done at the chimney, the coroner said there was really a most serious discrepancy. Both Harrison and the laborer Jarman stated that never at any time was there a larger space than eighteen inches square with bricks taken out, whilst a number of witnesses stated that they saw much larger spaces open during the course of the repairs, and two men asserted that a very short time before the fall of the chimney they saw a space several feet high. He hoped the jury would not jump at their verdict in this case, as he wanted them to consider and weigh the evidence very carefully. Harrison was in a very delicate position, and although he said he was inexperienced, he (the coroner) considered that he knew exactly how the chimney was. The question was whether, in carrying out the repairs, he was proceeding recklessly or was as careful as he ought to be. With regard to criminal responsibility, he did not think the jury would find Messrs. Moulson culpable; the case was really dwindling down into small compass, and the main question now was as to the nature of the repairs, whether they were recklessly carried out or whether sufficient care was exercised.

The jury then retired, and after an absence of more than an hour and a half, returned with the following verdict: "That these persons have been accidentally killed by the fall of a chimney which was under repair." The jury also added the following rider: "The jury consider that Messrs. Thornton are to blame, but not criminally so, for not having attended to the repair of the chimney at an earlier date, and further, that Mr. William Moulson is also to blame, but not criminally so, for not having more carefully considered the state of the chimney when he was consulted by Messrs. Thornton."—*The Architect*.

ROMAN AMPHITHEATRE AT TREVES.—At Trèves the ruins of the Roman amphitheatre have been explored, and it is now proved that this building formed part of the fortifications of the city.—*New York Evening Post*.

BLEACHING EFFECT OF SUN AND RAIN.



is a fact well-known to chemists that water that has been recently exposed to sunlight will bleach many colors, even in a dark room. This has a bearing upon colors which are exposed to rain followed by sun.

The writer was told by a lady that she once had a blue silk dress, which, when worn in sunlight, would be completely changed, but which, when treated like a naughty child by shutting up in a dark closet, returned to its original color.

The color in this case was a Prussian blue, which suffers a molecular change by sunlight, darkening and finally destroying the color. Prussian blue is the cheapest, strength considered, in the world, and therefore is frequently used by painters to obtain a green. It should, however, never be used outside, unless covered with a varnish or gloss of some sort. A stain or a dead finish paint should, therefore, never contain Prussian blue. The test for Prussian blue is a drop of soda or potash lye, which does in an instant what the sun does in a few months.

Another color which must always be covered with varnish is the New Vermillion, which has taken the place of the mercury vermilion.

To the architect, however, the most objectionable effect of rain and sun is the blackening which frequently attacks exterior paint and stains of all colors.

This is due to a dark substance which is formed out of linseed oil when an ordinary dryer is used. There are methods of treating linseed oil, however, by a slow oxidation with immense volumes of air, which obviate this, leaving the oil very white, without any apparent tendency to blackening.

CHEMIST.



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

DOORWAY TO HOUSE OF FRANCIS B. RICE, ESQ., BEACON ST., BOSTON, MASS. MESSRS. FEHMER & PAGE, ARCHITECTS, BOSTON, MASS.

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

SKETCHES BY THE *American Architect* TRAVELLING-SCHOLAR FOR 1891, MR. ALBERT KAHN, DETROIT, MICH.: TWO SHEETS.

[Issued with the International and Imperial Editions only.]

TOMB OF LORENZO DE' MEDICI, IN THE SACRISTY OF S. LORENZO, FLORENCE, ITALY. MEASURED AND DRAWN BY MR. LYMAN SISE.

[Issued with the International and Imperial Editions only.]

THE TEMPLE BETH-EL, FIFTH AVE., NEW YORK, N. Y. MESSRS. BRUNNER & TRYON, ARCHITECTS, NEW YORK, N. Y.

THE exterior is of Indiana limestone and nearly all of rock-faced material. The columns and carved parts being tooled of course.

The carving is quite elaborate on all the capitals, arch mouldings and in the spandrels and string-courses. The roofs of the building are covered with dull red slate, and the metal work of the roof is copper. The clerestory and the ventilator and the dome will all take on a fine deep color with age. The dome is 140 feet 6 inches high from the sidewalk and is 51 feet 8 inches in diameter. The dome is composed of iron trusses filled-in with fireproof building-blocks, and covered with copper sheets. These are decorated with a network of copper ribs that will be gilded thus showing a raised design upon the dull copper ground.

The outside dimensions of the building are as follows: 98 feet 8 inches on Fifth Avenue, and 150 feet on Seventy-sixth Street; height of main cornice from ground, 48 feet; height of tower cornice from ground, 66 feet.

The steam-heating system has been put in by Baker, Smith & Co., and introduces air at certain points that will combine with the ventilating system to keep a constant movement of fresh warm air in motion through the entire building. The bad air will be carried off from the rooms and into large ducts that lead to the tall ventilating-shaft at the southeast corner of the lot. Here is placed sufficient heat to insure a constant draught at all times. The large auditorium depends also on this shaft for its ventilation.

The windows are of soft warm brown tones relieved here and there by fine rich colored panels that form part of the designs. There will be upwards of 6,000 square feet of stained-glass in the building.

The contract for the shrine has been given to S. Klaber & Sons. The shrine will be composed of Mexican onyx, African marbles, alabaster and the golden gate. The steps that lead up to the gate are of St. Beume marble. The entire work stands upon an iron foundation and against a semicircular wall of gold and marble mosaic. This wall of mosaic is 25 feet high and supports a colonnade of marble columns behind which are placed the organ and the choir.

The music is heard through the edifice, but neither the organ nor the singers are seen to any extent.

Mosaic is used on the fronts of the galleries and marble columns are employed in all cases when it is possible. The decoration has been given to Maitland Armstrong & Co. (a firm of well-known artists, whose work is among the best that has been done in this locality.) The scheme of coloring is such that the whole of the interior is toned down to a soft warm and somewhat neutral effect relieved by gold lines and a highly decorative ceiling. In this ceiling is placed the central source of light, both by day and by night, a field of stained-glass 1,200 square feet in extent. Above this is a skylight of clear glass, by which during the day a flood of light is introduced into the interior. The colors of this dome light will be in harmony with the decorative scheme and yet sufficiently light to give ample illumination to the interior of the edifice.

