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THE cataclysmal disaster that nearly overwhelmed Galveston last week is a reminder of more things than the uncertainties of daily life. Amongst other things it seems to show that the Weather Bureau officials are not yet quite able to predict the course of a storm nor, perhaps, able to state whether the disturbance will be a cyclone of wide diameter, or a storm cutting a path in a fairly direct line from beginning to end, like a hurricane or tornado. It also suggests strongly the advisability for those who own property in the "cyclone belt" of protecting that property by insuring it against damage from wind-storms in the same way that they protect themselves from loss by fire. The wisdom of insuring against wind-storms is shown by the fact that since 1889 [*sic*], according to a statement made by the Continental Fire-insurance Company, three hundred and sixty-eight tornadoes have occurred in the United States, inflicting a property-loss of over twenty-three million dollars! These figures, compiled before the occurrence of this latest storm, are said to be from the official reports of the Government, and they certainly afford cogent reason for a large increase in this particular branch of the insurance business, so far as such increase would depend on the desire of prudent property-holders in the cyclone belt to secure such protection. It is not, however, a kind of insurance which we should care to find any insurance company in which we were interested as stockholders indulging in. The intelligence and activity of man can fight against and often conquer fire, but before the irrepressible ravages of flood and wind man seems nearly powerless and profitable insurance a chimera. The St. Louis cyclone of a few years ago showed that even the best of modern buildings were not absolutely secure from damage, and who can know that a storm-pressure or a vacuum might not be at some time created that would lift or topple over even the strongest and heaviest of steel-frame structures. It seems a very risky kind of business for the directors of insurance companies to meddle with. At the same time we hope that the new form of insurance may become popular for the reason that it will give the insurance companies added reason for insisting on a better style of building in the properties they insure. It is only now and then that a great storm occurs which few structures could hope to survive, while the greater number of storms, which now cause such damage to property and life through the collapse of flimsy brick and wooden houses, are not powerful enough to injure well-built structures.

A SCORE of years ago we were employed by a capitalist in search of a good investment to report upon the opportunities that lay before the manufacturer of American Portland cement. We made our inquiries and reported sub-

stantially, as we now remember it, that the opportunities for a good Portland cement were vast, as the use of it in this country was expanding rapidly, but that consumers were suspicious of the American brands then on the market, and much preferred to use, and were fully satisfied with, the English cements, at that time imported in great quantities; that if a good cement could be made in this country it must be marketed at a loss for years, until it had won a reputation. The report was distinctly unfavorable to the speculation. We were thanked, paid, and our hinted advice disregarded. The capitalist invested his money and lost it; because of what defect or miscalculation, we do not know. The same investment made a few years later would probably have yielded large returns, for the sale of the American Portland cements is now really vast in amount. The first variety was made in 1875 by a Pennsylvania concern, which disposed of seventeen hundred barrels in its first year and five years later sold only thirty-two thousand barrels, while ten years after that they were selling one hundred thousand barrels, the combined output of all the cement mills then in operation being treble that amount. To-day, again ten years later, the output of all the American mills exceeds four million barrels a year, and as the quality of the cement is being constantly bettered through the introduction of improved machinery and the application of a more understanding care during the process of manufacture, it is impossible to foresee to what dimensions this industry may grow. During this time the English brands have lost in favor, as the makers have been slow to adopt improved machinery, while at the same time the popularity of German cements and one or two of French and Belgian make has increased steadily. Thus, of last year's importations, a little over two million barrels, more than half was of German make, while English cement formed only one-tenth of the entire amount.

OF this vast amount of Portland cement, building operations probably consume less than a sixth. The balance is used by engineers in building bridges, water-reservoirs, docks, sewers, tunnels, road-beds and so on; and, as they use the largest quantity, it is the engineers' duty to concern themselves most actively in studying the properties of the several brands and suggesting to the manufacturers ways and means of improving the material in desirable directions. Architects are quite willing to accept and act on the deductions which are formulated by the more scientific profession. In performance of this necessary, if self-imposed, duty, the American Society of Civil Engineers is prosecuting an inquiry into the matter of the proper manipulation of tests of cements, and the committee in charge of the investigation has just published its preliminary report, a report which is full of interest for many reasons, for none more, perhaps, than because it presents so many diverse views. For this reason we may be thankful that only twenty-six out of the hundreds of members of the Society cared to make answer to the committee's list of seventy-odd questions. One would think the list long enough to bring out all the information desirable, and yet there are two questions which we would like to have had answered, and these two questions are: What is the true value of cement tests when regarded from the standpoint of the satisfactory meeting of practical requirements in average building or engineering construction? What becomes of the cement that is rejected at one job, because of failing to satisfy the tests of the engineer in charge? We believe that a true reply to the second question, a reply which could only be furnished by cement dealers—under compulsion, shall we say?—would go far to provide a true answer to the first. What becomes of all this mass of cement condemned by the voice of the engineering profession? In bulk it amounts to a good deal, and its manufacture has consumed much money. Its bulk is not to be dissipated by a breath of engineering disapproval, and cement dealers are not likely to leave unsold to a second party what a first one would not buy. It may be taken for granted, then, that condemned cement is nevertheless sold and used, by some one, for some purpose. If the use of cement that does not satisfy the appointed tests is so perilous, why do we not have to note the occurrence of a continuous train of constructional disaster in some degree commensurate with the bulk of the rejected cement? Supposedly, of course, rejected cement is sold later as second quality and used only for low-grade work where strength is not very material. Doubtless much of it is

so used, but we fancy that not a few not over-scrupulous dealers, knowing how greatly tests depend on the personal equation, do not hesitate to sell the cement rejected by one engineer to his neighbor around the corner, and no very real harm seems to result. We feel that there is a good deal of unnecessary particularity in this matter of tensile tests for cement.

THE answers set down in the committee's report reveal a state of considerable uncertainty, to say the least. To the question, How much cement may properly be accepted on the test of a single sample? even these twenty-six respondents give almost as many answers, and they run from a single barrel to a car-load, though a plurality favor testing one barrel in every ten. Chemical and microscopic tests are held by most to be needful only occasionally, in cases of inexplicable failure, or where adulteration is suspected. Crushed quartz is to be preferred to natural sands in testing cement mortars. Answers to questions relating to manipulation, proportions of ingredients, duration, and so on, are very various and often conflicting. In fact, the presence of the personal equation is everywhere conspicuous in the answers, many of them seeming to be based on mere acquired habit, pure and simple. The advisability of making compressive tests is admitted by a majority, it being generally stated that such tests would "correspond more closely to the conditions existing in practice" and that "there is no necessary relation between tensile and compressive strength." Professor J. B. Johnson, one of the most practical of scientific observers, going so far as to declare that there is "no necessity for tensile or cross-breaking tests." The utility of a bending test, in view of the many new uses of concrete, is advocated by seven of the thirteen members who answered the question. Finally, amongst many other interesting matters, the supposedly important question of using cement in low temperatures is treated as if it were not a matter of much consequence after all, the few answers quoted tending to show that the actual damage due to freezing is superficial, and can easily be negated by ordinary precautions.

