

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXXIX.

Copyright, 1893, by TICKNOR & COMPANY, Boston, Mass.

No. 895.

Entered at the Post-Office at Boston as second-class matter.

FEBRUARY 18, 1893.



SUMMARY:—

The Movement to create a Memorial to the late Bishop Phillips Brooks.—Civil Service in France and the Declaration of Rights.—The Panama Canal Scandal.—The Development and Modernizing of the City of Sofia.	97
THE LANGUEDOCIAN SCHOOL OF ARCHITECTURE.—I.	99
THE SAXON CHURCH AT BRADFORD-ON-AVON.	100
CONSTRUCTION.—XX.	102
LETTER FROM CANADA.	103
THE MAIN QUADRANGLE AT THE WORLD'S FAIR.	107
EFFECT OF TURPENTINE GATHERING ON THE TIMBER OF LONG-LEAF PINE.	109
SOCIETIES.	109

ILLUSTRATIONS:—

The Indiana State-House, Indianapolis, Ind.—Six Competitive Designs submitted for an "Eads Memorial Entrance" to the St. Louis Bridge.—House at St. Louis, Mo.—The First Methodist Episcopal Church [Sands Street Memorial], Brooklyn, N. Y.—The Union Railroad Station, Portland, Me.—House at Oyster Bay, Long Island, N. Y.	
Additional: Door in a Private Dwelling, Rue Ballu, Paris, France.—A Fireplace in the same House.—Seal of La Société des Architectes du Poitou et de la Saintonge, France.—The Château de Pierrefonds: Façade on the Court.—House at Wiltshire, near Blackburn, Eng.—House at Witton, Blackburn, Eng.—Proposed Clock-tower, Walton-on-the-Naze, Eng.	109

COMMUNICATIONS:—

The U. S. Timber Examinations and Tests.—The Caisson Foundations of the Manhattan Life Insurance Building.—Modern Sepulture.	110
NOTES AND CLIPPINGS.	112
TRADE SURVEYS.	112

THE friends of the lamented Bishop Brooks, of Massachusetts, among whom may be counted all persons who have ever come within the influence of his pure and loving spirit, wish to perpetuate the remembrance of him by some enduring memorial. A committee of gentlemen interested in Harvard College affairs are urgently in favor of having subscriptions for that purpose applied to establishing a fund for maintaining religious exercises in the University, and think that, if three hundred thousand dollars could be contributed, this apparently expensive luxury might be secured; but, although the friends of Dr. Brooks would, we suppose, acknowledge that the maintenance of religious services in Harvard College is a desirable object, most of them seem to prefer to have their money used for a more tangible memorial, which they would like to see erected in Boston, the birthplace of their beloved bishop, and the scene of most of his labors. In the choice of the character of the memorial, and the site for it, there is, however, great diversity of opinion. Naturally, the neighborhood of Trinity Church, which was Dr. Brooks's charge for many years, seems an appropriate position, and as the church fronts on a spacious assortment of polygons, known collectively as Copley Square, which is, moreover, already architecturally notable, this certainly seems to be the best place for setting whatever statue or monument may be decided upon.

DR. BROOKS, who was greatly attached to Trinity Church, and always regretted the necessity which existed, at the time of its erection, for leaving Richardson's design incomplete, left by will a contribution toward constructing the western gallery, which formed a part of the original plan. When this was announced, it was at once proposed by the newspapers that the money contributed should be devoted to making up the sum required—about seventy thousand dollars—for completing the west façade of the church in accordance with its bishop's wishes. The members of the church, however, much preferring that this mark of affection for their friend should be their own affair, completed the amount themselves, declining any contribution from outside, so that the subscribers to the general fund are free to follow their own judgment. Of course, there have been numberless propositions that the fund, which it was hoped to make one hundred thousand dollars, and is likely to be more, rather than less, should be devoted to hospitals, infant-homes, and so

on; but, however admirable these charities may be, it is evident that a large part of the subscribers prefer, and with reason, to see it used for a purely artistic memorial, which shall remind them, not of the excellences of Christian charity, or of virtue in general, but of the man whom they have loved.

WE do not often find any contributions to political science in our technical exchanges, but a story appears in *La Construction Moderne* which we can commend with confidence to civil-service reformers as one of the most interesting of its kind. Last August, in the French Department of Pas-de-Calais, a competitive examination was held, for the position of assistant in the office of the Ponts et Chaussées. Seventeen candidates entered for the examination, six of whom belonged to the town of Saint-Omer. Out of these six candidates, four, of excellent character, graduates with diplomas from the schools, and favorably reported, after the preliminary inquiries, by the engineer-in-chief, were excluded, by order of the Minister of Public Works, from the competitive examination. It happened that all the four had been educated at private schools, which, in France, generally means Church schools, and their exclusion was attributed to this circumstance. The matter caused a good deal of comment, and a member of the Chamber of Deputies made it the subject of an interpellation of the Government, asking whether there had not been a violation of the Declaration of Rights, which decrees that no Frenchman shall be molested on account of his religious opinions.

THE Minister of Public Works, M. Viette, replied to the interpellation very frankly, not to say coolly. He acknowledged that he had refused to allow the four candidates to be admitted to the examination, but said that there were numerous precedents, under all administrations, for such a course, and that his decision was based on an administrative proposition. The prefect of the Department had been called upon to make a very complete investigation in regard to the candidates, and had ascertained that the four excluded ones belonged to "families connected with some of the most noted members of the reactionary party"—"*des familles inféodées aux personnages les plus marquants du parti réactionnaire.*" Under such circumstances, they would not have been admitted, even if they had been graduates of the public schools; and in the same department a graduate of a convent-school had been admitted to the examination in question. In fact, the administration did not concern itself with the fact of a candidate having been educated in this or that establishment, but only with his political relations. He thought that every one would admit that the government should not recruit its functionaries among the adversaries of the institutions which they would be called upon not only to serve, but to commend to public favor. "The fact," he thought, "of occupying a public employment implied fidelity and devotion." The ingenious impudence of this explanation is sharply exposed by M. Rümler in *La Construction Moderne*. In brief, he says, four young people are refused entrance into the public service, not on account of their personal opinions, for, being boys of only seventeen, they could hardly have any, but on account of those of their families; and he thinks, with justice, that such mean discrimination, which M. Viette would probably call clerical intolerance if it were to be applied by his political opponents to his own friends, tends only to revive the political resentments which had shown signs of disappearing in a common attachment to liberal institutions.

THE great Panama scandal has a certain interest for architects, not only on account of its being the most gigantic piece of robbery since the South Sea bubble, but because the tricks through which the stockholders were swindled are almost all very familiar to the older members of the profession. To put the whole story in a few words, the stockholders and bondholders of the company paid in about two hundred and sixty million dollars in cash. Of this, about fifty-four millions were paid back to them, in interest and payments on drawn bonds, leaving two hundred and six millions, with interest, as their net investment. Eighteen million six hundred thousand dollars is said to have been spent in buying the Panama Railroad, which would probably be a good asset,

but is said to have been hypothecated to contractors, who, again, have virtually disposed of it to certain bankers. Of the remaining one hundred and ninety-seven and one-half millions, not quite one hundred and twenty-two millions are said to have been paid for construction, materials, and transportation, or to contractors, while the balance of seventy-six million dollars is charged to "Preparatory work, organization, concession, general expenses, advertisements, taxes, etc." It may be imagined that the concession and the taxes did not form a very large part of this item, and the fact is perfectly obvious that something like seventy million dollars was used in "organizing" and "advertising" a company formed for the purpose of spending a hundred and twenty-two millions in digging a canal. Nor is this by any means all. Of the one hundred and twenty-two millions alleged to have been paid out for the actual canal work, it is very doubtful whether the company received more than a fraction in value of what it paid for. Of the American contractors engaged on the work, the two most important were a New York corporation and a private firm. The corporation, which was formed for the purpose of carrying out this single contract, and never did anything else, was dissolved a few months ago, after paying more than a hundred per cent in dividends to its stockholders; and two members of the private firm are said to have made a profit of three million dollars apiece out of their Panama contract alone. But if such enormous profits were made by quiet American contractors, who had no political or financial influence, and obtained their contracts simply because they were the lowest bidders for their part of the work, what must have been the gains of the French individuals and corporations, who were not the lowest, but the highest bidders, and who are acknowledged to have been employed because they could help in floating the company's bonds? According to the testimony in the French court, M. Eiffel's profit on his contract for a part of the work was six million dollars, and it appeared from his own testimony that he received large sums on account of a contract for certain machinery, although he never furnished the machinery. The American newspapers, at the time, were full of accounts of the dredges purchased and sent out, at immense expense, by the company, which never did any work whatever; and, of those which did work, the *Engineering News* reported that one lay at anchor for many weeks under a sloping bank, shovelling mud up the slope, from which it immediately ran back, to be shovelled over again. Taking these things into consideration, together with the enormous prices specified in some of the contracts,—such as five dollars a cubic yard, for example, in M. Eiffel's contract for embankment, and the vast outlay at Colon for hospitals, offices, residences, and so on, having nothing to do with the actual canal excavation,—it is doubtful whether the real value of the work done on the canal was much more than one-tenth of the sum actually subscribed and paid in by the deluded purchasers of the stock and bonds. The rest, with the exception of that paid for the Panama Railroad, and the comparatively small legitimate expenses of administration, appears to have been swallowed up by favored contractors, by the greedy managers of the most venal press in Europe, and by what Feuillel calls *la haute corruption financière*.

WHILE some may regret the severity few can question the abstract justice of the sentence of from two to five years' imprisonment for the Count de Lesseps, his son Charles, M. Eiffel and two or three others, which has been the outcome of the exciting investigation which has just closed at Paris. The onus of culpability seems to have fallen upon at least some of the shoulders where it should rest. Yet without sharing the respect for the rather tawdry and theatrical glory in which De Lesseps has been arrayed since he accomplished the not really difficult feat of making the Suez Canal, common humanity can accord to the infirm and mentally broken old man some share of sympathy in his misfortunes, while stoutly decrying all the time that he deserves leniency, because his adherents assert for him a right to be held, with Victor Hugo, "one of the glories of France." Interest in the Panama matter is now transferred to this country, where a Committee of the House of Representatives is trying to discover what has been the American interest in the bubble, and it seems likely that a clear understanding of what went on here may be had, since Mr. Seligman, the banker through whose bank forty million dollars were disbursed, appears to

be willing to answer frankly all questions asked, and has declared his willingness to produce his books for examination.

WE have before spoken of the energy with which the town of Sofia, the capital of Bulgaria, is being transformed from a village of hovels into a brilliant modern city, and of the peculiar system under which expropriations were made for the rapid and extensive operations necessary for carrying out the plans which have been determined upon. Quite recently, M. Arthur Comte, the chief engineer of the city, has given, in the *Schweizerische Bauzeitung*, a detailed and interesting account of the present state of affairs there. It must be remembered that it is only a few years since Sofia was a residence of one of those Turkish beys who, according to the observations of English travellers, amused himself by impaling on sharpened stakes the Bulgarians who happened to incur his displeasure; and that its connection with the outside world by means of a railroad is a very recent thing. In fact, if we are not mistaken, the citizens were so well contented with their isolation that, if Prince Ferdinand had not paid a large part of the cost of the railroad out of his own pocket, they would probably have been without it to this day. Now, however, matters are changed. The half-savage Bulgarians have had an opportunity of seeing "the wonders of the world abroad," and have drawn from their observations comparisons unfavorable to their ancient ways of life. Moreover, being blessed with a beloved and enlightened prince, and having, at the head of the city, a very energetic mayor, Dimitri Petkoff, they have had an intelligent direction given to their efforts at improvement of their condition, which seems likely to carry them very far in the path of municipal civilization.

NATURALLY, the first thing to be done in a Turkish town was to widen the streets, and this was effectually provided for by laying out a system of splendid boulevards, ninety-two feet wide, one of which, the Boulevard Ferdinand I, entirely encircles the city, while several others traverse it in various directions, dividing the whole town into regular blocks, which are again subdivided by streets varying from thirty-two to eighty feet in width. Besides these, there is, as is common in Continental cities, a splendid avenue leading from the central portion of the city to the railroad station. This avenue is one hundred and ninety-seven feet in width, and comprises a central roadway fifty-nine feet in width, two lateral streets, two gravel-walks, and a paved sidewalk, twelve feet wide, next the houses on each side. Six rows of trees shade this noble avenue. Another street, the Boulevard Stambouloff, which leads from the middle of the town to the new park, passing by the prince's palace, is one hundred and fifty-seven feet wide, divided like the other, and with four rows of trees. To carry out these streets, sixteen hundred and ninety-eight houses were demolished in three years, and eighteen hundred and eighty-six reconstructed. Meanwhile, the area of the city doubled, and although the population, which is at present thirty-seven thousand, is probably smaller than it was during the Turkish occupation, the inhabitants have much more fresh air to breathe than ever before. But what would astonish the old impaling beys most is probably the improvement in the supply of light and water. Hitherto, water has been obtained by bringing supplies from the neighboring river, which is far from being of unsullied purity, through wooden pipes to street hydrants; but springs have now been taken in the mountains, which will furnish very pure water, and dams have been built, and pipes laid, to distribute it in the modern manner. For lighting, a waterfall in the upper course of the River Vitoche, situated about nine miles from Sofia, and sixty-five hundred feet above the sea, has been utilized to drive three turbine wheels, giving a force of two thousand horse-power, which is converted into electric currents by six dynamos, and transmitted to the city, where a part of it will be used for lighting the streets, and the rest, probably, for propelling electric street-cars. Besides these improvements, a beautiful park has been laid out and planted, a large public garden has been formed in the middle of the town, with smaller ones at various points, and a great nursery, covering a hundred acres, has been established near the city, from which plants are not only supplied to the public parks and gardens but are sold by the city to private individuals who wish to decorate their houses or estates.

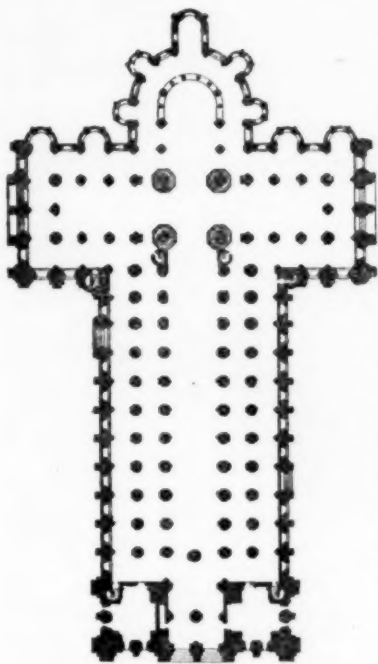
THE LANGUEDOCIAN SCHOOL OF ARCHITECTURE.¹—I.

Fig. 1. Church of St. Sernin, at Toulouse.

alone. We, however, accord to it the banks of the stream from Viviers to the sea, making certain reservations for the Provençal school and calling attention to the fact that the territory of the latter is, in its turn, invaded by the Languedocian, so far as sculpture is concerned. An ideal line of demarcation drawn from Viviers cuts Vivarais and Gévaudan, leaving only the southern half of each to the Languedocian school; beyond this, it claims Rodez, Conques and Figeac and is deprived of Cahors, Agen, Nérac, Saint-Séver, Dax, Bayonne and perhaps the entire shore of the Bay of Biscay.

During the Gothic period, within this monumental district, the largest in France, a restricted school grew up, which we will term the school of Toulouse because this city inspired it most directly and was very nearly its geographical centre. Its outer bounds were the towns of Castelnaudary, Castres, Albi, Cordes, Saint-Antonin, Caussade, Moissac, Valence-d'Agen, Fleurance, Gimont, Saramon, l'Isle-en-Dodon, Aurignac, Saint-Girons, Foix and Mirepoix.

The Languedocian school not only covers the greatest extent of territory of all the French schools, but it is also reputed to be the oldest. Its sculpture has its roots in antiquity. In those days its two centres were Narbonne, capital of the earliest Roman possessions in the Gauls, and Nîmes; under Augustus and the Antonines the latter city and its environs for a considerable distance around were dotted over with sumptuous monuments of a remarkably fine style. The city of the Tolosates was united to these two toward the end of the second century, and it soon won for itself the intellectual supremacy. In the time of Ausonius it was already entitled "*Palladia Tolosa*,"—Toulouse the learned. Though its fortification-walls were built of brick, marble statues and columns were not wanting in the capitol and temples. The rich quarries of the central Pyrenees were then in full operation, for example, at Aubert, Saint-Béat and Sarrancolin—and the products were not all sent to Rome. A goodly portion of the yield was taken up at Martres-Tolosane, and there chiselled and shaped in the most important *atelier* of sculpture ever known in France. Several of the cities of Narbonaise and Aquitaine evidently drew their supplies from this *atelier*, which turned out works of genuine merit, if they can be judged by the valuable specimens now in the museum of Toulouse.