The lighting at night is by one thousand electric lamps placed on the walls and beneath the arches and worked into the decorative scheme wherever possible.

ENTRANCE TO THE TEMPLE BETH-EL, NEW YORK, N. Y. MESSRS. BRUNNER & TRYON, ARCHITECTS, NEW YORK, N. Y.

COMPETITIVE DESIGN FOR THE CARNEGIE LIBRARY, PITTSBURGH, PA. MR. GEORGE PALLISER, ARCHITECT, NEW YORK, N. Y.

COMPETITIVE DESIGN FOR THE CARNEGIE LIBRARY, PITTSBURGH, PA. MESSRS. BORING, TILTON & MELLEN, ARCHITECTS, NEW YORK, N. Y.

[Additional Illustrations in the International Edition.]

A HOUSE AT MAYENCE, GERMANY.

[Gelatin Print.]

COUR D'HONNEUR OF THE CHATEAU DE CHANTILLY. RESTORED BY M. DAUMET, ARCHITECT.

[Copper-plate Etching.]

THIS view shows the chapel and also the inner face of the entrance archway.

GRAND CANAL, VENICE, ITALY.

For this plate Prout took his stand near the Cavalli Palace, which appears on the left, and resembles a great many of the palaces on the Grand Canal. From his point of view he was able to make the Dogana and the Church of Sta. Maria della Salute appear as terminating the view, and this has brought together many interesting parts in the lower reach of the Canal.

THE MANOR HOUSE, WANDSWORTH, ENG.

DESIGN FOR MUNICIPAL BUILDINGS, BATH, ENG.

In preparing this design it was considered that the best way to gain prominence was to emphasize the wings by giving extra height to their termination, at the same time providing that the mass of such extra height should be as unlike the cubical centre as strict conformity with the style of the older building would permit. Consequently domed pavilions were employed, and they were connected by a two-story façade of as low an elevation as was compatible with sufficient height for the several rooms. The leading horizontal lines of the present Guildhall were adopted, and unity of design was further secured by employing its best characteristic, that is, the fenestration of the first floor, which is elegant in character and worthy of repetition. There is, however, one defect in the Guildhall—the entrance. If unsuitable now it would become still more so when wings were added to the building. It was therefore proposed to add a Doric portico, and to employ the order on the additional façade.

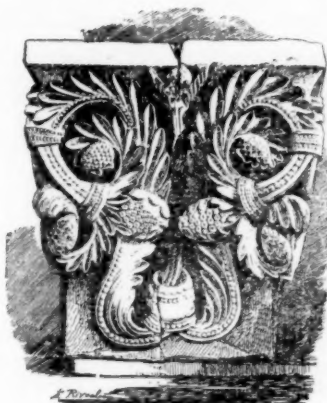
The style of the central Guildhall is in Adam's manner, with a slight leaning towards the earlier work of Kent. It is supposed that two architects were concerned in the design, and hence the difference of feeling. It was the author's endeavor to keep the wings subordinate to the central part except at the extreme termination. In order that the height of the new building should not dwarf the older work the roofs were kept flat, with the exception of the pavilions, which were carried up to a second story with a stone cupola springing from an octagonal base. On the south the pavilion would contain the entrance and grand staircase to that wing, while on the north the pavilion would form a vestibule to the technical schools. An archway leading to the markets would separate the schools from the Guildhall.

The proposed arrangements are shown on the plans. It was intended to build the external walls of Combe Down stone (which was used for the central building) the inside casing and all the internal walls being of brick. The corridors would be floored with

concrete with solid parquet. The other floors, with exception of basement, would be of fireproof construction, finished with parquet.

It was calculated that the work could be carried out for 84d. per cube foot. As the building contained 527,136 cube feet, the cost would be 18,609l. (exclusive of architect's fees) or with 10 per cent added 20,535l.

PARIS PRISONS.



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

IT was certainly an original idea to write a book on the morgue, and to pay so much attention to the temple of death, of criminal or voluntary death in this city of Paris, which has the well-deserved reputation of being addicted to pleasure. But there are men and women in Paris who give almost all of life to philanthropy; they do it noiselessly, in a true Christian spirit, and this same spirit will be found in "The Prisons and Prisoners of Paris," by M. Guilloit. Permanent contact with criminals has not hardened him; it has inspired him with a sentiment of profound pity and compassion. Not that this pity goes so far as to excuse crime or to attempt to diminish human responsibility. M. Guilloit does not belong to the modern criminalistic school, which has invented the "criminal man," the man born for crime, absolutely irresponsible, led by hereditary and irresistible instincts. M. Guilloit believes in hereditary instincts, in their influence, in the influence of education and of the surrounding medium; he believes, also, in human liberty.

His work is a minute description of the ancient and the modern prisons of Paris. The most ancient prison was the Roman dungeon, which Gregory of Tours describes under the name of *carcer Glaucini*. Saint Denis was shut up in it by order of the Roman Governor; it became afterwards the chapel of a little church. Under Louis XVI, Paris had eight principal prisons: the Grand and the Petit Châtelet, the Conciergerie, For-l'Évêque, the Magdelonettes, Sainte-Pélagie, La Force, the Temple, La Salpêtrière, Bicêtre, Saint-Lazare, the Bastille. Many of these prisons have been minutely described; the memoirs of the Revolution have rendered some of them famous. Balzac, in one of his novels, has led us through all the doors and passages of the Conciergerie. The prisoners who were in the Châtelet on the 2d of September, 1792, were all massacred. The Châtelet itself exists no more, and there remains no trace of it. As for the Conciergerie, it still forms one of the most beautiful features in the valley of the Seine, near the Palais de Justice and the Sainte-Chapelle. Three of its old towers still exist: the Tower of Cæsar, the Silver Tower (Tour d'Argent, so called, probably, because in Saint Louis's time it was inhabited by his mother, Queen Blanche) and the tower called Bon-Bec.