IT seems to us that the editor of the *Brickbuilder*, in its last issue, while attempting to show how foolish is the man who employs an unskilled architect, makes an unnecessarily ambiguous statement. He declares that property-owners often entertain the idea that they can be held blameless, no matter what accidents befall, if only they have employed an architect of some kind, and says that this view is not sustained by the courts, which have "decided that if an owner is not wise enough to pick out a good adviser, he has no one but himself to blame when the results of the advice are not satisfactory." From this the editor infers that this attitude of the courts will lead owners to be more circumspect in the selection of their architects, and so it would if it were altogether true, and as far as it goes it will be helpful to properly-trained architects. But the statement, as made, equally allows the reader to draw the inference that an owner is wrong in believing his architect can be held responsible for mishaps, and this misstatement is one to carry comfort and rejoicing to the incompetent or fraudulent architect. The tendency of our courts, and, even more, the Canadian courts, is to hold architects to an increasingly strict accountability, and though one of the cases resulting from the Ireland Building disaster, which, we fancy, must be one of the cases the editor had in mind, has been sent back for retrial on the ground that it was doubtful whether the owner had "a right to rely on his architect," it is not yet known how the matter will result, and the nature of the architect's responsibility is, we believe, still undetermined.

THE employment of competently-trained architects is greatly to be desired, but we think that even they need not seek to have placed upon their shoulders any responsibility that can be avoided, and as there are no present means of always knowing who is trained and who is not, neither owners nor judges should be blamed for holding that there is no great difference between the good and the bad. In France, where these differences are better understood, and where the accountability of the architect in cases of building-accidents is assessed under very precise and severe rules, the judge in a recent case, where eight lives were lost, used this bitter language in rendering his decision in a suit for damages brought against the owner, the contractor and the architect of the collapsed building; speaking of the architect, he said: "Seeing that this de-

fendant was not qualified by any previous studies, by any exercise in the art of building, for the practice of the profession of architect, of which all the technical rules and the indispensable knowledge were unknown to him at the moment when he presumptuously charged himself with the erection of the building in question; considering that, in spite of his notorious inefficiency, he did not hesitate to undertake as his first job the preparation of plans and specifications for a six-story building and the supervision of the important operations involved," there could be no question of his accountability. Accordingly, the architect and the contractor were sentenced to eight months' imprisonment, and were furthermore condemned to pay heavy damages to the relatives of the slaughtered workmen. Now, a righteous judgment is refreshing and surely conduces in some degree to better building, done by competent men. But how many of our fledgling American architects would decline a commission for a sky-scraper through fear that a judge might, in event of a mishap the contractor could not keep them from, call them "presumptuous" and "notoriously inefficient." Moreover, in the French case the architect and contractor alone were punished, the owner being discharged, a decision which runs counter to the view which the *Brickbuilder* and the court, which sent one of the Ireland cases back for a retrial, seem to hold.

FRANCE, however, seemingly does not have a monopoly of bad architects, for here is the *New York Times* saying:

"New York is full of bad architects. To be assured of that, one has only to walk around the block, any old block, any new block. It is also full of, or at least it is fairly supplied with, obscure architects." Measurably this is true, but architects in other towns could hardly expect a metropolitan paper to admit the fact quite so bluntly, though in very truth no one could walk along even one face of a block without noting the work of bad and obscure architects; and, unfortunately, some of the bad architects could not be called presumptuous and notoriously inefficient for the reasons assigned by the French judge. The *Times* makes its allegation, or confession, while referring to the correspondence now being conducted in the daily papers between the architects of the new City Prison and the defenders of the firm of architects, certainly far from being the peers of Messrs. Withers & Dickson, whom Tammany officials evidently wish to have supplant them. It is Penelope's web over again. Messrs. Withers & Dickson finish one part of the work — in this case it is the boiler-room, just as before it was the substructure for the cells — and then along come the Tammany architects, who pull it down because it is too weak or too small, or too something else, and rebuild it according to their ideas and at large expense to the city, of course. Such procedure is irritating, certainly, and as the original architects have earned reputations, and reputation is about all an architect finds he has when he has reached the age of Mr. Withers, they naturally object, and, as the matter is more political than professional, it is natural that their protests should get into the newspapers, and so the public hear more than they care to.

THE architects who are not in sympathy with the mosaic decoration with which Sir William Richmond is embellishing the interior of St. Paul's have once more addressed a letter to the Dean, in which they declare unabated interest in the building and reiterate their lack of sympathy with the work that is going on. As amongst the signers of the letter occur the names of Brydon, Belcher, Colclutt, George, Scott, Brooks, Champneys and Stevenson, it seems that this should be a protest that even a stiff-necked ecclesiastic could heed. The letter, after expressing the hope that the recent experiments on the dome may be abandoned as being "out of sympathy with the character of the building and injurious to its dignity," becomes a protest against a "red and gilded iron railing now being placed upon the main cornice." The protest seems both justifiable and consistent. The purpose of the railing is to enable tourists and other sight-seers to obtain in safety a closer view of the new decorations, while it is the common contention of the critics of the Richmond decorations that they are too bright, too coarse and garish, and that their only chance of becoming acceptable is through being toned down by time and dirt, or through being seen from the greatest distance the limits of the building allow. The protestants believe that to shorten the distance between the view-point and the decorations is unnecessary and illogical.

THE EVOLUTION OF DECORATIVE MOTIVES.¹—XIII.

THE ACANTHUS AND SPIRAL SCROLL.—III.



Fig. 203. Greek Corinthian Angle-volutes: a from Athens; b from Epidauros.