The domination of the Visigoths, whose seat of government was fixed at Toulouse from 419 to 508, arrested for nearly a century the progress of barbarism in this region: in spite of a few short-lived persecutions, the Christians continued to rear beautiful churches in the country lying between the Pyrenees

and the Cevennes; there was one at Narbonne with a lantern-tower in the centre. Between 442 and 446, Rusticus, bishop of Narbonne, erected at Minerva, in his diocese, a basilica, the dedicatory inscription of which is preserved and gives us a glimpse of its magnificence. In the early days of Frankish rule there were yet a few generations of skilled architects. Launobode, governor of Toulouse, found at hand a man capable of constructing a basilica for him in this city, "the like of which a Roman artist could not have erected," according to Fortunat. A century later, that is about 640, Géry or Didier, bishop of Cahors and a native of Albi, endowed his episcopal city with monuments of all kinds whose massive walls won the admiration of his contemporaries.

Meanwhile Gallo-Roman civilization had not been wholly banished from what was to be, from the ninth to the thirteenth century, the flourishing county of Toulouse. The municipal institutions were much less altered there than in the provinces of the north, notwithstanding the material ruin effected by the invasions of the Saracens and the Normans. The latter part of the tenth century and all of the eleventh may be considered as a period of architectural restoration. Many of the ancient cities were rebuilt: Lescar (980), Lectoure (990), Maguelonne (about 1045), Oloron (1085) and Comminges (about 1100). Toulouse was as prosperous as ever, and its court, represented at Paris by the haughty Constance, was the most polished in the west. It was during the time of Queen Constance, from about 1010 to 1030, that the main elements of the Romanesque-Languedocian architecture must have become fixed. We ought not to seek any very pronounced stamp of a school in the Carolingian edifices of the region,—not in the curious choir of Saint-Just at Valcabrière more than in certain fragments preserved in Lower Languedoc,—exception perhaps being made for the sculptures and a few profiles. The construction of the basilica of St. Sernin, the choir and transept of which belong to the second half of the eleventh century, and the nave to the twelfth, marks the first period of artistic glory after the Roman.

St. Sernin (Fig. 1) exhibits all the grandeur and nearly all the characteristics of Languedocian Romanesque art. There are few edifices whose influence has been so great on a school of architecture or has extended so far even outside of the limits of its school. There are likewise few whose influence can be so easily detected. This ascendancy is due to its structural beauty and the amplex of its dimensions; after Cluny it was the most finished and the most remarkable of all the Romanesque churches. Its length is 377 feet and its height, beneath the vaulting, 72 feet; the breadth of the five aisles is 105 feet and the length of the transept 210 feet. The unusual development of the latter, each arm of which is flanked by two small apsidal recesses, the five aisles, the right angles of the inner side-aisle on the arms of the transept as well as on the nave, and the binary disposition of the great doors on the three façades, constitute the typical elements of St. Sernin much more than the

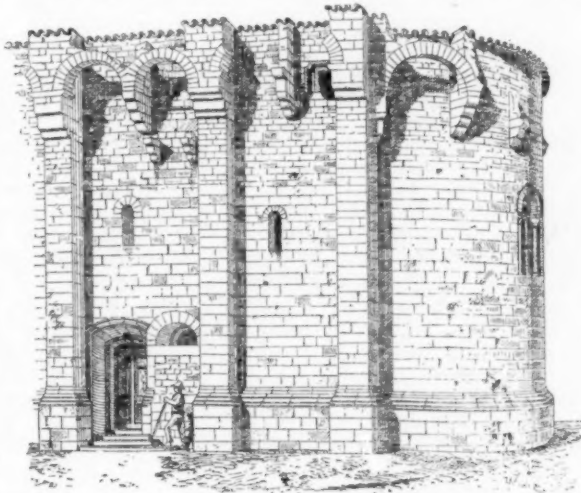


Fig. 2. Church of Colleneuve.

deambulatory and the five radiating chapels. These features, with a few others that we shall indicate, unquestionably exist in the most celebrated of Spanish-Romanesque churches, at Santiago de Compostela (see *American Architect* for June 6,

¹ From the French of Anthyme Saint-Paul, in Planat's *Encyclopédie de l'Architecture et de la Construction*.

1891, "Spanish Architecture," Fig. 9). The church of Conques, in Rouergue, is a diminutive St. Sernin. In many respects, Saint-Salvi at Albi, Saint-Théodard at Montauban, Saint-Sauveur at Figeac and, outside the limits of the Languedocian school, Saint-Martial of Limoges and even Saint-Martin of Tours are, or were, derived from St. Sernin. The inner side-aisle of St. Sernin is covered with groined vaults, as is the outer; but above it runs a gallery covered with half-barrel-vaults, which form an abutment to the bold barrel-vault of the nave; this constructive arrangement is common to the schools of Auvergne and Languedoc. In the latter, besides at St. Sernin and its derivative Sainte-Foy of Conques, examples of it are seen in the churches of Saint-Gaudens, Aulon, Valcabrière, Saint-Bertrand-de-Comminges (bay of the belfry), Marignac and Saint-Béat, in Haute-Garonne; in Notre-Dame-de-l'Oder, at Ambialet, in Tarn; in the churches of Fontfroide and Rieux-Minervois, in Aude; of Espoueilhan, in Hérault; of Elne, in Pyrénées-Orientales; of Unac, in Ariège; in Sainte-Croix at Oloron, in Basses-Pyrénées, and in the church of Bosost, in the valley of Aran, a section which formerly belonged to Comminges.

The twelfth century witnessed the rise and development of the system of broad naves without side-aisles, which became

so common during the Gothic period, and the origin of which is variously accounted for. An attempt has been made to connect it either with the plan of certain Provençal churches, for example, the cathedrals of Avignon and Cavaillon, or with the influence of churches with Périgord domes, which asserted itself through the cathedral of Cahors, Saint-Caprais at Agen and the cathedral of Tarbes. Without attempting to settle this question, we will remark that the single nave offered two advantages to the people of the south which caused its general adoption. In a region where brick was the building material, it made it possible to dispense with interior piers, which would of necessity have been too massive to accord with the tendencies of the period; again, this disposition admitted of the construction of walls of uniform thickness carried straight up and

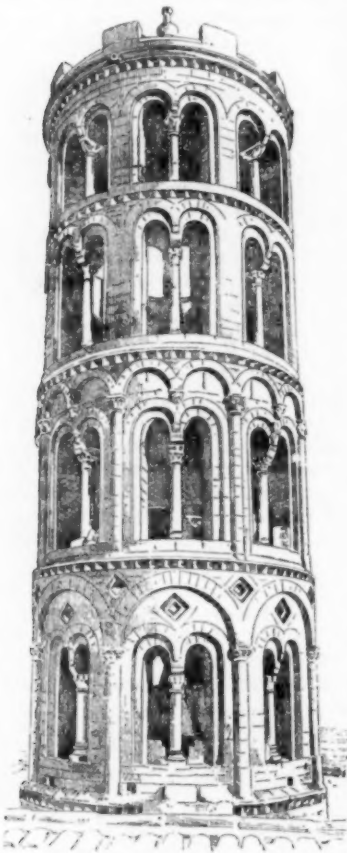


Fig. 3. Fenestral Tower, at Uzès.

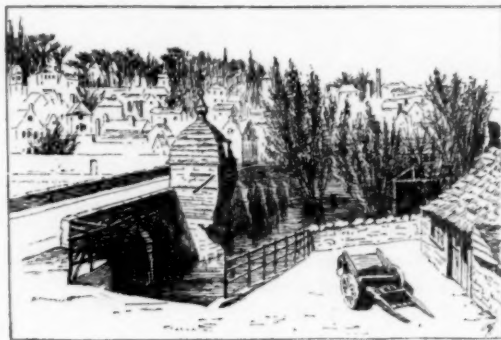
crowned with great machicolations connecting the buttresses, a matter of no small importance during the troubled reigns of the last counts of Toulouse. The churches of Celleneuve (Fig. 2) and Vic-Mireval and the cathedral of Agde were built in this way; their machicolations, which very probably antedate those of the donjons of the Château-Gaillard and of Niort — both by Richard Cœur-de-Lion — are certainly among the most ancient in France. The style was in vogue down to the close of the Middle Ages, with the simple substitution of the broken arch for the semicircular.

The care taken to fortify religious structures against armed attacks, and even to make them serviceable in the defence of the surrounding country or of the monastery, was nowhere more vigorously exercised than in Languedoc, from the middle of the twelfth century until the close of the religious wars of the sixteenth. It was for this reason that the bell-towers of the Romanesque era were of a feudal simplicity that made them quite like keeps, and that enabled them to serve as such in case of need. The staircases and interior passages often present

strategical devices; octagonal towers are rare and the stone spire was wholly unknown before the Gothic period. The isolated tower of Saint-Stephen at Puissalicon (Hérault), with its obtuse roof, is an exception; the elegant fenestral tower at Uzès (Fig. 3), on a circular plan, appears to be an imitation of certain Italian campaniles, but it has found no copyists in France.

(To be continued.)

THE SAXON CHURCH AT BRADFORD-ON-AVON.



Bradford Bridge, with Chapel.

NESTLED upon the side of a hill which rises from the water's edge, the old town of Bradford with its gray stone houses forms a picturesque termination to the valley through which river and railway run side by side. From Avonmouth, where it enters the Severn, through Clifton, Bristol and Bath, to Bradford, a prettier little watercourse, embedded in pasture-land on one side and wooded hills upon the other, could scarcely be found. But beauty of scenery is not the object of the modern pilgrim, who alights from the train at Bradford; verdant trees and grassy pastures, wooded hills and limpid streams may be found all over our island; but a little church of ante-Norman times, an authentic Saxon building, is not to be seen everywhere. It is unique, and, in the words of Professor Freeman, "the one surviving Old English Church in the land." "So perfect a specimen," he adds, "of primitive Romanesque is certainly unique in England; we should not be surprised if it is unique of its own kind in Europe."

The origin of the town's name is purely Anglo-Saxon, — Broad Ford on Avon; this being the spot where vehicles forded the river before the bridge was widened; for, originally, only foot-passengers and pack-horses could traverse the bridge. Whether Bradford was a Roman settlement or not is doubtful, but it being situated in a country which was a stronghold of the Romans, and various "finds" having been discovered in its neighborhood, it probably was, although there is no direct evidence. To its north lies Cirencester with its Roman pavements, and only a few miles to the west is Bath, now so rich in extensive ruins of its Roman baths; to the east is Old Sarum, and to the south Silchester. But authentic history begins about A. D. 700, when Ina, King of Wessex, granted permission to St. Aldhelm, afterwards bishop of Sherborne, to build a monastery, endowing it with lands and money. St. Aldhelm, or Aldhelmertone, as the name is written in Doomsday-book, was an illustrious Saxon, given to learning, and an accomplished musician, and,



Chancel, Nave and North Transept, from the Northeast.

like his descendants, having a passion for travel. He visited France and Italy, and for some time worked and studied under Maidulf, the Scotch anchorite who kept a college at Maidulfes-Burg, afterwards Malmesbury. Subsequently he became a Benedictine, built a monastery at Malmesbury, and became its first, or second, abbot. He

seems also to have been abbot of Frome and Bradford, for, upon becoming bishop of Sherborne, he wished that, "his monasteries should receive an abbot selected by the spontaneous voice of my establishment." But his pious monks objected: "As long as you are alive we will most humbly submit to the yoke of your government, entreating only that you will by deed secure to us, that, after your death, no king, or pontiff, or any authority claim dominion over us, except with our voluntary consent." The bishopric to which Aldhelm was appointed in 705 was one of two sees formed out of the old bishopric of the West Saxons. For more than 300 years the see was situated at Sherborne; then it was removed to Wilton, afterwards to Old Sarum, and subsequently to Salisbury.

The monastery founded in Bradford by St. Aldhelm is said, by William of Malmesbury, to have been dedicated to St. Laurence. Its site was most probably near the northeast end of the present church, a spot of ground still bearing the name of the Abbey-yard, and where, a few years ago, several stone coffins were discovered. If this conjecture be a fact, the little Saxon church now standing may be the veritable building founded and consecrated by St. Aldhelm at the commencement of the eighth century, and used in the last century as a schoolhouse. Between these two eras, it must have seen many changes, for we find it described, in 1715, in the deed of conveyance to trustees as "a building adjoining to the church-yard of Bradford, commonly called the Skull House," which seems to imply that it was, at some time in its history, used as a charnel-house. In 1715, the nave and porch were used as a school for the children of the parish, and it was probably at that time that the chancel was converted into a cottage, the chancel arch being made to serve as a chimney; for, when the church was restored, a segment of the arch was discovered in this chimney. When used as a school, the nave

to take the form of the pitch of the roof, being stilted in increasing height to the centre. Above the tabling on the north side of the porch there would seem to have been a similar arcade to that on the east end of the nave, the central pilaster, which is moulded, yet remaining.

The chancel is entered through an archway with the usual characteristics of ante-Norman work. Its vast disproportion in size to the height of the wall is very striking. Above this arch, imbedded in the wall, are two stone bas-reliefs of angels. One of them bears what appears to be a cloth in his hands, and, from their position, it is probable that they formed part of a representation of the Crucifixion — an early form of rood-screen. Possibly the central part of the group was removed or destroyed, to make way for the chimney-stack above mentioned.

The pilasters on the east front of the chancel are moulded into three depressed roundels, the earliest form of decoration found in England. On the south wall is a circular-headed window.

The nave is entered through a similar archway, which springs from an impost, which is itself simply a plain string-course stopping a slightly-moulded pilaster formed by a series of segmental roundels. Above the impost, this is continued over the arch, as a hood-moulding.

The front of the porch seems to have been decorated, a moulded pilaster still remaining. So early an example of a porch — especially on the north side — is thought to be not only rare, but unique; and, from foundations and outlines of the roof being discernible, it is thought that possibly the church was originally cruciform, with a corresponding porch, forming a species of transept, upon the south side. But as the approach to the building upon this side could only have been managed at any time by means of a flight of at least



Bradford Church.



Entrance from Porch to Nave.



Nave and Chancel.

and porch formed three separate rooms, one on the ground and two on the first floor; and to the south of the nave there was a two-storied house, built probably about 1715, and used as the schoolmaster's residence.

The following are the exact dimensions of the various parts of the building¹:

	Breadth.	Length.	Height to wall-plates.
Porch	9 feet 11 inches	10 feet 5 inches	15 feet 0 inches
Nave	25 " 2 "	13 " 2 "	25 " 3 "
Chancel	13 " 2 "	10 " 0 "	18 " 0 "

Doorways: — width, 2 feet 4 inches; height to crown of arch, 8 feet 4 inches.

The building has three distinct roofs. All the elevations, excepting that of the porch, which was only of two, were divided into three stages. The lowest was quite plain, with the exception, only, of a series of slight projections, which are so slight that they can only be called pilasters, and not buttresses. These occur at regular intervals, and support a string-course which runs all round the building. Upon this string-course runs an arcade, consisting of a series of flat pilasters, partially moulded upon the east, and formed by upright stones which do not tail into the wall; and on these are square blocks of stone, slightly bevelled, which appear to support plain arches. The arches themselves are only surface decorations, not constructive arches, as they are cut out of the stone, which runs, irrespectively of them, in regular courses. Around the porch the pilasters do not support arches, but merely a tabling, which is built to receive the eaves. In the eastern gable of the nave are the remains of an arcade above the one already described, which was built

twelve or fourteen steps (the ground sloping down from the church to the river), this is, by some persons, considered to be doubtful.

The most remarkable features in the building are: its very great height compared with its breadth,—especially noticeable in the doorways; the figures of angels on the east wall of the nave²; the insufficiency of windows for light, and the method in which the external architraves are cut out of and on the surface of the stones, and not through them.

It was through Canon Jones's zeal and energy that the old church has been restored to its original condition and to its ancient uses, and one would like to see the effect of lighting it with pendant lamps during the celebration of the Divine mysteries. The vicar gathered funds to purchase the site and building, and vested them in the hands of trustees, who are bound, so far as their means permit (and they have no funds, unfortunately, save such as the public may from time to time give them) to preserve the church as a memorial of past ages, and for public benefit and instruction, regarding it always as a place dedicated to the worship and service of God, with permission to use or to allow it to be used for such purposes as by the majority may be approved.

The monastery of Bradford was part of the domain of the Abbess of Shaftesbury, second only in importance and wealth to the Abbot of Glastonbury, that earliest of communities, founded, as tradition tells us, by St. Joseph of Arimathea. So wealthy were these two

¹ For these and other particulars of the church, I am indebted to a monograph by the late Canon W. H. Jones, vicar of Bradford.