The Magdelonettes have been demolished in recent years, and have been replaced by the prison, "de la Santé." Sainte-Pélagie has been described by Madame Roland, who left it to go to the scaffold. Saint-Lazare is a dark and gloomy building, which was at first built for the unfortunates who were attacked with leprosy. The Kings and Queens often visited it, and made it their last station before being carried to the Church of Saint-Denis. The Abbé of Saint-Lazare was an ecclesiastical lord of the first rank. This prison is now at the same time a prison and a hospital exclusively for women. For-l'Évêque became famous, as it always received the comedians arrested in virtue of a *lettre de cachet*. Mlle. Clairon remained in it five days, and received in it the homage of her numerous admirers. This prison has been demolished. La Force was opened only in 1782 as a prison; it was a part of the ancient Hôtel Saint-Pol, which belonged to Charles, King of Naples and Sicily, a brother of Saint Louis, and afterwards to the Dukes of La Force. "La Petite Force" was annexed to "La Force"; it was the Hôtel de Brienne, and was intended chiefly for the class of women who in the last century were called *femmes du monde*, and who would not in our time be called even "du demi-monde." Poor Mme. de Lamballe was shut up with these unfortunates and cut up by the populace. During the September massacres the blood flowed in torrents in the prison of La Force. This prison was shut up only in 1850; the 700 prisoners who were in it at the time were transferred to the new prison of Mazas, which shows its high walls near the terminus of the Lyons-Marseilles Railway. The name of Bicêtre comes from an Englishman (Winchester) who had a castle on the spot in the sixteenth century. Bicêtre is called by Mercier, in his "Tableau de Paris," the ulcer of Paris; it has ceased to be a prison and is now only a hospital. The Bastille was the State Prison; it is needless to say under what circumstances it was demolished. The Temple received Louis XVI within its walls, and thus gained an eternal

celebrity; it was demolished in 1811, and prisoners guilty of high treason have ever since been sent to the dungeons of Vincennes.

The genesis of crime fills the greater part of the work of M. Guilloit; he shows us the roads to the prison, as well as the prisons themselves; the personal, domestic, and social causes of the demoralization of men and women in a great capital, the destruction of family ties, the corruption engendered by bad examples, by poverty, by the competition of labor, by the organization of huge shops, by the *hôtels garnis*, the cafés, the brasseries, the races. He analyzes at length the effects of alcoholism; he has a curious chapter on the crimes which go now under the name of *passionnels*, and criticises the leniency of the jury and its responsibility. There is, in fact, not a line in his work which is not instructive and suggestive. — *N. Y. Times*.



ARCHITECTURAL LEAGUE OF NEW YORK.

IN compliance with a unanimous resolution of the Architectural League of New York at its April meeting, we desire to place on record the profound sorrow with which the members of the League have received the news of the recent death of Mr. Arthur Lyman Tuckerman, and our appreciation of the earnestness of purpose and refinement of character which marked his career among us.

We would also express our sincere approbation of his faithful and efficient labors as Manager of the Art Schools of the Metropolitan Museum and his deep and intelligent interest in the cause of Architectural Education; while those personal qualities which endeared him to his friends are held in grateful remembrance by those who knew him most intimately.

(Signed)
A. D. F. HAMLIN, }
W. H. RUSSELL, } Committee.
W. B. FAXON, }



[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.]

AN EXPLANATION.

BRIDGEPORT, CONN., April 18, 1892.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Please do not publish my design for the Milford Church any more. I understand that it is a good design, but I do not wish to have it appear that I have bought up the paper.

Very truly, JOSEPH W. NORTHROP.

[The accidental duplication of the negative of the church at Milford is accountable for the publication of this plate in two issues of the *American Architect*. Like other editors we have comparatively little occasion to refer to the published numbers of our journal until the volume is bound, and the familiarity with the raw material, which may be on hand for months before it can be used, is, as may be seen, no protection against an accident which occasioned the placing of duplicate negatives in the rack, as the mere finding of a negative in that place would be ordinarily proof enough that the subject had not yet been published. — EDS. AMERICAN ARCHITECT.]



PRINCE COLONNA AND THE PACCA EDICT. — Prince Maffeo Colonna de Sciarra, against whom the Italian government is instituting proceedings for having sold the pictures from his gallery, has been seen at his Paris residence in the Champs Elysées by a New York *Herald* reporter, to whom he said: "There are two laws in Italy — first, the *loi des majorats*, which forbids the sale of pictures from family galleries but does not give the right of prosecution; and second, the *loi pacca*, which does not permit the sale of pictures abroad without the permission of the government, which has the power to seize pictures at the frontier or impose a fine amounting to the value of the pictures. The sale of pictures, however, is permitted in Rome, but there is little use in that. If my pictures were sold to a person in Rome and that person were to convey them over the frontier and sell them to some one else, that third person could in no way be held responsible. As regards prosecuting me, I am a Deputy and they will have to ask for the authorization of Parliament. They will then have to prove that I exported the pictures. I say nothing; I do not say that I sent them out of Italy, and I do not say that I didn't. If they condemn me they can fine me the value of the pictures. My gallery consists of two hundred pictures, and the authorities find twenty missing. All they want, you know, is the purchaser of these pictures, who is perfectly secure. To the question 'Are they going to be sent to the United States?' I reply that I do not know — I do not know even where they are at present. I am pressing a lawsuit against the government to prove that my pictures do not come under the *majorat* law, and that I only consider myself bound by the *pacca* law. The government wanted to see my pictures and I

refused permission. The government said: 'You have sold your pictures abroad,' and I replied 'I will say nothing until the case comes on. Prove it if you can. Unless you can prove it you have no right to say that.' The government is in such a position that it does not know where to begin. The suit, however, is now before the courts. The truth is I wanted to sell my pictures to the State very cheap. The Minister refused and then I offered to present to the country several of the best pictures if he would allow me to sell the rest. Now the Minister feels that he did a foolish thing in refusing my offer. In February last a severe law was passed imposing the penalty of imprisonment for selling pictures out of galleries abroad, but it was before that law was passed that my pictures were missing. Remember, I have said nothing nor made any statement." — *The Collector*.