ROMAN art, in adopting the externals of Greek columnar architecture and adapting them to its new requirements, found in the Corinthian column a feature peculiarly suited to the growing love of splendor of the Roman taste. The final form had been given to the type by a Roman architect, Cossutius, in the colossal temple of Zeus, at Athens; and this type, adopted a century later for the rebuilding of the temple of the Capitoline Jupiter at Rome, remained throughout the whole history of Roman architecture the most conspicuous and characteristic element in that art. Endless variations of detail were attempted from time to time, but rarely, if ever, did they depart from the general proportions and typical arrangement of the original model, so far at least as the capital was concerned. Whereas it is hard to find in late Greek architecture two Corinthian capitals from different buildings alike, for instance, in the way in which the corner volutes and the acanthus-leaves under them are treated (the differences being oftentimes fundamental, as instanced by the two capitals shown in Figure 203), there are comparatively few



Fig. 204. Typical Roman Corinthian Capital, from Temple of Mars Ultor, Rome.

departures in Roman design from the accepted arrangement first perfected in the Temple of Zeus at Athens, and elaborated with consummate skill in the well-known and magnificent capital of the Temple of Castor and Pollux at Rome.

In this accepted type, shown in Figure 204, a slightly bell-shaped core, supporting a quadrilateral moulded abacus with concave sides, is almost wholly concealed by two encircling rows each of eight acanthus-leaves, occupying together two-thirds of the total height of the bell, and by eight pairs of branching scrolls, springing from caulicoli, or acanthus-leaf nests, whose stems are set between each pair of leaves of the upper row. The scrolls meet in pairs of volutes

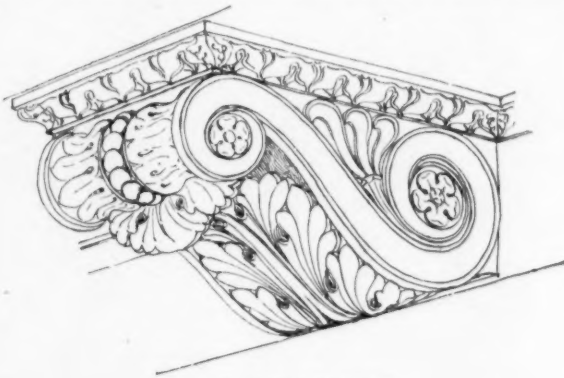


Fig. 205. Roman Modillion.

under the far-projecting corners of the abacus, and under the middle of each of its sides. Above each of these last-named four pairs is a strongly projecting rosette or flower. The total height of the capital is a little greater than the lower diameter of the shaft, and the total spread of the abacus (the side of the square from which it is cut) is

a diameter and a half. These general proportions and arrangements are not rigidly adhered to, but are approximated in nearly all the important Roman examples known. The chief variation was in the treatment of the volutes, which were sometimes replaced by symbolic forms — rams, dolphins, trophies of armor, etc. Pilaster-caps were somewhat more fully varied, at least in



Fig. 206. Console, North Door of Erechtheum.

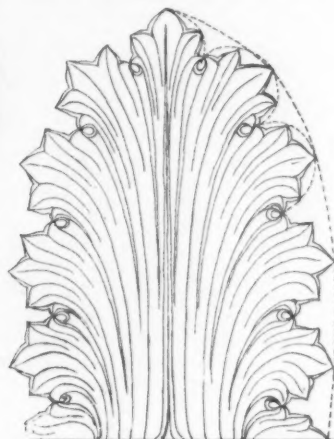


Fig. 207. Typical Greek Acanthus-leaf.

minor buildings; and the Composite capital was invented, late in the first century, as a variant of the Corinthian, and used chiefly on triumphal arches.

But the Corinthian order, as used in Greece, was not a complete order. It had neither a base nor a cornice especially fitted to its slender proportions and rich detail, and these the Romans (or their Greek artists for them) supplied. The Attic base was modified by dividing its scotia into two with a double bead between them; and the Ionic cornice enriched by adding to the denticular bed-mould a bracket-course under the corona. This came as near being an out-and-out invention as any in the history of architecture; it was a

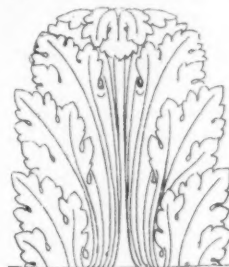
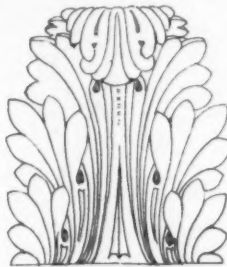


Fig. 208 a, b. Typical Roman Acanthus-leaves.

wholly successful and praiseworthy innovation. The Roman bracket, or modillion, was a combination in a new form of the two elements we are discussing, the scroll and the acanthus-leaf (Fig. 205). The reversed double scroll, or S scroll, gave form to the outline of the bracket, while its under side was covered by a single acanthus-leaf, curled over at the outer end. This conception was not unknown to Greek art, as the celebrated consoles of the north door of the Erechtheum at Athens testify (Fig. 206). But the acanthus plays here only a very subordinate rôle, a small leaf, omitted on the cut, being applied under the console, of which it really forms no part; and neither this nor any other form of bracket was ever used in a classic Greek cornice. The



Fig. 209. Byzantine Acanthus-anthemion.

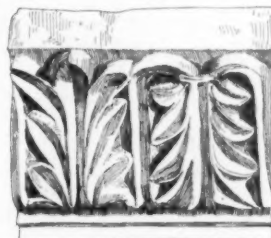


Fig. 210. Italo-Byzantine Acanthus-leaf.

credit for this adaptation and novel application of the S-shaped bracket belongs wholly to Roman art.

The acanthus-leaf, thus introduced into Roman art with the Corinthian capital, commended itself at once to the Roman love of rich detail by its endless possibilities of varied treatment and application. It lost the massive, stiff, sharply pointed form favored by the Greek

¹ Continued from No. 1275, page 69.

carvers (Fig. 207), and was converted into a richer, softer, more flexible leaf, more complex in structure, more easily lending itself to the wide range of decorative uses to which it was applied by the Romans (Fig. 208). On the Corinthian and Composite capitals it was made to curl outwards and over to a degree which in many



Fig. 211. Capital from S. Apollinare Nuovo, Ravenna.

cases seems to violate the essential character of stone and marble, while displaying the remarkable technical skill of the carver. The greatest possible variety appears in the modelling of these leaves, and especially in the treatment of their serrations and indentations. While in many cases the *acanthus mollis* of Italy is strongly suggested, in many others it is assimilated now to one and now to another of a dozen different herbs with indented and crinkled leaves. One cannot help feeling that the free, rich, plastic handling of these leaves suggests modelling in clay or wax, rather than out-of-hand carving in stone. The Greeks conceived their decorative details in marble; they had little clay, but were passed masters in stone-cutting. The Romans made abundant use of brick, and their earliest sculptures were Etruscan terra-cottas. Roman relief ornament has the air of having been first modelled in clay and then interpreted into stone. In all its variations, however, the Roman leaf retained certain features unchanged: the strong midrib, the oval hole or "eye" at the bottom of each main indentation or cleft, the "pipe," or convex crinkle, which carries the line of the cleft in a curve down to