² Photographs of these bas-reliefs, which give a better idea of them than any drawing could do, show that they have all the characteristics of early Christian sculpture, bearing the remains of the Greek archaic style, which came to be welded, as it were, into Christian art during the first few centuries of our era, although Greek art itself had fallen into its decadence. If the remains of these heads be compared to the archaic Greek, which bears so much resemblance to the Assyrian type of feature, it cannot but strike us that there is much similarity. Whether angels were ever portrayed with beards in early times it is impossible to say, but the chins seem to have the remains of bear's.

abbeys, that the country people had a proverb that "if the Abbot of Glastonbury might marry the Abbess of Shaftesbury, their heir would have more land than the King of England." Probably, during the Danish invasions, the monks of St. Laurence had been dispersed



Angels over the Chancel-arch.

by the enemy; but in 1001 Ethelred bestowed the monastery and *vill* (i. e., the manor) upon the Abbess of Shaftesbury as a recompense, in Leland's words, "of the murdering of St. Edward his brother"—a deed of which the king was supposed to be not wholly innocent, although it was carried out by the order of his mother, Elfrida. The charter of this gift is to be found in the Harleian MSS. of the British Museum, and is interesting to antiquaries as marking out distinctly the boundaries of the manor. It states that the king gives to the Church of St. Edward at Shaftesbury the monastery and *vill* of Bradford, to be always subject to it, that therein might be found a safe refuge (*impenetrabile confugium*) for the nuns against the insults of the Danes, and a hiding-place, also, for the relics of the blessed martyr, St. Edward, and the rest of the saints. But, in spite of Bradford being (possibly in consequence of its wooded surroundings) an *impenetrabile confugium*, it was discovered by the Danes, and laid waste within a few years of Ethelred's charter. On St. Brice's day, 1002, an indiscriminate slaughter of the Danes took place, in spite of the king's promise of peace, and it was probably retaliation for the royal treachery that led to the destruction of the monastery.

Wiltshire must have been happier in its climate at the time of the Conquest than now, for, under the head of "Lands of the Church of Shaftesbury," in 1086 we find at Bradford an *arpen* (something less than an acre) of vines. There were forty plough-lands, nine servants, eighteen freedmen and twenty-four hog-reeves; and some burgesses, instead of paying money-tax, paid each seven quarts of honey.

The present church was built about the middle of the twelfth century, but is of all styles. It is close to the old church—so close that, from some points of view, the tower and spire seem to spring from the west end of the Saxon church, and, for this reason, I have purposely omitted it from my sketch.

The barton barn, with its Early English roof, so framed from the ground as to be independent of the walls, was built in the earlier years of the reign of Edward I. A chapel dedicated to the Blessed Virgin was situated on Torry (*Tor*, Anglo-Saxon for high hill or tower); but all that remains now is the east wall and window, and a niche of very elegant design. Below the ruin is the Lady-well and well-close, marking the spring which supplies the town.

Leland, visiting Bradford in 1540, speaks of the bridge, which had "nine fair arches of stone"; but he says naught of the chapel thereon. Some persons have thought



Plan of the Church.

and tempests. As examples, the reader may recollect the smallest bridge at Luzerne and the old bridges of Bamberg and Prag.

The chapel is built upon the central pier on the eastern side. It is almost square in plan, and rests on some good and bold graduated

corbelling overhanging the "cut-water" of the pier. The eastern end appears to have projected still farther into the stream, so as to form a recess for a figure—perhaps of the patron saint. Concerning the dedication of the chapel there is no authentic record. The "fish" which forms the vane at the top of the chapel is, probably, the old ecclesiastical emblem of our Blessed Lord,—the *ichthus*,—the letters of which are the initial letters of three Greek words, signifying "Jesus Christ, the Son of God, our Saviour."

CONSTRUCTION.¹—XX.

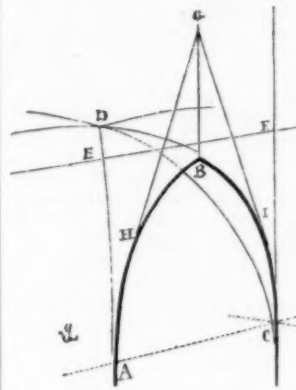


Fig. 107.

WE must now retrace our steps somewhat. In Ile-de-France, as we have already observed, we could not point out the boldness of the Burgundians at the beginning of the thirteenth century, or that of the architects of Champagne at the end of that century, when these latter could use large materials, hard, close-grained and resistant, like the stone of Tonnerre.

The builders of Ile-de-France make scarcely any of that open-work, formed of a single stone, those partitions pierced with openings: they keep the stability of their edifices less by rigid surfaces and supports than by weights

accumulated at the points which seem to them to present an insufficient base.

We find a remarkable proof of this fact, from the middle of the thirteenth century, in the great constructions.

We have seen that the Gothic architects had arrived, in vaulted edifices, at considering the wall-arches as relieving-arches and at taking out the structure under these wall-arches, so as to keep only the piers. They did away with the walls as being a useless accumulation of material between these piers, since the latter had to receive and to support all the weights; but these wall-arches, not being weighted at the key, might deviate from the perpendicular, because of the pressure and the thrust of the rows of filling stones in the vaults which they supported.

Let us remark (Fig. 107) that the wall-arch *ABC* at the apex of its two branches, at the key *B*, where this pointed arch shows the greatest flexibility, receives the very last rows of stones in the filling *BD*, which have a slight thrust from *D* to *B*, because of their curvature.

It might happen that the apex *B* would be thrust out of the vertical, if not made immovable. To build a wall upon this arch *ABC* could strengthen the arch very little, since the two triangles of masonry *AEB* and *CFB* press far more upon the haunches of this arch than its key *B*. The surest plan was to load the key *B*. Hence the builders arrived, by the middle of the thirteenth century, at building outside, upon the wall-arches of the vaults, gables *HIG*, of masonry, framing the apertures and thus rendering, by this additional weight *BG*, the summits of the wall-arches immovable, or at least stable enough to resist the thrust from the keys of the vault-fillings *BD*.

One of the first attempts of this kind is seen in the Sainte-Chapelle-du-Palais, at Paris.

Let us observe that the architects of Champagne, who had adopted wall-arches of strong resistance because of their great thickness, since they were real pointed cradle-vaults, to receive the fillings of the vaults; and that the Burgundian architects, who detached their wall-arches from the outer partitions, leaving between them and these partitions a rather broad space supported by the courses of the crowning piece, had no need to resort to the artifice explained in Figure 107.

It was only in Ile-de-France, Beauvoisis and Picardy that we see, toward 1240, the adoption of this means of giving stability to the wall-arches. Thus the differences in the character of the architecture of the various provinces of France, in the thirteenth century, are nearly always to be explained by a necessity of building. If any one wishes to learn about the usefulness of these gables, regarded generally as ornaments, he must examine Figure 108.

But architecture is an imperious art. As soon as you modify one of its members, as soon as you add anything to the arrangement, you see the difficulties of detail accumulating. A first change in the system, which you suppose trivial at first, demands a second, then a third, then a crowd of others. Hence you must either go backwards, or become the slave of necessities which you have evoked by a first attempt, or a first concession.

One struggles against these successive difficulties which seem to arise in proportion as he overcomes them. In days when idleness of mind is regarded as a virtue, men treat these perilous attempts as

¹ From the "Dictionnaire raisonné de l'Architecture Française," by M. Viollet-le-Duc, Government Architect, Inspector-General of Diocesan Edifices, translated by George Martin Huss, Architect. Continued from No. 893, page 71.

vicious tendencies, as forgetfulness of sound doctrine. But the architects of the Middle Ages and especially of that period which now occupies us, would never have thought that a step backward or a repentance was in progress; they felt that they were led by their own principles and they solved courageously each of the new difficulties which they were continually raising.

To surmount the wall-arches with triangles of stone, in order to weight their keys, means at first only a little more stone and a little more handwork. But there must be gutters upon the wall-arches, and balustrades above the gutters; these gutters must rest upon the arches and not upon the filling of the vaults; the slopes of the gables must themselves throw off the water in some way; these rigid lines must be embellished; and this new member added to the architecture must find a place without intruding upon that of other indispensable members.

Figure 108 explains how the builders at the middle of the thirteenth century were able to reconcile at once both the purely material requirements and those of Art.

They set over their wall-arch *A* (see the section), often strengthened and doubled by an archivolt *B*, having the thickness of the filling-stones of the vault, about two-thirds of the width of these arches, the solid gable *C*, leaving a shallow notch at its base in order to fit in the gutter *D*, set over the remaining third part of the width of the arch. The gable being detached, this gutter had a drip-stone overlapping the cornice, as seen in *E* and received the balustrade, as usual, in a groove.

Two stones *F*, carrying a cistern and gargoyles, were placed at the base of the gable to collect the water falling upon the roof-pieces of these gables. These roof-pieces, made in long sections to avoid seams, were cut according to the outline *G* and beneath the cornice were imbedded in the tympanum and were provided, behind the crockets, set in grooves, with a little furrow *I*, suitable for collecting the water and guiding it to the cisterns of the gargoyles.

Above the cornice these roof-pieces were then cut according to the drawing *H*, throwing off the water in front and behind. A head-piece *K*, made in one piece of stone, maintained the extremities of the two inclined roof-pieces, as also the branches of crockets. The balustrade *L* was set behind, level with the rear surface of the gable, in order to make way for the rows of crockets *M* inlaid in the grooves. Later they completely hollowed out these gables, which appeared too heavy to the eye, above such light mullions in the windows. This example shows how each new member added to the Gothic architecture led to a series of details, studies and combinations.

Some one will perhaps tell us that the efforts here are too great for the causes that evoke them; the criticism will be just, but it is too severe. In the natural order of things how many complicated

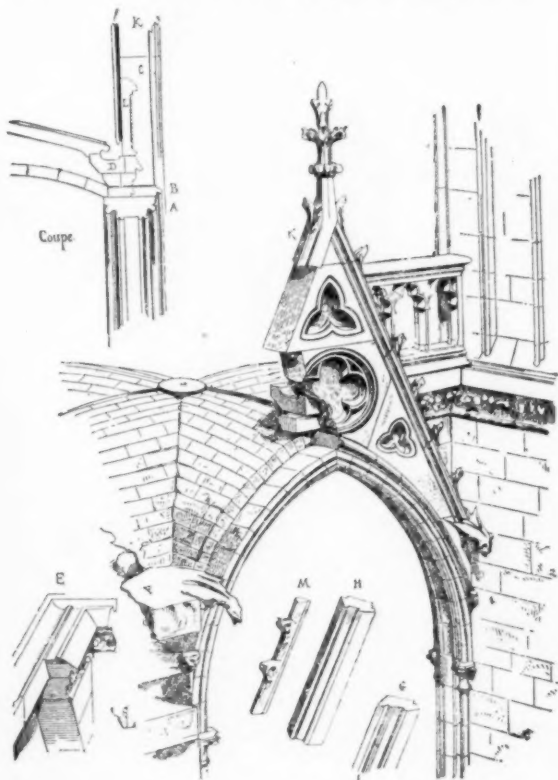


Fig. 108.

arrangements do we not see, how many details, how many long and powerful efforts to produce apparently trifling results? It is not we who created the world, who presided over its ordering and if things are well arranged in it, we must yet grant that this arrangement is far from simple.

The architects of the Middle Ages will admit a criticism that might be addressed to the great Orderer of the Universe. These architects, like their predecessors, had inert matter to work upon; they had to submit to the laws of attraction and resistance and to take account of the wind and rain. In the presence of inert matter

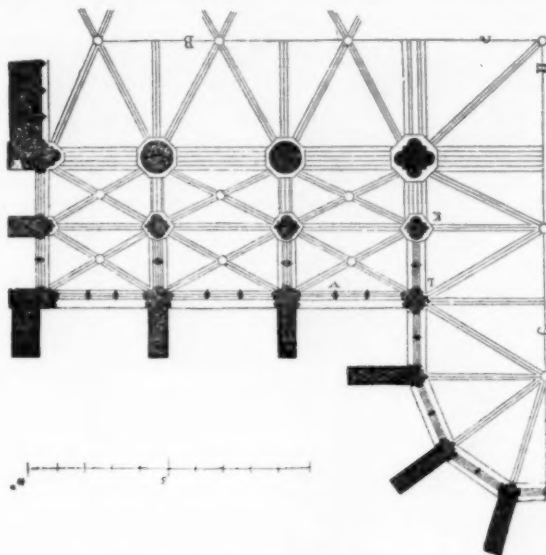


Fig. 109. Choir and Transept of St. Nazaire, Carcassonne.

and the action of natural forces, they believed that equilibrium was the true law of construction. Perhaps they deceived themselves; but it will at least be admitted that they deceived themselves like men of genius and there is always some good to be gained from men of genius, even when they are deceived. Moreover, it must be conceded that the more man seeks the more he combines and complicates matters and the sooner he ascertains the weakness of his judgment. Here are *rationalists* (if I may use the term), artists who follow a principle, ready to accept anything in conformity with the strictest rules of logic; who take, for building, freestone, that is to say, a substance shaped in such a way as to be set in courses; hence the principal lines in their construction must be horizontal. But no; after half a century of attempts of combinations, each more ingenious than the preceding, they come, on the contrary, to making the vertical line predominate, in their edifices, over the horizontal and that too without ceasing for an instant to follow the consequences of the true principle, which they have laid down. Many causes conduce to that result. We have mentioned some, as, for instance, the utility of stones set upright to make buildings rigid, or the necessity of weighting the points of support liable to be forced out of their vertical by oblique thrusts. There is a last point which has its importance: in the cities of the Middle Ages space was limited. Every city, because of the feudal system, was fortified, and they could not move the fortifications of a city every ten years; hence it was necessary to enclose the monuments in narrow spaces and to take up as little room as possible.

Now, if you build by a principle which makes all the actions of your structure oblique and if you cannot take more space, you must make up by vertical weights for the room which you lack on the surface.

A law originally imposed by necessity and endured as such, soon becomes a habit and a need; so much so that even when one could get rid of it, he submitted to it, it became pleasant and entered into his customs.

From the time that the architects of the Middle Ages learned that the structure of their vaulted buildings required them to multiply the vertical weights so as to resist all oblique pressure, they freely accepted the situation and, as in an edifice, either the horizontal line must necessarily prevail over the vertical, or the latter over the horizontal, unless they wished to have a real checker-board pattern. They ended by suppressing the horizontal line almost entirely, keeping it only to indicate the level of the stories, to show a resting-place within, or a floor. Also, carrying their principles always farther and farther, the master-workmen, at the end of the thirteenth century, show clearly, on the outside of their edifices, the interior arrangement and in this we should do well to imitate them. If we examine the outside of a Gothic building we can say whether it is vaulted in stone or roofed with timbers.¹

Its pinnacles indicate to us the number of its interior supports; its bands, the levelling-stones above the vaults; the strength of its buttresses, the force of the thrusts and their direction; its win-

¹ In this regard and to show how far opinions upon architecture are false to-day, we shall here quote the opinion of a man, otherwise very enlightened, who, seeing the outer buttresses indicated in a plan, wished to have the architect suppress them, for the reason that the progress of construction ought to do away with these appendages, applied to buildings in barbaric ages and showing nothing but ignorance, etc. One might as well say that we are too civilized to be truthful and that falsehood is the most certain mark of progress.

dows, the number of wall-arches and compartments; the shape of the roof, the perimeter of the various halls, etc.

At St. Urbain of Troyes, already, the different members of the structure are so delicate and they have each a function so clear and independent, that the architect assembles them, but does not bind

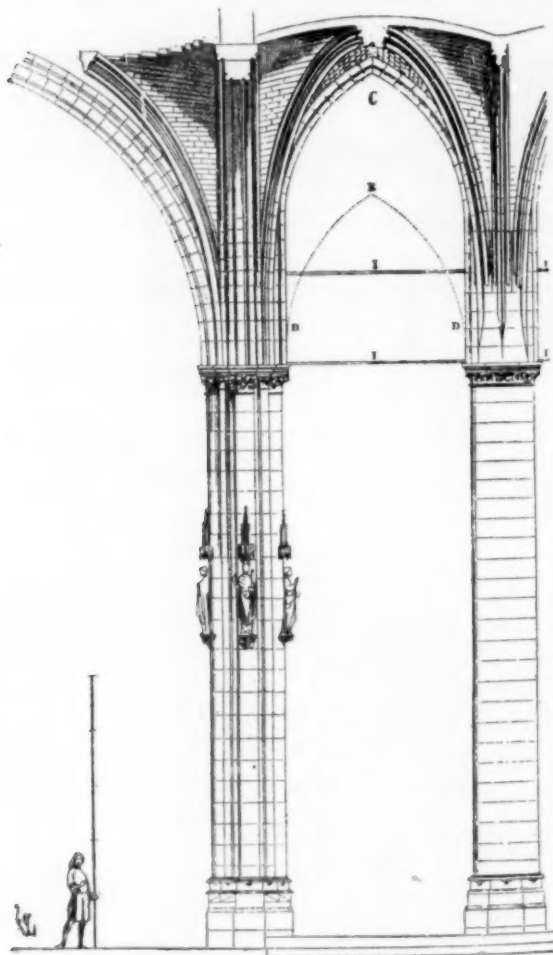


Fig. 110. Transept Arch, St. Nazaire, Carcassonne.

them together. He places them one beside another, keeps them together by mortising and fitting them in, as in joining; but he avoids binding them, for this produces homogeneity of all the parts and this the builder fears in using a system where every part of the structure acts, resists, — has its own action and resistance, — an action and resistance which can be effective only so far as they are independent.