BIRMINGHAM SEEKING WATER FROM WALES. — The commercial capital of Scotland, the city of Glasgow, enjoys, as is well known, one of the finest water-supplies in the world, drawn direct from Loch Lomond; and for years past London has been considering the monster scheme of tapping the English Lakes, and bringing the water-supply for the imperial metropolis almost the whole length of England, by aqueducts, from Cumberland and Westmoreland. Meanwhile, Birmingham is about to add a magnificent supply of pure water to its other triumphs of municipal government, and quite recently a scheme suggested by the Water Committee was passed by the City Council, and will be presented for the approval of the ratepayers. Like Liverpool, Birmingham is going to Wales for its water. It proposes to buy the rivers Elan and Claerwen, in Mid-Wales, some 80 miles from the Midland capital, rivers with a watershed some 46,000 acres in extent, and to form a great artificial lake. The principal dam will be built at Nant-Gwilt, just below the confluence of the streams, at a height of 800 feet above the sea. The lake thus constructed will be over three miles in length, with an area of 497 acres, and a total capacity of 7,540 million gallons. This is but one reservoir out of a possible five, not all of which, however, will be wanted at the outset. The water will reach the town by nine miles of tunnel, 35 miles of "cut and cover" conduit and 35 miles of iron pipes. The ultimate cost will be about £5,500,000, but only some £3,300,000 will have to be spent on the works which are needed to give all the water required at present. Wales has always been noted as one of the few mountain countries that do not abound in lakes. It looks as if the hand of man were going to be called in to redress the balance, and to give her a series of Grasmere and Derwent waters. At any rate, the spirited project confirms once more to Birmingham the splendid position she has won for herself of late years as the foremost among the large-minded, liberal-spirited and progressive municipalities of England. Birmingham has even distanced Manchester, which so long held the blue ribbon of municipal administration. — *Australasian Builder*.

THE STORY OF A BELL. — The story is related of a little town called Feldkirch, on the frontier of Austria, on the Ill, an affluent of the Rhine. In the year 1799, when the armies of Napoleon were sweeping over the continent, Massena, one of his generals, suddenly appeared on the heights above the town at the head of 18,000 men. It was Easter day, and the morning sun, as it rose, glittered on the weapons of the French at the top of the range of hills to the west of Feldkirch. The town council hastily assembled to consult what was to be done. Defence was impossible. Should a deputation be sent to Massena with the keys of the town and a petition that he treat the place with mercy? Then the old dean of the church stood up. "It is Easter day," he said. "We have been reckoning our own strength, and that fails. Let us ring the bells and have service as usual, and leave the matter in higher hands." His words prevailed. Then all at once, from three or four church towers in Feldkirch, the bells began to clang joyful peals and the streets filled with worshippers hastening to the church. The French heard with surprise and alarm the sudden clangor of joy bells, and concluding that the Austrian army had arrived in the night to relieve the place, Massena suddenly broke up his camp, and before the bells had ceased ringing not a Frenchman was to be seen. — *Fire and Water*.

MALE AND FEMALE EYES IN GREEK SCULPTURES. — Professor Ernst Curtius, the famous Greek scholar and archaeologist of the University of Berlin, announced a few months ago that he had discovered that the Greek sculptors always made the eyes of men fuller and rounder than those of women. The alleged discovery was considered important, as it was believed that it would lead to a proper classification of many of the unidentified heads of Greek statues. The hopes, however, seem to have been premature, despite the fact that Curtius, who has been called "The Modern Greek," fathered them. Doctor Greef, of Berlin, in a recent lecture delivered before the Prussian Academy of Science, declared that Curtius's conclusions were wrong, as he had found flat, narrow eyes — those of women, according to Curtius — in the heads of Greek statues of men. He had also measured plastic representations of women with large, full eyes. In nature, he added, there was no difference between the eyes of men and women. He had examined, recently, in Berlin, the eyes of a hundred members of each sex and had found that they were the same in shape, size and form. He thus upheld the theories of Zinn and Sommerling that the Greek sculptors who gave a greater fullness to the eyes of men than to those of women did not follow the conditions of nature. Professor Curtius, as far as is known, has not replied to Doctor Greef. His answer is awaited with interest. — *New York Tribune*.

BAR, LOCK-PLATES AND ESCUTCHEONS. — In England, perhaps, the oldest existing works in iron are hinges to doors, strengthening bars, handles, escutcheons, lock-plates and the like. Even the nails were things of beauty. Abroad, the massive doors of the Cathedral of Notre Dame de Paris offer a wonderful example of early ironwork. Probably designed in the twelfth century, the doors are nearly concealed with their decoration of trees and birds, dragons and other grotesque beings.

The door in St. George's Chapel, Windsor, is of about the same date. The grotesque knocker on the sanctuary door of Durham Cathedral, which bears a rather distant resemblance to a lion, is said to be of the twelfth century. The hollows for the eyes may have been formerly filled with crystal or enamel, or, as it has been suggested, the open eyes may have been contrived to emit light from within the church, so as to guide the hapless being seeking sanctuary by night to the welcome haven of safety. — *Chambers's Journal*.

"RIFT-SAWED." — In the *American Architect*, of a recent date, in an article on "Better Wood Construction," the terms "rift-sawed" and "quarter-sawed" were used as terms meaning a separate way of cutting lumber. The writer may have known more about the exact meaning of the two terms as applied to cutting boards than lumber manufacturers in general, but throughout the country the *Lumberman* happens to know that saw-mill operators and woodworkers use the two terms as meaning identically the same. The expressions quarter-sawed, rift-sawed, vertical-grained, straight-grained and edge-grained, as applied to manufactured wood mean the same thing; that is, lumber thus cut is diagonally to the square of the log, or diametrically to the rings of growth. Bastard or flat-sawed is when the cutting is done from the side through and through. Since the dictionaries define rift to be a splitting or riving of anything, the mind of the writer, which is doubtless more scientific than practical, according to the popular meaning of the last-named term, looked upon rift-sawing as a kind of splitting. — *Northwestern Lumberman*.