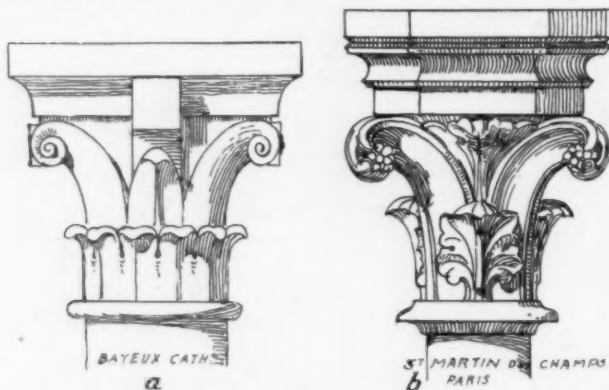


Fig. 212. French Early Gothic Capitals: a from Bayeux Cathedral; b from St. Martin des Champs, Paris.

the base of the leaf, the subdivision of the main lobe into minor leaflets, and the general roundness of these leaflets (Fig. 208).

Medieval art inherited the traditions of Roman design, but maintained them with varying degrees of fidelity and persistence. In the Byzantine, or East Roman, Empire the Roman forms were early and radically modified, but in their modified form continued in use for nearly a thousand years. The acanthus-leaf underwent a curious change, to which allusion has already been made in treating of the anthemion. The leaf was flattened, to adapt it to the Byzantine system of flat surface carving in somewhat lace-like patterns formed rather by incision than by genuine relief. All the complex Roman modelling of pipes, eyes, ribs and subdivided lobes was given up, and the leaf evenly serrated with somewhat sharply-pointed teeth, from which tapering V-shaped channels led in curves to the centre of the base of the leaf. The result was a carved pattern strongly suggesting the anthemion, and the Byzantine carvers emphasized this suggestion by adding some of the accessories of the familiar anthemion patterns of Greek vases (Fig. 209), especially the "frame," and in some cases even by alternately reversing the leaves, as in Figure 210. The Corinthian capital lost its characteristic proportions and profile, in some cases being reduced to a sort of inverted cone-frustum with rudimentary volutes and incised leaf-patterns, as in the well-known capitals of the great nave-columns of Hagia Sophia at Constantinople; sometimes, like the example in Figure 211, recalling the details while departing from the proportions and spirit of the Roman prototype.



Fig. 213. Acanthus-leaves, Church at Avalon (France); Tenth Century.

These radically modified variations of the acanthus-leaf and Corinthian capital persisted for centuries in the art of Eastern and Southern Europe, preserving the traditions of Classic design from utter extinction, and exercising a strong influence on the Roman-

esque style both of France and of the Rhenish provinces. Particularly in the latter are these survivals of Byzantine forms abundant both in carvings and capitals, many of which are remarkable for their vigor and elegance of design.

Meanwhile, the Roman tradition had in Italy and Southern France survived the fall of the Empire and all the destruction wrought by

the Western barbarians. The Romanesque monuments of Provence and Spain are full of reminiscences of Roman design, especially in their capitals and mouldings. The Corinthian capital was, indeed, the model upon which all French capitals were formed until, in the fourteenth century, naturalism in the foliage finally killed the tradition of the acanthus (Fig. 212). Figure 213, from the church at Avalon, illustrates how pure and vital was the tradition of the acanthus in the twelfth century, while even in the thirteenth the influence of this tradition is distinctly traceable in many of the most beautiful examples of French early Gothic carving (Fig. 214).



Fig. 214. Modified Acanthus: Notre Dame, Paris; Thirteenth Century.

In Italy, there was never a time, from the reign of Augustus until the Renaissance, when men were not carving acanthus-leaves, Corinthian capitals, Roman leaf-mouldings and scrolls among the details of all their changing styles: Italo-Byzantine, Tuscan-Romanesque, Basilican, Lombard, Tuscan-Gothic and Venetian-Gothic — all these styles betray in their details and minor ornaments the vitality of the acanthus and scroll. The Renaissance did not in this respect make a new departure or strike out a novel path. It merely emphasized, gave direction to and made universal, tendencies and practices already existing and asserting themselves in a fragmentary and sporadic manner.

But how rich, varied and beautiful was the decorative fruit of these old traditions thus replanted and cherished by the artists of the Renaissance! To illustrate adequately the extraordinary beauty and variety of the results achieved in the use of the Roman acanthus and scroll would require a volume. I can here only touch, in the most superficial way, upon a few points in this phase of Renaissance art.

The "Mandorla" door of the Cathedral of Florence, dating from about 1399, furnishes a number of striking examples of the vitality of the Classic acanthus-tradition. The remarkable *rincaux* and leaf-mouldings of this doorway are like a presage of the Renaissance about to dawn. Its designers must certainly have inspired themselves from Classic models, so completely does their handiwork display the mastery of the Classic spirit as well as the Classic detail. Indeed, in the Metropolitan Museum at New York, the casts from these scrolls and mouldings have been hung among the works of the Italian Renaissance, though they antedate by twenty years the appearance of Brunelleschi in the competition for the dome of the cathedral — the event usually accepted as the starting-point of the Renaissance in architecture.

But these leaves and scrolls are heavy in comparison with those



Fig. 215. Bronze Acanthus: Medici tomb, Old Sacristy of S. Lorenzo, Florence.

of the second half of the fifteenth century — the masterpieces of such artists as Mino da Fiesole, Benedetto da Majano, Desiderio da Settignano, Andrea Verrocchio, Matteo Civitali, Pietro Lombardi, and half a score of others who wrought in Florence, Lucca, Sienna, Venice, Prato, Pavia, Bologna and Milan, in Perugia and Urbino,

and later in Rome itself; working in marble and wood, metal and inlay and terra-cotta. They outdid the Romans of antiquity and all the Greek carvers in the Roman employ, beating them, as it were, on their own ground. They moulded the acanthus-leaf to a thousand

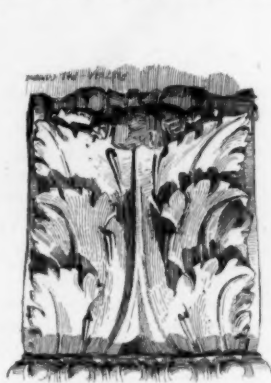


Fig. 216. Acanthus bracket, Carved Wooden Stalls in Pal. Comunale, Pistoia.