At the beginning of the fourteenth century this system of allowing to each member in French construction its own function and of uniting these members in accordance with the individual function of each, is carried to exaggeration. This is very evident in a highly interesting monument, built from 1320 to 1330; we refer to the choir of the church of St. Nazaire at Carcassonne, one of the rare original conceptions of a period during which the art of architecture had already fallen into the use of formulas and cast aside every new attempt, every individual expression.

The careful examination and analysis of this monument have revealed a fact interesting to us to-day: it is the simple method followed by the architect and his subordinates for building a structure seemingly very intricate and apparently requiring a fabulous number of operations and drawings. In reality the difficulties of arrangement do not exist. This structure is merely a collection of vertical planes, whose horizontal projections need only a simple drawing each. It must be admitted and well understood, first of all, that the architect knows what he wants, — that he actually *sees* his building, under all its aspects, before laying the foundations; that he has looked out for all the different parts of his construction; that he has done, before cutting the first stone, all the work that we do upon an edifice when measuring and studying its final details.

Gothic architecture is exacting upon this point and perhaps this is what brings it most of its enemies. It is so consoling to say, when a difficulty meets us on the spot, "We shall see about that when we come to the plastering." It is so painful, when everything is not provided for in advance, to listen every day to a long series of questions from the stone-cutter or the overseer, — questions which must be answered clearly and simply, as by a man who knows what he is going to do and has foreseen everything that can possibly be required.

Accordingly the architect of the choir of St. Nazaire at Carcassonne made not only the plan of his edifice, not only the elevations and cross-sections, but he knew beforehand, the exact point where the various arches spring, meet and intersect; he drew their profiles and knew exactly upon what they were to rest; he knew the results of the thrusts, their direction and their force; he estimated the weights and reduced the pressures and the resistances to their most exact limits. He knew all this beforehand and he must have known it from the time when the first course was placed above ground.

His conception being thus complete, fixed on paper and in his brain, his subordinates go blindly forward. He says to one: "Here is the design of the pier A, repeated twice; this is the design of the buttress C, repeated ten times, etc.; here is the drawing of the window A, repeated six times and of the window B, repeated seven times; here is a branch of a pointed arch with its stones of impost, of a transverse arch with its imposts, etc." This being said, the architect can go away and let all the courses and the parts of each member be cut out. The cutting finished, a master-setter comes, who, without possible mistake, has all these different pieces taken up and put into their places, like the pieces of a well-planned machine. This mode of procedure explained how, at this period (at the end of the thirteenth century and during the fourteenth century), French architects had monuments erected in countries where, perhaps, they had never set foot; how from Spain, from the south of France, from Hungary and from Bohemia, requests came for designs of monuments by these architects; and how these monuments could be built and exactly resemble, save in some details of profile and sculpture, the edifices built between the Somme and the Loire.

The choir of the church of St. Nazaire at Carcassonne was probably erected thus, with the aid of plans furnished by an architect of the north, who perhaps never visited the city.

Our reason for this opinion is that, evidently, the architect has avoided every difficulty requiring a decision on the spot; those difficulties which one solves, not by a design, but by explanations given to the stone-cutters and workmen in the very work-yard while watching their work and taking, if necessary, the gauge, the rule, or the square and applying it to the design. The architect, for instance,

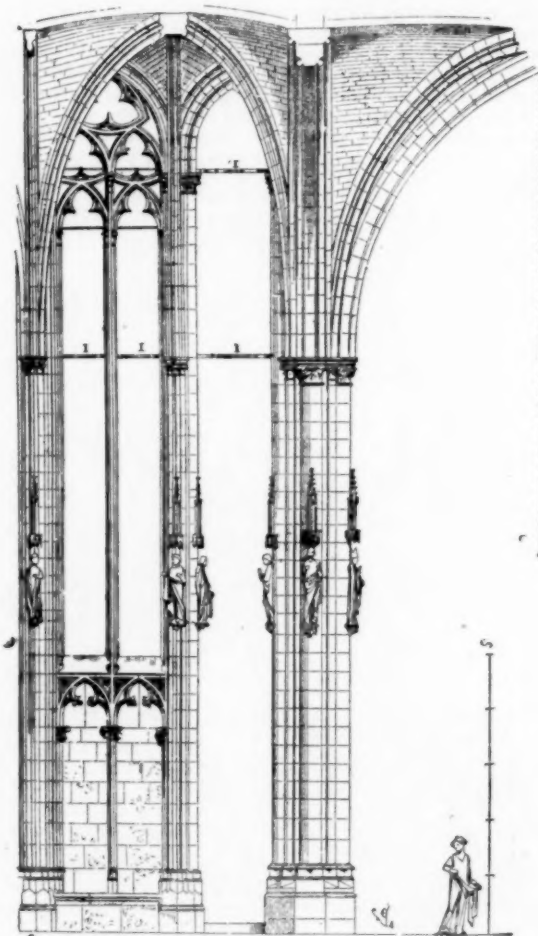


Fig. 111. Choir Arch, St. Nazaire, Carcassonne.

has almost entirely, in the vaults of this edifice, given up imposts common to several arches; he has given the curve of each of these arches and their profiles; each has been cut without regard to the adjoining arch and the master-setter has arranged all this like a game of patience. But in order that the singular method of

construction used in the choir of the church of St. Nazaire at Carcassonne may be appreciated, it is best to give, first, half of the plan of this choir with its transept (Fig. 109).

We see in this plan the horizontal projection of the vaults; they have all their keys on the same level, or nearly so, although their

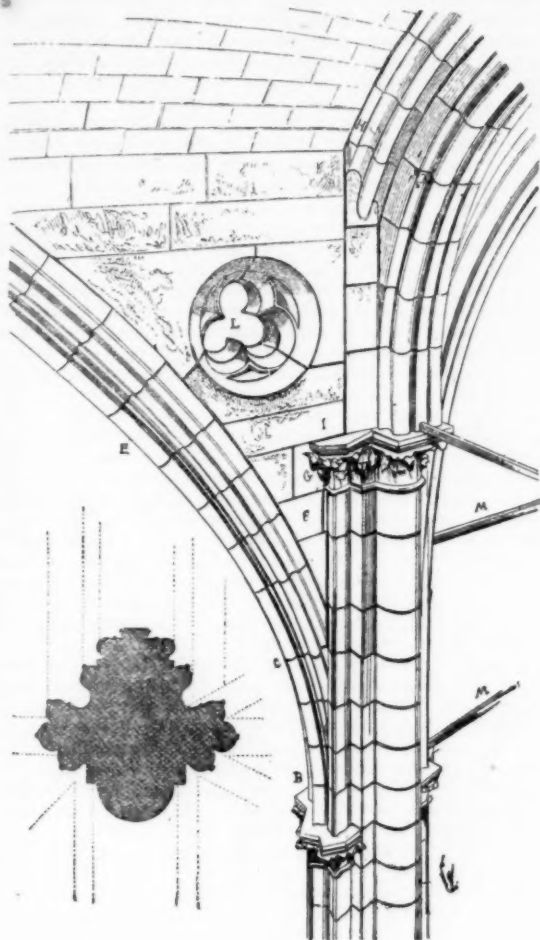


Fig. 112. Choir Pier, St. Nazaire, Carcassonne.

dimensions and forms are not alike; so, necessarily, the springings of these arches are found on very different levels.

We must also see the general section of this building through *A B*. The architect had thought of closing the vaults *C* (Fig. 110) at a level below that of the great vaults of the chancel and of the transept; and the structure had been so built up above the springing of these low vaults, as seen by the dotted lines *D E*.

But the architect had to yield to the desire for greater effect, by raising the keys of all the vaults to the same level. Perhaps a requirement from the clergy caused the adoption of this latter course; but certain it is that the low starting-points, indicated by dots, were cut off at the surface of the piers, as can be easily seen and that these springings were raised, as indicated in our drawing, in order to have through the whole extent of the edifice windows of equal height.

Figure 111 gives a section through the line *G H* of the plan.

Let us at once notice, that, to hinder the buckling of these slender piers, subjected to the unequal thrusts produced by the elevation of the secondary vaults, the architect has fixed bars of iron, *I*, 0.05 centimetres square, to be seen in our two sections and that the stone used is a hard and resistant limestone, which permitted them to place the vaults upon these slender supports.

Let us now examine with care the details of this structure; let us take the summit of the pier *K* (of the plan) at the point where that pier receives a large intermediate transverse arch of the chancel, two archivolt, a transverse arch of the chapel and two branches of pointed arches.

The horizontal section of this pier (Fig. 112) is drawn at *A*.

From *B* to *C* we see four courses of stones to receive the large transverse arch.

Starting from the section *C*, normal to the curve of the transverse arch *E*, the voussoirs of that arch are independent and the pier rises behind the filling *F* of that arch, without being attached to it, up to the capital of the wall-arch *G*. The projection of this capital forms a connection with the filling and then the pier rises, again independent, up to its meeting with the wall-arch *H*.

Above the capital, *G*, the filling rises vertically from *I* to *K*. It

is pierced by a trefoil, *L*, which ornaments the bareness of this triangle, receiving the vaultings of cut-stones.

The two bars of iron *M* serve as ties between this pier and the one adjoining and maintain the thrust of the transverse arch *E*.

Let us take the adjoining pier *L* of the plan, that of the entering angle, which is located between three windows and which receives a large transverse arch, two branches of the great pointed arches of the principal vaults and a third branch of a pointed arch from the chapel (Fig. 113). It is again seen that here the drawing of each part has been made independently of the rest and that the arrangement shows only the fewest possible connections, in order to avoid too complicated designs. This independence of the different members of the vaults, in falling upon the piers, allows great elasticity to the structure, — an elasticity necessary in a monument so light, very high and very unevenly weighted. It can, in fact, be affirmed, that in the choir of the church of St. Nazaire there have been torsions and considerable movements, without destroying any of the solidity of the building.

Once more, these are not examples to follow, but useful ones to know, because of the simple and practical means put in operation.

In Figure 114 we see the outer side of the same pier. We are placed in the angle of the chapel, at the point *V* of the plan; we suppose the upper mullions of the great window of this chapel to be taken away.¹

At *A* is seen the bar of iron which maintains the tops of the pillars of these mullions and which serves at the same time as a tie for the springing of these arches [see "*Meneau*"]; at *B*, the groove reserved for setting the open-work centering of the mullions; at *C*, the stones of impost of the wall-arch that encloses the window-frame of cut-stone; at *E*, the branch of the pointed arch of the chapel-vault, whose courses of impost are mingled with those of the wall-arch.

At the starting from the bed *D*, the voussoirs of that pointed arch are independent.

At *G* is the archivolt surrounding the carved open-work centering of the first window in the chancel and filling the place of wall-arch of the interior; at *F*, the archivolt wall-arch of the mullions without glass, separating the chapel from the choir. Here it will be observed that this arch *F* is moulded even in the part hidden by the masonry of the entering angle behind the pointed arch *E*, which proves in the clearest manner that each member of the structure was separately outlined and cut in the work-yard after partial designs and that these different parts thus prepared by the stonemason were put into place by the setter, who alone knew each of their functions and their relations with the whole of the structure.

The mason filled the gaps remaining between these interlacing, interpenetrating members, all remaining free.

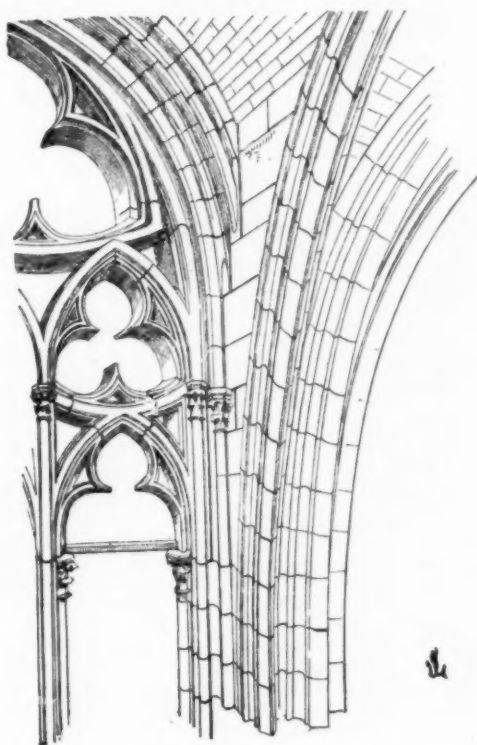


Fig. 113. Choir and Chapel Pier, St. Nazaire, Carcassonne.

We have drawn at *K* the horizontal projection of that entering angle, with the intersection of the two archivolt-wall-arches *G*.

¹ This operation having taken place under our eyes, we have been able to ascertain very exactly, and here reproduce, that construction.

Such a structure consists only of piers holding elastic but resistant groins, supporting the fillings of the vaults, or maintaining the sashes of stone in the large grooves.

It shows us that the master-builder could leave nothing to chance, postpone nothing; that he could foresee everything from the first course, classify his designs methodically and that he needed, when once the stone was cut according to the designs and the pieces ready, only to give instructions to a skilful stone-layer, who took successively all the parts of the structure and put them in order into their places, as the master-carpenter takes, one by one, the pieces of timber, cut in advance, in order to raise them to their places.

To-day people proceed otherwise: they collect the blocks of stone, often without knowing very definitely what form they will finally take and they cut in these same blocks the intersections of the voussoirs and the mouldings, as one might do in a homogeneous mass, without very much anxiety about the beds and joints that fail to coincide with the given forms. Is this better? Is this the means of obtaining a more solid structure? We beg leave to doubt. We can affirm, on the contrary, that it is less reasonable, less skilful, less intelligent and more costly.

There is no religious construction of the Middle Ages more advanced than that of the churches of St. Urbain of Troyes and

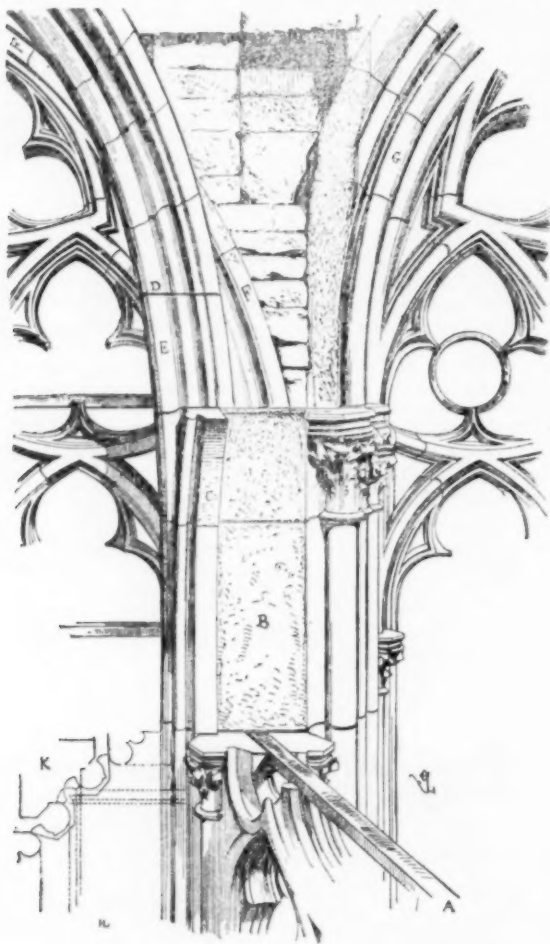


Fig. 114.

St. Nazaire of Carcassonne, in the path opened by the architects of the thirteenth century. They could not, in truth, go farther without substituting metal for stone.