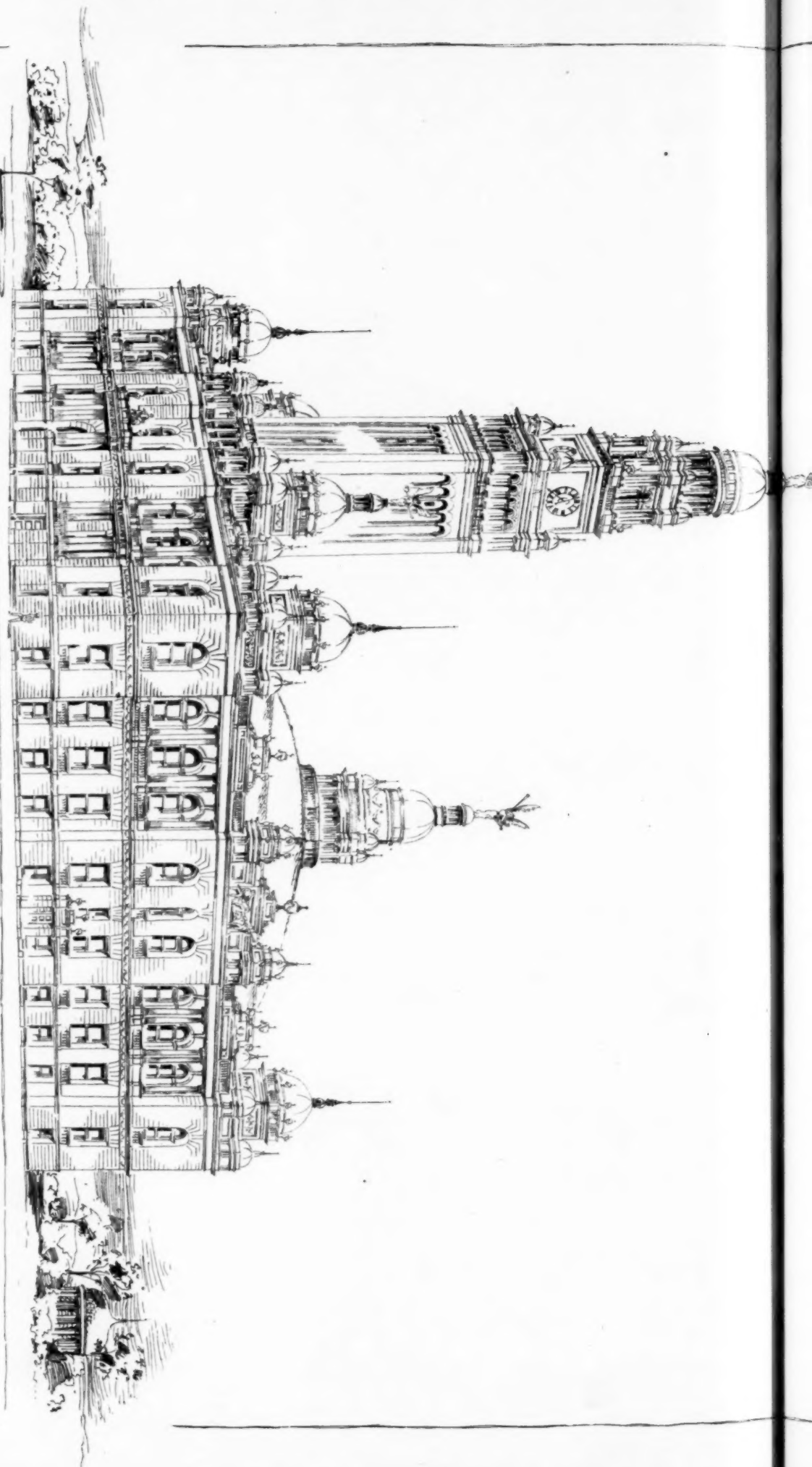
TRADE SURVEYS.

