

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXXIX.

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

No. 891.

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

JANUARY 21, 1893.



SUMMARY:—

The Origin of the Chicago System of Skeleton Building.—The Retempering of Cement.—The latest Discoveries relating to the Pantheon and the Portico of Agrippa.—Trips round about Pekin and what they disclose.—Utilizing the Falls of Tivoli.	33
THE ILE-DE-FRANCE SCHOOL OF ARCHITECTURE.—I.	35
OFFICE-HELP FOR ARCHITECTS.—VI.	37
AN ARCHITECTURAL COMPROMISE.	40
SIX HOURS IN SALEM.	41
LETTER FROM SAN FRANCISCO.	44
LETTER FROM WASHINGTON.	44
THE EIGHTH LEAGUE EXHIBITION.	45
DRAINING THE OKEFINOKEE SWAMP.	46
SOCIETIES.	46

ILLUSTRATIONS:—

House of S. Alexander Orr, Esq., Troy, N. Y.—Old Colonial Work, Salem, Mass.: Three Pages.—Sketches by the <i>American Architect</i> Travelling-Scholar for 1891: Three Pages.—State Asylum for the Chronic Insane, Wernersville, Pa.—House at Setauket, N. Y.—Proposed House at Winchester, Mass.—Sketch for Proposed Presbyterian Church.—Public School Building, Savannah, Ga.	
Additional: Central Southern Porch of the Manufactures and Liberal Arts Building, World's Columbian Exhibition, Chicago, Ill.—Private House, Paris, France.—Rear Elevation and Plan of the Same.—Fox Oak, Burhill, near Weybridge, Eng.—Manchester Technical Schools, Eng.—Plans and Section of the Same.	47

COMMUNICATIONS:—

The Validity of General Conditions.—The Destruction of "The Breakers."—Windows over the Fireplace.	47
NOTES AND CLIPPINGS.	47
TRADE SURVEYS.	48

A CORRESPONDENT of the *Engineering News*, speaking of the patents for the metallic skeleton system of building, mentions that, in 1873, an architect named Saulnier proposed and used this system in the construction of a portion of the great Menier chocolate factory, at Noisiel, France. The structure in question was built directly over the River Marne. Four stone piers were set in the stream, and box-girders laid on the piers, and on these girders was constructed a frame of angle-irons and channels, three stories high, which was afterwards covered with a four-inch veneer of colored bricks. A description of the structure, with detailed drawings, was given in the *Encyclopédie d'Architecture* in 1874, and a similar one in the *Deutsche Bauzeitung* in 1878; and the *Engineering News* reproduces the illustrations from the latter, which show a framing very similar to that used in our high buildings, but better braced than is common with us. As the publication of the description of the system, even in another country, would make a subsequent American patent for the same system invalid, the Saulnier designs may become of considerable importance, if Mr. Buffington presses his suits, as it is reported that he intends to do.

AN important investigation was recently carried out by Messrs. L. H. Goddard and P. P. Evans, both graduates in the class of 1892 in the Ohio State University, to determine the amount of injury, if any, which is caused to the strength of cement by retempering after it has begun to set. Architects know that many masons, particularly tile-layers, claim that cement, either Portland or Rosendale, sets as hard if retempered after the initial set has begun as if undisturbed; and tile-layers generally mix their cement purposely overnight, and retemper in the morning of the day in which it is to be used, and insist that it sets harder so than if mixed fresh. Notwithstanding these assertions of the so-called "practical" men, architects and engineers almost universally disbelieve in the virtues of retempering, and it will be a satisfaction to them to know that the results obtained by Messrs. Goddard and Evans fully sustain them in their opinion. The *Engineering News* publishes interesting diagrams and statistics, which show that, for cements of both kinds, the ultimate strength is greatly affected by retempering. Rosendale cements suffer more than Portland, losing, on an average, when used neat, about forty per cent of their strength, at the end of seven

weeks, if they are disturbed after the first set has begun; while Portland cements lose, on an average, about twenty-eight per cent. If mixed with sand, both sorts of cement, as might be expected, lose less in proportion than when used neat, and Rosendale cements that have been injured by retempering regain some of their properties with age, while Portland cements lose with time. The retempering makes the cement easier to work, and this is probably the real reason why the tile-layers practise it, but instead of being advantageous to the firmness of the tiling, it seems to be particularly detrimental, for, at the end of seven days, which is just about the time that elapses before a tile floor is thrown open to use after laying, it is found that Rosendale cement which has been retempered has only seventeen per cent of the strength of that mixed and laid fresh, while Portland cement has only fifty-five per cent. The publication of this important paper, which formed the graduating thesis of its authors, is due to an admirable arrangement by which the *Engineering News* gives prizes in money every year to the authors of the best graduating theses in engineering schools. This thesis, which received last year the first prize, of seventy-five dollars, would probably have been lost to the professions which it concerns had it not been for this excellent plan, by which intelligent students are encouraged in serious and scientific work, at the same time that the results of their labors are given the publicity that they merit.

A VERY curious discovery has been made in the Pantheon at Rome. As every one knows, the Pantheon has been the subject of an immense amount of archaeological and historical speculation, and almost numberless stories have been invented to account for its construction and design. An inscription on the entrance-portico asserts that Marcus Agrippa caused the building to be constructed in the year of his third consulship, which is known to have been the year B. C. 27, and behind the great rotunda are the ruins of baths, also known to have been built by Agrippa, connected with the Pantheon by the remains of spacious passageways. These circumstances, added to certain facts of history, have suggested the romantic story that the Pantheon originally formed part of the plan of the baths, but that, on its completion, it was so vast and splendid that some of Agrippa's enemies raised an outcry, saying that the impious son-in-law of Augustus, forgetting his duty to the immortal powers, had erected a mere bath-house superior in magnificence to the dwelling of any of the gods. The story goes on that Agrippa, alarmed at the prospect of a public accusation of impiety, which might have had serious consequences for him, hastened to proclaim that he had really intended the building, not for a bath-room, but as a temple to all the gods at once; and having, by this astute move, engaged the favor of the entire celestial family, he caused the seven niches to be cut in the walls, which still remain, and placed in them statues of the seven principal Roman deities, Julius Caesar, as is known, having been one of them. This interesting tale has the disadvantage of being extremely improbable, but nothing much more reasonable seems to have been conjectured to take its place, and the history of the design and erection of one of the noblest buildings in existence, containing the widest dome ever constructed by human hands, is practically unknown.

UNTIL very recently, there has been no question that the rotunda was, at least, as old as the portico. It has, indeed, often been suggested that the rotunda might have been previously built, and that Agrippa only added the portico to it; but there is no mention in history of the existence of any such structure before Agrippa's time, so that it has been generally concluded that the rotunda and the portico were designed and built together. Now, however, a grave doubt is cast upon this point. It appears that M. Chédanne, a young Grand-Prize student of architecture in Rome, learning that some repairs were to be made on the roof of the Pantheon, where a leak had shown itself, obtained leave from the Italian authorities to supervise the work, and, in the course of his inspection, made some singular discoveries. Like most of the Roman vaults and domes, the roof of the Pantheon is made with a sort of network of ribs of brick, the interstices between the ribs being filled with concrete. In the course of the

repairs some of the ribs were disturbed, and a large number of bricks taken out from various parts of the structure. Many, perhaps all, these bricks were found to be stamped with various inscriptions and devices, generally giving the name of the maker and the place at which they were made. Now, so far as is known, no stamped bricks were used in Rome before the second century A. D., or nearly a hundred and fifty years after Agrippa's time; and, although it is, of course, not impossible that an early brickmaker might have stamped bricks for a single building, it appears that every one of the inscriptions and devices found on the Pantheon bricks has been found on bricks in other buildings, which are known to have been erected during or near the reign of Hadrian, A. D. 117-138. It thus appears certain that the ribs of the dome, at least, must have been constructed long after Agrippa's time, and, as the ribs are the essential part of the dome, it is difficult to avoid the conclusion that the dome, which is the most important part of the building, with, very possibly, the rotunda itself, was erected, not by Agrippa, in the time of Augustus, but by some unknown person about a hundred and fifty years later.

OBVIOUSLY, the next question is, how to account for the portico attached to the front of the building, and bonded in with it, and bearing the name of Agrippa. It seems that, on excavating in the floor of the rotunda, a pavement was found seven feet below the level of the present pavement, and M. Chédanne thinks that this, together with the present portico, was a portion of Agrippa's Pantheon, and that, when the rotunda was reconstructed, in Hadrian's time, the ground had risen outside the building, as it has generally in Rome, and the floor of the new structure was set much higher than the old pavement, while the old portico, which had been carefully taken down, was rebuilt, in connection with the new rotunda, at the higher level. We must confess that this hypothesis appears to us to have some weak points. Even supposing that the Romans of Hadrian's time had been seized with a disposition — which they never seem to have shown in any other instance — to restore Agrippa's portico exactly as it was before, in connection with a magnificent new building, with which he had nothing to do, and which would have reflected the highest honor on its real author, it is inconceivable that, in a hundred and fifty years, the ground outside should have risen, by the accumulation of rubbish, so much as to require the new pavement to be seven feet above the old one. We know that the floor of the present Pantheon was originally five steps above the street. Three of these steps are now covered, and the pavement of the little Piazza on which the building faces descends slightly toward the portico; but, even supposing the difference of level between the street as it now is and as it was when the floor of the rotunda was laid to be five or six feet, it is still unexplained why the street should have risen as much in a hundred and fifty years — between Agrippa and Hadrian, — as in seventeen hundred years subsequently. It may be, of course, that the street grade was purposely raised in or about the first century, and this might explain the rebuilding of the portico, and even the filling up of the interior to the new level, but it would hardly require the destruction of the original building. Excavations, however, would determine many of these points. It would be easy to see whether the soil below the present steps was accumulated debris or filling purposely placed there, and as the foundations, either of the original building or any subsequent one, must have been carried down to the virgin soil, it would probably not be difficult to ascertain something about, at least, the plan of whatever earlier building, if any, stood upon the site.

AT a recent meeting of the Munich Society of Architects and Engineers, Professor Buchner, the conservator of the Munich Ethnographical Museum, read a very interesting paper on China, which is, to architects, an almost unknown region. He began by comparing it with Japan, which is a pleasant country to travel through, and at first extremely interesting, but which, he thought, has reached its highest civilization, and is likely to lose in interest, while China, though disagreeable in climate, and inhabited by a surly and repulsive population, produces a certain imposing effect on the mind of the tourist. Concerning the journey to Peking, Professor Buchner said that it was full of strange and surprising impressions. The journey must be made by water, through a country almost desert, to Tientsin, whence the land journey to Peking, about a hundred miles, is made on horseback. The road leads

through a region completely waste and deserted, and it is with something like fear, as at a supernatural apparition, that the traveller first sees the monstrous walls of the city, seventeen miles long, and from seventy to a hundred feet high, and mixes with the throng of people at the entrance-gate. There are nine of these gates, all of which are shut at sunset, and not opened until sunrise the next morning. Each gate is guarded by two huge towers, like pylons. The towers are pierced with innumerable windows, which are closed by wooden shutters, and on each of the shutters is painted the muzzle of a cannon. Inside the gates the most conspicuous objects are masses of ruins. The city, which would accommodate ten million inhabitants within its walls, if packed as closely as is usual in Chinese towns, and which ranked not very many years ago as the most populous city in the world, has now only half a million inhabitants, its former glory being shown only by acres of abandoned dwellings. Whether it ever held ten million people, even though there would have been room for them, is doubtful, but it was certainly once a vast and very cosmopolitan city, for three Roman Catholic cathedrals and several Arabian mosques still remain to recall the days when there were foreigners enough to fill them all. Now, there is practically no foreign population. About a hundred foreign tourists, on an average, visit the city every year, but there is no accommodation fit for them, and Europeans, whose stomachs will not endure the Chinese habits of living, bring all their provisions and household apparatus, and even their drinking-water, from Tientsin.

WHERE are three interesting trips to be made from Peking: one to the Chinese wall, one to the tombs of the Ming emperors, and the third to the ruins of the Summer Palace. That to the Chinese wall is the most novel, as it leads all the way along the great road, in which the tourist meets a stream of caravans, bringing furs, frozen sheep, and other luxuries to Peking, while from time to time the Russian post-horses may be seen carrying the mails over what is now an official Russian route. The ruins of the Summer Palace have more architectural interest than almost anything else in China. This palace, the pride of the kingdom, was built for the emperors in the palmy days of Peking, under the direction of European Jesuits. The Jesuits have always been well instructed in architectural design of the gorgeous Renaissance type characteristic of their buildings, and they produced for their Imperial employers a magnificent mass of beautiful baroque detail, curiously mixed with Chinese motives. As is well known, this palace was burned, by order of Lord Elgin, as a punishment for the treachery of the Chinese Government in the massacres of 1859 and 1860, and the treasures it contained were scattered all over the world; and it has never been rebuilt.

ONE can hardly imagine what Julius Cæsar, or, let us say, Cato the Censor, would have said, if he had read in the Sibylline books that a company of Scythians would, two thousand years after his death, install an apparatus through which the streets of Rome would be illuminated every night by a cascade at Tibur, twenty miles off in the Alban Hills; yet that is just what has come to pass. Several years ago an Italian company undertook the utilization of the Tibur, or Tivoli, water-power, by means of turbine-wheels and dynamos, for the purpose of lighting the little town of Tivoli. Soon afterward, the establishment passing under the control of the Roman Gas Company, the plant was increased, until it now collects and transmits a force of twenty-seven hundred horse-power, and wires have extended to Rome. The experiment proved so successful that it has now been determined to utilize the whole available force of the cascade, amounting to about five thousand horse-power, and the contract has been intrusted to a firm in Buda-Pesth, Hungary. The current will be transmitted, at a pressure of fifty-one hundred volts, through copper cables, protected with special care, as they must cross the desolate Campagna, and would otherwise be at the mercy of brigands. The cables enter Rome at the Porta Pia, where the current is converted by thirty-two transformers into one of two thousand volts, this being the pressure for which the city system of electric lighting is designed. In the city itself preparations are being made for increasing greatly the lighting plant. In place of two hundred and fifty arc-lamps, the present number, six hundred will be installed, and the system, when complete, will be the most important example of transmission of electric force in the world.

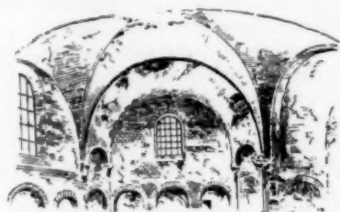
THE ILE-DE-FRANCE SCHOOL OF ARCHITECTURE.¹—I.

Fig. 1. Vaulting from the Palace of the Thermæ, Paris.

THE regional school of Ile-de-France, termed also the school of the royal domain, the French school, and sometimes the Parisian, has its geographical centre at Paris; but before the sixteenth century this city did not play the part in the development of architecture around it that its political importance and the intensity of its intellectual life would naturally seem to have forced upon it. That rôle was filled at short intervals, and, as it were, incidentally by Saint-Denis; the Ile-de-France of the Middle Ages had, in fact, no artistic centre. There was perhaps less uncertainty and less fluctuation in the boundaries. At the close of the twelfth century, the period when the French school was at the zenith of its influence and glory, we find its limits on the south, following the course of the Loire from Gien to Blois; passing on the west near Vendôme, Châteaudun, Chartres, and Dreux, in a way to include these towns and then join the Epte, the Norman frontier; on the north, running a little below Amiens, Péronne, and Saint-Quentin; and wresting from the School of Champagne, on the east, Laon and Soissons, but sharing with it Meaux, Provins, and Sens.