It is doubtful whether the architects of the fourteenth century were checked by that impossibility, or whether their fruitless efforts had proved to them that they had already passed the limits imposed by matter: in any case a reaction took place about 1330 and the builders abandoned these too-bold methods to return to a wiser system. But this reaction ended by destroying originality; they came to formulas. At that period we see the builders casting aside, in the vital parts of their structures, that simultaneous use of stones set upon their bed and against the stratum, which had furnished the builders of the thirteenth century with such beautiful subjects for decoration. They keep the forms prescribed by this system, but no longer appreciate the reason for them and, losing something of the adventurous spirit of their predecessors, they give up the stones set against the stratum as a means of rigidity for the supports and return to structures built in courses, reserving the stones set against the stratum for mullions and inlaid arching,—that is, for the architectural members supporting no weight and serving only as window-sashes or decorations. Still, as if to follow, in appear-

ance at least, the consequences of the system devised during the thirteenth century, they multiply the vertical lines and wish that not only the members of the vaults, the arches, shall have each its point of support, but even the mouldings with which these arches are ornamented. Hence there results between the form given to the piers, for instance, and the construction of these piers, the most evident contradiction. In fact, the builders of the fourteenth century return to heavier forms, although they try to disguise that reaction under an apparent lightness, by multiplying the slender members of the architecture. As workmen they are very clever, very prudent, experienced and skilful, but they entirely lack invention. They have no more of that boldness which indicates genius. They are wiser than their predecessors of the thirteenth century, but they have the defects which often accompany wisdom; their sure methods, their formulas, are stamped, despite all their efforts, with a wearisome monotony.

One of the most striking and most complete examples of religious construction in the fourteenth century is the Cathedral of Narbonne, whose choir only was built from 1370 to 1400.¹

It is the work of a consummate master of the art, though lacking in that imagination, those unexpected resources which charm us in the constructions of the thirteenth century and which lend themselves to the most varied conceptions.

What gives the architects of the fourteenth century this degree of practical skill was that repairing of the lower structures, those partial reconstructions made in the older edifices. At this period the materials used are always of the first quality, the design learned, the arrangement excellent and the cutting executed with remarkable care. Otherwise the general system of construction is modified very little, but is applied with more sureness and with perfect knowledge of active and passive forces, of thrusts and weights. The flying-buttresses, for example, are well drawn and set just where they ought to be. We have a very clear proof of this in the Cathedral of Paris. All the flying-buttresses of the nave and of the choir were rebuilt at this period (toward 1330), and rebuilt so as to clear the galleries of the first story and fall upon the large outer piers [see "Arc-Boutant," Fig. 59, "Cathédrale"].

These flying-buttresses, which have a very long radius and hence a curve very slightly marked, have been calculated with an exact knowledge of the function they had to fulfil and when we reflect that they had to be rebuilt under new conditions and resting upon old structures, we are obliged to recognize in these builders of the fourteenth century a great experience and an uncommon skill.

We do not believe that we need continue longer upon the religious constructions of the Middle Ages, for we shall teach our readers nothing new, after what we have already said.

The articles in the "Dictionnaire" state elsewhere the differences resulting from the improvements in detail, added by the architects of the fourteenth and fifteenth centuries, in religious constructions.

We shall now devote ourselves to the civil and military constructions, which proceed after their special methods and have but little relation to the construction of edifices purely religious.

(To be continued.)



A CONFERENCE of the various Provincial Commissioners of the Dominion for the World's Fair, Chicago, was recently held in Ottawa for the purpose of allotting to each Province its share of the space allowed to Canada as a whole. A report was presented from each Province showing what had already been done towards collecting and preparing for exhibits, and in the subsequent allotting of space each Province was allowed a position according to the quality of its exhibit, the Provinces making the best exhibition having the most prominent positions. It seems that the shape of the space allowed to Canada in the Mineral Building is somewhat peculiar, making it rather a difficult matter to arrange satisfactorily; but it was finally decided to give Ontario the whole frontage on the main aisle—2,250 square feet out of the total of 6,500 square feet. The entrance to the Ontario section will be the main entrance to the entire Dominion exhibit. Ontario has the largest exhibits in agriculture, educational matters and stock, especially with regard to stock, as the other Provinces will not exhibit any

¹ It should be said that in France we have not a single large edifice complete, in the architecture of the fourteenth century. The thirteenth had left no great monuments of this class to be built and the fourteenth could only finish edifices already begun, while they had no leisure to finish the small number founded by themselves.

sheep or swine. Ontario and Quebec only will exhibit cattle and horses. In forestry, Ontario and British Columbia will have about an equal space, while in fruit Ontario has secured about 2,000 square feet. Dr. Selwyn, chief of the Geological Survey Department, considers that Ontario has the finest mineral exhibit ever collected on this continent. He will make an exhibit from the Geological Department showing the rock-formation from which the various specimens are taken. From British Columbia will be sent a very fine exhibit of minerals, which will convince the public generally of the immense wealth of that Province in the more valuable varieties. The shipments of grain and minerals will begin early this month.

The Ontario Society of Artists' winter exhibition was of more than usual interest this year, as from this collection paintings from Western Canada were to be selected for the Chicago Fair. The committee appointed to make the selection was, unfortunately, composed of a number of artists, and, naturally, their calling made it a difficult matter for them to avoid the appearance of partiality. Had they really sent the best paintings, it would have seemed as if they had favored some artists more than others, which would have been a result only natural, when the very "amateurishness" of many Canadian artists is taken into consideration. The forty pictures they have selected comprise a large variety of subjects, and it has been suggested that, in order to get over their difficulty, they made this, rather than excellence of work, the condition of choice. The largest canvases were chosen, altogether apart from merit, evidently, for "A Peasant-girl Drinking" is about as crude and wooden a production as could be, a thoroughly amateur piece of work, by Charles Alexander; but it is of the same size, or thereabouts, as E. E. Thompson's ghastly "Waiting in Vain," described in a recent letter, and "The Foreclosure of the Mortgage," by G. A. Reid, which is a commonplace subject, figures life-size, illustrating a very sad but not uncommon incident—a plain subject plainly treated, without a shadow of poetry, or even artist's license, to redeem it.

It is greatly to be regretted that many really good paintings are not to go, such, for instance, as F. A. Verner's "Ojibway Wigwams" and "Sioux Encampment," except that in his case he will be well represented by his "Cattle at Milking-time," in oils, and his "St. Clair Marsh" in water-color. These two are certainly the best, in every way, of all in the gallery. The latter has been exhibited in the Royal Academy, London, and other European galleries, and is a clever representation of the sun just dipping below the horizon, a great red ball, over the marsh, from which rises the evening mist, diffused with the sun's glow. The late Paul Peel's picture, the "Venetian Bather," a nude child, life-size, returned from her bath, and standing before a large mirror in which her figure is reflected, is probably the finest piece of flesh-painting ever produced by a Canadian, and it is well worth a prominent place. Mr. Forbes's unfinished picture of shipwrecked mariners on a raft should have had a place, but being unfinished it appears to have been barred on that account. It is a large canvas and strikingly depicts the terrors of the storm and the misery of the occupants of the raft. A feature upon which much labor and skill are displayed is the light of the lantern with which they attempt to signal a distant vessel, but it is open to question as to whether shipwrecked sailors would be likely to have a lantern, or be able to light one in such a raging storm if they had it. Portrait-painting is not a success, judging from the specimens on view. One of a young lady by E. W. Grier is coarse and very funereal. The subject is arrayed in black, sitting in a black carved-oak chair of peculiar design, and the background is also very dark. One would not object to the blackness had the subject anything to relieve it, but the result is that the lady looks ghastly ill. "Christobel," a scene from Coleridge, is a charming piece by Mrs. Scriber, of a character that one seldom sees attempted here. Among the most noticeable of the water-colors are several views from the Rocky Mountains, but the grandeur of the subject has generally been too much for the artist, and the pictures seem to need a great deal more work upon them than has already been given, although they exhibit a considerable amount of skill and painstaking.

Two charming pieces of landscape by C. M. Manly should not pass unnoticed. Mr. Manly has a very delicate touch and his forte seems to be the representation of sunlight on open stretches of heather and other moorland accompaniments. His "Land of Peach and Vine" and "Heather Land" are really excellent. It is to be regretted that none of Mr. L. R. O'Brien's (late president of the Canadian Royal Academy) pictures are on view. There is certainly no Canadian painter to touch him in the execution of his works. A recent exhibition of his pictures was a treat to see: his landscapes and water-scenes are exceedingly beautiful. Being a member of the Canadian Royal Academy, his paintings have gone down to Montreal.

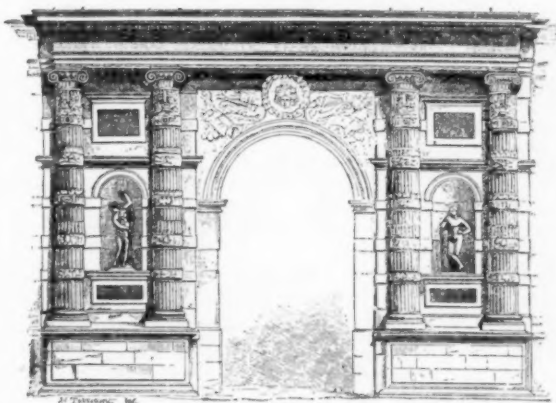
A month or two ago I mentioned the water-works' trouble at Toronto,—the bursting of the great conduit-pipe that lay at the bottom of the bay, and brought the lake-water to the city. It was then supposed that the repairs necessary could be temporarily effected now, and properly completed and the pipe sunk to its original position when the ice had gone. Now, however, it is stated by the city engineer, an authority on water-engineering, that it is more than probable the conduit is beyond repair, and that nearly a couple of hundred thousand dollars have been practically and actually thrown into the water.

It is suggested that a second conduit would be advisable, even if it is found that the present one can be patched up, and, probably, with

new engines, a new conduit, a renewal, in fact, of all existing plant, which has already cost the city hundreds of thousands of dollars, Toronto might have a good water-supply. Was ever a more iniquitous state of things heard of? It seems that a year ago a contract was let for a new lining of iron to the pumping-well at the city end of the conduit: the material was made, supplied and delivered, but up to the present has never been put in, and the reason given is that it was necessary in order to give the city its required daily supply of water that the engines should not be stopped to allow of the lining being renewed, although it was absolutely necessary that a new lining should be put in. Here is a city of 200,000 inhabitants, which has expended fabulous sums on its water-system, so dependent upon the pumps for its every-day supply that the engineer in charge dare not stop them for one day for necessary repairs, lest there should be a water-famine; and yet there is a ten-acre reservoir capable of holding enough water to last the city for a month; but for all the outlay it is now rarely full, and mysterious leaks carry away a considerable quantity of that pumped up into it. It was actually stated, on authority, that the cause of the diminution of the water of the reservoir was that so many people left their taps running at night to prevent freezing. As a matter of fact, very few people do think of turning on their taps at night, but if many actually did so, it would be a very small reservoir that could be emptied by such means. It is certainly rather an unusual thing in these days to find restaurant-keepers advertising that they receive daily supplies of pure water from the neighboring country, but that is actually a fact here, and citizens are continually warned of the necessity of boiling all water before using.

The *Canadian Architect and Builder* begins the sixth year of its life with a special number designed to celebrate this important event in its history, and certainly the editor deserves great praise. The "New Year Number," as it calls itself, presents a specimen of journalism better than has heretofore been produced in Canada. The cover was specially designed by a Toronto architect, and is a clever piece of design; the illustrations are intended to be representative of Canadian progress, and give views of prominent buildings in Toronto, Quebec, Hamilton, Ontario, and Halifax, Nova Scotia, while the body of the paper contains a number of special articles by architects in the various Provinces. It is not too much to say that the members of the architectural associations of Ontario and the Province of Quebec are thoroughly satisfied in having guaranteed their influence towards the support of the journal, and the journal has proved a very satisfactory medium for the propagation of principles of self-defence, for which both these associations were formed, while at the same time builders and contractors have, through its columns, been supplied with a vast amount of practical information which they could not have obtained in any other way. Professional journals of other countries will be glad to know of the success that their contemporary has met with, and may take encouragement from the result of the venture. The annual convention of the Ontario Association of Architects is being held at the time of writing, so that we must hold over an account of its proceedings to another month.

THE MAIN QUADRANGLE AT THE WORLD'S FAIR.



Detail from the Tuileries by Philibert Delorme. From *L'Art*.

FROM a rather interesting and quite impartial discussion of the World's Fair buildings in the *New York Tribune*, we make the following extract:

Eliminating the Mines Building from the main court for the sake of argument,—although it has a frontage on an unimportant portion of the latter,—the structures to be touched upon at this end of the grounds possess so many characteristics in common that the coherence of the unit which they combine to make is to be dwelt upon before their individual qualities. The height of the Administration Building has been alluded to. It is the loftiest building in the court, as the portico of the Exposition should be. The buildings grouped

with it are longer, wider and, naturally, lower. The Administration Building is 262 feet square. The Electricity Building measures 345 by 690 feet, the Liberal Arts Building is 787 by 1,687 feet, the Machinery Building is 494 by 842 feet, and the Agricultural Building is 500 by 800 feet. Both the Machinery and Agricultural buildings have annexes of considerable size. Above the cornice each building has points which differ radically from those in any other structure, and the result is a sky-line that, with a reservation to be noted below, is of delightful variety. Beneath the cornices there are differences of design, but when the court is viewed as a whole they are less marked. The effect then is as of a vast quadrangle surrounded by arcaded structures on the three sides overlooked by the front of the Administration Building, the arcades being kept in scale by an adherence in all the buildings to the same measurement from pier to pier, and being saved from monotony by the independent treatment of details. Thus it will be seen from the sketch of a fragment of the Agricultural Building that on the side shown therein—the west side—the pavilion on the angle is open and the spaces between the columns which support the arches on the right are closed. The conditions are reversed on the north side of the building, and, while the corner pavilion is closed, the succession of single-story columns extending from it to the entrance pavilion in the centre, a succession only interrupted twice by a wide solid pier with double-story pilasters, is left open and the wall which it screens is recessed so as to leave a broad walk. Across the basin where the south end of the Liberal Arts Building faces the Agricultural Building the entire spaces between the central and corner pavilions are filled with double-story flat columns bearing round arches just beneath the cornice, and with the separation between the first and second stories marked by a flat arch thrown from the middle of one column to another. The second-story openings are glazed. The first are left open and from corner to corner the promenade is unbroken, the central pavilions being connected with the arcades by a continuous passage.

To return to the broad relations of these buildings: The Administration Building could be made massive because in length and breadth it is the same, and could be carried to any height. The Machinery, Agricultural, Electricity and Liberal Arts buildings are all greater in length than in width, and far greater in both length and breadth than in height. Free to raise their roofs by the aid of iron trusses and such expedients, the architects of these buildings were yet obliged to keep their cornice-lines down to a uniform standard of about sixty feet. With long, low façades to produce, therefore, it was out of the question to conceive them in a massive style, as Mr. Hunt was at liberty to conceive the pavilions of the Administration Building. It was imperative to give them as much lightness and elegance as would be compatible with their pseudo-solidity. The frequent use of the Corinthian order, sometimes pure and sometimes modified, and a general reference to Classic architecture, which at its grandest still may be said to have elegance,—furnished the solution of the problem. It would be hard to imagine a stater quadrangle than these buildings form,—the rows upon rows of columns in the Machinery and Agricultural buildings framing the right-hand side, those of the Liberal Arts Building and the pilasters of the Electricity Building filling in the scene on the left, and the peristyle, or arcade, at the foot of the court, joining a triumphal arch in the centre to the simple Italian music-hall and casino on either side, thrown out boldly and distinctly against the steely clouds that hang over the lake. The ornament is nowhere excessive but, on the contrary, is generally excellent in itself, and applied with taste. The effect is at once rich and refined. The sculpture particularly and the painted decoration, which need to be considered in greater detail than is possible upon the present occasion, lend incalculable animation and charm to the designs which they adorn.

One thing that has contributed much to the harmonious effect of the buildings in the court is the policy followed by the architects in regard to the projections requisite to relieve the long stretches of their façades. By common consent these have been confined to the porticos in the centre of each side of the different buildings and to the pavilions at the corners. The former are, of course, more pretentious than the latter, but all are characterized by the moderation which is the key-note to the architecture of the court, and all are monumental—all, that is, with the exception of those of one building. The exception invites a short discussion of specific points in the court. All things considered, the court is such a triumph of architectural proportions that a blemish here and there is comparatively of no consequence, but it cannot be disguised that if the quadrangle has one weak member it is the Electricity Building, designed by Messrs. Van Brunt & Howe. The cooperation of its pilasters with the columns of the Liberal Arts Building to form an *ensemble* on the north side of the court has been referred to favorably, and is really creditable, but the success of this cooperation has been due more to a respect for the rules as to measurements, and the relations of arch-spans, cornices, etc., than to accomplishment in design. The design of this building lacks grace, lacks beauty of outline, lacks most of all largeness of style and dignity. Its conspicuous features are a number of towers rising from the cornice to various heights and surmounted by lanterns and domes. These are commonplace and ungraceful enough in themselves: combined with certain other features their effect is hardly to be lauded. For example, the main entrance, which faces on the court, is marked

by an immense arch that springs from a point as high as the cornice of the building itself. Above the arch is a pediment of generous dimensions, and above this is a heavy attic with a horizontal top. As has been observed, the entrance is not truly monumental, and the reason is that below the cornice it is kept flat, not sufficiently emphasized, and behind the arch it is built in the form of an alcove, or niche, which increases the feeling of flatness. But the pediment and attic give it great heaviness, and to balance the mass—for it is a mass—the architects have provided at each corner a belfry, as aforesaid. The sky-lines of the building are restless without being picturesque. The surfaces of the façades are broken up by piers and columns with commendable regularity, but with no special ingenuity or artistic skill. Fortunately this is one of the smallest buildings on the court, and it is powerless to seriously disturb the effect of the latter.