A SPIRIT of complaining is manifesting itself in a good many quarters, notwithstanding the fact that the volume of business transacted this year exceeds that of last year. The chief ground of complaint lies in the very small profits in all kinds of business. Very few have dared to express opinions as to when an improvement is probable. The volume of trade is extremely large; speculation is insignificant. It appears as though lower prices were probable, notwithstanding the reiterations that lower prices mean loss and a partial suspension of production. The country at large, no doubt, profits by low prices, and complaints of middle-men, manufacturers and others must be taken with grains of allowance. It is not always best to take the opinions of metropolitan observers of trade and finance in order to arrive at truthful conclusions; better conclusions can be frequently formed by ascertaining the condition of things in the outlying sections. All of the favorable trade and manufacturing features continue; exports are large; stocks are also large; railway traffic is heavy; ocean traffic is all that is to be desired as to volume. Banks have a demand for all the money they are able or care to loan, and middle-men generally are meeting with a good demand, but only for immediate distribution. Railway managers, in speaking of the probable future course of traffic, give good reasons why a steady increase can be expected. Manufacturers, in speaking of the narrow margins incident to business, do not anticipate much higher prices during the summer, because they recognize the growth of conditions for two or three years past that forbid much, if any, improvement. In the smaller shops and factories of the country there is a large amount of work being done. In the textile mills throughout New England business is quite good. In the car and locomotive works, as well as shipyards, orders have been steadily increasing since April 1st. In the cotton mills throughout the South, a slight improvement has been reported within a few days. In the saw and planing mills in the country a general increase in demand has set in. In the paper industry in all sections there is a sluggishness, due more to the increase of paper-mills and to the increase of machinery than to any relative decline in demand. The lumber interests are all looking forward to an improving trade, which will probably be enjoyed. Builders in almost all localities are looking forward to a good year. Architects do not promise a very marked improvement as yet, although in the larger cities there is a great deal of preparation on finer classes of work, such as railway buildings, office-buildings, banks, churches and public institutions. The crisis in labor agitations is likely to pass without serious incident. There is no anxiety upon the part of so-called "leaders" to precipitate any conflicts. Their desire, rather, is to maintain existing membership. Serious complications are looked for among laborers abroad, but it is probable that these apprehensions will not be realized. While there are vast bodies of discontented workmen throughout Europe, and while their leaders would seize opportunities for making a successful contest, or even putting employers and the Governments to a great deal of trouble, there is no purpose to needlessly precipitate strikes or to enter into conflicts with the authorities. The masses of labor abroad feel deeply aggrieved, and long for better conditions, and would take opportunity of any revolution or serious disturbance to break loose; but, as long as things move along in their usual channel, nothing more serious need be expected than parades, meetings and covert threats at authority of all kinds. In our own country, we are pretty free from danger of any kind for the present. There are contingencies under which the labor question would prove a most serious one, but these contingencies are not likely to localize. Trade and manufacturing reports for the past week or two show that the volume of business is once more steadily increasing. Large amounts of money await investment, both in foreign countries and at home. The estimated amount in London is equivalent to over one hundred million dollars; in our own country, one hundred million dollars has been added to circulation within the last year and a half. In five years past, seven hundred national banks have been chartered. A multitude of agencies have been established for the quicker and safer transaction of business. There are under consideration at this time a multitude of schemes which have for their end the cheapening of cost in transportation by both rail and water, and the development of territory now unused. There are also indications that the mining of precious metals will be greatly increased, and steps are being taken to revive gold mining in California. It is hardly probable that anything will be done to lessen the demand for silver. Throughout the East a healthy trade condition exists, but there are too many wheels turning for good prices. Throughout the South a more hopeful condition of things is developing, but it will be some months before the effect of the low prices of cotton are overcome. Throughout the Lake region trade is more vigorous than in any other section. There will be dullness in the mining of ore and in the making of iron, but activity in the mining and sale of copper. There are fewer attractive opportunities for the investment of capital in large blocks this season, but more opportunities than last season for the investment of capital in small bits.

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PERSPECTIVE VIEW

DESIGN FOR THE "CARNEGIE" LIBRARY PITTSBURGH, PA.

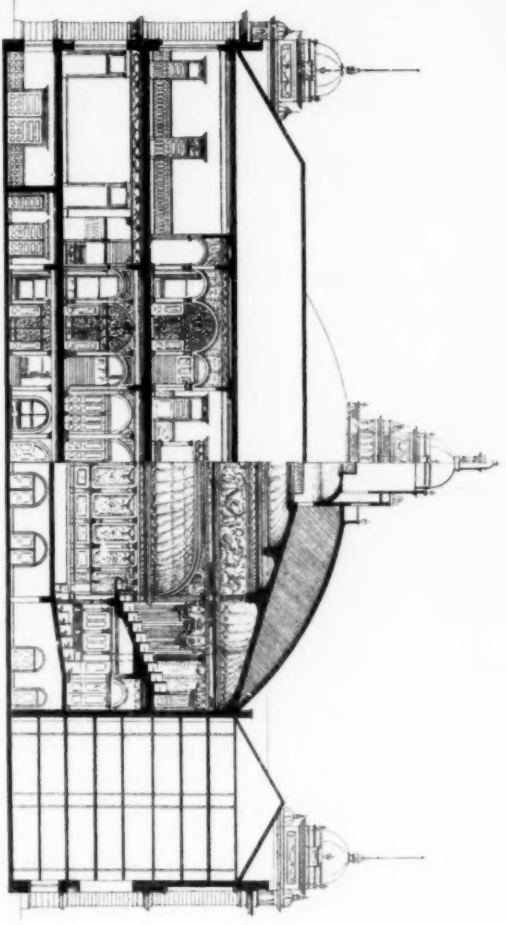
Geo. B. Morris
Architect
407 & 409 5th Ave
New York