Fig. 217. Typical Francis I. S-scroll, Chimney at Blois.

new uses, with a delicacy, a freedom of imagination, and a grace of line never met with, even in the best Roman work. What use they made of it in their *rincaux*, or leaf-scrolls, we shall see later. Figures 215, 216 illustrate two out of the marvellous and uncounted varieties of form, modelling and application which we encounter in Italian Renaissance work.

The scroll, too, received new life and value in their hands, not



Fig. 218. Pilaster-cap: Sta. Maria Maddalena del Pazzi, Florence.

only in the Corinthian capital and free imitations of it, but in all sorts of brackets, consoles, corbels and other ornaments; particularly the S-scroll, which they developed almost into an independent ornament. The French especially affected the S-scroll, and in the carved ornament of the period of Francis I, it was used with great frequency in very effective combinations (Fig. 217).

But the most interesting feature of early Renaissance ornament is its capitals. These were, with but few exceptions, of the Corinthian type, but, with still fewer exceptions, they were free and fanciful imitations, not copies, of any Classic model. It is a curious fact that it is easier to find close copies of the Roman Corinthian capital in mediæval Italian work than in that of the early Renaissance, although the latter was avowedly inspired from the antique. The Corinthian, or Corinthianesque, capitals of pilasters and columns dating from 1430 to 1500 or 1510 resemble the antique only in general scheme. They retain the bell-shaped general outline, the moulded abacus with concave sides, the rosette or flower, at the centre of each side of this abacus, the lip of the basket or bell-core of the capital, the corner-volutes and the acanthus-leaves. But here the resemblance ends. In place of the sixteen volutes of the Roman type, they usually count but eight. The two rows of leaves about the bell are reduced to one; the sixteen leaves to eight or usually only four — a tall leaf under each pair of corner-volutes. The eight *caulicoli* are wanting; the scrolls either branch from four vertical stems, one in the centre of each face of the capital, or, more commonly, they are S-shaped, the inner ends meeting low down in



Fig. 219. Pilaster-cap, Tomb of Mat. Ferilius, Naples (1499).

the centre of each face of the capital, and forming a nest from which springs a flower, or anthemion, filling the vacancy on each face between the two huge corner-leaves. Not infrequently the usual outward curl of the volutes was reversed, the S-scrolls curling upwards and over inwards under the corners or horns of the abacus



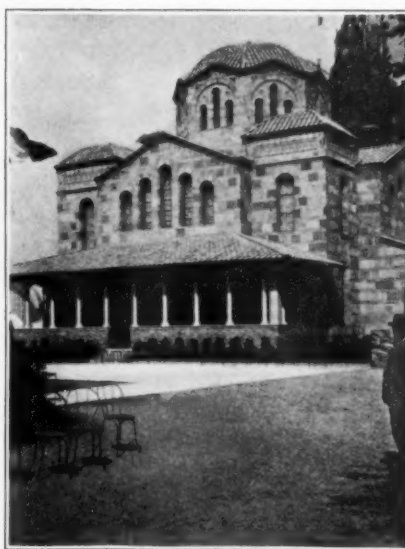
Fig. 220. Capital from Pal. Gondì, Florence (1500-1510).

(Fig. 218). These characteristic features are illustrated in the Figures 218, 219, 220.

These deviations from Classic precedent were not the results of caprice or ignorance. Doubtless, the idea of minutely detailed study and close imitation of antique models had not yet come into vogue, and Vignolesque exactness was a conception *in futuro*, not *in esse*, in the fifteenth century. But this was really because the exuberant inventiveness and fancy of this remarkable period rendered unnecessary any such study and copying. These began to be resorted to only when the springs of originality and imagination had begun to run dry, and the taste in ornament had taken a turn towards sobriety and restraint. The capitals of this early period are well worthy of study for their grace of proportion, elegance of detail, and beauty of execution. If less magnificent than the Classic Corinthian, they are often more elegant, refined and varied, and far more appropriate to the class of structures they adorn — the tombs and pulpits, the stalls and doorways and light arcades in which Renaissance designers were so conspicuously successful. A. D. F. HAMLIN.

[To be continued.]

FIRE HAZARDS.¹



The Grecian Building: Paris Exposition. L. Magne, Architect.

A TALL building, having openings in the floors from the roof to the basement, resembles closely a chimney-stack.

The contents and trim are the fuel in a fireproof building, and the air enters the windows, doors and other openings to support the combustion. As the contents are beyond control, it is essential that the design should be as dissimilar as possible to that of the furnace and chimney. The air-supply should be under some restriction, by keeping the windows and door-openings tight, and resistance should be offered to all tendency to flue-draught, by partitions and division of floors. Openings in a vertical line should not be encouraged, but when necessary for elevators and stairs such openings should be cut off from the rest of the building by fire-division walls.

It has repeatedly been proved that unprotected metal construction cannot withstand fire, nor can it be called "slow-burning." No matter how "fireproof" a building may be, it will be ruined if there is sufficient combustible material to create a hot fire lasting for sufficient time. The metal must be kept below the point of "redness." Metallic members should be made of at least sufficient thickness to

¹ Extract from a paper by F. de B. Parsons, read before the Franklin Institute, February 8, 1900, and published in the *Journal of the Franklin Institute*.

prevent rapid heating, even though they have excess of strength to withstand the stress to be actually carried.

For a building of good modern construction, the fire hazard of exposure is greater than the risk of fire within, and precautions should be taken in the original plans. This is seldom done, as the exposed sides are primarily designed for some architectural effect. A building is liable to take fire from an external hazard on every floor at the same time, a condition most difficult to control, and one that would never exist naturally from internal causes.

Modern tall buildings make most efficient "fire-stops," but they are not designed for that purpose.

Manufacturers have produced many forms of fireproofing protection, and have striven to obtain something that will not burn. Architects and engineers have given too much attention to the subject-matter of which the fireproofing is made, and not enough to its proper application.

No building-material has better fire-resisting qualities than good hard-burned brick set in cement mortar. Most stones are injured by heat, and marble, granite, sandstone and slate are liable to disintegrate or fracture under the action of heat and water. All fancy ornamentations of stone, such as balconies, cornices, trim, etc., are extremely dangerous, from the fact that they are liable to fall during the conflagration.

Terra-cotta in certain forms has been used for trim, but it has been found that terra-cotta, while a good fire retardant, will be seriously damaged on the thin edges, and will necessitate subsequent removal and renewal. The cost of this renewal of stone and terra-cotta on the façade of a building will be much greater than the cost of the actual material injured, as much of the backing will have to be taken down although in itself uninjured. This was shown in the Pittsburgh and Home Life fires.