If the touch of piquancy aimed at in the Electricity Building had been attained with perfect success nothing in the court could have commanded warmer praise, for it serves to link the Administration Building with the Liberal Arts Building on the north side of the court, as the Machinery Building serves to link it with the Agricultural Building on the south. The transition from the academic but gorgeous Administration Building to the more severe structures which border the lower sides of the court could not have been better effected than through buildings also academic, but treated with an occasional picturesque note. Messrs. Peabody & Stearns have proved this in the Machinery Building. Their arcade on the first story is formed of rusticated piers, and above these runs a loggia, or open gallery, with a series of columns supporting its roof. The result is thoroughly dignified, but a profusion of modelled and colored decoration, especially about the wall of the loggia, makes it very animated. The corner pavilions, slightly projected from the line of the façade, repeat the scheme of the arcade and loggia, but are crowned with domes. The main entrances, of which one has a columnar portico crowned by a pediment, and the other a portico crowned by a dome, are likewise made picturesque by being flanked by towers of which the stages above the cornice are designed in the freest Renaissance style. The rich Corinthian capitals are being picked out in gold; so are the great names in the history of mechanics which are inscribed on the frieze, and in its present spotless state this building—which is the last one finished on the court, and therefore the freshest—is as sumptuous as it is monumental.

The basin filling the lower half of the court has two arms, flowing north and south, which separate the Machinery and Electricity buildings from the Liberal Arts and Agricultural buildings. Between these canals and the Peristyle which shuts off the lake the Liberal Arts and Agricultural buildings have each the entire frontage on their respective sides of the court. Both are the most classic structures on the grounds, after the Art Building, which cannot now be discussed, and both have been designed with such fine scholarship—the Liberal Arts Building by Mr. G. B. Post, and the Agricultural Building by Messrs. McKim, Mead & White—that, although they are unlike each other, they balance each other supremely well. Mr. Post's lake front is once again as long as the longest façade of the Agricultural Building, but the greatest front of the latter is equalled by that shortest front of the Liberal Arts Building, which it faces, and, entrance for entrance, corner for corner, the pavilions of the two buildings give answer to each other's proportions. On the north a Roman triumphal arch with three openings rises in the centre of the Liberal Arts façade, and similar arches of but one opening each adorn the corners. They are composed with splendid Corinthian columns. On the south the end pavilions of the Agricultural Building, built up solidly with pilasters, are emphasized partly by the profile of the projecting columns and pediment shown in the sketch of the west front, and partly by a sculptured attic, and the group called "The Horoscope," which stands on the roof. The main entrance, with its colossal columns and a pediment, is made prominent by a low dome roofing the noble rotunda through which admission is gained to the Exhibition Hall,—a rotunda now such a net-work of scaffolding that only the rough grandeur of its dimensions can be appreciated. The "Diana" by Mr. St. Gaudens, which was formerly poised upon the Madison Square Garden tower, is on this dome.

MECHANICAL THUMBS.—Two men got into an argument the other day over the expansion of steam in a cylinder. "Why," said one, "you don't know anything about machinery and the principles of mechanics. Your thumbs are not shaped right." He then went on to explain that a man with long, thin thumbs did not have a mechanical turn, while those with thick thumbs, broad at the ends, were natural-born machinists. "I never believed in physiognomy," he said, "but I do believe in thumbs. Now, thumbs have been appreciated ever since the world began. The ancients used to call the thumb the 'other hand.' Barbarous kings used to swear and make compacts by their thumbs. In Rome it was a sign of favor to wring and kiss the thumb, and of disfavor or disgrace to lift it up or turn it outward. A man who was hurt in his thumbs was excused from serving in the Roman wars. Some of the scoundrelly citizens used to cut off their thumbs, so as to remain home and get rich. Teachers used to punish their pupils by biting their thumbs. Oh, the thumb is a great and an influential member! I can look at the thumb of a young woman and describe her figure. I can tell whether she is thin and bony, or plump and round; whether her joints are large and ill-shapen, or small and perfectly proportioned. By examining a man's thumb I can tell what ought to be his vocation."—*N. Y. Tribune.*

EFFECT OF TURPENTINE GATHERING ON THE
TIMBER OF LONG-LEAF PINE.Miserere in Choir of Amiens Cathedral. From *L'Art pour Tous*.

IN Circular 8 of the Forestry Division, published about a year ago, it was stated that tests made on timbers of long-leaf pine, bled or unbled, lent countenance to the belief that bled, or tapped, timber did not suffer in strength by virtue of the tapping. Further tests and examinations permit now the announcement without reserve, that the timber of

long-leaf pine is in no way affected by the tapping for turpentine. This refers to its mechanical as well as chemical properties, and hence even the reservation that it might suffer in durability is now eliminated, and any prejudice against the use of bled timber in construction wherever the unbled timber has been considered desirable must fall, as having no foundation in fact, being based only on vague belief, proved to be erroneous.

It is to be hoped that this fact will be made widely known among builders, architects and engineers who have hitherto made discrimination against bled timber, and thereby depreciated or discouraged the manufacture and impeded the sale of an article which answers all the purposes of construction, and the unrestricted use of which is dictated by true economy.

The basis for the statement regarding the mechanical properties is furnished by a series of tests comprising not less than 300 tests on 32 trees of this pine, bled and unbled, from various localities.

The somewhat puzzling fact that bled timber exhibited, if anything, greater strength in the tests, has been accounted for by the fact that the turpentine orchards are located mostly on sites which produce better-quality timber, as well as larger yield of turpentine.

To determine whether any changes in the chemical composition take place, a series of chemical analyses of bled and unbled timber has been made which indicates that the resinous contents of the heartwood are in no wise affected by the bleeding, — the oleoresins of the heartwood being non-fluid, the whole turpentine flow is confined to the sapwood.

Among other interesting facts regarding the distribution of resinous contents through the tree, which will be published in a separate bulletin, it appears that trees standing side by side, and, to all appearances, in similar conditions, show very varying quantities of resinous contents.

To make sure that experience did not, if sifted down, contradict the results of these investigations, a competent agent, Mr. F. Roth, visited turpentine orchards and saw-mills in the long-leaf pine region. He reports that nobody was found — although it was claimed by some — able to discern any difference in the appearance of the bled and unbled timber; that in spite of consumers' specifications for unbled timber, they are almost invariably served with a mixture without finding it out; that experience in the districts where bled timber is cut and used has not sustained the claim of inferiority.

This information is furnished in advance of the full report on the investigations in question in order to remove as quickly as possible the unwarranted discrimination against the product of nearly one million acres of Southern pine, which are annually added to the total acreage in turpentine orchards.

This result of authoritative investigation should be worth several million dollars to the forestry interests of the South, permitting readier use and sale for a product that, left uncut, endangers the future of the forest by the destructive conflagrations to which it is specially subject.

B. E. FERNOW, *Chief of Division*.

Approved:

EDWIN WILLITS, *Assistant Secretary*.

FIRE PROTECTION FOR THE WORLD'S FAIR. — There is a branch of the city fire department at the park, consisting of three steam-engines, four chemical engines, a water-tower, forty hose-carts, a thousand hand fire-extinguishers and a fire-boat, with sixty-five firemen to man them, while the Columbian Guard, consisting of five hundred men, under command of Colonel Edmund Rice, U. S. A., is always at hand to assist in case of emergencies. Much reliance is placed upon the Columbian Guard, which will be raised to its full strength of 1,800 men by May 1. The guard is made conversant with the use of all fire apparatus by a fire-drill three times a week, and is on the watch at all hours of the day and night. Smoking is rigidly prohibited on the grounds, and the offender who does not obey at once the order to put out his cigar or cigarette is hustled off to the police-station without ceremony. The city has established a police-station just outside the grounds, and here a justice sits to hear complaints against those arrested inside the Exposition enclosure. A force of police is also on duty to patrol that part of the city and render assistance to the Columbian Guard should it be necessary. — *Fire and Water*.



THE SKETCH-CLUB OF NEW YORK.

THE meeting held in the club-room Saturday, February 4, was largely attended, and of unusual interest, being the annual meeting of the Club. Twenty-four drawings were handed-in for the Miller prize for an exterior design of a country-house, from plans furnished, and six drawings for the Ackerman prize for pen-and-ink rendering of a carved panel. A criticism of the last month's competition, a hillside tomb, was received in writing from Mr. Thomas Hastings. N. Hausseman received first mention, Edgar A. Josselyn second mention. Officers elected for the coming year were as follows: Frederick R. Hirsh, *President*; James Ackerman, *Vice-President*; Edgar A. Josselyn, *Recording Secretary*; Frank H. Quinby, *Corresponding Secretary*; Harry L. Parkhurst, *Treasurer*; Edgar B. Bross, *Chairman of Current Work Committee*; Danford N. B. Sturgis, *Chairman of Entertainment Committee*; and J. Oliver Cummings, *Chairman of House Committee*. After the election, the members discussed the probable future alliance with the Architectural League.

EDGAR A. JOSSELYN, *Secretary*.



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

THE INDIANA STATE-HOUSE, INDIANAPOLIS, IND. THE LATE
EDWIN MAY, ARCHITECT.

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

SIX DESIGNS SUBMITTED FOR AN "EADS MEMORIAL ENTRANCE"
TO THE ST. LOUIS BRIDGE IN A COMPETITION OF THE ST. LOUIS
ARCHITECTURAL CLUB.

[Issued with the International and Imperial Editions only.]

In judging the competition for the Eads Memorial Entrance to Bridge, there are, as usual, several matters to be taken into consideration. First, the surroundings: So far as can be judged from the plan and from some of the perspectives, the entrance is to be located in a portion of the city devoted to warehouses and manufacturing buildings. These buildings are likely to become, if they are not already, high, of simple broad scale and of almost brutal mass; therefore any entrance located in their midst, if it be desired to avoid the appearance of being out of place, must, if high, dominate its surroundings, or if low, must be extremely massive and broad in order to hold its own. At any rate, a delicate piece of architecture will seem lacking in proper character.

Second, the lines of the present bridge, though horizontal necessarily in general mass, are distinctly perpendicular in the details of the abutments, and suggest that while the mass may be considered a strong base, the tendency of lines of any buildings at the ends of this mass will be best if perpendicular.

Third, the choice of idea, whether a tower, a triumphal arch, or both: It seems to the writer that a dominant perpendicular mass, flanking an arched approach, is the best solution of the problem, and that in any event the masses must be broad in scale and the detail not too small. The designs marked "Mike" and "River-view" alone fulfil these requirements.

"River-view" — 5th Place [J. Willard Adams] — has a tower which is suggestive of a certain Garfield monument which should never have been a permitted design. This tower is made up of a jumble of square, cylindrical and truncated cone forms, with little relation to each other. The pedestals to the groups of horses are especially bad. The colonnade is a distinct obstacle to traffic and could not be allowed by any municipal government. The design is loosely and poorly rendered.

"Mike's" — 1st Place [Oscar Enders] — design is vigorous and simple in masses. It is somewhat uncertain at the left of the drawing, where the gable suggested is necessary to complete the composition, and yet does not seem to be incorporated in the design, but is to be left to the courtesy of the adjacent owner. The tower and arch are good. The canopy over the clock is rather crude, and, we are inclined to think, impossible in its present form, but it could easily be made good in studying the design. The long openings in the tower run a little too high, and do not leave enough surface from the crowns of the arches to the top of the parapet. The *tourelle* on the right should be roofed like that on the left, and this would close an opening which apparently weakens the buttress. The rendering is excellent.

"Back number M. I. T." — 2d Place [E. A. Manny] — This is the better of the triumphal arches, but it is not very good. The large arch is too thin, has not sufficient depth of soffit. The footway

arches should be at least larger than the intermediate arches, and these latter seem to have no especial reason for being. The pediments are unnecessary. The columns are neither connected enough with the arch, nor isolated enough to have individuality, and they are too slight. The figures are too large for the columns. The arch is not sufficiently weighted above the cornice. The figures above the arch are meagre and sadly lack dignity. The spandrel decoration is feeble, and does not fill the spandrel, nor is it retained in a panel. The rendering is scratchy.

The other arch (unmarked) — 3d Place [J. C. Greene] — while sufficiently strong in mass, is commonplace and unstudied in detail. The pedestals for the groups project too far. The cornice lacks detail and the fascia is too small. The arch mouldings are weak. The key-stone is too small. The whole arch lacks base. The use of triglyphs in the fountain entablatures is out of key with the rest of the design. The terminal figure is too small. The rendering, though coarse, is fairly good.

Design marked with a kind of Caduceus. — 4th Place [Lewis Mullgardt]: — The tops of the towers, though probably too delicate for their surroundings, are good, but the lower parts of the towers need more wall-surface, and less proportion of openings. The suspended bridge seems an afterthought. A high triumphal arch between the towers would have been much better. The waiting-rooms, etc., are slight, and lacking in effectiveness. The rendering is good.

The last design — 6th Place [M. P. McArdle], — while sufficient for the gate-posts of an estate, provided the gates and fence supplemented them, is neither sufficient for, nor expressive of, a memorial entrance to a great bridge. The posts themselves are good. The rendering is fairly good, excepting the sky.

All the designs are, however, both in conception and rendering, much superior to the designs usually presented in competition for such a subject. There are no really bad ones.

The designs should be classed as follows: "Mike," "Back-number M. I. T.," "(Unmarked Arch)," "River-view," "(Unmarked Design with Posts)," C. HOWARD WALKER.

HOUSE OF GEORGE L. ALLEN, ESQ., ST. LOUIS, MO. MESSRS. EAMES & YOUNG, ARCHITECTS, ST. LOUIS, MO.

This building, which has a frontage of 86 feet and a depth of 74 feet, is built of buff Bedford stone, with all moulded work — pilasters, cornice and other finish — of blue Bedford stone.

THE FIRST METHODIST-EPISCOPAL CHURCH [SANDS STREET MEMORIAL], BROOKLYN, N. Y. MR. JOHN WELCH, ARCHITECT, BROOKLYN, N. Y.

THE UNION RAILROAD STATION, PORTLAND, ME. MESSRS. WINSLOW & WETHERELL, ARCHITECTS, BOSTON, MASS.

HOUSE OF THEODORE ROOSEVELT, ESQ., OYSTER BAY, LONG ISLAND, N. Y. MESSRS. LAMB & RICH, ARCHITECTS, NEW YORK, N. Y.

[Additional Illustrations in the International Edition.]

DOOR IN A PRIVATE DWELLING, RUE BALLU, PARIS, FRANCE. M. DEZERMAUX, ARCHITECT.

[Copper-plate Etching.]

A FIREPLACE IN THE SAME HOUSE.

[Copper-plate Etching.]

The elevations and a plan of this building were published in our issue for January 21.

SEAL OF LA SOCIÉTÉ DES ARCHITECTES DU POITOU ET DE LA SAINTONGE, FRANCE.

[Engraving.]

THE CHATEAU DE PIERREFONDS: FACADE ON THE COURT.

THE château de Pierrefonds being close to Compiègne, the late Emperor of the French could hardly fail to take an interest in the building. As a consequence, an immense sum of money was expended in restoring the ruins, or rather in a re-creation of the buildings as they were supposed to appear before Louis XIII destroyed them in 1616. The work was intrusted to M. Viollet-le-Duc, and probably it formed his most important commission as an architect, for the outlay was at least 200,000*l.* About three-fourths of the money was contributed by the Emperor. The remainder came from the Historic Monuments Commission. The château, like most of its

class, served a double purpose. It was a residence as well as a fortified stronghold. But as there were no representations of the buildings in their perfect state, M. Viollet-le-Duc had to exercise his logic in order to infer what appearance they presented up to the seventeenth century. Practically he had only a part of the external walls to guide him. Opinions differ about the value of the restoration. Some approve of the architect's arrangements, but enthusiastic Gothicists maintain that Viollet-le-Duc was incompetent to realize the beautiful work of the old designers. His modern buildings, where he had free scope, have been subjected to very severe criticism, and it is held that at Pierrefonds he was not more successful than at Coucy or Paris.