McGraw-Hill Printing Co. Boston

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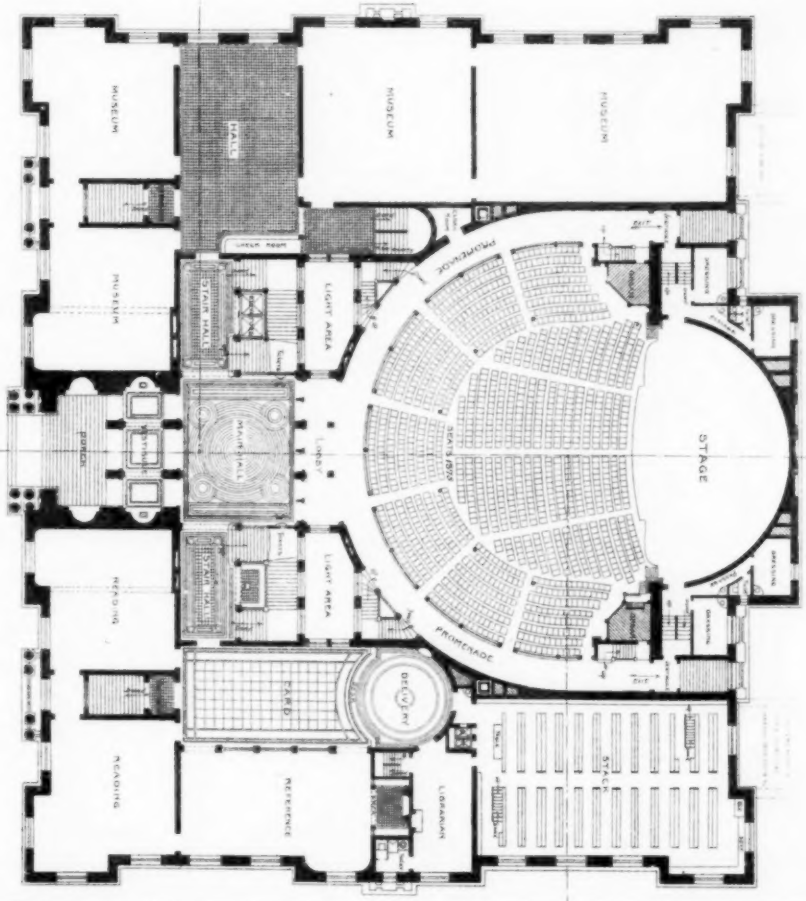
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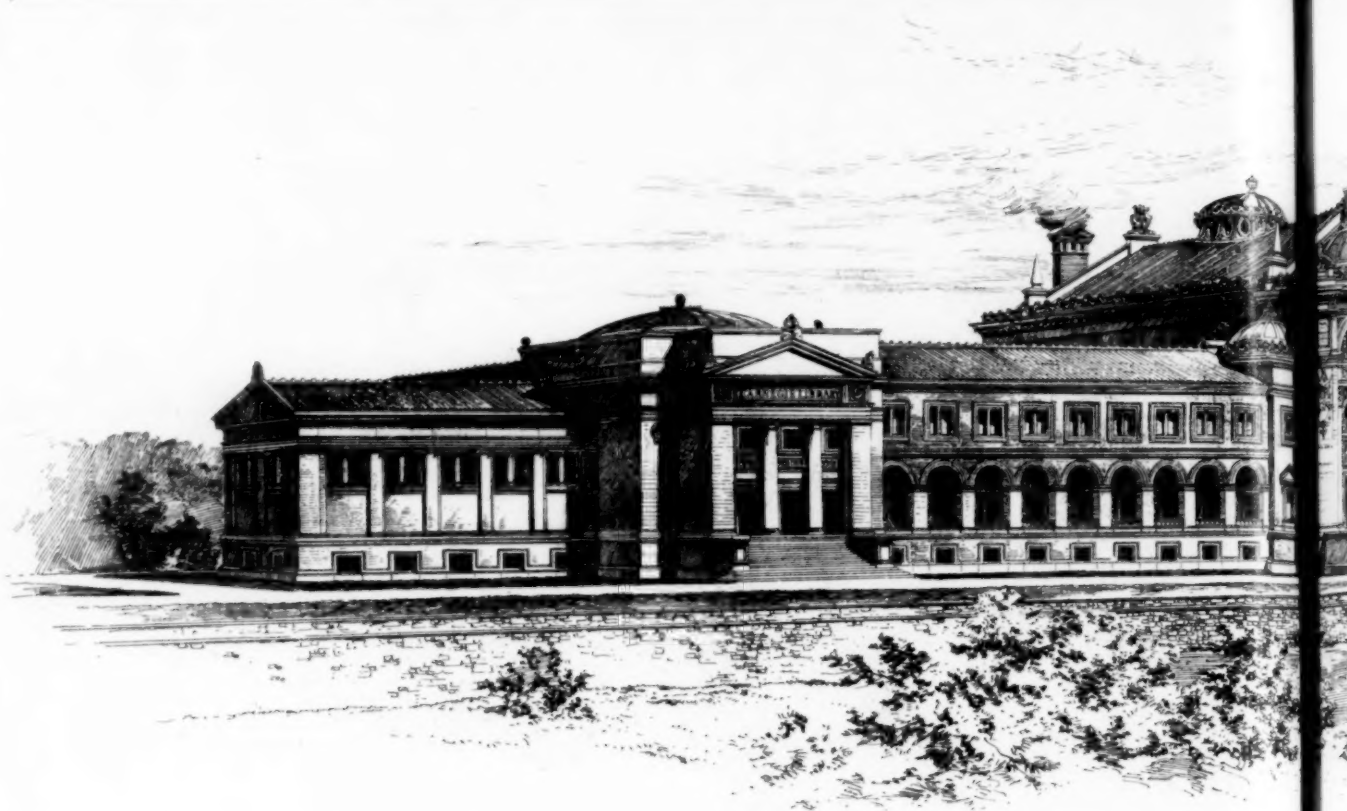
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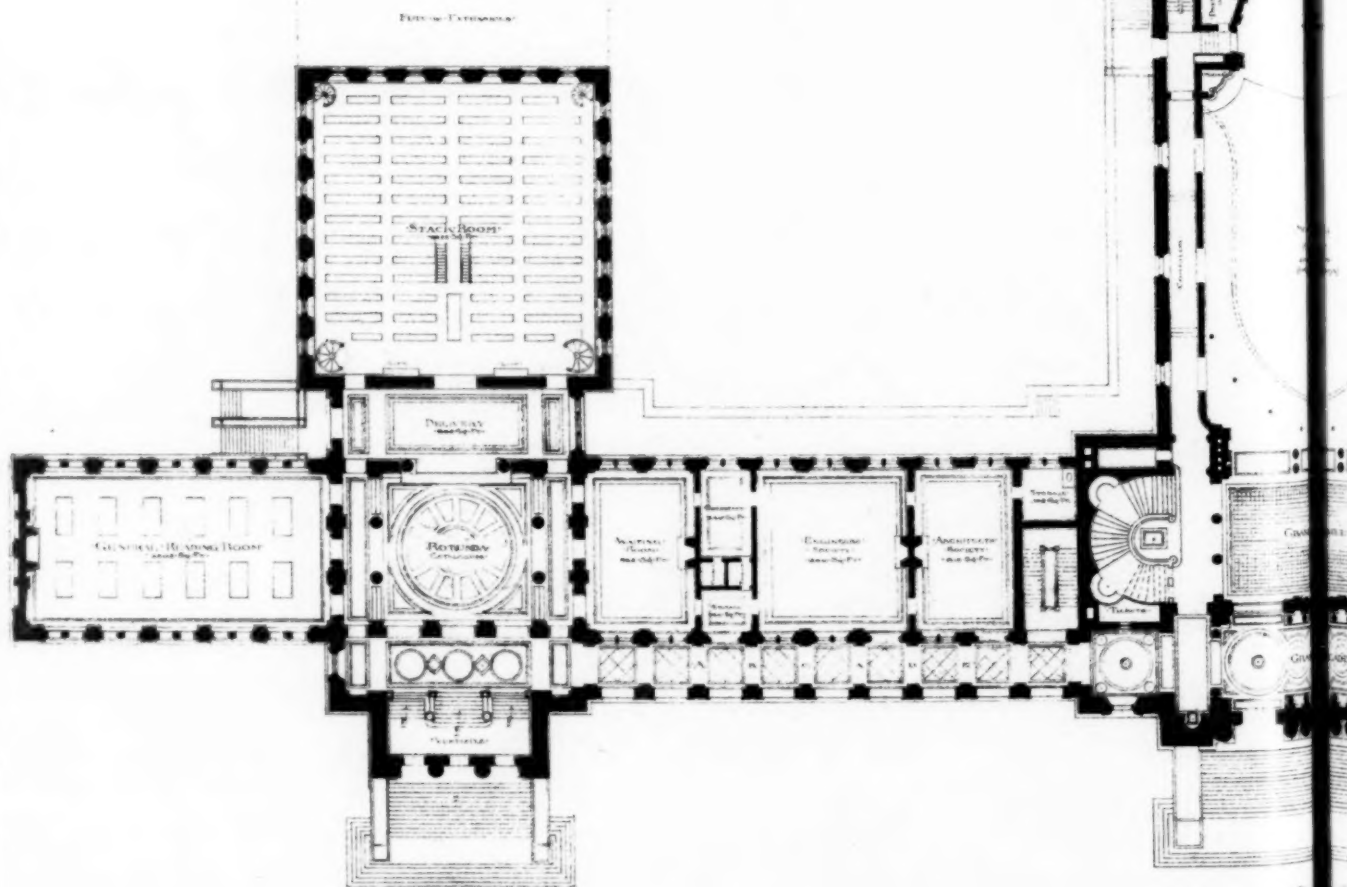
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FIRST STORY PLAN