Within these bounds lie the entire province of Ile-de-France, as Richelieu left it, a narrow strip of land belonging to Picardy, a small section of Champagne, and more than half of Orléanais. In view of the fact that, notwithstanding their administrative union with Ile-de-France, Beauvaisais, Valois, Soissonais, and Laonnais were Picard districts, there is ample justification for the term "Picard School," which was for some time during the Middle Ages applied to a variety of architecture that grew up within the French school itself and which was at one time as influential as the latter.

Nothing prior to the latter part of the eleventh century betokened the artistic eminence which the Parisian school was destined to attain under Roman supremacy; the cities of the north, with perhaps the exception of Rheims and Autun, possessed no monuments at all comparable with those of the southern cities, and especially with those of Narbonne. The protracted sojourn at Paris of the emperors Constantius, Chlorus, Julian, Valentinian I, and Gratian — during the period of Roman decadence — at no time raised the future capital of France to the rank of political or intellectual capital of the

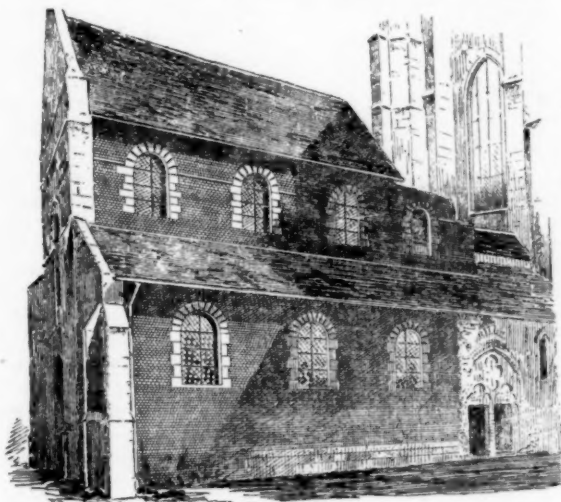


Fig. 2. The Basse-Euvre, Beauvais.

Gauls. We find hardly any edifice worthy of being cited here except the Palace of the Thermæ, the ruins of which still exhibit a superb intersecting vault (Fig. 1). This may have furnished some elements to the early Romanesque constructors.

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

The Merovingian kings, who resided at Paris, Soissons, and Orléans, were not powerful enough themselves, nor were they ably enough seconded to avert the downfall of monumental art. Among the churches left by them, only two, Saint-Germain-des-Prés, erected at Paris, by Childebert I, and the basilica of Saint-Denis, the architectural triumph of the reign of Dagobert, attracted the attention of contemporaries; and we learn from the writings of Suger that the latter was not so much distinguished for grandeur of dimensions as for the sumptuousness of the paintings and of the productions of the goldsmith's art. There is, however, evidence elsewhere that masonry and sculpture had not dropped into utter oblivion. It is indeed possible that the crypt of Saint-Avit, at Orléans, discovered beneath the great seminary, belongs to the sixth century; it is lacking neither in harmony of proportions nor in solidity [see *Crypte*, Fig. 5]. The famous crypt of Jouarre, in Brie [see *Crypte*, Figs. 6, 7, 8, and *Eglise*, Fig. 34], is less noted for its masonry, which is rather coarse, than for its oft-cited capitals. Capitals quite as interesting as these have been dug up at different times at Paris; others have been preserved in edifices reconstructed in the twelfth century, as for example, at Saint-Germain-des-Prés and Saint-Pierre-de-Montmartre.

Pépin le Bref restored and enlarged the basilica of Saint-Denis; but it is difficult to believe that this structure remained intact down to Abbé Suger's time, and that the Romanesque confessional, still in existence at the centre of the crypt, dates back of the early part of the eleventh century, when doubtless a second restoration was made, although the fact is carefully ignored by the illustrious monk, of whom we shall have more to say later.

It was Pépin's son Charlemagne who, in fact, ushered in the so-called Carolingian or Carolingian era of art. But with



Fig. 3. Church of Saint-Benoît-sur-Loire.

Charlemagne the intellectual centre also was displaced, to the advantage of Germany. The church of Germigny-des-Prés, erected in 806 by Bishop Théodulfe of Orléans, is an isolated product on the banks of the Loire of the great movement in progress beyond the Rhine (see *American Architect* for July 12, 1890, "Religious Architecture," Fig. 3; also for May 14, 1892, "Byzantine Architecture," Fig. 14). Its plan, in the form of a Greek cross with four terminal apses, its domes, its lantern-tower, and even its structural arrangement in broad courses did not found a school in the middle basins of the Loire and the Seine. On the advent of the Capetian dynasty to power, in the dioceses of Orléans, Beauvais, Soissons, and Laon, where there are noteworthy remains of the period, we find the Roman constructional system, with or without in-bond brick-pillars (Saint-Pierre-le-Puellier, at Orléans, Basse-Euvre of Beauvais (Fig. 2), Hermes, between Beauvais and Creil, etc.), and the triple aisles with square pillars and no vaults. We are, however, approaching a preparatory period, which begins in 997, with the reign of King Robert, sometimes styled "the father of religious architecture." The impelling energy came rather from the bishop and the monks. We can ascribe nothing to King Robert personally, except the founding of Notre-Dame at Étampes, the primitive crypt of which belongs to the eleventh century, and a reconstruction of Saint-Aignan at Orléans, which likewise still retains its eleventh-century crypt. The plan of the latter confirms the remark of the chronicler Helgaud, who says that the choir of the basilica was built in imitation of the Cathedral of Clermont, in Auvergne. We have here, doubtless, the earliest deambulatory and the first radiating chapels constructed within the royal domains. About the same time a Romanesque

cathedral was erected at Orléans, at great expense, and Gauzlin, abbot of Saint-Benoît-sur-Loire, began, by the construction of a magnificent porch, with storied capitals, and a huge tower, half belfry, half donjon, works which made the church of his monastery almost a rival of that of Cluny [see *Eglise*, Figs. 18, 19, 21]. These works were abandoned for a while at one

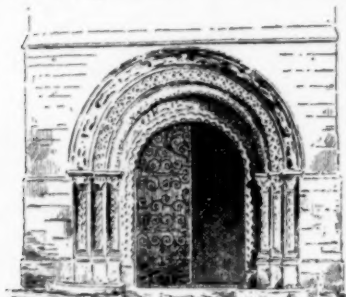


Fig. 4. Portal of Saint-Basile, Etampes.

time, but they were resumed in 1069 and completed in 1131. On the death of King Robert, in 1031, the great Cathedral of Chartres, begun by Fulbert, had been in process of construction ten years already, so that a solemn consecration took place in 1037. The present nave of Saint-Germain-des-Prés, at Paris, is attributed to another contemporary of

Robert, Abbé Morard. It was, we believe, built after 1050, at about the time that Countess Hodiérne de Monthéry erected for her priory of Longpont the church whose apse and transept have just been so successfully restored by the architect Naples.

Beauvais did not wait for the terrors of the year 1000 to pass. Bishop Hervée, in 997, took the lead in the construction of four churches here: the Haute-Œuvre, Saint-Etienne, Saint-Gilles, and Saint-Laurent.

These edifices and many others that we cannot now cite started a movement which gained steadily in force until the close of the twelfth century, and out of which the French school sprang. The latter settled into form as a Romanesque school from about 1060. The claims of the Parisian school to a real existence during the Romanesque period have been but recently called in question by us, and we were certainly right in one sense, for prior to the Pointed period there was neither vaulting device nor decorative system peculiar to the French region. But arguments against our position were thereupon brought forward, the force of which we must recognize, and which are, moreover, based on our own writings. In fact, the French school of the second half of the eleventh century possesses, if not its finished architectural form, at least its characteristic physiognomy. Quite unlike the other schools, which seem to move consciously in a certain direction, it gropes its way in a waiting spirit, which is only in appearance in action. The student detects the proofs of eclecticism, of restless search, on the part of the architect. This very slowness of assimilation and this dullness of invention were destined to become the best guaranty of a success that lost nothing by being delayed somewhat. One must be bigoted indeed to pass hastily or disdainfully over the purely Romanesque structures of the French school; certain ones offer typical dispositions, some of which were perpetuated in the Gothic monuments and did not fail to exercise an appreciable influence on them.

The French Romanesque churches are usually not vaulted. Saint-Germain was without vaults, in the side-aisles as well as the naves, before the seventeenth century (and those were not the vaults of to-day, which are imitations of the ones in the choir); other less important naves were vaulted between the twelfth and sixteenth centuries; several were so constructed as to make vaulting impossible, for example, in cases where the upper windows bestride the pillars. This last disposition, which Viollet-le-Duc noted in Burgundy, in the abbey-church of Fontenay, we have found north of Paris in at least nine localities, namely, at Fosses and Fontenay-lès-Louvres, near Luzarches, at Corneilles-en-Vexin, at Plailly, near

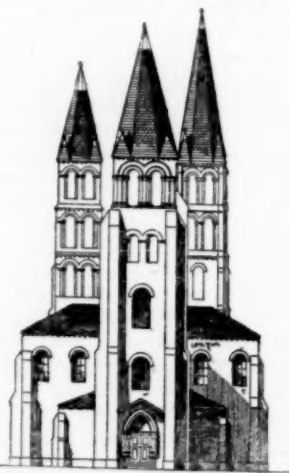


Fig. 5. Saint-Germain-des-Prés, Paris (Restoration).

Senlis, in Saint-Denis at Crépy-en-Valois, in Saint-Gervais at Pontpoint, between Pont-Sainte-Maxence and Verberie, at Orronny and in the ruined church of Champlieu, at Terney, between Soissons and Coucy. Doubtless the number of examples might be still further augmented; but it should be remembered that this method of setting the windows was in vogue, as is indicated here and there by the style of the pillars, until the middle of the twelfth century, a period when ribbing was universally understood, and when, consequently, it was not always an indication of want of power.

The few apses that still remain are covered by a half-dome; the Roman intersecting vault is quite common; the cupola is almost unknown.

There are comparatively few examples of Romanesque portals in the Parisian school, but there are enough to show that this district is hardly behind its neighbors in the matter of luxurious decoration. This is seen at Saint-Basile of Étampes (Fig. 4), at Ouzouer-sous-Bellegarde, at Tric-Château, in Saint-Etienne at Beauvais, at Villers-Saint-Paul, etc.; each one of these types has its own bit of originality.

One of the elements which the Parisian school relies upon most in the expression of its individuality is the belfry. If I interpret aright the term "*arx*" used by the poet Fortunat in the sixth century in connection with Saint-Germain-des-Prés, — then Saint-Vincent, — this Merovingian church possessed a central tower forming a lantern, similar to those known to have existed, at the same period or from the preceding century, at Nantes, Tours, and Narbonne. There is a lantern-tower dating from the reign of Charlemagne at Germigny-des-Prés. But this fashion was not perpetuated when the progress of Romanesque art became more pronounced. The church of Saint-Benoît-sur-Loire (Fig. 3), a structure of exceptional richness and development (there is no call for us to discuss here its plan, in the form of an archiepiscopal cross), has a central belfry borne on vaulting, besides three others, one at the entrance to the nave and two at the beginning of the apse. Let us imagine the central tower removed, — an element rejected by



Fig. 6. Belfry of Urcel (Aisne), after a Photograph by M. E. Durand.

the French school in the eleventh century and afterward accepted by it with some reservation, — and let the relative position of the other three be retained; we shall find the arrangement reproduced at Saint-Germain-des-Prés (Fig. 5) and at Morienvall [see *Eglise*, Figs. 36, 37, 38]. If this disposition is to be ascribed to the influence of Saint-Benoît-sur-Loire, it is probably the only one traceable to that source. For the sake of concentrating our attention on as small an area as possible, let us eliminate for the time being the basin of the Loire; that section of it indicated above was, in fact, not closely connected with the French school before the formation of the Gothic style.

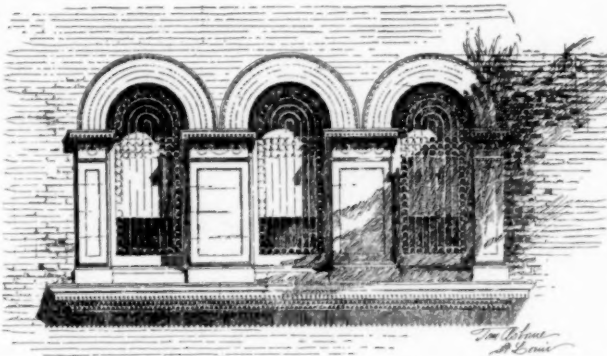
As has just been said, the French school of the eleventh century barred out the central belfry. When the towers ceased to be built as lanterns, and quite heavy bells were suspended in them, architects were afraid to rest them on the four arches at the intersection of the nave and transept. They therefore disposed them at the entrance to the nave, on the west, when they were to serve as works of defence; in ordinary cases, they rose at the right or left of the choir; we are considering now the single tower; we have already indicated the disposition

when there were three; if there were two, they would naturally stand on the sides of the choir, as at Notre-Dame of Melun, or at the angles of the façade, as in the church of Saint-Denis, that was torn down by Suger.

Octagonal towers, which presupposed a considerable advancement in the art of building, were not attempted before the latter part of the twelfth century, and in all instances they may be looked upon as exceptions. The square tower, with upper stories lighted by twin bays pierced in each face, always had the preference. In Picardy these bays are often subdivided, as appears in the western towers of Urcel (Fig. 6) and of Morienval (see *Eglise*, Fig. 37); this distinction is observable in the structures of Picardy and Ile-de-France until the close of the Middle Ages.

(To be continued.)

OFFICE-HELP FOR ARCHITECTS.²—VI. CHAPTER II.—RESISTANCE OF MATERIALS.



SECTION I.—DEFINITIONS:

§ 158. General:—A material is strained when it is subjected to the action of an external force, which causes stress in the fibres of the piece to resist it. In buildings and elsewhere pieces are subjected to strain due to the external forces of the wind, people, furniture, floor-construction, etc., the forces being named according to the way in which they act, as follows:

Compression:—When the forces tend to reduce the size of the piece by pressing the fibres past one another in the direction of their length.

Shearing:—When they tend to cause one set of fibres to slide past another set, usually in a direction at right angles to their axes.

Tension:—When applied in the direction of the fibres and tending to pull them apart.

Torsion:—When applied perpendicularly to the fibres and tending to twist them apart.

Transverse:—When perpendicular to the fibre in such a manner as to cause compression in the fibres on one side of the neutral axis and tension on the other.

§ 159. Live Loads:—External forces are called "live loads" when they are variable, as the load due to people, furniture and the like. All live loads should be applied as far as possible without shock, as the effect of the impact is to double the strains due to any load. The distribution of the load is also important, as a concentrated load at the centre has double the effect that a uniformly distributed load of the same size has. These loads must be assumed in all cases.

§ 160. Dead Loads:—Are the loads in a structure due to the weight of the material used and can be calculated, the calculation requiring a series of approximations. They are therefore usually assumed at a certain figure known by experience to be very near the truth.

§ 161. Effect:—When a piece is strained by the imposition of a dead or live load it tends to cause the particles of the piece to move, and this tendency is resisted by the stress in the piece. So long as the stress in the piece is such that it will return to its original size and shape when relieved the piece is said to be strained within its "elastic limit." When the strain exceeds the elastic limit the piece takes a permanent set or is crippled, and then repeated applications of the load will in time cause failure, even if the load is well within that which would cause rupture if applied to the piece only once.