Bonds and pier-caps are frequently made of stone and subjected to great weight. As these are usually unprotected, they are dangerous, and it would be much better to use cast-iron. In the same manner, stone columns carrying great weight cannot be recommended; their unreliability to withstand the action of the heat and water is an item which must be kept in mind, both from the financial viewpoint of cost of renewal and from the danger of failure, thus dropping part of the building, which otherwise would have stood.

The floors should be solid, to prevent the fire from spreading, and the beams and girders be well imbedded and protected, so that no part of the metal will be exposed. While most fireproofing substances have proved to be excellent, it must be remembered that there is a choice of grades, and that many of those grades are deficient in fire-resisting qualities. The greatest weakness with all floor-arch blocks is an exposed thin edge. Most arches have such an edge, covering the lower flange of the floor-beams. These thin edges are apt to break off and expose the metal. It is still an unsettled question whether hard-burned tile, porous hollow-tile, ordinary bricks or solid construction of cement is the best.

The under side of floors, forming the ceiling beneath, should always be finished flat and smooth. The custom of having a panelled ceiling, by permitting girders and beams to project below the main level, should not be sanctioned without penalty, as it is difficult to protect these important members when thus arranged and to prevent them from retaining the smoke and heat in the pockets thus formed. The consequent local heating and irregular expansion may cause serious trouble. When such projections must exist, it would be well to supply a false ceiling made with expanded metal and plaster.

In tall buildings, where the ground-area is limited and valuable, it is not feasible to construct the floor without openings. Fire can only spread from floor to floor through such openings for light, stairs, elevators, dumb waiters, chases for pipes and wires, etc., or externally from window to window. This hazard is grave, since it can only be overcome at the cost of inconvenience and considerable expense. The modern mill-construction is admirable in this regard, where the floors are solid and the openings are made in an adjoining tower-like building, or in parts separated and cut off by permanent fire-walls. As both of these methods are wasteful of area, they will not be countenanced by owners of tall buildings for city use. The closest approximation to such mill practice, however, should be adopted. The elevator and stair wells should be enclosed in fire-walls of brick, with all combustible material removed. Elevator entrances are usually open lattice-work, a hazard which could be rectified by using fire-doors or metal roller-shutters that could be closed in cases of emergency. Openings for pipes and wires should be packed with non-combustible material. Any opening will act as a flue, and it is remarkable how rapidly fire will pass through the smallest crevice.

Besides the risk of fire, the hazard of water-damage is seriously increased by these openings. Floors should be waterproof, and so arranged that the surplus of water may not pass down an opening to the injury of the floor or contents below.

Subdivision of the floor-area by partitions reduces the hazard very materially. Partitions act in three ways: they confine the fire; they keep it back from the floor-openings or draught-areas; and they diminish the rapidity of spread, giving time for assistance to arrive. Partitions that are not fireproof are valueless and increase the hazard by preventing close approach to fight the flame and by the cost to replace. Wooden studs covered with metallic lath and plaster are not to be treated as fireproof. Such partitions may withstand a fire,

but are liable to damage to such an extent as to require renewal, since the wood chars beneath the plaster and lets the nails pull out.

Partitions should not rest on wooden sills or flooring, but be built on the arches and extend to the bottom of the arches above. This precaution is often neglected. Partitions should be solid, with as few openings as possible, in order to be most effective, as openings cut for doors and transom-lights decrease their value as a fire-retardant.

Comparisons have been drawn between fire-partitions and brick walls. It is not reasonable to expect that partitions made of 2 inches of concrete plaster on expanded metal, or of 4-inch terra-cotta blocks, can withstand the same severe punishment as a 12-inch brick wall. Both fire-walls and partitions have their legitimate duty to perform, and the inspector should not underrate the hazard by mistaking the one for the other.

Fire-walls are especially valuable. Buildings covering a large area should be divided by such walls. If there had been some such division in the Windsor Hotel, the building could have resisted much longer. Every one has noticed how a thin brick wall will remain standing, even though a building be gutted and every floor falls. A thin party-wall will hold a fire and prevent its spreading. Curtain-walls, carried on the metal "cage" frame, are not as reliable as self-sustaining walls of equal thickness.

Combustible contents must be expected, but the quantity of combustible material in the trim and finish of a building, and the manner of its application, directly affects the hazard. The amount of wood used in an average so-called "fireproof" building having wood flooring, base, chair-rail, door and window trim, amounts to about 2 pounds for each cubic foot of contents, without including the furniture or movable fittings. This would exceed the weight of the metal in a skeleton frame and be equal, or nearly so, to that in a cage frame. Without injury to the usefulness or efficiency of a building, the amount of combustible material could be reduced by careful planning. The wood floors could nearly all be left out, or, if retained, used only on limited areas and laid thin and solid on the concrete filling. An air-space under flooring should never be allowed, as it is extremely hazardous. Nearly all the door and window trim can be made of adamant plaster, and the only wood required would be for jamb and lintel. As the edges of partitions are always rough, the carpenter usually puts on the trim with an air-space behind it. This air-space should be filled with absolutely incombustible and permanent material.

Bases and chair-rails are useless ornamentation, and their value could be better utilized in some form of real fire-protection. It is not necessary to use wooden studding for nailing purposes, as nails will take a firm hold in terra-cotta. In general, all woodwork should be omitted except where absolutely necessary, and then used on the slow-burning principle.

Windows are dangerous because they let a fire enter from without, and supply air and draught to a fire within. In consequence, they should be as small in size and as few in number as the circumstances will permit. They should be protected with shutters. When shutters are not feasible, wired glass should be used, and in exposed positions the glass should be doubled, with an air-space between. There is no reason why wired glass cannot always be used for windows on elevator and stair wells, and for door-panels and transom-lights. Wired glass has one advantage over shutters, in the fact that windows are less likely to be left open.

The main parts of the buildings should be made self-supporting, no matter what happens. Heavy weights, such as tanks, elevator appliances, cornices, balconies, and the like, should be so constructed as not to fall, except in cases of total destruction. The hazard from falling weights is most serious in impeding the firemen, in breaking openings through the floors which would act as draught-flues, and in damaging parts of the structure which would otherwise have been uninjured.

Smoke-flues cause an annual loss to the insurance companies doing business in the United States of upwards of \$20,000,000. In modern tall buildings, however, the hazard from these flues is reduced to a minimum, on account of the manner in which such buildings are constructed.