HOUSE AT WILPSHIRE, NEAR BLACKBURN, ENG. MESSRS. STONES & GRADWELL, ARCHITECTS, BLACKBURN, ENG.

This residence, of which we illustrate the principal fronts, is now being erected at Wilpshire, a fashionable suburb of Blackburn. The whole of the building is faced with straight-cut parpoints from Lightcliffe Quarries, Yorkshire. The stone dressings are from Morley Quarries, Yorkshire. The roofs will be covered with Peake's "Perfecta" brown-red tiles. The site is elevated, and commands fine views from Yorkshire to the Irish Sea, and full advantage has been taken of this favorable prospect. The general contractors are Messrs. Marshall & Dent, of Blackburn, the contractors for the masonry and brickwork being Messrs. E. Lewis & Sons, of Blackburn.

HOUSE AT WITTON, BLACKBURN, ENG. MESSRS. STONES & GRADWELL, ARCHITECTS, BLACKBURN, ENG.

Our illustration shows the west and south fronts of residence now being built in this favored part of Blackburn. The principal rooms command extensive views over the valley of the Ribble. The lawns, terraces and kitchen-gardens are all most suitably placed, having due regard to aspect and the contour of the land.

PROPOSED CLOCK-TOWER, WALTON-ON-THE-NAZE, ENG. MR. J. S. MOYE, ARCHITECT, WALTON-ON-THE-NAZE, ENG.

The town of Walton-on-the-Naze might be made one of the most attractive watering-places in England, but rival interests have prevailed, and it is kept back. The clock-tower will, when erected, be effective in breaking the monotony of the sea-front, afterwards it may be expected that the neighboring houses will be transformed.



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

THE U. S. TIMBER EXAMINATIONS AND TESTS.

WASHINGTON UNIVERSITY, ST. LOUIS, MO., February 4, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Believing that your readers are interested in the results to be obtained from the elaborate series of Timber Tests and Examinations so auspiciously begun under the Forestry Division of the Agricultural Department, I wish to indicate how they may now greatly assist in hastening the work. There have been two very small annual appropriations, under which the work proceeds very slowly. One *Bulletin* (quarto, 60 pp. and 6 plates) was published about a year ago, describing the scope of the investigation and the methods pursued. Another is now in press, giving results of tests on long-leaf pine (Georgia pine). This is probably the most valuable timber in America for structural purposes. Its strength is about twice that of white-pine, and in large sizes it is superior to oak. It has also been shown that the timber which has been "boxed," or "bled," for turpentine is in no way inferior to that in its natural state.

It is proposed to study all the principal species of timber used for commercial purposes, selecting five trees of each species from four or five different localities, making in all twenty or twenty-five trees of each species. The logs from these are shipped to the undersigned at St. Louis, where they are sawed into various sizes and shapes and tested in various ways, both "green" and "dry."

This is the most extended and valuable series of physical experiments ever undertaken, and if it can be properly supported it will fix once for all the experimental constants for the different kinds of timber, which will determine both their absolute and relative value.

Your readers are asked to write to Mr. B. E. Fernow, chief Forestry Division of the Agricultural Department, Washington, D. C., asking for copies of such *Bulletins* as have been, or as may be, published on this subject, and, if convinced of its importance, to show their interest by writing at once to Hon. Charles H. Page (R. I.),

M. C., chairman, Committee on Manufactures, asking him to have the bill reported, which was referred to their committee at the last session of Congress. This bill is as follows:

A BILL PROVIDING FOR THE EXAMINATION AND TESTING OF AMERICAN TIMBERS.

Whereas there has been inaugurated in the Forestry Division of the Department of Agriculture a comprehensive and elaborate series of tests and examinations of our American timbers, which promises in its results to be of incalculable financial benefit to the country, and, Whereas, for lack of appropriations, this work cannot be carried on at a rate proportionate to its value and the great benefits to be derived thereby,

Be it enacted by the Senate and House of Representatives in Congress assembled,

That the sum of \$40,000 is herewith appropriated to be expended by the Secretary of Agriculture in the Forestry Division exclusively for the work of timber testing and examinations and for the necessary apparatus and other expenses incident thereto; and, further, that \$10,000 of this sum or as much of the same as necessary become available at once and before July 1, 1892.

The same bill was introduced into the Senate, and referred to the Committee on Agriculture and Forestry, Hon. Algernon S. Paddock (Neb.), chairman.

By writing to these men, and urging the passage of this bill, your readers would greatly aid in obtaining the necessary legislation to prosecute this investigation with vigor. Up to date active work has been carried on only from July to December, 1891, and from July to December, 1892. It should be made continuous to obtain the best results and in the shortest time. It is the duty of all good citizens to show their interest in such legislation as they think is desirable, and the only effective way to do this is by personal correspondence. Failing in this duty, one must not complain when nothing is done.

J. B. JOHNSON,

Professor Civil Engineering and Director Testing Laboratory.

THE CAISSON FOUNDATIONS OF THE MANHATTAN LIFE INSURANCE BUILDING.

NEW YORK, N. Y., February 8, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—Concerning the proposed caisson foundations of the Manhattan Life Insurance Building in this city, since you seem to have considered the matter of sufficient interest to dwell on it in your issue of 4th inst., and indeed to express doubts as to the practicability of the method proposed, and concern as to the difficulties to be encountered, I trust you will permit me, the engineer of the foundations in question, to endeavor to remove the doubts you have expressed, especially as, coming from such a source, those doubts would reflect unfavorably both on the management of this great building and the method itself, which is really the best possible, if not the only one, to employ in this case, where the loads are too great to be carried on piles; while to excavate by any other method to bed-rock thirty feet below the cellar-floor through fine sand and quicksand would permit this to flow and undermine adjacent buildings.

Let me say, first, that the great loads provided for are due, not only to the extreme height of the building, but also to the fact that the architects, Messrs. Kimball & Thompson, have recognized fully and provided for all the possible strains upon the foundations from wind-pressures and the various other sources in, probably, a more thorough way than is generally done. Moreover, they have not been willing to carry these loads down on the outer edge of the foundations, as has so often been the practice in large buildings, but are transferring the loads by means of amply strong cantilevers far enough into the interior of the building to make the centre of weight concentric with the base of each foundation.

The spirit of your remarks seems counter to that approval which your leading journal should surely give to architects who, having to construct one of the modern high office-buildings, are progressive and wise enough to design their work on engineering principles, which, as you must know, have been too frequently neglected in the case of the new style of skeleton construction. This style has brought into play factors and conditions which should be met, from the foundations to the roof, by methods radically different from those previously employed.

But, to meet the specific point which you mention, permit me to ask you to picture one of the proposed caissons as a rectangular box without bottom, about twenty-five feet long, twelve feet wide and eight feet high, placed on the lot when the excavation has been carried about to the water-level. It is built of steel, and stiffened by angles and beams. This box is undermined by men working inside of it, the water being held back by the air-pressure; and there is no possible danger of its ever capsizing or moving laterally. When the cutting-edge reaches the bed-rock, we can, by chiselling or blasting where necessary, cut away the high points until the wall of the caisson touches the bed-rock at the lowest point. Or we may dig down below the wall of the cutting-edge, and build a temporary coffer-dam. The bed-rock can be perfectly cleaned and levelled, or stepped. The concrete filling, about which you express doubts, is done by first covering the entire bottom two or three feet thick, then beginning near the outer edges and building it up in layers of convenient thickness. This concrete can be put in with as much care

as can be exercised in the open air, being thoroughly rammed, and it is gotten into place within five minutes after it is mixed. The few inches at the top is rammed in laterally between the roof and the layer previously laid. This work of course begins around the outer edge, the workmen filling-in towards the centre until the space becomes so small that but one man can work. He then completes the work and the shaft is filled after the air-pressure has been taken off. None of the work has to be done by soft grouting.

The process which has been described to you is exactly that which we have employed in many large bridges across the Missouri and Mississippi, and other rivers, and we have just completed a steel caisson, blasting immediately under the cutting-edge, levelling off the rock and filling precisely in the manner described, for a bridge across the Harlem River here.

There is no chance for settlement, and there is no appreciable shrinkage of the concrete. Where the proper preparations are made and energy used, the process will be amply rapid for buildings, as in this case our caissons are ready to bolt together as soon as the lot is excavated. The piers will be built on the caissons as they are undermined, so that the foundations will be finished when the caissons are sunk and filled. The method will surely give a perfect foundation, and it may be of interest to you to know that the cost for foundations of this character is but a small percentage of the entire cost of such a building.

If I am right in supposing that you are mistaken in saying that the process has been used before for the foundations of buildings,—and I know of no such case,—you may feel that the matter is of sufficient interest to excuse this lengthy communication.

Very truly yours,

CHARLES SOOYSMITH.

[We can assure General Sooy Smith that we had no intention of reflecting upon any one in connection with the building in question; on the contrary, we approved as cordially as we could do the conscientiousness and care which have led the architects to consider so thoroughly a problem of very unusual character, and to engage to assist them in its solution the cooperation of engineers of the highest skill. As General Sooy Smith describes the method to be used, we see no reason why it should not be completely successful. We think, however, that he will agree with us, that it is not one to be handled by amateurs.—EDS. AMERICAN ARCHITECT.]

NEW YORK, N. Y., February 8, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—We note the reference you have made in the editorial columns of the *American Architect* of February 4th as to the method to be employed in securing a satisfactory and permanent foundation under the new Manhattan Life Insurance Building to be erected under our direction.

The matter is not new with respect to bridges, but we have never heard of its use for foundations of buildings, and should be pleased to learn where, as you intimate in your notice that it has been used, if you will kindly inform us.

To us who have had this matter under consideration for some months, and have made, and had made by competent engineers, exhaustive calculations bearing on this subject, no insurmountable difficulty is apparent in the sinking of the caissons and securing a solid and well-distributed foundation. The concentrated loads were so great that the methods in common use were inadequate, therefore, when the method adopted was considered, prominent bridge-engineers were consulted, among others Mr. Charles Sooy Smith, of Sooy Smith & Co., who has had large experience in sinking piers by the pneumatic process, and was selected to direct the work.

We believe this method will meet with favor and come into general use when a foundation such as this is to be successfully carried through.

By the cantilever system employed, we secure full piers for wall-columns with an equal distribution of the load, and not a one-sided affair with a theoretical distribution never attained; and unreliable were the calculated maximum loads ever reached.

We prefer to give such information as may be desired regarding these foundations, as unofficial published reports are not always reliable.

Respectfully,

KIMBALL & THOMPSON.

[We shall be very glad to receive information at first hand of the progress of this interesting work. As we often have occasion to say, we are generally obliged to depend for early intelligence of matters of the sort on the daily papers, and, while we would like to get exact details from the persons best able to give them, it is not often possible to wait for them. As to the buildings which have been previously constructed with the help of caissons, we, of course, only referred to caissons of the ordinary sort, which have been used for a half-century, at least. So far as we know, the pneumatic modification and the filling of the caisson with concrete from the inside are entirely new, in their application to buildings.—EDS. AMERICAN ARCHITECT.]

MODERN SEPULTURE.

BOSTON, MASS.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—In your issue of January 14, 1893, there was an account of people being buried beneath churches. Recently, when about to pass the graveyard on Boston Common, I saw some men at work opening a tomb under the walk from Park Street Church to Park Square. I went into the graveyard, and I saw a sight that I did not suppose existed in the State of Massachusetts. Wooden coffins without boxes, some of grown people and some of infants, all

in a heap: some were broken open, from their decay, and the contents were protruding in an indiscriminate manner. I was informed that the last interment was made in 1885, and another was to be made that day. The top of the last coffin must have come within three feet of the surface of the earth. Is not Boston preparing for a pestilence? Yours respectfully,

AURIN F. HILL.

[THE man who properly respects his nerves and stomach will refrain from allowing his curiosity to carry him into the dissecting-room, charnel-house, catacomb, burning ghaut or other place where poor humanity is dissolved into its primal elements. Such communications as this may do good in reminding people that cremation offers a more civilized method of disposing of the dead than does inhumation or intra-torial sepulture. — EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS

MODERN CHURCH-BUILDING IN ENGLAND. — A Parliamentary Return which has just been issued in England shows the number of churches (including cathedrals) in every diocese in England which have been built or restored, at a cost exceeding £500, since the year 1873. The Return also shows, in each case, as far as possible, the amount expended and the sources from which the required funds were derived. The period covered extends from 1873 to 1891, or about eighteen years, and the total amount spent reaches the vast total of £20,531,403. Of this sum £9,607,783 were devoted to the building of churches, and £10,609,628 to the work of restoration, while the sum of £313,992 was expended for kindred purposes. Concerning the sources of these great sums, church-rates and parish-rates are sometimes mentioned for small amounts, but by far the greater part was derived from private subscription. Thus, in the case of the Diocese of Canterbury, the total expenditure (exclusive of £35,127 for the cathedral, of which £10,773 proceeded from private benefactions, and the remainder from church-funds) amounted to £672,012, towards which church-rates furnished £1,824; church-funds, £8,127; church-building societies, £16,502; and ecclesiastical commissioners, £12,563; these amounts making £39,016; while the remainder, £632,996, proceeded entirely from private sources. The Diocese of London led in the expenditure for church-building, the amount being very little less than £1,180,000. For church-restoration there was an outlay of £820,329, the total exceeding £2,000,000. The restoration of St. Paul's Cathedral cost £126,000, half of which was paid by voluntary contributions. In several cases churches costing from £30,000 to £40,000 were entirely paid for by their own congregations. — *New York Evening Post.*

SMOKELESS COMBUSTION IN GERMANY. — The problem of the smokeless combustion of coal is said to have been solved by an invention which has just been patented in Berlin, and which is thus described by a German correspondent of a London newspaper: "At the furnace door there is a movable pear-shaped apparatus, consisting principally of a fire-chamber lined with fire-brick. One aperture of this hollow pear opens, in the direction of the axis of the boiler, into the mouth of the hitherto employed furnace, from which the fire-grates, fire-bridges, etc., have been removed. The opposite aperture of the hollow pear is intended to admit a current of air. By means of an ingenious automatic contrivance, coal-dust, supplied through a funnel placed above the current of air, is continually conveyed into the current of air, and thence into the fire-chamber, where it is immediately brought into combustion by means of the small fire which is placed there. When this has once taken place, the coal dust conveyed by the current of air continues to burn in one regular, intense flame. The current of air which brings the coal-dust into the apparatus is regulated so as merely to convey the dust thither, whereas the further supply of air necessary for a combustion is sent into the zone of combustion at right angles and in radiating jets. By this arrangement the coal-dust and the air in the zone of combustion are intimately and thoroughly mixed, while the speed of the current which introduces the coal-dust is diminished. It will thus be seen that the combustion of the coal which this method produces is extremely thorough, for each particle of fuel floats in the air and is brought into contact with the oxygen necessary for its combustion, so that it is totally consumed the moment it enters the sphere of combustion. The proof of its being totally consumed is seen in the fact that not even a trace of smoke is perceptible."

THE GARDEN OF THE TAJ. — The Taj at Agra is a building unique among the trophies of human art, in so far that it commands admiration from every beholder, European or Asiatic, young or old, cultured or Philistine. Any interference with such a monument is regarded with jealous alarm by men of taste the world over. We read in the *Kew Bulletin* that the famous garden surrounding it has been subjected to omnious reports and memoranda lately. Those favored souls who can consult their memory are apt to declare that the garden they recall could not be bettered. Those who know it only by photographs entertain the same belief, probably. But landscape-gardeners and others on the spot, permeated with the superior taste of Europe, see lots of room for improvement. They have already cut down "nearly all the lofty trees, principally *minusops*, forming the main avenue from gate to tomb." They pronounce "the existing medley of shrubs on either side of the canal unsightly." They would like some cheerful carpet-bedding and some winding walks. Happily, the Government of India is an intelligent despotism, and even gardeners cannot carry through their schemes without reference to higher authority. The Lieutenant-Governor himself paid a visit, to judge with his own eyes, and most of these scientific projects are dismissed. The lofty trees cannot be restored, but others are to be planted; yet we observe that *Eucalyptus globulus*, an Australian tree, is not positively forbidden in the gardens of the Taj.