§ 162. Failure: Compression:—Failure here comes either by a crushing-in of the fibres or by a wrinkling or buckling of the extreme fibres, crushing-in some and tearing apart others.

Shearing:—Fibres are pushed apart in sets or groups.

Tension:—Fibres are pulled apart.

Torsion:—Fibres are twisted apart, as in a shaft with a pulley.

Transverse Strain:—Usually causes failure either by the tearing apart of one set of fibres or the crushing, wrinkling or buckling of the other set. Under loads so applied, the beam or girder deflects until finally the rupture occurs.

§ 163. Elastic Limit:—Should be, closely, one-half of the ultimate strength of any material. Long-continued application of a load only slightly in excess of this limit will finally result in rupture.

§ 164. Safe Strains:—Should be limited to one-half of the elastic limit where the maximum can be accurately determined and is of infrequent occurrence, but for all general cases it should be made one-third of the elastic limit. The safe fibre-strains given in Table IV are those generally approved, although there is very little data from tests of full-sized pieces on which to base them, and they are certainly too low for thoroughly first-class timber, free from all imperfections and well seasoned.

Certain classes of material should rarely be subjected to certain strains: for instance, cast-iron should sparingly be used in tension; cement, lime or mortar should never be used in tension and should be guarded against vibration; wood should be used sparingly in tension and never in torsion; masonry should never be used in tension.

§ 165. Factors-of-safety:—Should more properly be called, "factors-of-ignorance," since they are necessary to cover the unknown elements of the problem: the strength of the particular piece of material that we are using, the unknown loads that may in time be used, and similar circumstances. Should the elastic limit only of the material be known, divide it by 3 for the safe fibre-strain; if only the ultimate strength be known, divide by 10 for woods and masonry; by 4 to 5 for wrought-iron or steel; by 8 to 10 for cast-iron.

§ 166. Centre of Gravity:—Is that point of a mass on which it will balance itself if there supported and only acted on by gravity.

§ 167. Neutral Axis:—Is a line drawn in any direction through the centre of gravity. In bodies subjected to transverse strain, all the fibres on one side of the neutral axis are assumed to be subjected to compression and on the other side to tension.

§ 168. Moment of Inertia (I):—Is the sum of the products of each particle of a mass in any section at right angles to its axis, multiplied by the square of the distance of each particle from the axis around which this section is assumed to rotate.

§ 169. Radius of Gyration (r):—Is the distance from the axis around which the section rotates to the point which represents the average distance of all the particles in the section away from the neutral axis.

§ 170. Moment of Resistance (R):—The moment of resistance of any fibre equals the moment of inertia divided by the distance of the fibre from the neutral axis. This distance is called n .

§ 171. Bending Moment (M):—The effect of a force applied to any piece loaded transversely, considered in relation to some fixed point, is called its "moment," and equals the amount of the force multiplied by the distance from the point of application of the force to the point around which moments are being taken, measured in a direction perpendicular to the line of direction of the force. At any point in a beam the moments on opposite sides of this point are equal. The point of greatest bending-moment in a beam, referred to either point of support, is that point where the amount of the load equals the reaction at the point of support, and is obtained by passing from the point of support along the beam until the loads passed over equal the reaction at the starting-point.

SECTION II.—FORMULÆ:

§ 172. Compression:—For wood, stone and brick.

For short columns ($l = d \times \frac{1}{2}$).

$$W = Sc \times A \quad (1)$$

$$A = \frac{W}{Sc} \quad (2)$$

² By George Hill, Consulting Engineer. Continued from No. 888, page 209.

For long columns in which $l > \frac{5d}{6}$ use.¹

$$W = \frac{A Sc}{1 + \frac{(12l)^2 n}{r^2}} \quad (3)$$

$$A = \frac{W + \frac{Wn(12l)^2}{r^2}}{Sc} \quad (4)$$

For cast-iron, wrought-iron and steel.

For short columns $l =$ or $< \frac{5d}{3}$

$$W = Sc \times A \quad (5)$$

$$A = \frac{W}{Sc} \quad (6)$$

For long columns $l > \frac{5d}{3}$

$$W = \frac{A Sc}{1 + \frac{(12l)^2 n}{r^2}} \quad (7)$$

$$A = \frac{W + \frac{W(12l)^2 n}{r^2}}{Sc} \quad (8)$$

In which n is a factor as given in Table V below.

TABLE V.
VALUE OF n .

Material.	Both ends square.	One end square. One end pointed.	Both ends pointed.
Cast-iron	0.0003	0.0004	0.00057
Wrought-iron	0.000025	0.000033	0.00005
Steel	0.00002	0.000025	0.000033
Wood	0.00033	0.00044	0.00067
Stone	0.002		
Brick	0.0033		

§ 173. Tension:—For all pieces

$$W = St \times A \quad (9)$$

$$A = \frac{W}{St} \quad (10)$$

§ 174. Shearing:—For pieces subject to direct shear

$$W = Ss \times A \quad (11)$$

$$A = \frac{W}{Ss} \quad (12)$$

For shear in girders see § 202.

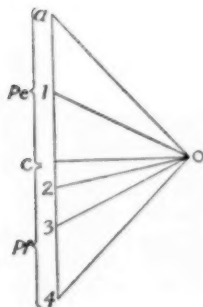
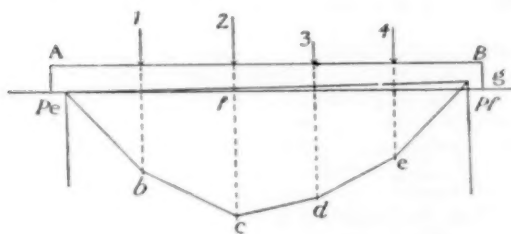


Fig. 20.

§ 175. Transverse Stress:—The relations of r , I , M , R are as follows:

$$R = \frac{I}{n} = \frac{M}{S} = \frac{3lW}{2S} \quad (13)$$

¹ Rankine's Formula.
² From Berg, p. 23.

$$r = \left(\frac{I}{A} \right)^{\frac{1}{2}} \quad (14)$$

$$M = RS = \frac{Sl}{n} \quad (15)$$

$$I = Rn = \frac{Mn}{S} = Ar^2 \quad (16)$$

$$S = \frac{3Wl}{2I} = \frac{3W}{2R} \quad (17)$$

Values of r , I , and R are given in Table VI. For various

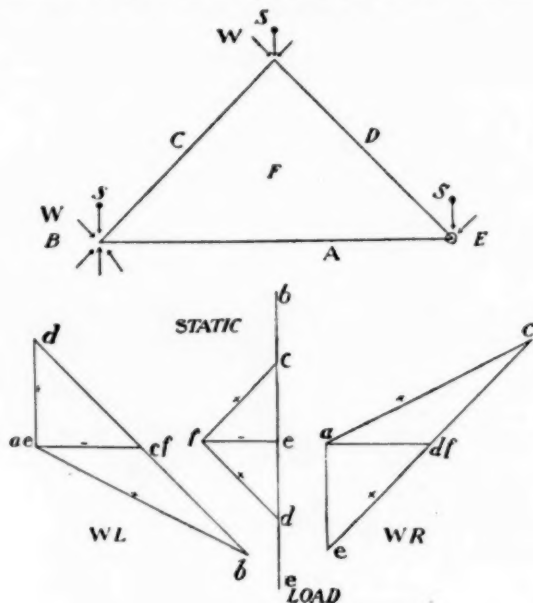


Fig. 21.

sections and for the usual steel and iron shapes are given in the Tables of Properties—Table VII.

The maximum effect of a load in tending to disrupt a beam is called its maximum bending-moment and is resisted by the fibres of the beam as shown in the above equations.

TABLE VI.

Section.	I	R	r^2
 $A_{sq} d$	$\frac{d^4}{12}$	$\frac{d^3}{6}$	$\frac{d^2}{12}$
 $A_{rl} d$	$\frac{b d^3}{12}$	$\frac{b d^2}{6}$	$\frac{d^2}{12}$
 $A_{hl} d$	$\frac{b d^3 - b_1 d_1^3}{12}$	$\frac{b d^2 - b_1 d_1^2}{6 d}$	$\frac{b d^2 - b_1 d_1^2}{12 (b d - b_1 d_1)}$
 $A_{cl} c$	$\frac{11}{14} c^4$	$\frac{11}{14} c^3$	$\frac{c^2}{4}$
 $A_{cl} c$	$\frac{11}{14} (c^4 - c_1^4)$	$\frac{11}{14} \left(\frac{c^4 - c_1^4}{c} \right)$	$\frac{c^2 + c_1^2}{4}$
 $A_{hl} d$	$\frac{b}{12} (d^3 - d_1^3)$	$\frac{b}{6 d} (d^2 - d_1^2)$	$\frac{d^2 - d_1^2}{12 (d - d_1)}$
 $A_{hl} d$	$\frac{d^3}{12} (b - b_1)$	$\frac{d^2}{6} (b - b_1)$	$\frac{d^2}{12}$
 $A_{hl} d$		$\frac{4}{15} b d h$	

To determine the position and amount of the maximum bending-moment, the bending-moment at any point in a beam

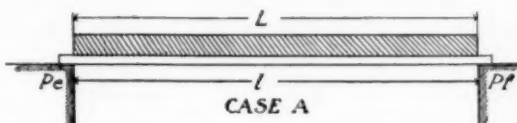
and the reaction at the points of support for any condition of loading, draw the beam to some convenient scale, marking on it the points of application of each load. (Fig. 20.) Then draw a vertical line and lay off on it, to any convenient scale (say 200 pounds = 1"), the loads, thus $a1 = \text{load } 1$; $1, 2 = \text{load } 2$; $2, 3 = \text{load } 3$; and so on. Take any point 0 and draw lines connecting it with $a, 1, 2, 3, 4$. Then from P_e , draw a line P_b , parallel with $a, 0$ until it meets a vertical

that point to the line a, f measured in inches and will be a maximum, when this distance is a maximum.

This method may be followed with equal facility when there is but a single load, giving results much quicker than by calculation, and with sufficient accuracy if the scale chosen is such as to enable you to scale a load within 5%.

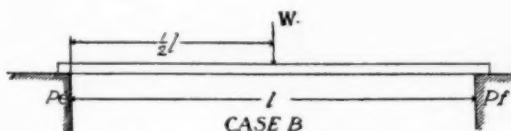
By calculation, the maximum bending-moment may be found from the following formulæ (Fig. 21):

CASE a. $M = \frac{Ll}{8} \times 12$



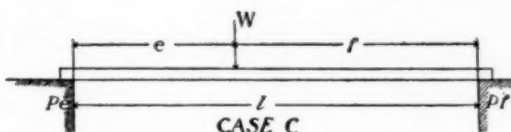
(18)

CASE b. $M = \frac{Wl}{4} \times 12$; $L = 2W$



(19)

CASE c. $M = \frac{Wef}{l} \times 12$
 $= P_e e \times 12$
 $= P_f f \times 12$
 $L = \frac{8Wab}{l}$

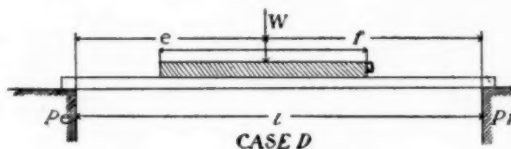


(20)

(21)

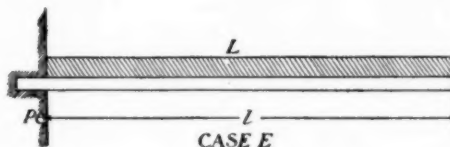
(22)

CASE d. $M = \text{Same in Case c.}$



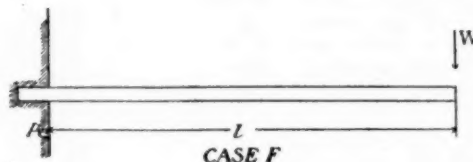
CASE D

CASE e. $M = \frac{Ll}{2} \times 12$; $L = 4W$



(23)

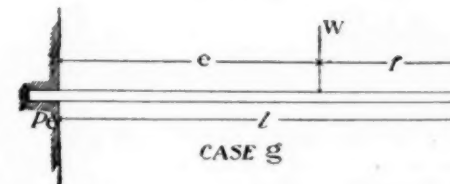
CASE f. $M = Wl \times 12$; $L = 8W$



(24)

CASE F

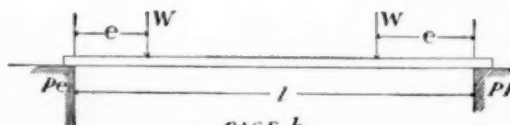
CASE g. $M = We \times 12$



(25)

CASE G

CASE h. $M = We$; $L = \frac{8We}{l}$
 $\text{if } e = \frac{1}{2}l$; $L = W$



(26)

CASE h

dropped from 1, then from this point draw a line parallel to 1, 0 until it meets a vertical dropped from 2 and so proceed until the line drawn parallel with 4-0 passes through a vertical from P_f ; connect this point of intersection with P_e and draw a line from 0 to $a-4$ parallel with this line. It will divide $a-4$ into two parts which will equal the reaction at P_e and P_f . Draw a line through 0 horizontally calling its value, as scaled, H . Then the bending-moment at any point on the beam = the product of H by the distance from the line a, b, c, d, e, f , at

In Cases a, b, c, d , the point of greatest bending-moment is under the centre of gravity of the load. In Cases e, f, g , the point is at support.

The maximum bending-moment of any combination of the above conditions of loading would be their sum.

In Case c

$$P_e = \frac{Wf}{l} \quad (27)$$

$$P_f = \frac{We}{l} \quad (28)$$

[To be continued.]

AN ARCHITECTURAL COMPROMISE.



"Temperance," from the Tomb of Francis II, Duke of Brittany, Nantes Cathedral. From *L'Art pour Tous*.

IN politics, compromises have not always proved highly successful. Will they be any more certain to produce good results in architecture?

This may sound like an irrelevant opening for an architectural subject; and it would be irrelevant were it not that architecture is just now engaged in an internecine strife within itself, and that some of the conditions of political administration have been transferred to the domain of aesthetics, where they are producing very marked results in the execution of the artistic code. In other words, the policy of compromise has been carried into architectural administration, and it behooves us to know if compromises are apt to be productive of permanently good results, and if they do not generally end in a misfortune of some kind.

We have heard a great deal recently about the constructive merits of Chicago architects, and their performances have received the indorsement of some men of good qualifications as architectural critics. Their works are widely

imitated, too, in other cities, by architects of reputation, and the drift of public opinion seems to be turning in their favor. Yet what is this Chicago idea when it is dissected, and what is its tendency, in the view of good taste, on the development of architecture? We must be careful to keep the line between architectural engineering and architectural design sharply drawn, if we wish to estimate the one at its true value as a handmaid and companion of design, and protect the other from the possible evil influences of its stronger, but, æsthetically, somewhat disreputable and less attractive sister. But all this may sound enigmatical; and it will be best to hasten forward to a more definite explanation, in order that the appropriateness of the opening paragraph may be clearly understood.