Expansion and contraction cause hazards which cannot be neglected. Every material used in construction expands on the application of heat, and the amount of expansion is not uniform. In composite construction — that is, where part is metal and part stone or brickwork — the difference in the lengthening of the various subdivisions in a tall building may be sufficient to create severe cross strains that may cause failure of certain details which otherwise would have withstood the heat. In many fires, external and fire-division walls have been thrown down by the expansion of the main metallic members. The design should provide allowance for expansion in all parts where the amount of lengthening would cause damage or failure.

There can be no question but that there is a hidden hazard in metallic members subjected to rust. Rust is a process of slow combustion, and, if allowed to progress, will eat away the members to an extent that may render them so thin as to heat rapidly, or to fail under a normal load. Metallic members, therefore, buried in masonry cannot be considered as safe as those which are located away from such masonry and protected with some good fire-retarding covering, which could be removed from time to time for the purposes of inspection.

In a broad sense, there are two separate methods of construction—one of them monolithic in character, the other built up of small pieces, joined or cemented together by some different substance. Monolithic construction has the great advantage of solidity and uniformity, and from it small pieces are not apt to fall or break out, thus forming draught-areas or flues. On the other hand, the financial hazard of such construction is great, for, if any damage is created, a greater quantity of good material must be taken out and replaced than if the construction were made up of smaller pieces.

A building of the Walker Soap Works, in Allegheny City, was exposed to fire on May 25, 1899. The fire occurred in a brick building 14 feet away, and for the time was very intense. The building was built of steel framework, filled in with cement walls, retained on expanded metal. The construction was monolithic, and withstood the heat with but slight injury, although the brick building was greatly damaged.

One of the most serious troubles is the alteration of the plans after the work has been started. The original design may call for a well-protected building, but, through carelessness of inspection or the desire to save a little money, the character of the building may be changed to a veritable fire-trap.

The question naturally arises whether it pays the owner to make a building thoroughly fireproof. Unfortunately, there are many who build for the specific object of obtaining the greatest income from a minimum outlay, and the effort to save on the first-cost is so great as to render their judgment valueless as to what should or should not be done. Tall buildings of cheap construction are a menace not only to owners and tenants, but to the community. In any building there must be, and always will be, an amount of combustible matter that cannot well be reduced.

Owners frequently locate floor-openings so as to take up a minimum floor-space, and thus render a maximum area available for income-earning purposes. Nearly ever builder estimates the amount of space devoted to public use, and concludes that the best building is the one that has given up the least percentage. While this effort is commendable from a purely income-earning standpoint, it often renders the design dangerous to life and property, and frequently makes it impossible to design a building under such conditions that it shall be fireproof. When stairs and elevators are placed together in the same well, there must always be a strong tendency to cut off means of escape and means of saving property from floors above.

Even in a fireproof building dependence must be had upon human aid; and when the building is tall, it towers beyond the reach of any fire-department.

A fire in the lower part is easily accessible, and the hazard most dreaded is that of a fire in the upper stories. The water-tanks as usually supplied on roofs of tall buildings are inadequate in capacity. Unless the pumping-plant of the building be so situated as not to be injured or rendered useless, the tank hardly pays for its cost in cases of severe fire.

Owners do not hesitate to spend thousands of dollars on fancy marble panelling, architectural carving and similar ornamentation, and will refuse to spend a few hundred dollars to have plans properly prepared and to see that the dangerous parts are constructed with that care which a really fireproof building should demand.

From the viewpoint of the fire-insurance companies, it appears as if such companies had no interest in actual fireproof construction. Such should not be the case, for anything that will tend to reduce the fire-hazard will necessarily tend to reduce the fire-loss. The gross business of the companies might be reduced, but the net income would be increased. Unfortunately, they do not act in unison, and each one seeks risks which are dangerous in character, through a sheer spirit of competition. The influence for good that could be exerted by insurance companies is great, provided they would properly classify their risks, charging penalties or reducing their rates in accordance with the elements of design and the means employed to secure really fireproof construction.

ILLUSTRATIONS

[Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.]

RESIDENCE FOR FRANK W. SIMMONS, ESQ., OTTUMWA, IA. MR. F. R. COMSTOCK, ARCHITECT, NEW YORK, N. Y.

THE exterior of the residence, which was built last year, is of narrow clapboards, painted Old Colonial red. The porch trimmings, pilasters, and cornices and window-finish are painted an ivory-white and the roof-shingles a moss-green.

The interior finish of the house is entirely of cabinet-work, the staircase, hall and parlor being finished in quartered-oak, and dining-room in mahogany. The entire second story is of white-pine, painted to harmonize with the scheme of decoration.

COMPETITIVE DESIGNS FOR THE PUBLIC LIBRARY, EAST LIVERPOOL, O. MESSRS. E. G. W. DIETRICH AND HENRY LAPOINTE, ASSOCIATED ARCHITECTS, NEW YORK, N. Y.

PROPOSED INSTITUTION FOR AGED GENTLEWOMEN. MR. BRUCE PRICE, ARCHITECT, NEW YORK, N. Y.

[The following named illustrations may be found by reference to our advertising pages.]

"CITADEL," ETON HALL, NEAR CHESTER, ENG. MR. J. E. BOEHM, SCULPTOR.

CENTRE VESTIBULE: GRAND PALAIS DES CHAMPS-ÉLYSÉES, PARIS, FRANCE. MR. ALBERT THOMAS, ARCHITECT.

This plate is copied from *l'Architecture*.

[Additional Illustrations in the International Edition.]

THE DELIVERY-ROOM OF THE PUBLIC LIBRARY, PROVIDENCE, R. I. MESSRS. STONE, CARPENTER & WILLSON, ARCHITECTS, PROVIDENCE, R. I.

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METALWORK,—XI: NO. 516 MADISON AVE., NEW YORK, N. Y.

METALWORK,—XII: NO. 304 MOTT ST., NEW YORK, N. Y.

PLAN OF SELECTED DESIGN FOR NEW SESSIONS HOUSE, OLD BAILEY, LONDON, ENG. MR. E. W. MOUNTFORD, ARCHITECT.

DETAIL OF ELEVATION OF SAME BUILDING.