So the carpet-bedding and the winding walks are negatived; but "geometrical scrolled beds on each side of the water, with a line of *cycads*," find approval. The Lieutenant-Governor may be unaware that *cycads*, unsuitable in themselves, come from New Zealand — the species, that is, which is probably chosen. Other "improvements" also are passed. Could not his Excellency find courage to declare that the gardens of the Taj are sacrosanct, and forbid any meddling at all? — *London Standard.*

A MILLENNIAL LABOR-UNION. — A remarkable labor-union must be the Boilermakers' and Iron and Steel Ship-builders' Society of Great Britain, according to the testimony of its secretary before Lord Salisbury's Labor Commission. Its membership embraces about ninety-five per cent of all the workmen engaged in the trades represented in the union, and it has an excellent record for peaceful settlement of disputes with employers. For the past eleven years it has spent only a little more than three per cent of its income in support of strikes, and has adopted the sensible principle of having its men keep on at work pending the settlement of any controversy over wages. It is said that sometimes a vessel is actually finished and at sea before the price paid for putting on her plates has been finally determined. What is still more remarkable, the union undertakes to be pecuniarily responsible for the good faith and good workmanship of its members. Thus, when ten men working on a vessel at Hartlepool, the contract for which called for speedy delivery, struck for higher wages, contrary to agreement, the union made good the difference to the firm and compelled the strikers to refund the money. So when contracts are left unfinished or work is botched, the union stands ready to make good the losses caused by dishonest or inefficient members, and looks to the offenders for reimbursement. If all unions went on such principles, it would make the millennium seem nigh at hand. — *N. Y. Evening Post.*

ROBBING CORNER-STONES. — It has been discovered that a corner-stone under a noted market-place in Mexico City, built some fifty years ago, has been recently robbed. The thieves got several dollars' worth of gold and silver which had been buried in the stone. We know of another case in Mexico, where a corner-stone of a foundation was robbed the night after it had been formally "laid" and a list of its contents, including some current coins of small value, had been read out as part of the ceremony. But this is the first instance brought to our notice of the robbery of a corner-stone of such ancient date, even in Mexico, and suggests that some precaution will have to be taken in future against this form of robbery.

TRADE SURVEYS

ALL commercial, industrial, financial and railroad reports agree in this, that a large volume of business is being done. Another fact apparent is, that business is active in all parts of the country, except where weather prevents. A third favorable fact noticed is, that preparations are being actively made for a busier year than last among builders, engineers, architects and contractors. The information on this point is not quite thorough enough to warrant a cast-iron deduction, but the probabilities point to a busier building year than last. Brick is quoted higher than last autumn in several cities, and stocks are light. Large contracts, extending over the season, have been already made by large builders, and makers of brick have within two weeks declined to make further contracts at similar figures. Lumber is also declared to be stronger and relatively scarcer, but whether this is a dealers' scare or not it is impossible to say. Certain it is that the market is short several hundred feet of what it was at this time last year, and the trade-reports of all reliable lumber papers breathe a stronger tone than even thirty days ago. Special advices from several Southern points also show a bolder feeling among the hard-wood manufacturers over the satisfactory winter distribution of stocks. Then it is learned that Southern mills have not been crowded so energetically as last year, and that there is less amount of ready lumber for sale. A somewhat similar course has been pursued by some other makers of building material, so that the shrewder among the builders have deemed it wise lately to extend their contracts for material a little further. This action, as above mentioned, has attracted the attention of manufacturers, with what result remains to be seen. The iron trade is quite active. Large contracts for material have been placed within a few days. Turning to textile interests, it is observed that large purchases of wool have been made; that large contracts for the supply of yarn have been entered into; that a generous distribution of goods, including hosiery and cloth goods, has been made; that orders are crowding in; that stocks of cotton goods are exceptionally light, and that mills generally are running full time. Looking at Boston, New York and Philadelphia jobbing centres, the fact is quite apparent, and is made more prominent by statistics of rail shipments of freight, that a big business for mid-winter is being done in all the leading lines of staple goods. Several authorities say the reason is that retailers recognize that goods are at rock-bottom, and that it is advisable to carry larger stocks. If this is the correct opinion, it means that the jobbers will do a larger business during the next ninety days than they have done during the same time for some years; but the inference is scarcely warranted at present. It has been said before, and is here reiterated, that the strongest feature of the whole business situation is the moderate amount of merchandise, stocks, wares and material in the hands of middle-men, store-keepers or intermediates, by whatever name known. This fact may prove to be a sad one to many and a happy one to many more, according as it strikes them. It is hardly possible that the business interests of the country have been making, or are making, the mistake of manufacturing too little and carrying too little stocks. The probabilities are that business interests are occupying conservative grounds, and are doing what should have been done years ago. There is no increase in commercial failures, no weakening of confidence, no hesitancy among the promoters and pushers who make new business. All conditions are favorable, notwithstanding the newspaper lamentations over strike possibilities, gold-bond evils, silver troubles and all the rest. The narrowness of margins must be borne with; there is no artificial or legislative remedy for it, and no real harm can ever come to business interests from it.

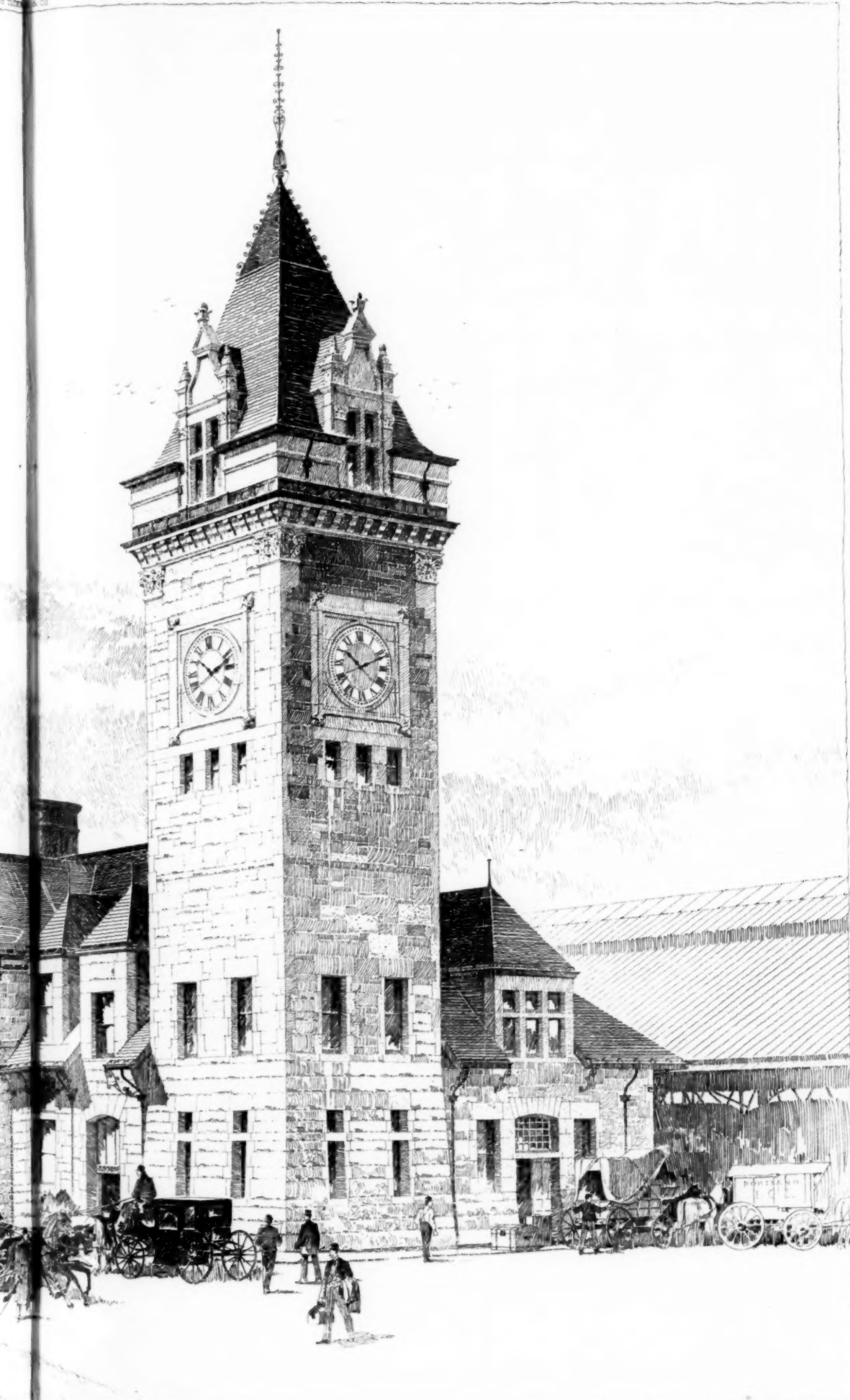
1870

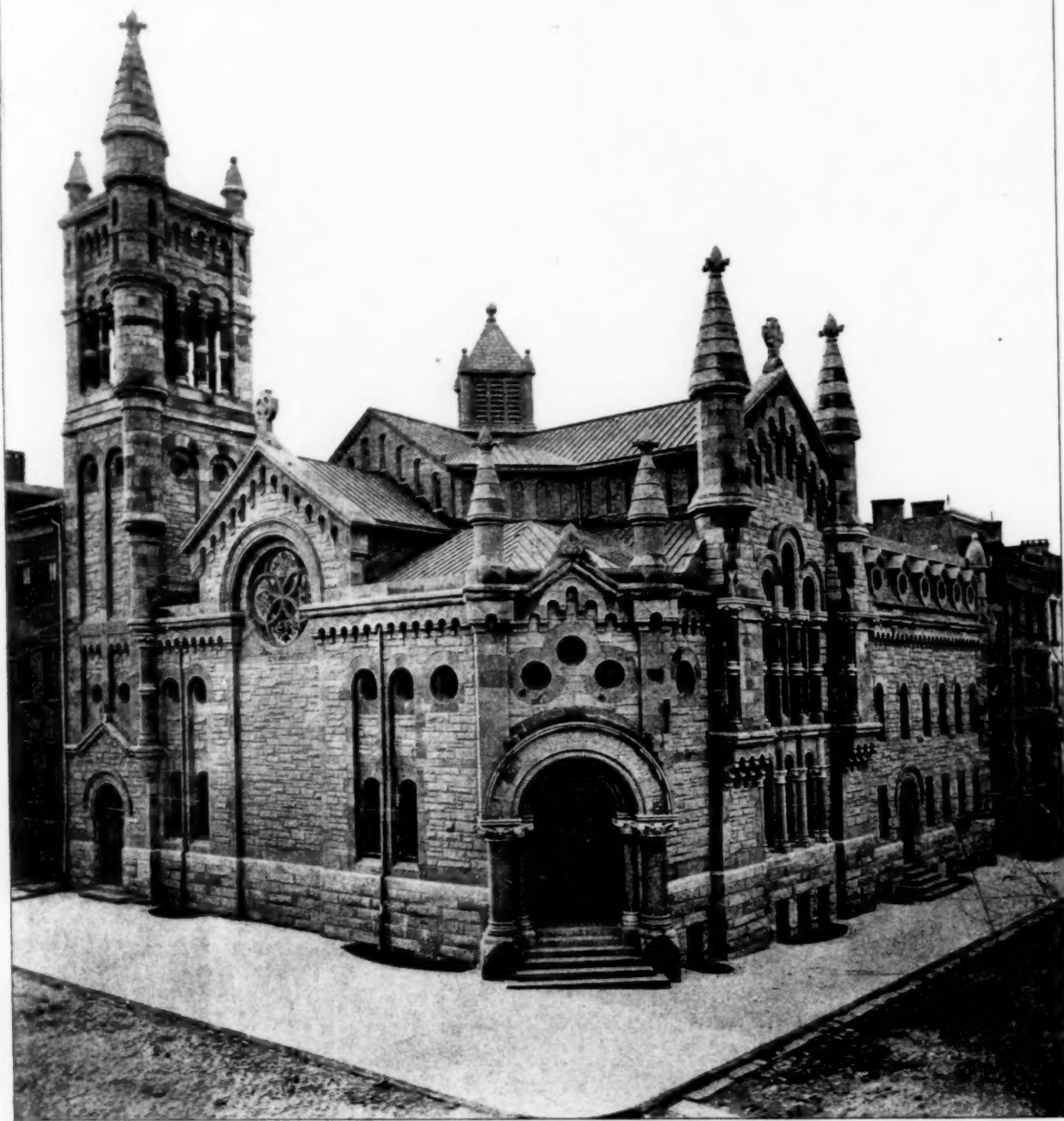
U N I O N R . R . S T A T I O N .
P O R T L A N D , M E .

W I N S L O W & W E T H E R E L L A R C H I T E C T S

B O S T O N , M A S S .



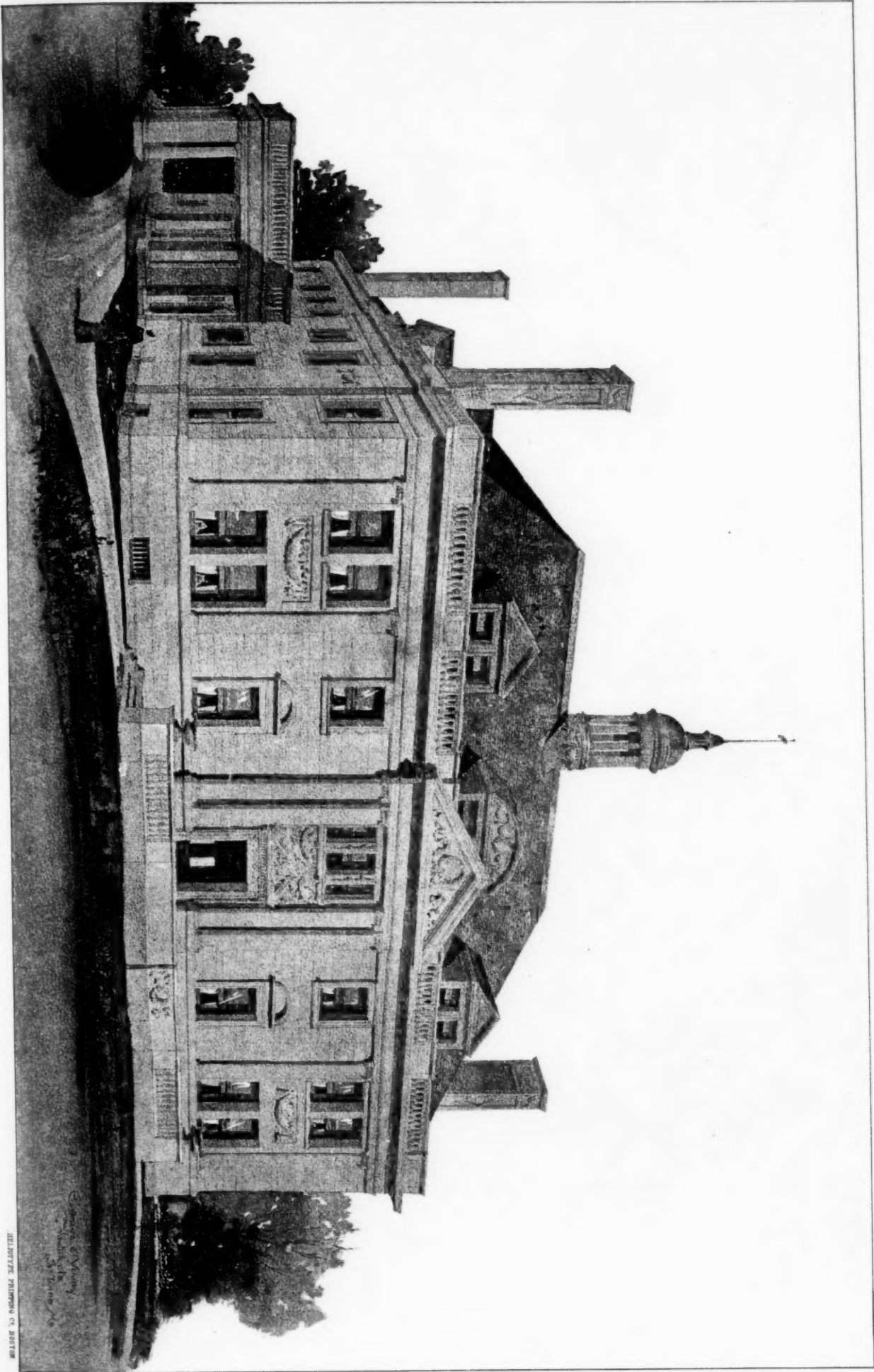




HELIOTYPE PRINTING BY BOSTON

FIRST METHODIST EPISCOPAL CHURCH, BROOKLYN, N.Y.
SANDS STREET MEMORIAL
JOHN WELCH, ARCHITECT.

COPYRIGHT 1893 BY TICKNOR & CO.



DESIGNED BY GEORGE L. ALLEN, ESQ., ST. LOUIS, MO. - FAMILIAR & YOUNG, ARCHTS.

REPRODUCED BY THE ARCHITECTURAL FIRM OF TICKNOR & CO., BOSTON.



Residence Hon. Theodore Roosevelt
Oyster Bay Long Island
Lamb and Rich Architects

QUI PLANTAVIT CURABIT



HELIOTYPE PRINTING CO. BOSTON