Some years ago, or many years ago it may now be said, the iron manufacturers came to the conclusion that iron might be made not merely a good structural feature of architecture but an exclusive building material for all parts of a structure above the foundations, and they were successful in convincing a great many persons that their idea was well conceived. Superficially, the arguments in their favor seemed overwhelmingly strong. As a building material iron appeared to be absolutely incombustible. It was easily moulded or cast into the semblance of plastic or sculptured art, and its great tensile strength permitted its use in buildings where light and ventilation were chief recommendations. Hence, long rows of iron fronts—nominally of iron, but chiefly composed of glass—sprang up along the traffic arteries of our chief cities; and it looked for a time as though the stone quarries and brick-yards were to be relegated to the realms of antique superstitions. A new building material was taking possession of the field, and if none of the quarrymen or brickmakers committed suicide, it is probably because these industries fail to cultivate those excruciating sensibilities that lead to tragedies of the kind.

Nevertheless, the innovation did not prove to be quite successful. Architecture as a member of the fine-art family is closely related to music, and it is subject to some of the same laws that control musical production. But as it has been proved that a Wagner may be the only great man in music until a Mascagni comes, so it also may finally be found that when our ears have been alternately stormed and charmed to the border of deafness by the two great masters we shall be ready to welcome a resurrection of a Meyerbeer and a Mozart. In other words, a brick was not made to be disregarded, whether it strikes us on the subcranial and æsthetic or supercranial side of the head; and it was possibly the consciousness of this fact which relieved the brickmakers from despondency in their hour of peril.

The danger to architecture, however, has not yet entirely passed. It was said, but now, that the iron innovation had not been quite

successful; but the declaration must be qualified. The invader has not yet abandoned the field. It carried the outpost, and, having met with a check, it proceeded to entrench itself in the structural parts of the citadel and to demand a parley and a compromise. It will relinquish its exclusive claims to the edifice if we will permit it to carry its structural features into the façade. It will even consent to bury itself, or the more offensive parts of itself, in the recesses of brick, where, by the way, it can find protection from the inclemency of the weather, if we will only permit it to decree that the wall-face shall still be composed mainly of glass, and the brick or stone subdivisions shall not be permitted to display their proportions too obtrusively. Can the architects, with their principles of architectural design in view, afford to accept the compromise and permit the measure of self-effacement which the acceptance of such terms will compel? This is the question that must be answered now; and when we have discovered the place where the true architect must draw the line between yes and no we shall have found in what way the compromise can be considered without witnessing a decadence in architecture.

Let us clearly understand the nature of the lack of adaptability in iron as an exclusive building material, and then we shall more clearly comprehend what the architects are called upon to surrender in its behalf, and how far the surrender can be made without an abandonment of the highest architectural art, and the substitution of a merely structural art in its place. Iron proved to be inimical to those combinations of lines and masses that enter into the highest architectural expression. Good taste demands the observance of certain proportions in building. The apertures must bear a definite relation to the wall-face, modified, it is true, in different examples of architecture, but still clearly defined, and not unprecedented in any good example, and columns, cornices and pediments must be suggestive of a certain weight and symmetry derived from the subjection of the details to the mass. The structure, in short, must hang together as a whole, and not look like the mere box-like enclosure of a certain number of cubic feet of space conceived without any artistic motive.

For causes which it will not be worth while to specify here, iron failed of meeting these requirements. It refused absolutely to adapt itself to the laws of proportion. It will be useless to say in reply, too, that our ideas of proportion are borrowed from the material long used in architecture, and that a new material might create a new sense of proportion. The claim at best could be only a half truth; for our sense of proportion has only in part been derived from material, and it is in much larger part, probably, derived from the sense of mathematical ratios and a close observance of what may be called the æsthetic works of nature. Ruskin, though generally an architectural critic of the highest qualifications, was probably wrong in tracing a too close relationship between the sense of proportion and material. Wood has been a building material longer than either stone or brick; yet we have seen all through its history that whenever the builder in wood sought to give expression to any high order of æsthetic sentiment he was compelled to imitate the ratios of brick and stone, and to be a follower instead of a leader in architectural design. The truth is, our sense of architectural proportion has several origins, some plain and palpable, and others, though subtle and hidden, none the less operative. It is certain that even light and shade enter so largely into the combinations that make grand proportions that our cathedral architecture would have been developed along entirely different lines of evolution had the subtle forces of these two agents not wrought-in the combinations that contribute to the perfections of Gothic art. We have a world of nature all around us, in the rocks, the cliffs, the hills, the mountains, and the forests, which is continually impressing itself on our æsthetic sensibilities; and it would be impossible to say to what extent our emotions are derived from one source and to what extent from another. We only know absolutely that they are inspired, and that they cannot be violated without producing some very discordant results.

Here is where iron failed in its first intrusion among the various substances used as a building material. It came both as an imitator and a creator; and wherever it was an imitator it was a burlesque imitator, or, to use the term most appropriate in artistic discussion, a caricaturist, and wherever it was a creator it was a creator that studied only the utilitarian and not the decorative side of architecture. But now it is demanding a compromise, and offering to render itself invisible, or less obtrusive at least, provided only that we shall accept its principles and conform to its strictly structural regulations.

Unfortunately, however, for the success of the negotiations in progress, its principles and its regulations are precisely what we are unable to accept without degrading all other building material almost down to its own level. It would be a mistake to suppose that our chief quarrel with iron and our rejection of its first overtures were due to its external features, however brazen they may have been, or to any lack of polish in the mode of its presentation to the public. All these blemishes could have been endured and condoned on account of its really fine structural qualifications, but its overtures were rejected because it brought in an exaggerated form the very vices which it is now asking us to embrace in a modified form. It took the field in contempt of those well-established principles of proportion on which not only grandeur in architecture is dependent but from which even beauty cannot escape without disfigurement, and it now asks us to compromise by conceding the excellence of

its chief innovations. But is it any more compatible with good taste in the new service which it is seeking to render?

Well, yes; it may be admitted, possibly, that it is a little more compatible. It confesses to the artistic necessity of something broader than mere iron posts between apertures. It concedes that a wall-face, not inclusive of the windows and doors, may be expedient for decorative purposes, and it goes farther, and will help to sustain in place cornices and pediments of stone. True, it is not quite an honest material even in its concessions. In contending for the contraction of the wall-face to adapt the wall to its own structural requirements, it presses into service a system of lines and combinations of lines in which very massive and grand cornices and pediments would look disproportioned, thus nullifying some of the best fruits of its surrender. But it has left enough of architecture to enable the true architect to reconstruct the art in accordance with the established canons of taste, and it may, therefore, be credited with a higher degree of compatibility with aesthetic art than it originally manifested. But its overtures must still be accepted with great caution. It loses but little of its ability to outrage good taste by its partial withdrawal from observation, and the very subtlety of its movements renders it the more dangerous.

But now that this much has been said by way of a caveat to architects, may it not also be true that something may be said in favor of the new structural combination of iron, brick and stone? Unquestionably a great deal may be said in commendation. We could not build with too much strength, even were there no call for the greater elevation of buildings than five or six stories. But however desirable it may be, from many points of view, to restrict elevation, it is not probable that it can ever be restricted. The great concentration of population in large cities, and the possibly still greater concentration of a population demanding space in town that will be brought to the suburbs of large cities by improved and cheapened means of transit must continually cause the pressure upon building plans to be perpendicular rather than horizontal. It will not be prudent, therefore, to say that buildings will not continue to grow in altitude until all the resources of safe construction have been exhausted. Then, it will be in providing for this new demand that the combination may be made most useful. In the hands of men really competent as architectural designers, it may even be made a protection to the aesthetic features of architecture and help to avert a danger which must already be pronounced as more than threatening in its manifestations on some of the most elaborate and expensive of recent architectural examples. What is the nature of this danger?

It can hardly have failed to strike the critical observer for a number of years past that something discordant was creeping into our most ambitious architecture. Our best structures were continually becoming more and more massive in effect; but at the same time they became neither more grand, more dignified, nor more beautiful. On the contrary, they seemed to be losing rather than gaining in all three qualities; and, to increase the measure of their defects, they were pervaded by a certain air of gloom that was oppressive rather than inviting. On rambling through some of the lower districts of New York, where the structures are of the most elaborate description, an impressionable spectator could hardly resist the feeling that he was in a neighborhood of highly decorated bastiles, attractive enough if he kept his eye upon the façades, but suggestive of dungeons, if not of the thumb-screw and the rack, when he allowed his vision to wander through the open portals. Within, everything seemed dark and forbidding, and the sickly gleam of gas or electric lights at noon-day only added a Plutonic aspect to a spectacle already sufficiently suggestive of the nether world. Evidently, architecture, like the full moon at times, was moving behind a cloud, and its light was becoming hidden from mortal vision.

The truth is that, in attempting to climb higher and higher, brick and stone had finally climbed so high that structural necessity compelled them to violate some of those same rules of proportion that iron has always violated in mere wantonness. True, they erred upon the other side, and had not yet departed far enough from the true ratios in proportion to make their combinations hideous; but they had departed far enough to show that true art will surrender nothing to either structural necessity or caprice, and that the moment material begins to impress itself upon the conceptions of the architect she will fly away, and fly so far that she can be won back only after prolonged and painful endeavor.

Here, then, is the conclusion of the whole matter: In the structural union of iron, brick and stone we have found a combination that will enable us to build to a great elevation without compelling us to sacrifice our sense of aesthetic proportion. But it is a combination, at the same time, which enables architects to walk dangerously close to the verge of too great lightness and frivolity, and which thus far seems to have displayed chiefly a faculty for toppling them over into the abyss. True architects will accept no compromises so long as their employers will permit them to put fine art before constructive art, and build in accordance with the true principles of design. They have nothing to learn from iron, and no artistic deductions to draw from its use. At the best, it is only an enabling material. In buildings that are low enough to be built without any violation of proportion, its reinforcement to the wall will not be needed; and in buildings that demand its use it should have no influence after the true proportions are secured. Unquestionably, under the new system of construction, the walls of very tall buildings will be somewhat

thinner than they would have been had there been no improvement in constructive processes; but they should not be reduced in thickness because iron permits the reduction. They should be reduced only because the old processes of construction sometimes caused them to be made disproportionately thick. There is no suggestion of solidity or strength in most of the buildings now under construction by the new process, and when we have lost this suggestion we have lost one of the chief elements of the classic in architecture.

Doubtless, it will be a nice thing for an architect to draw the line between what he could do as a constructor and what he ought to do as an artist; but if he is a man of the true feeling it should not be difficult. His greatest difficulty, it is to be feared, will be found in his lack of liberty. The potency of estimates on cost is something quite overwhelming.

WILLIAM NELSON BLACK.

SIX HOURS IN SALEM.



On Gallows Hill.

THE material for the accompanying drawings and sketches, and the following facts, relative and irrelevant thereto, were all collected by the present writer and a friend in a six-hour long visit to Salem, supplemented by a short preliminary cramming at the Boston Library on the evening previous. In so short a time, and with imperfect facilities (our only instruments were note-books, rules, and pencils, and a kodak camera), it is perhaps presumptuous to suppose that much of fresh interest or of permanent value could be gathered in a field already so well harvested by such men as Arthur Little, Frank Wallis and others not less competent, but it so happened, partly by accident and partly also from design, that we devoted our attention principally to houses not treated before. In so doing we have hoped not only to escape comparisons, sure to be disastrous, but also to augment, in some slight degree, the sum total of drawings and documents pertaining to Colonial architecture in America.

In the popular mind, Salem is so indissolubly associated with the idea of witchcraft that in any article on the subject, however practical its nature or prosaic its style, it would be impossible not to refer in passing to that insane delusion, the horrid and bloody results of which have made the town famous not in the history of the country merely but of humanity at large. Indeed, the tragedy enacted there two centuries ago colors the life of the place to-day, and, like a murderer's conscience, clamors for recognition. There is a sinister something in the names one hears, such as the "Witch House" and "Gallows Hill"; the very word "witch," which once struck terror to brave hearts, is used now by tradesmen to enhance the value of their wares. In the court-house are still to be seen the documents relating to the trials, and objects used as evidence thereat; among them the "witch-pins" with which the accused were supposed to have tormented their victims. On the corner of Washington and Lynde streets we came upon a black bronze tablet bearing the following inscription:

"Nearly opposite this spot stood, in the middle of the street, a building devoted from 1677 until 1718 to municipal and judicial uses. In it, in 1692, were tried and condemned for witchcraft most of the nineteen persons who suffered death on the gallows. Giles Corey was here put to trial on the same charge, and, refusing to plead, was taken away and pressed to death. In January, 1693, twenty-one persons were tried here for witchcraft, of whom eighteen were acquitted and three condemned, but later set free, together with about 150 accused persons in a general delivery which occurred in May."

It was like encountering a funeral on the street, and, hurried and preoccupied as we were, we could not but pause, and try to realize, if only for an instant, the terror which ruled the community when husbands accused wives, children and parents, and safety lay neither in wealth nor station — least of all in innocence — and fear and cowardice passed like a pestilence from heart to heart.

In reading over the reports of the witch trials one is afflicted by a feeling of something uncanny in it all, and is tempted to believe in witchcraft — obsession by evil spirits, and the rest; but time has strangely reversed the positions of accuser and accused, for now it is the judges who appear to be the vehicle of the diabolic will, so blind and implacable they seem — so intent on having the blood of their victims. I call to mind a single instance which will suffice in illustration of this: One of the afflicted girls said that Sarah Good, then on trial, had cut her with a knife and broken the blade in her flesh. Search was made, and, sure enough, the blade was found on Sarah's person. A young man, thereupon, got up and exposed the fraud. He produced the rest of the knife, and told how he had thrown the broken blade away in the presence of the girl; but the Court, instead of admitting his evidence, dismissed him with an admonition not to tell lies and continued taking the testimony. What wonder that justice such as this wrung from Martha Corey the pathetic protest: "You are all against me and I cannot help it!"

Next to its having been the centre of the witchcraft delusion, Salem is perhaps most famous as the birthplace of Nathaniel Hawthorne and the supposed scene of many of his romances. The house where he was born, and others in which he lived at various times, may still be seen by the curious visitor, and so intermingled do the real and the ideal become with the lapse of time that one of the principal "objects of interest" is a house supposed to have been the original of the "Seven Gables," though there is little or no evidence in support of such an assumption. Whatever may have once been its condition, it certainly tallies ill with Hawthorne's description; and of gables we counted only two. The Pickering house came much nearer our ideal — even to the magnificent old elm before the door.



Pickering House.

These two are about the only remaining examples of the many and steep-gabled houses, built here in the middle of the seventeenth century, in evident imitation of the Gothic half-timbered cottages of England.

We visited the Custom-House, where Hawthorne served a term in the capacity of Surveyor of the Port, an experience which he subsequently immortalized in his introduction to the "Scarlet Letter." The place looks to-day exactly as he there describes it:

"In my native town of Salem, at the head of what, half a century ago, in the days of old King Darby, was a bustling wharf, — but which is now burdened with decayed wooden warehouses, and exhibits few or no symptoms of commercial life; except, perhaps, a bark or brig, half way down its melancholy length, discharging hides; or, nearer at hand, a Nova Scotia schooner pitching out her cargo of firewood, — at the head, I say, of this dilapidated wharf, which the tide often overflows, and along which, at the base and in the rear of the row of buildings, the track of many languid years is seen in a border of unthrifty grass, — here, with a view from its front windows adown this not very enlivening prospect, and thence across the harbor, stands a spacious edifice of brick. From the loftiest point of its roof, during precisely three and a half hours of each forenoon, floats or droops, in breeze or calm,



Custom-House.

the banner of the republic; but with the thirteen stripes turned vertically, instead of horizontally, and thus indicating that a civil, and not a military, post of Uncle Sam's Government is here established. Its front is ornamented with a portico of half a dozen wooden pillars supporting a balcony, beneath which a flight of wide granite steps descends towards the street. Over the entrance hovers an enormous specimen of the American eagle, with outspread wings, a shield before her breast, and, if I recollect aright, a bunch of intermingled thunderbolts and barbed arrows in each claw."