PERSPECTIVE VIEW

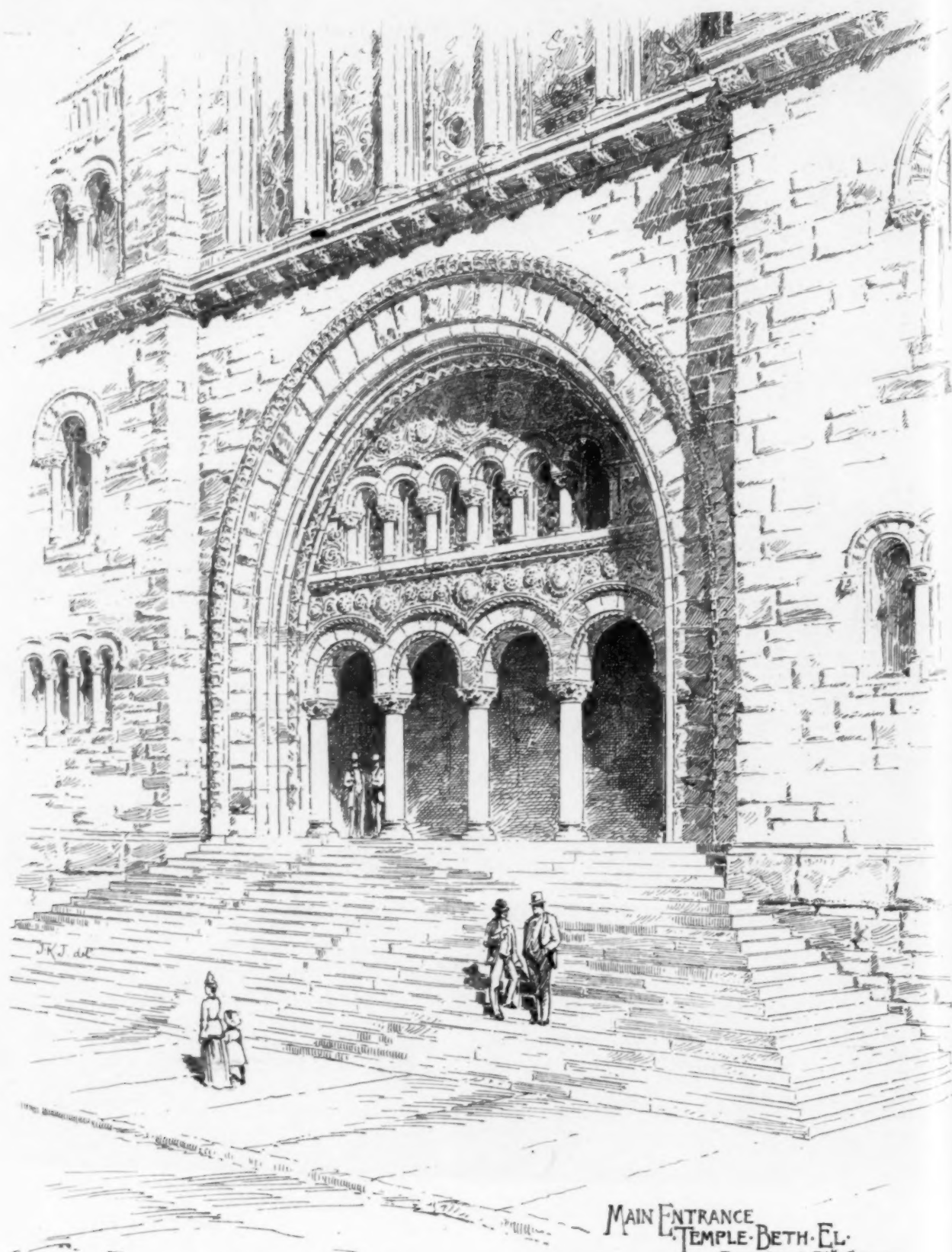


PLAN OF THE BUILDING



PLAN OF 1ST FLOOR





MAIN ENTRANCE
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FIFTH AVE & 76th STREET
NEW YORK.
BRUNNER & TRYON
ARCHITECTS.



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FIFTH AVE & 76th STREET.
NEW YORK.
BRUNNER & TRYON
ARCHITECTS