Fresh from a reperusal of Hawthorne's description of his life there, we tried to imagine him as still an incumbent of the post,

going about his accustomed duties, and we almost duped ourselves into believing that we would see his familiar figure within each newly opened door. There was little to discourage such a fancy. For aught that we could see, he might have left there only yesterday. The same superannuated sea-captains, apparently, slouched about the corridors, calling one another "Cap," and discussing the last or coming "clam-fry," just as they did when Hawthorne passed among them like a prince disguised among his poor, — he alone conscious of his rank and power, and waiting till the time came to declare it. One of the above-mentioned dignitaries showed us the window at which Hawthorne worked, and the chamber in which he found the scarlet letter (if he ever found it, except in a chamber of his brain), in a manner which showed it to be an accustomed service.

The building itself, erected about the beginning of the century, impressed us as a fine example of later Colonial architecture, full of dignity and repose, and, though scarcely larger than some of the houses with which it is surrounded, expressing in unmistakable and appropriate terms its character and office.

Hawthorne is by no means the only illustrious son of Salem. Prescott was born here; here Roger Williams taught and preached, and here Count Rumford kept a store. Washington and Lafayette both visited the little town in the stirring Revolutionary days, and almost all of the presidents since. It is said that the first armed resistance to British authority occurred at the North Bridge in an engagement known as "Leslie's Retreat." In the war of 1812 the battle between the "Chesapeake" and the "Shannon" was fought off the shore of Salem, so that it could be witnessed by the townspeople from the hills.



Salem Back-yard.

But more interesting to us than the town's history were the lovely old houses of which it is built up. It was to see them that we had come and to this purpose therefore we devoted our remaining time. To the mind of an architect the buildings of Salem arrange themselves naturally into three classes: First, those very old houses, built by early settlers in the most primitive times, possessing all the dignity and simplicity and, withal, the barrenness of the Puritan character, and around which cluster many strange, true histories

and curious traditions; second, those built in later Colonial and Revolutionary days, usually by rich merchants and ship-owners, when Salem had become a principal port of entry, and an important commercial centre, and in which the Colonial style is exhibited in its very flower; and third, those purely modern structures — confused, chaotic — which have sprung up in profusion in some parts of the town, like weeds in an old-fashioned garden.

The very oldest house of all, as well as the most famous, is the Roger Williams house, on the corner of Essex and North streets. The exact date of its building is not known, but it cannot be far short of three centuries ago, for in 1675 the chimneys had to be taken down and rebuilt. It again suffered alteration in 1746, and now a vulgar little modern drug-store grows out of its withered old side, like some excrescence, indicative of age and disease and swift-coming dissolution. The western portion, with its quaint, overhanging second story, is almost all that remains of the original structure, but from it, in imagination, one may reconstruct the whole.

In 1635 this house was the home of Roger Williams, and from it he was driven by Puritanical intolerance to seek shelter among the Indians at Narragansett Bay, where he founded the State of Rhode Island, as every school-boy knows. In a letter to his friend, Major Williams, he thus refers to the event which drove him thither:

"When I was unkindly and unchristianly, as I believe, driven from my house and land and wife and children (in the midst of a New England winter now about thirty-five years past) at Salem, that ever honored Governor, Mr. Winthrop, privately wrote to me to steer my course to the Nahigonsset Bay and Indians for many high and heavenly and public ends encouraging me from the freeness of the place from any English claims or patents. I took his prudent motion as an hint and voice from God, and waving all other thoughts and motives I steered my course from Salem (through winter snows which I feel yet) into these parts where I may say Peniel, that is, I have seen the face of God."

The house passed then into the possession of Captain Richard Davenport, whose administrators sold it in 1675 to Jonathan Corwin, notorious as being one of the two magistrates before whom were tried and condemned those first persons, "charged with certain detestable arts called witchcraft and sorceries wickedly and feloniously used, practiced and exercised by which the persons named were tortured, afflicted, pined, consumed, wasted, and tormented." The preliminary examinations of some of the accused are said to have taken place in a room of the old house, and this circumstance has given it the name of the "Witch House," by which it is best known.

In rumaging over some old files of the *Essex Institute Bulletin* in

the Boston Library I came upon a transcript of the contract between Corwin and one Daniel Andrewe for remodelling the house. I give it here entire. As an example of an early specification, it will be seen to possess all the diffuseness and obscurity common to such documents at the present time:

"The said Daniel Andrewe is to dig and build a cellar as large as the easterly room of said house will afford (and in the said room according to the breadth and length of it) not exceeding six foot in height: and to underpin the porch and the remaining part of the house not exceeding one foot; the said kitchen being 20 feet long and 18 foot wide; and to make steps with stones into the cellar in two places belonging to the cellar, together with stone steps up into the porch. 2. For the chimney he is to take down the chimneys which are now standing, and to take and make up of the bricks that are now in the chimneys, and the stones that are in the lean-to cellar that now is, and to rebuild the said chimney with five fireplaces viz., two below and two in the chambers and one in the garret; also to build one chimney in the kitchen with ovens and a furnace, not exceeding five feet above the top of the house. 3. He is to set the jambs of the two chamber chimneys and of the easternmost room below with Dutch tiles, the said owner finding the tiles; also to lay all the hearths belonging to the said house and to point the cellar and underpinning of sd. house and so much of the hearths as are to be laid with Dutch tiles the said owner is to find them. 4. As for lathing and plastering he is to lath and siele the four rooms of the house betwixt the joists overhead and to plaster the sides of the house with a coat of lime and haire upon the clay; also to fill the gable ends of the house with bricks and to plaster them with clay. 5. To lath and plaster the partitions of the house with clay and lime and to fill, lath and plaster the porch and porch chambers and to plaster them with lime and haire besides; and to siele and lath them overhead with lime and to fill, lath and plaster the kitchen up to the wall plate on every side. The said Daniel Andrewe is to find lime, bricks, clay, stone, haire together with labourers and workmen to help him, and generally all the materials for effecting and carrying out of the aforesaid worke, except laths and nails. 7. The whole work before mentioned is to be done finished and performed att or before the last day of August next following provided the said Daniel or any that work with him be not lett or hindered for want of the carpenter worke. 8. Lastly, in consideration of the aforesaid worke, so finished and accomplished as is aforesaid, the aforesaid owner is to pay or cause to be paid unto the said workmen the summe of fifty pounds in money current in New England, to be paid at or before the finishing of the said worke. And for the true performance of the premises, we bind ourselves each to other, our heyes, executors and administrators, firmly by these presents, as witness our hands, this nineteenth day of February, Anno Domini 1674-5

JONATHAN CORWIN
DANIEL ANDREWE"

The meeting-house in which Roger Williams used to preach—the first for congregational worship built in America—has been carefully restored and preserved, and stands now in the rear of the Essex Institute. The frame is about all that remains of the original building. It is so small that a person reaching forward from the front of the gallery might touch the extended hand of the minister behind the desk. It is used as a repository for many curious relics, among them Hawthorne's desk, at which the "Scarlet Letter" was written, or at least begun.

The Pickering house, before alluded to, is also of great antiquity, having been built in 1651 by John Pickering, and inhabited ever since by his direct lineal descendants. For this reason, perhaps, it betrays few evidences of the ravages of time. There are other houses in Salem, built about the same time, which, though interesting historically, present few attractions to the lovers of architectural beauty. It was for those built about the year 1800 that we reserved our admiration and our lead-pencils,—great square structures, usually of brick and stone, with wooden cornices and porches. One of them, typical of the whole class, especially arrested our attention by the beauty of its proportions and detail. Standing a little back from the street, and apart from its neighbors on either side, it displayed a façade plain almost to barrenness, but so well fenestrated



Pingree House.

and divided horizontally by broad bands of brickwork at each floor-level as to quite fill and satisfy the eye. This wall was finished with a well-proportioned cornice, and this, in turn, surmounted by a delicate balustrade. The only other bit of ornament consisted in one of those dainty and beautiful semicircular porches before the

entrance, of which we saw so many in Salem. Through the courtesy of its occupants, we obtained admission to this house, and made drawings of much of its interior woodwork, which was both rich and refined. It was while so engaged that we first learned that the house had been the scene of one of the most horrible murders in all



Typical Salem Frame House.

the history of crime, known at the time of its committal as the "Salem Murder," and celebrated alike for its cold-blooded brutality, the high position of many of the individuals concerned, and the singular succession of fatalities which accompanied and followed it. The facts are, briefly, these:

In a room of the old house, on the night of the 6th of April, 1830, Capt. Joseph White, a rich and respected citizen of Salem, was stabbed and beaten to death, as was alleged, by his nephews, George and Richard Crowninshield, and an accomplice, in order, it is supposed, to obtain possession of the old

man's will. When the crime was discovered, the whole countryside was aroused, a great public meeting held, and the murderers apprehended and hunted down. In the trials which followed, some of the greatest lawyers in the country participated, among them Daniel Webster and Samuel Hoar. The jury failed to agree, and so the trials came to nothing; but they were full of startling and dramatic incidents. Chief Justice Isaac Parker, immediately after delivering his charge to the jury, fell forward, dead, and one of the Crowninshields killed himself in jail while awaiting trial. The other, Richard, was the inventor of some of the most intricate machinery used in the factories of New England to-day.

This tale, when we heard it, somehow dampened our architectural ardors. At this window, we reflected, where now the sun streamed so brightly in, the assassin entered; these floors creaked warningly beneath his stealthy feet, and then were treacherously still; this spotless white woodwork had been crimsoned by the old man's blood; these walls resounded with his dying groans. We did not care to linger after that, but tiptoed down the broad stairs and through the still hall out into the welcome noise and glare of Essex Street.

The Essex Institute was just next door, and we spent half an hour very pleasantly in the museum, where there are many pieces of fine old furniture and woodwork taken from houses now destroyed. We found fine furniture, also, in the house of Major George Whipple, and the first "Salem cupboard" that we had ever seen.

A little beyond the Essex Institute is the armory of the Salem Cadets, a stately old house built by Col. Francis Peabody in 1818. Its front is diversified by two segment-shaped bays, in this respect a departure from the usual Salem type, though a common feature of many old houses in Boston. The interior is more than ordinarily grand, one room containing a white marble mantel with carved caryatides. Off of the stair-landing is a banquetting-hall finished in oak in Elizabethan Gothic, where, we are told by the guide-book, "Prince Arthur of England was entertained at dinner on the occasion of his attending the funeral of George Peabody, the banker, February 8, 1870." This rich, dark, elaborate interior is in startling contrast to the trim white Colonial finish of the rest of the house.

We left Salem for Boston about three in the afternoon, with such feelings of regret as must have been Sinbad's on quitting the Valley of Diamonds, for, to our unaccustomed Western eyes, the place seemed a veritable mine of architectural wealth. The permanent impression left with us by our hasty visit was of an exceedingly quaint and picturesque old town, striving here and there to be "smart" and modern, like some faded spinster who has seen better days, who mistakenly prefers our shoddy fabrics to the faded silks and yellow lace and other heirlooms of an opulent past. The old houses which we visited, redolent with memories of other days as a rose that has been kissed and laid away, awoke in us a mood of pleasant melancholy full of vague guesses and conjectures. It was as though the houses themselves were trying to communicate to us their secrets, and had half succeeded. They seemed, indeed, human in a way that modern houses never do,—like the Colonial dames, their mistresses,—trim, plain, and a bit prudish in outward appearance, but interiorly beautiful, full of fine and delicate sentiment. This comparison, fanciful, perhaps, is yet applicable to the old houses of the South, which occupy their acres more invitingly, with less restraint, and are, altogether, more charming outwardly, like the Southern women, yet, within, are not without a certain strain of coarseness, the result of the idle, luxurious living and the languid air.

CLAUDE FAYETTE BRAGDON.

A STONE ELEPHANT. — An Indiana stone quarry company is having a life-size figure of an elephant chiseled out of a solid block of stone. It will be eleven feet high and weigh thirty tons. It is designed for the World's Fair. — *Exchange*.



THE SUGGESTED ARCHITECTURAL EXHIBITION.—THE FRENCH HOSPITAL COMPETITION.—THE STARR KING AND OTHER STATUES.—THE DEPOT MATTER.

SINCE I last wrote you, little in the way of architectural gossip has transpired in the city, but it may even be well for you to know what we are not doing. "The best-laid schemes o' mice and men gang aft a-gley"; and so, I am afraid, it has been with a proposition put forward some months ago to get up an exhibition relating to architecture and the kindred arts. The scheme, among a few who were good at talk, took form rapidly, until the range of its embrace extended to the horizon, and, reflecting backward, finally became concrete in the form of a dinner, at which about twenty out of a possible hundred architects were present. It is almost unnecessary to say more. The architects, old and young—mostly those at the two extremes of life—met: on the one hand, those too old to vivify new projects, and, on the other, those whose enthusiasm would lead them to undertake the building of anything without counting the cost. Lockless age and beardless youth met, ate, told stories and made merry. One orator alone thrilled with the passion of his art, but his voice was as one crying in the wilderness "Prepare!" Yes, in the future we may have such an exhibition, but not just yet. The idea is an excellent one—to have an exhibition of architectural drawings, photographs, artistic metal and wood work, decoration, stained-glass, and all the artistic arts that relate more or less directly to architecture. It has been done in other cities, and we have no doubt that, if the right persons would take the scheme in hand and set it going, the public would, in a few years, so patronize such exhibitions as to make them self-supporting.

In the matter of competitions, we have had quite an important one in the French Hospital.

It is the privilege of an architect to be intimately sympathetic with every joy and sorrow that thrills the human heart, and as, in designing a place of amusement, he may allow his spirits to be gay even to the point of frivolity, so, in designing a hospital, must he be as sympathetic in his tenderness as a woman, if he would lay his square and triangle in such a manner, on his part, that the pain and weariness of sickness and disease may be more easily borne. The directors of the hospital were wise beyond measure in the manner they went about arriving at what they desired. First, they employed one of the leading architects of the city to prepare them a number of preliminary drawings, from which, by study and criticism, they might outline in the form of conditions of competition this partially perfected ideal arrangement.

The competition was then thrown open to the public. They proposed covering a lot, surrounded by streets, 240 x 600, with, approximately speaking, eight wards, an administration-building and culinary department, to accommodate about 150 patients; the buildings to be of brick or other non-combustible materials, with all the most approved hygienic appliances, and to cost not more than \$180,000. An interior court for convalescents, where they might bask in the sun, sheltered from the rigorous trade-winds that bluster over our city half the day for more than half the year, was considered most desirable. Each ward also had to be detached and separated from all adjoining buildings by once-and-a-half the height of such buildings.

The problem of a hospital is never an easy one, and especially as, in this case, the ground space was insufficient. However, Mr. Mooser, of this city, in conjunction with, presumably, an expert of Paris, has been successful in satisfying the needs of the Board of Directors. His plan is similar in its fundamental lines to those which undoubtedly come nearest the mark. At the centre of one end of the lot is placed the administration-building; flanking it, and stretching the full length of the available ground space, are arranged the eight main wards on either side, with the kitchen department in the centre of the lot. The space between these two rows of buildings is occupied by a garden for the use of patients.

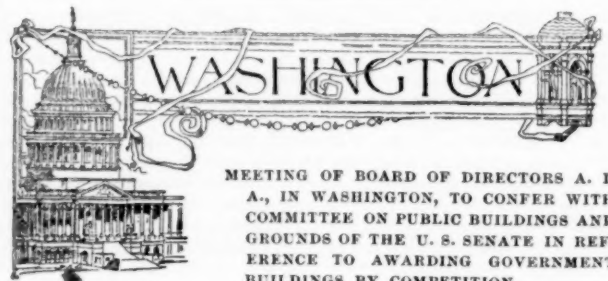
The buildings are two stories in height, besides a basement, and appear cheerful in elevation, although not in any way architectural. The style is essentially "cottage architecture, nineteenth-century" in its dry utilitarianism, and, for what little interest is attached to it, depends wholly on the manner in which many-colored bricks are banded and interlarded in various ways. It will appear modest and unassuming, but is altogether too finicky for many tastes.

Several of the other designs were far more pleasing in their bold simplicity; but a hospital is a plan essentially, and on that alone must we decide. A week more nearly than an hour would be required to weigh the pros and cons of these many plans, and so judgment is reserved. Suffice it to say that the directors were well qualified, and that they gave a careful and therefore valuable judgment. Sixteen sets of drawings were submitted.

Unlike Rome in her palmy days, we have fewer statues than inhabitants in the city of San Francisco, for which, of a truth, we have much to be thankful, else would we rapidly forget the human form divine, and think only of it in that grotesque form in which man has fashioned it—not after the image of God, but after something that has no counterpart either in heaven above or in the earth beneath. San Francisco boasts of her park, and, in her pride, would adorn it with statues, if she knew how. The latest addition, however, which was unveiled a few weeks ago, has not about it the touch of genius, or, if so touched, then so lightly that the vulgar eye cannot detect it. Starr King, a philanthropist of this city, is the one chosen to be immortalized. It is continually being said that it is difficult to make out of a nineteenth-century individual in the costume of a civilian anything that will move the human heart; but why should it be so? Are we not impressed every day of our lives by just such men, though on them, we admit, is no romantic dress, but still true men? So on that score I will not excuse the sculptor. Starr King stands on his pedestal, steadying himself by his left hand with a Roman quiver of arrows, a thing which does not belong to a realistic study in this century. He is dressed in modern style, and holds in his right hand, in rather an aimless manner, a something that appears like a scrap of sheet-iron, which supposedly is a scroll. From his shoulder has fallen his mantle; but the man and this manner of disrobing do not agree. The Park Commissioners may, however, enjoy quietude of mind in so far as they may rest assured that this statue will not become unstable, as did the fair creation of Pygmalion. We have several others of this kind about town, notably that of Garfield; but, as an offset, we have that which, to me, is most poetic, the Scott Key monument, with its dreamy, restful-looking occupant sitting in his student's chair, gathering, as it were, from the inner realms of nature, those thoughts which he has so majestically expressed in our great national song. The "Ball-thrower" is a horse of a different color, and is a bound from the mental to the physical side of nature; but the keen eye and strengthened limbs of a sturdy young man when and all but ready to throw is well expressed.

In actual building operations, we have at present nothing important to relate. The hoped-for demand for new mammoth fireproof buildings to take the place of low two and three story frame and brick buildings seems to have exhausted itself for the present. Still, we may content ourselves in the thought that, if we do not progress as rapidly as some of our Eastern sisters, our progress may be equally satisfactory.

In time, we are to have a new building in place of the present shed-like structure, that so poorly accommodates the travelling public at our principal point of arrival and departure, and gives so bad a first impression of San Francisco. Five hundred thousand dollars are to be expended, and, if we can judge by the slowness of the gods in expending their money, we ought to expect something very fine.



MEETING OF BOARD OF DIRECTORS A. I. A., IN WASHINGTON, TO CONFER WITH COMMITTEE ON PUBLIC BUILDINGS AND GROUNDS OF THE U. S. SENATE IN REFERENCE TO AWARDED GOVERNMENT BUILDINGS BY COMPETITION.

ON Friday, March 11, 1892, the Committee on Public Buildings and Grounds, U. S. House of Representatives, gave a delegation of architects from various sections of the country a hearing. The result of this hearing was a strong report¹ by the House Committee in favor of the following bill:

52D CONGRESS, 1ST SESSION, H. R. 9592.

IN THE SENATE OF THE UNITED STATES, JULY 19, 1892.

Read twice and referred to the Committee on Public Buildings and Grounds.

AN ACT

Authorizing the Secretary of the Treasury to obtain plans and specifications for public buildings to be erected under the supervision of the Treasury Department, and providing for local supervision of the construction of the same.

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

That the Secretary of the Treasury be, and he is hereby, authorized in his discretion to obtain plans, drawings, and specifications for the erection of public buildings for the United States, authorized by Congress to be erected under the supervision and direction of the Secretary of the Treasury and the local supervision of the construction thereof by competition among architects under such conditions as he may prescribe, and to make

¹ Report No. 1078, House of Representatives, 52d Congress, First Session, to accompany H. R. 8152.

payment of expenses and for the services of said architects out of the appropriations for the respective buildings: *Provided*, That not less than five architects shall be invited by the said Secretary to compete for the furnishing of such plans and specifications and the supervision of such construction: *And provided further*, That the general supervision of the work shall continue in the office of the Supervising Architect of the Treasury Department, the Supervising Architect to be the representative of the Government in all matters connected with the erection and completion of such buildings, the receipt of proposals, the award of contracts therefor, and the disbursement of moneys thereunder, and perform all the duties that now pertain to his office, except the preparation of drawings and specifications for such buildings and the local supervision of the construction thereof, the said drawings and specifications, however, to be subject at all times to modification and change relating to plan or arrangement of building and selection of material therefor as may be directed by the Secretary of the Treasury.

Passed the House of Representatives, July 18, 1892.

Attest: JAMES KERR, Clerk.

The bill as passed by the House is a modification of the original bill presented in January, 1892, H. R. No. 3152.

On Tuesday, January 10, 1893, the Directors of the A. I. A. met in Washington, transacted their routine business, and by appointment met in the room of the Senate Committee on Public Buildings and Grounds to confer with them in reference to the bill which passed the House. (See *American Architect*, April 2, 1892.)

The meeting was adjourned to Tuesday, January 12, 1893, and the following memorial was submitted to the Senate committee and signed by the architects who were present at the meeting.

WASHINGTON, D. C., January 11, 1893.

TO THE HONORABLE, THE COMMITTEE ON PUBLIC BUILDINGS AND GROUNDS, UNITED STATES SENATE, WASHINGTON, D. C.:—

Gentlemen,—We, the undersigned architects from various States of the Union, and officers and members of the American Institute of Architects, assembled in Washington to meet your committee to urge the passage of H. R. 9592: "An Act authorizing the Secretary of the Treasury to obtain plans and specifications for public buildings to be erected under the supervision of the Treasury Department and providing for local supervision of the construction of the same."

And finding that owing to the indisposition of your acting Chairman the hearing for this morning cannot be held, and that some of our members cannot remain to be present at an adjournment of said hearing:

We hereby take this method of indorsing the bill for an act which is now before your honorable body and to commend for your consideration H. R. 8152, made by Mr. Tarsney, of Missouri, on behalf of the Committee on Public Buildings and Grounds, of the House of Representatives, and believing that its importance as an economical measure and also as insuring that excellence of professional service which is more marked in private practice than in that of the United States Government, we urge such action on your part as will insure the passage of the Act before the adjournment of the present Session of Congress. We also wish to call your attention to the paper prepared by James H. Windrim, late Supervising Architect, on *Architecture and the United States Government*.

E. H. KENDALL,
R. M. HUNT,
R. W. GIBSON,
New York City.
W. W. CARLIN,
Buffalo, N. Y.
ALFRED STONE,
E. I. NICKERSON,
Providence, R. I.
T. P. CHANDLER,
GEO. C. MASON,
Philadelphia, Pa.
W. G. PRESTON,
Boston, Mass.
JAMES W. McLAUGHLIN,
GEO. W. RAPP,
Cincinnati, Ohio.
L. T. SCOFFIELD,
Cleveland, Ohio.

W. W. CLAY,
Chicago, Ill.
W. S. EAMES,
P. P. FURBER,
C. E. ILLSLEY,
St. Louis, Mo.
GEO. B. FERRY,
Milwaukee, Wis.
W. C. SMITH,
Nashville, Tenn.
W. M. POINDEXTER,
ROBERT STREAD,
GLENN BROWN,
LEON DESSEZ,
J. C. HORNBLLOWER,
J. G. HILL,
Washington, D. C.

At the meeting held January 12th, although there was no quorum of the committee present, the case of the architects was presented by Mr. E. H. Kendall and Mr. R. M. Hunt, covering the points made before the House Committee. (See *American Architect*, April 2, 1892, and report by House Committee.)

Supervising Architects Potter, Hill, Bell, and Windrim are on record advising such legislation. In this year's report Mr. Edbrooke, the present incumbent of the Supervising Architect's office, takes the ground that the A. I. A., through its representatives, are in error. He claims government buildings are fully equal to municipal and private work of like magnitude in artistic effect, time of erection, and cost of construction.

On the question of cost he limits himself to the work done during the present administration.

On the first point,—character of design,—we can only judge from the buildings erected and the designs of public buildings contemplated. These fall far short of the best, or even the better, class of private work, as acknowledged by all who are capable of judging.

The time of erection is prolonged to double and treble the time it takes to erect similar structures for private corporation.

A conspicuous comparison may be made between the County building in Pittsburgh, Pa., and the Pittsburgh post-office.

The first is one of the architectural monuments of the country, while the second is commonplace in the extreme. The first cost thirty-one cents per cubic foot. A similar post-office to the one in Pittsburgh cost over sixty-five cents per cubic foot.

It is difficult to compare the cost of buildings during the present administration with other work, as none of any of magnitude have been commenced and completed under the present incumbent, who came into office in the spring of 1891.

GLENN BROWN.

THE EIGHTH LEAGUE EXHIBITION.



Miserere in Choir of Amiens Cathedral. From *L'Art pour Tous*.

WE know an artist who once took a picture to a dealer to sell. The picture had a fine frame, and appeared to its author quite attractive. He showed it to the dealer, and asked him how much he would give for it. "So many dollars," said the dealer, after a brief survey. "Why," said the disappointed artist, "that is

what the frame cost!" "So I supposed," replied the dealer, with unmoved countenance. It would, indeed, be far from our thoughts to apply this tale as an illustration of the value of the architectural drawings shown in the exhibition, but we must confess that it recurred to our minds as we compared the single small roomful of drawings with the noble series of galleries in which it was, this year, almost lost. Whether the actual number of strictly architectural works was smaller this year than last, or whether the difference was due merely to the contrast between the rooms in the Fifth Avenue galleries and those of the Fine-Arts Society's new building, we cannot say, but their effect was certainly much less important. However, as this was more than made up by the beauty and interest of the loan exhibition of tapestries, rugs, metal-work, and bric-à-brac of all sorts, which has never been so well shown before, and covered the walls of the new gallery—named for Mr. George W. Vanderbilt—with a charming dress of form and color.

Leaving this, however, for the present, we will devote ourselves to the more strictly architectural part. It is, perhaps, the misfortune of the present exhibition that it contains no special feature, like the collection of drawings for the Columbian Exhibition, which was shown last year, or the competitive designs for the New York Cathedral, which attracted so much attention the year before. The most noticeable set of drawings, similar in subject and of ambitious execution, consists of those for various State buildings in Jackson Park: North Carolina, Iowa, Georgia, Ohio, Minnesota, Texas, Massachusetts, Connecticut, Maryland, Rhode Island, New Hampshire, California, Pennsylvania, New Jersey, Nebraska, and New York being represented. Among these, the California Building is, perhaps, the most conspicuous, being shown in a very large, showy drawing, effectively, though rather crudely, rendered in color. In the design, the Spanish-Californian Mission style is very cleverly used. There is no style so characteristic of California as this, and, although some variations in scale between the different features of the building might be noted, the effect is not only striking, but quiet and architectural also.

Next to this in interest, and quite equal to it in originality and cleverness, is Messrs. McKim, Mead & White's design for the New York State Building. Nothing more different in conception from the California Building could well be imagined. While that is a long, low, yet dignified mass of whitewashed adobe, the New York house is a small Renaissance palace, brilliant and elegant, as becomes the *piet-à-terre* of the Empire State at Chicago. The drawing in which the design is shown, which is by Mr. F. L. V. Hoppin, is a curiosity in its way. At first view, the sky appears to have been painted with a whitewash brush, and the foliage then laid in with a sponge; but the architecture is not only correctly, but carefully, drawn and colored, and the whole effect is at once delicate and bright. The only remaining State building presenting any striking peculiarity is that of Georgia, by Mr. G. L. Norrman, of Atlanta, which portrays to the life the Greek-temple type of architecture, characteristic of the old Southern court-houses, colleges, and other public buildings. The style was once as familiar in the North as in the South, but the greater material progress of the North has long since displaced the temple court-houses and academies, and they are now confined mostly to the Southern towns, with whose air of cultivated repose they harmonize admirably.

Among the designs of more local interest, that of Mr. Henry B. Herts, for the Columbus memorial arch in New York, is noticeable, partly on its own account, and partly on account of the praise which the *Art Amateur* has bestowed on it. The *Art Amateur* compares it with Mr. White's Washington arch, to the disadvantage of the latter—a judgment in which we do not think that architects generally will coincide. Although well studied and nicely drawn, it does

not seem to us that Mr. Herts's design has the poetry and refinement of Mr. White's, nor do we quite approve of the polychromatic style adopted. In the opinion of the *Art Amateur*, the design is to be commended on account of this feature, and it is conceivable that a composition of the sort might add the attractions of color to those of form; but the attempt to accomplish this result usually ends in practically sacrificing the form to a mediocre color-effect, and, so far as can be judged from a drawing, Mr. Herts's arch would not form a conspicuous exception to the rule.

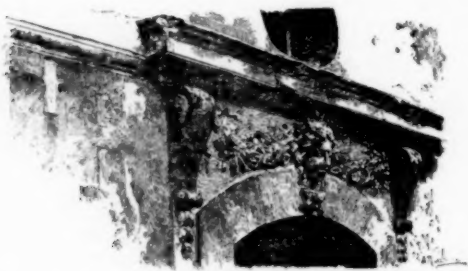
As we look along our marked catalogue for notes of other remarkable works we are reminded of a striking design, by Mr. A. Page Brown, for what the catalogue is pleased to call "El Grau Mercado de Lima." It obligingly adds a parenthesis, explaining that this means "The Grand Market."

The design of the Grand Market, according to our notes, consists in a happy combination of the Madison Square Garden tower and the St. Augustine hotels, associated with, or, rather, surrounded by, an arcade, of a rather Flemish pattern. The combination is by no means a bad one, and the building must be very imposing in execution, if it has been executed, as to which we have no information. Of the remaining architectural drawings, while all are good, and some very good, our notes do not indicate any of such extraordinary interest as to make it necessary to extend this article unduly to include them.

The "allied arts" rooms contain, however, some curious objects. Among others should be mentioned, for the benefit of those who have to design silverware, the competitive drawings for the silver service to be presented to the cruiser "New York" by patriotic citizens of the metropolis. The designs are not particularly good, and some of them are decidedly bad, but one set of drawings attracts attention by the remarkable beauty of its rendering, which makes every other set in the room look thin and scratchy. On examination, this rendering, which gives the very color and smooth sheen of silver, is found to be produced by cutting the body of the object out of a rather warmish gray paper, and pasting it on white card, and then tinting the shadows with what seems to be Payne's gray, not applied in the usual way, but, apparently, showered on with an old tooth-brush, after the fashion of the "spatter-work" which used to delight the infant mind some years ago. This spattered tint gives an extraordinary roundness and smoothness, which is heightened by putting in a cloudy cast shadow on the white card, in the same way and with the same tint; and nothing remains but to brighten up the drawing with a little brush-work, partly in Payne's gray, and partly in Chinese white.

The temptations of the bric-à-brac room do not permit us to linger long over the less strictly professional drawings, but the very extent and variety of the bric-à-brac collection makes it impossible to give any idea of it in the small space which can be devoted to the subject; so that we shall do best to say nothing about it, and conclude with a mild criticism—not new, but still necessary—of the proof-reading of the catalogue. The names of the exhibitors do not suffer as severely as they have on previous occasions, and this is something to be thankful for; but the proof-reader seems to have revenged himself on the saints and foreigners for the extra trouble that he has been put to in making the names of mortal compatriots recognizable. Thus, we find Santa Prassede masquerading as "St. Prosseole"; Raphael appears as "Raphuel"; and Viollet-le-Duc as "Viollet-le-Due"; Dinan becomes "Dinau"; the Hôtel d'Ecoville is printed "Ecouille," and Haddon Hall is called "Hadden." On the whole, however, the catalogue has improved in this respect, and, with a little more care on the part of the committee-man, to whom the thankless and repulsive task of proof-reading is assigned, the last blemish on what is otherwise a very perfect piece of book-making would be removed.

DRAINING THE OKEFINOKEE SWAMP.



Window-head, Eighteenth Century, French. From *L'Art pour Tous*.

THE work of draining Okefinokee swamp, the biggest undertaking of its character in America, which will eventually reclaim 220,000 acres of the finest agricultural land in the country, is progressing at a remarkably satisfactory rate. One of the engineers in charge of the work was in the city yesterday, and gave the writer an interesting chat about the scheme, which will open up a section which for centuries has been under water and muck, the home of alligators and various other reptiles.

One hundred and fifty laborers are now at work at the swamp, and the construction of the great canal, which is to carry the water from the swamp to St. Mary's River, is being pushed forward as rapidly as machinery and human hands can accomplish it. After January 1 this force will be doubled, one-half working during the day and the other at night, so that this year's results will be twice as much as that of the last twelve months.

This canal, when completed, will be 150 feet wide and 63 feet deep, with a fall of 125 feet to St. Mary's River. The most difficult part of the construction will be through a high knoll two miles long. Through the middle of the swamp, another canal, sixteen miles long, will be constructed, with small branches, the whole to act as feeders to the big drainage stream.

When the latter is completed, two hydraulic pumps, with a capacity of 30,000 gallons each per minute, will force the water off the swamps, while the largest inland dredger in the world will remove the muck and tear away the stumps, leaving behind a beautiful clay subsoil, which has become wonderfully rich by the muck accumulations of centuries. This muck averages six feet deep. The dredge is a ponderous machine 90 feet long, with a 40-foot beam. It is what is known as a combination dipper and stump-puller.

By April 1 the company will be able to secure timber from Okefinokee. In this alone the wealth of the swamp is incalculable. Its pine growth is the most magnificent in the world in point of size and quality, and its cypress deposits cannot be equalled anywhere. The pines average seventy feet to the limb, are as straight as an arrow, and from one to eight feet in diameter, while the cypress trees are enormous in size, the average diameter being from ten to twelve feet. Saw-mill men have besieged the company to secure the timber, but, as it is of such valuable quality, the company will probably erect saw-mills on the edge of the swamp and develop the timber on its own account.

The engineers expect to find many valuable curios as the work progresses. Already they have found evidences of Indian habitation of the numerous small islands which dot the great swamp. Numbers of Indian mounds have been discovered on these islands filled with all styles of pottery, specimens of which have been sent to the Smithsonian Institution at Washington.

The most interesting curiosities, however, are expected when the big dredge begins its work of removing the muck from the swamp. The engineers believe that mammoth wild animals, now extinct, made their homes in the swamp in past centuries, and are anxiously looking forward to the turning up of carcasses to prove their theories.

Just what length of time will be required to complete the draining of Okefinokee the engineers are unable to estimate, but it is safe to say that there is work ahead for several years. When the reclamation is accomplished, the stockholders of the company who had the nerve to put their money into the scheme, which, when first broached, appeared to many as a wild vagary, will realize handsomely on their investments. It may take a long time, but it is one of those things worth waiting for. — *Savannah News*.



THE ARCHITECTURAL LEAGUE OF NEW YORK.

THE regular monthly dinner of the Architectural League of New York was held in the club-room, 215 West 57th Street, on

Wednesday evening, January 11, there being present forty-seven members and seven guests. Vice-president William A. Coffin presided, and introduced the subject for discussion, "The Policy and Prospects of the League in the Future," with a forcible speech. A most interesting discussion followed, participated in by Messrs. Price, Hamlin, Clark, Huss, Du Fais, Wright, Israels, Berg and Briggs. The financial condition of the League was shown to be sound and the policy suggested by the various speakers was to be progressive and aggressive in the interest of architecture and the allied fine arts.

The subject of the proposed new City Hall, for the city of New York, was brought up and thoroughly discussed. A committee of five, Messrs. Bruce Price, Charles I. Berg, R. M. Hunt, John Du Fais, George L. Heins, and the President, Russell Sturgis, was appointed by the Chair to confer with the city officials and find out their intentions in regard to the proposed new structure.

WARREN R. BRIGGS,
Treasurer and Acting Secretary.

THE WORCESTER CHAPTER OF THE AMERICAN INSTITUTE OF ARCHITECTS.

THE Worcester Chapter of the American Institute of Architects was held at the Worcester Club, on Elm Street. President Elbridge Boyden presided. Architect A. P. Cutting read a paper giving a personal account of the late convention of the American Institute at Chicago, held in connection with the dedicatory exercises of the Columbian Exhibition.

ILLUSTRATIONS

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

HOUSE OF S. ALEXANDER ORR, ESQ., TROY, N. Y. MR. H. LANGFORD WARREN, ARCHITECT, BOSTON, MASS.

A VIEW of the entrance to this building was published in heliochrome in the *American Architect* for July 26, 1890.

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

OLD COLONIAL WORK, SALEM, MASS. MEASURED AND DRAWN BY MR. CLAUDE F. BRAGDON, ARCHITECT, ROCHESTER, N. Y.: THREE PAGES.

[Issued with the International and Imperial Editions only.]

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

[Issued with the International and Imperial Editions only.]

STATE ASYLUM FOR THE CHRONIC INSANE, WERNERSVILLE, PA. MESSRS. RANKIN & KELLOGG, ARCHITECTS, PHILADELPHIA, PA.

HOUSE OF CHARLES BENNER, ESQ., SETAUKET, N. Y. MESSRS. LAMB & RICH, ARCHITECTS, NEW YORK, N. Y.

PROPOSED HOUSE FOR WM. F. FORSYTH, ESQ., WINCHESTER, MASS. MESSRS. WAIT & CUTTER, ARCHITECTS, BOSTON, MASS.

SKETCH FOR PROPOSED PRESBYTERIAN CHURCH. MR. W. J. EAST, ARCHITECT, PITTSBURGH, PA.

PUBLIC SCHOOL BUILDING, SAVANNAH, GA. MR. G. L. NORMAN, ARCHITECT, ATLANTA, GA.

[Additional Illustrations in the International Edition.]

CENTRAL SOUTHERN PORCH OF THE MANUFACTURES AND LIBERAL ARTS BUILDING, WORLD'S COLUMBIAN EXHIBITION, CHICAGO, ILL. MR. GEORGE B. POST, ARCHITECT, NEW YORK, N. Y.

[Gelatin Print.]

PRIVATE HOUSE, PARIS, FRANCE. M. G. DEZERMAUX, ARCHITECT.

[Copper-plate Photogravure.]

REAR ELEVATION AND PLAN OF THE SAME.

[Copper-plate Photogravure.]

FOX OAK, BURHILL, NEAR WEYBRIDGE, ENG. MR. HALSEY RICARDO, ARCHITECT.

MANCHESTER TECHNICAL SCHOOLS, ENG. MR. ERNEST RÜNTZ AND MR. F. R. FARROW, ARCHITECTS.

THESE designs were submitted in competition and were awarded the third premium by Mr. Alfred Waterhouse, the assessor. The stipulated cost was £75,000, and the building had to provide accommodation for thirteen departments. The main idea was the arrangement of all the lecture-rooms on the first floor, so that students and professors attending lectures only should not have to traverse any of the other departments to get to their lecture-rooms. The staircase at Granby Row entrance serves the first floor. The two central staircases, which are carried up the whole height of the building, serve the various departments direct, and also the lecture-rooms, for students taking laboratory instruction. Separate entrances are arranged, as shown, for the Commercial Department and Women's Work Department. Throughout the whole of the scheme great care was taken to arrange each department so that it should communicate directly with the central staircases, thus obviating the necessity of students entering any other corridor except that connected with their class rooms. The materials proposed were Ruabon bricks for facings, with buff terra-cotta for dressings.

PLANS AND SECTION OF THE SAME.

FRANCOIS COPPEE ON THE EIFFEL TOWER:—

A ces hauteurs vertigineuses
Le savant voit-il mieux les chocs
Des mondes et des nebulæuses ?
Non pas ; on y prendra des bocks.

COMMUNICATIONS

[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 VALIDITY OF GENERAL CONDITIONS.

INDIANAPOLIS, IND., December 30, 1892.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—I have been informed that in a previous issue of your paper there was an account given of a lawsuit in which the courts held that the "General Condition" clause of specifications was valid and binding. By giving date of such issue you will greatly oblige

F. W. CADY.

[GENERAL Conditions, attached to specifications, and forming evidently a part of them, are just as valid as any other portion, and, as the specification is usually made a part of the contract, the general conditions are also incorporated in the contract. In the papers on "Architect, Owner, and Builder before the Law," which have been appearing in these pages, and are now nearly ready for publication in book form, may be found a great number of instances in which the various stipulations usually included under "General Conditions" have been enforced by the courts.—EDS. AMERICAN ARCHITECT.]

THE DESTRUCTION OF "THE BREAKERS."

EXCHANGE BUILDING, STATE ST., January 8, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—Did you have any knowledge on which to base so definite a theory of the cause of the fire at Mr. Vanderbilt's as that expressed in the enclosed clipping and which gained us an advertisement at the head of your editorial column? If so, it would greatly interest us to hear what it is, and if not, were you not making rather free with the facts and our name?

Yours very truly, PEABODY & STEARNS.

[In answering this communication, it is a temptation to reply in kind, but, shutting our eyes to the manner, we will answer the matter by saying that the most circumstantial account that we have seen of the burning of Mr. Vanderbilt's house said that fire was found to exist behind the plastering surrounding one of the chimneys in the second story, if we recollect rightly. There were other things in the account which confirmed the inference, already obvious, that such a condition of affairs must probably have been the result of the escape of sparks through the masonry among the furrings. If Messrs. Peabody & Stearns have any different account of the facts to give, or can deduce any different inference from them, we shall be glad to publish their account of the disaster. We do not comprehend how we have made "rather free" with their names, since they assuredly were the architects of the Lorillard-Vanderbilt house.—EDS. AMERICAN ARCHITECT.]

WINDOWS OVER THE FIREPLACE.

NEW YORK, January 16, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—Mr. John Brett, in his paper on "Daylight in the Dwelling-House," deploras the tendency of architects to break up wall-surfaces by putting in doors, windows, and fireplaces. He would be interested in knowing that some architects at least agree with him, for in several houses we find wall-space saved by putting windows over the fireplace. And in a picturesque residence in Montclair, N. J., the window is in the back of the fireplace.

But, aside from saving space, can one imagine anything more atrocious? With the bull's-eyes shining through the back of the fireplace, we are reminded of a customer who wished to place a lamp in his fireplace,—that it might look like a burning grate. Architects who permit these things have no right to remain in the professional circle.

EDWIN A. JACKSON & BRO.

NOTES AND CLIPPINGS

COOLING RAILWAY-CARRIAGES IN TROPICAL COUNTRIES.—An ingenious contrivance for cooling railway-carriages was shown us the other day. It consists of small tanks at both ends of the carriage, which receive their supply from the main tank above, which holds water for the passengers' use. From these tanks are conveyed dropping troughs, which work automatically, canting over gently when full of water, and perfectly saturating kus-kus tatties that are suspended across an open trap-door, which is let down at the fore end of the carriage in whichever direction the train is travelling. This keeps up a constant supply of cool air, without any necessity for passengers twisting and turning the little nonsensical arrangement they now use on some railways. Added to the cooler is the centre revolving punkah, which is a round light rod fitted with four stiff fans, but not so stiff as to hurt if one's head happens to come in contact. When the train moves the punkah goes round and round, and its revolutions can be moderated by loosening or tightening the check-chain. Altogether the invention is a good one, and will simply be perfect when the inventor accomplishes what he hopes soon to do, viz, to convey the surplus

cool air during movement into a cylinder, and so compress it as to admit of its gentle release when the carriage stops, and thus keep down the temperature when the train is at a standstill. — *Indian Engineering.*

MALEVOLENT STATUES. — When Darius I, according to Herodotus, wished to erect his statue near that of Ramses II (Sesostris), the priests objected on the ground that Sesostris was a greater conqueror than he. The statue in question was one of several erected before the Temple of Ptah at Memphis, on the borders of the sacred lake, where is now the village of Bedreshein. After Memphis became Christian the renown of its monuments died away, and when it perished the stones were removed to serve in building Cairo. One colossus remained to our day, it having been preserved under the sand, and on being unearthed by Cavaglia at the beginning of the century was found to represent Sesostris in his youth. This colossus has been visited by most tourists in Egypt. It lay on the sands near the palm of Bedreshein, in a hollow or ditch, and was covered with water during the inundation. The remains of the temple might be traced along the lake, which is still represented by a depression in the ground, covered with wheat-fields. Of late years General Stephenson and Major Bagnold, R. E., have excluded the waters from the colossus, raised it on timber supports above the ground, and surrounded it by a brick wall. On payment of two piastres, however, it can be seen by the curious. M. Maspero, the great Egyptologist, relates in a French contemporary that the Arabs had formerly a great awe of this, which they called Abou'l Hol, the "father of fright," as they do the Sphinx. The ancient Egyptians, he assured us, believed that statues, divine or human, were animated by a spirit or "double" detached from the soul of the person they represented. This double ate, drank, and spoke or delivered oracles. In later times the double was credited with playing evil tricks on those who approached the statue, and even with killing them. His power could be destroyed by breaking the statue, or at least the features; hence it is that so many statues of the Pharaohs have been mutilated by the Arabs. The spirit of Ramses II was supposed to haunt the palms at night, and M. Maspero relates that every time he passed by in the evening towards dusk the driver of his ass would mutter his prayers and hurry on his beast. One evening M. Maspero asked him if he was afraid of some "afrite," and the driver begged him not to speak of such things or some harm would befall him. Presently M. Maspero was thrown from the ass in the middle of the wood, and the incident was regarded by the driver as a punishment for his not speaking respectfully of the spirit in the statue. Egypt is full of such superstitions dating from the far past. — *The London Globe.*

THE GARBAGE DESTRUCTOR AT OLDHAM. — A furnace for the destruction of the town's refuse is in operation at Oldham, England, which burns at a temperature of over two thousand degrees, F, and this prodigious heat, when applied to raising steam, is said to render sufficient power available to more than repay the cost of collection and burning. The cells of the destructor are each just over five feet wide, and one of the most important features is a jet of steam which forces air into the closed ash-pit by means of surface friction at a pressure equal to one-half inch of water. Another special feature is the arrangement of flues and flue openings, these being placed in the front of the reverberatory furnace arch, over the hottest part of the fire; thus the gases given off by the drying refuse at the back have to pass over the hottest part of the fire, of two thousand degrees temperature, and through small apertures in a red-hot reverberatory arch, before they can escape; the flues pass along over the top of the reverberatory arch and then down through cavities in the side walls to the main flue underneath. The furnace is practically surrounded with hot gases, which have the maximum effect in drying the green refuse. A longitudinal trough or hopper is at the back, into which the carts tip direct, the hopper being brought down to the grate-bars, and the opening at the back is of the full width and height of the furnace; the grate-surface proper is twenty-eight square feet in each cell. The refuse is gradually moved forward by a wave-like motion, and deposited in the form of clinker on the wide "dead plate," where it remains until the attendant comes along to remove it. The continual admission of cold air to the furnace is by this arrangement completely avoided. — *N. Y. Sun.*

THE TEMPERATURE OF MELTING STEEL. — Recent investigations made by means of the pyrometer show that the temperatures which occur in melting steel, and in other industrial operations, have been over-estimated. It is now demonstrated that both the amount of light emitted from a body and the quantity of fuel required to heat it increase much more rapidly than the temperature. The calorimetric method has been that most frequently adopted for determining high temperatures, the assumption being made in this case that the specific heat of the iron rods or balls used is constant, which assumption, however, is inaccurate. In the case of the flame of the Bessemer converter, the temperature of the issuing flame has been recorded as two thousand degrees, Cent., because platinum appears to melt rapidly in it. This, again, fails to coincide with the outcome of recent experiments, the fact being, as now represented, that platinum does not really fuse in the flame, but only appears to do so, on account of its alloying itself with drops of molten steel carried over by the blast. — *N. Y. Sun.*

CHICAGO'S PROPOSED ELEPHANT RESTAURANT. — Chicago is to have a gigantic elephant, larger than the one at Coney Island, which is only one hundred feet high. A syndicate, backed by Frank Hall, who, with J. Mason Kelley, the Brooklyn architect, constructed the Coney Island affair, will begin work on the new animal building, to be located near the Fair grounds, in a short time. This steel mammoth will be 125 feet high to the ridge of the back and 200 feet to the top of the

"howdah." The trunk will be swung by machinery, the ears will flap, the eyes will roll, and the tail will wag. Within this trunk will be a calliope to simulate the beast's roar. There will be two floors in this \$250,000 elephant — the main floor and grand promenade and dancing-hall, with a gallery, and the "stomach floor," where will be located a great restaurant. The animal will be lighted by numerous windows and an abundance of electric lights. The projectors are certain that it can be constructed in three months. — *Cincinnati Commercial Gazette.*

AN OLD WALL-PAINTING FOUND. — The parish church of Wenhas-ton, in Suffolk, England, has lately yielded an old wall-painting. It has suffered at various times from two sorts of iconoclasts — one sort the destructive purists, who were so called; the other sort the no less destructive parish priests. A rood beam remains, over which, until lately, stretched to the roof a wooden partition covered with plaster. The partition was removed and placed in the churchyard, where rain washed away the plaster and showed traces of a painting. On treating the plaster carefully, a complete "Last Judgment" came to light, with three rows of Gothic inscription below it. A cross of wood nailed on the face of the painted partition formed part of the scheme. The ground color was olive-green. The date fixed is prior to A. D. 1520. The large feet and slender limbs of the naked souls in paradise or near the jaws of the hell monster recall early Italian work; and perhaps the painting itself was performed by some Italian or Fleming, for the British clergy of that period were not by way of encouraging native artists. — *N. Y. Times.*

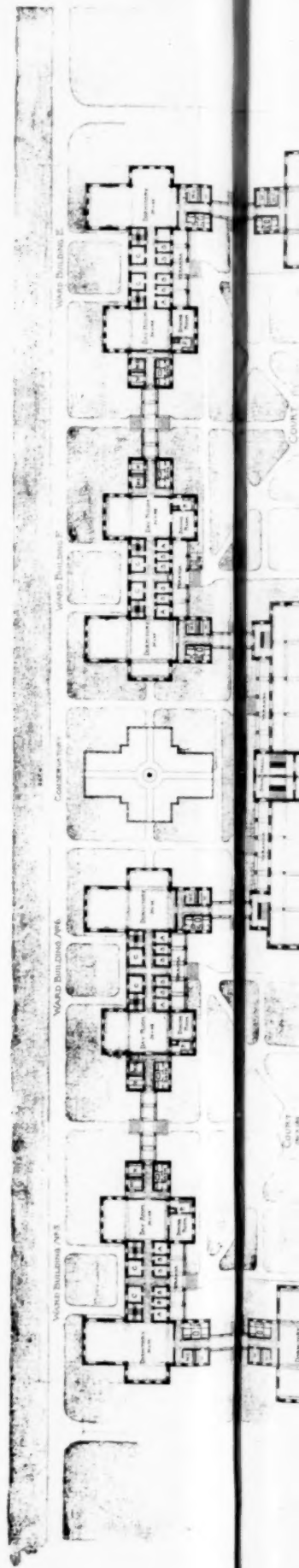
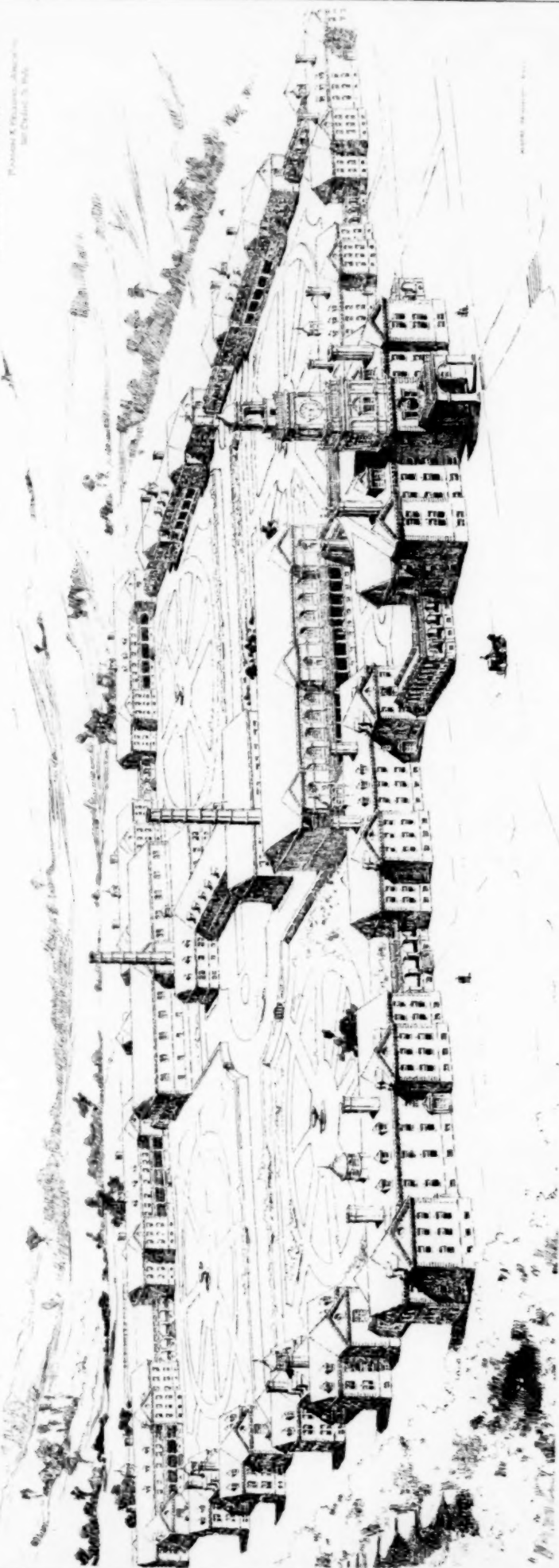
CURIOUS ACCIDENT TO AN INTAKE PIPE. — The water-works intake pipe at Toronto rose from the bed of the bay a few days ago and broke through the ice at several points, parting or opening at some of the joints. It is said that the flow of water through the pipe was so obstructed as to cause it to become empty, after which it floated to the surface. — *Engineering News.*

TRADE SURVEYS

AN enormous volume of business for this season of the year has been developed within the past few days, despite the difficulties in traffic. Advances from a large number of commercial and manufacturing centres in the New England and Middle States show that numerous orders — some of them for very large quantities of material — have just been received, and that inquiries for late delivery are flowing in even faster than was anticipated in December. Advances not quite so encouraging are received from farther West; at Chicago, Milwaukee, St. Louis, and one or two more remote points there are indications that a very large amount of business will soon be transacted in general merchandise, and the opinion is held by competent authorities on this point that the small store-keepers throughout the country are lower in stocks than usual at this time, and that there is a strong confidence in the permanency of prices, which will lead them to order liberally for three or four months' supplies. In the mining regions of the West, while everything is tied up so far as actual operations go, there is a strong feeling of confidence as to the year's business. A great deal of improvement and expansion of work is in contemplation, and operations will begin just as soon as possible. It transpires that a great many new mines are to be opened, but whether more work than the mere opening will be done is not apparent as yet. It is also known that a great deal of money has been subscribed in Eastern centres for investment in mining properties in the West, chiefly iron ore, copper, and lead. There are evidences that this will be a very active year in the mining States, and that this improvement will be due to the heavy investments made by Eastern capitalists, who think they see a long way into the future. Railroad managers also say that while construction at this time is hampered, and while plans are not perfected for the coming year, without doubt, a great deal more work will be done than last year, some of them fixing the increase in consumption of steel rails at one-third. The probabilities, however, are that the increase will reach one-half. The strongest and most encouraging feature in the commercial situation is the moderate amount of stocks on hand, and the probability of a heavy demand soon setting in to replenish. The manufacturers of almost all kinds of dry goods are particularly encouraged just now; the same may be said of the boot and shoe manufacturers. Stronger, though perhaps not higher, prices are confidently looked for within the coming six months. The more sanguine, of course, anticipate an advance, but, as has been frequently stated, the extraordinary producing-capacity in every industry is against this probability. The iron trade is gaining very slowly. The lumber manufacturers are full of hope but short of business. The cotton-growers anticipate a very good year, and believe that a reaction is about to set in, which will bring prices to a higher level. The anthracite-coal trade is very active, and prices have slightly advanced. A very heavy demand has lately set in, but this is due to merely temporary causes. After all the predictions that have been made as to the probability of a stringency in money, it is rather surprising that there is such an abundance and ease in banking circles. Nearly all demands are promptly met, and the banking interests say there is an abundance for all commercial requirements. Another fact deserving of at least passing notice is the possibility of a growth, within the next few months, of demand for American securities. Certain causes are at work in Great Britain and Europe pointing to this result, among them a growth of confidence among the better informed of the Old-World investors, and the fact that they find the opportunities for making investments at home decreasing, rather than expanding. An increasing amount of money is likely to seek investment on this side, and securities, when once purchased, will probably be held with more evenness than heretofore. For some time, at each shock to confidence, a return flow has set in, upsetting all calculations, and unsettling plans and possibilities for sound and safe financial management. The incoming of an administration hostile to prevailing economic conditions is having little weight with business men; they seem confident that necessity will forbid any very radical departure from present policies. It is also becoming apparent that but little progress will be made in the solution of the silver question. The hopeless differences between public men in both parties on this question render any immediate settlement improbable.

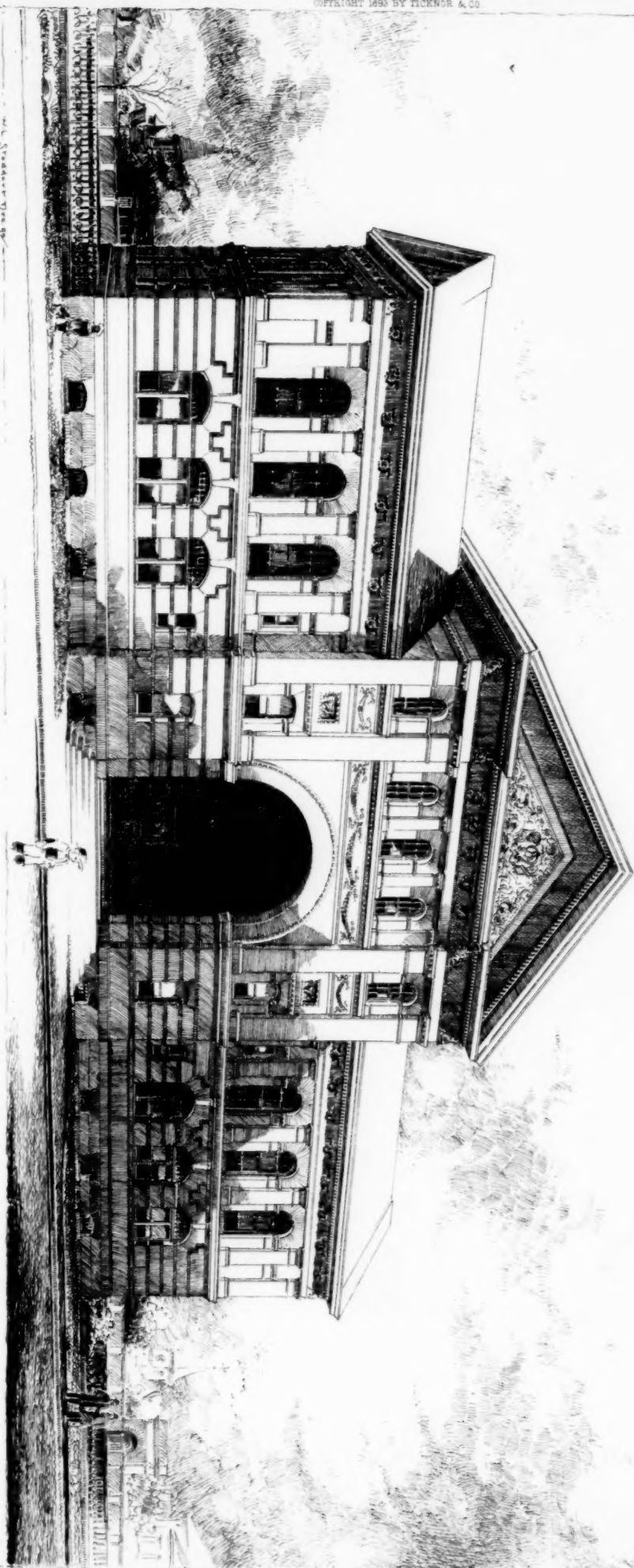
OFFICIALS: 1893 BY TICKETS & 20

STATE ASYLUM FOR THE
CHRONIC INSANE at
WILKESVILLE, PENNA.
DESIGNED BY H. H. HARRIS, ARCHT.
1870-71-72-73-74.





COPYRIGHT 1893 BY TICKNOR & CO



SAVANNAH GA. PUBLIC SCHOOL BUILDING.

G. L. THOMPSON ARCHT., ATLANTA, GA.



Residence of Mrs. Bennett
Setauket N.Y.
Lamb and Rich Architects