NOTES & CLIPPINGS

AGE OF CALIFORNIA'S BIG TREES. — The Department of Agriculture has issued a report on investigations of the big trees of California that brings out some interesting and new conclusions. It shows that the dimensions of the big trees are unequalled and that their age makes them the oldest living things. They are described by the report as "the grandest, largest, oldest, and most majestically graceful of trees," and "the scarcest of known tree species, with the extreme scientific value of being the best living representatives of a former geologic age." The report says the bark of the big trees often is two feet thick and almost non-combustible. "The oldest specimens felled," it says, "are still sound at the heart, and fungus is an enemy unknown to it. Yet the big trees apparently have not increased their range since the glacial epoch. They have only just managed to hold their own on the little strip of country where the climate is locally favorable." Continuing, the report says: "The only grove now thoroughly safe from destruction is the Mariposa, and this is far from being the most interesting. Most of the other groves are either in process of, or in danger of, being logged. The very finest of all, the Calaveras Grove, with the biggest and tallest trees, the most uncontaminated surroundings, and practically all the literary and scientific associations of the species connected with it, has been purchased recently by a lumberman, who came into full possession on April 1, 1900. The Sequoia and General Grant National Parks, which are supposed to embrace and give security to a large part of the remaining big trees, are eaten into by a sawmill each and by private timber claims amounting to a total of 1,173 acres. "The rest of the scanty patches of big trees are in a fair way to disappear—in Calaveras, Toulomo, Fresno, and Tulare Counties they are now disappearing—by the axe. In brief, the majority of the big trees of California, certainly the best of them, are owned by people who have every right and in many cases every intention, to cut them into lumber." The most recent investigations, according to the report, confirm the estimates that these giant trees probably live 5,000 years or more, though few of even the larger trees are more than half as old. The average rate of growth is estimated at one inch of diameter for every twelve years. The report also corroborates the statements of one authority who says that one tree, on which he counted 4,000 rings, was undoubtedly in its prime, "swaying in the Sierra winds, when Christ walked the earth." The report states among other things as the result of the official investigations: "The only place in the world where the big tree exists is in ten isolated groves on the west slope of the Sierra Nevada Mountains. The species, however, represent a surviving prehistoric genus of trees once growing widely over the globe. The Southern groves show some reproductions, through which there is hope of perpetuating these groves. In the Northern groves the species hardly holds its own." — *Exchange*.

WASTE IN MAKING ARTIFICIAL LIGHT.—Under the best conditions obtaining at present, out of every 100 tons of coal delivered at gas-works or electric-light stations, something like 98 tons are, as far as the production of light is concerned, absolutely wasted and go to produce useless heat. When one considers the enormous quantity of coal used annually for the production of artificial illumination, the absolute waste of 98 per cent of it seems little short of criminal. Will the problem ever be solved? It must be confessed that at present the prospects are far from being bright. Some means must be found of exciting ether vibrations between the visible limits only, and of eliminating the slow, radiant heat-waves. Whatever method may be eventually employed, it is interesting to note that already, on a small scale, the problem has been solved by the firefly, the most delicate measurements having failed to detect any radiant heat in the light emitted by this little creature. Surely this ought to be an interesting subject for investigation by the physiological chemist, who, working in conjunction with the physicist, might enable us to get nearer the solution of this important question.—*Cassier's*.

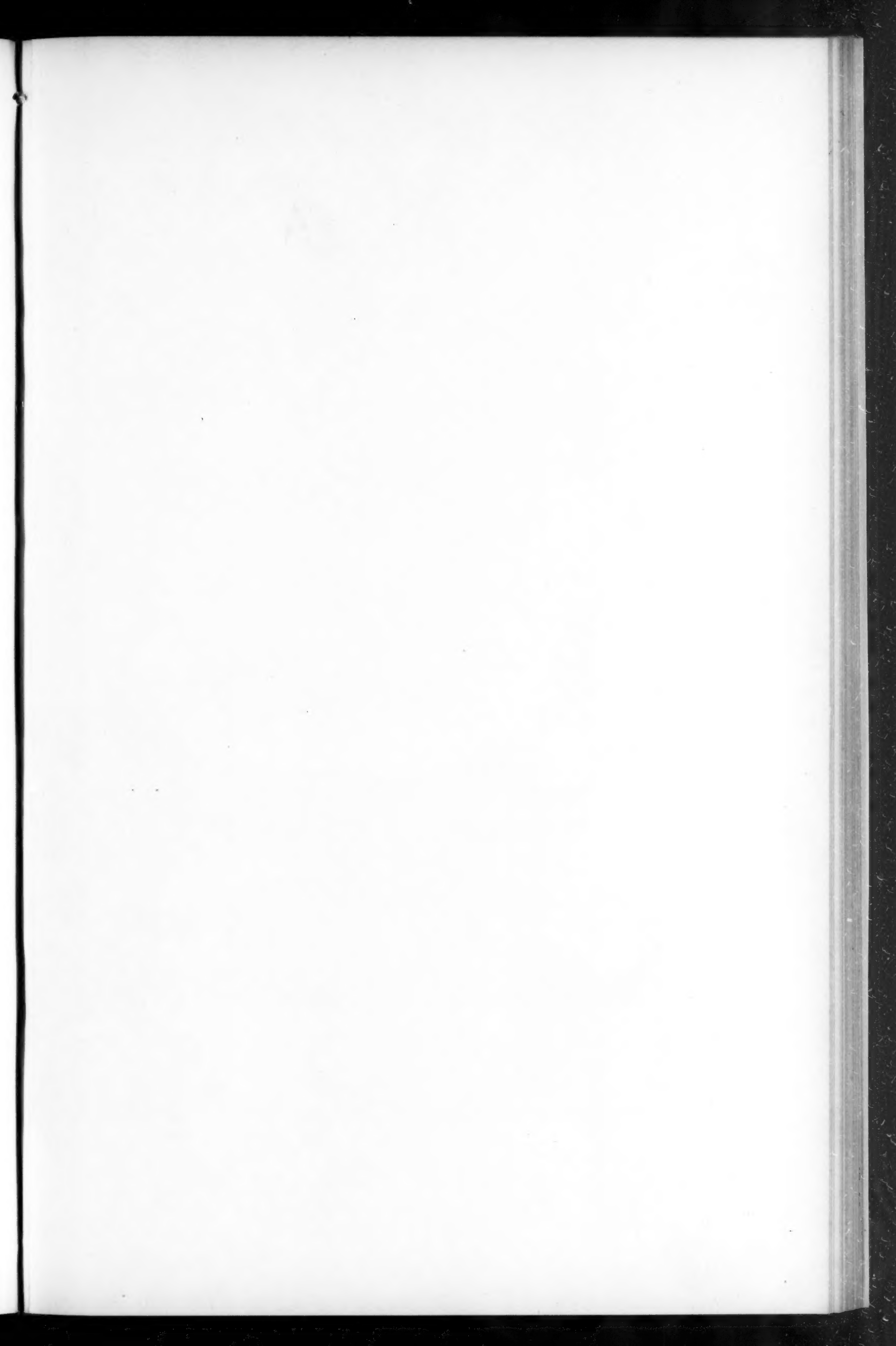
THE IRONWOOD TREE.—A circular was recently forwarded to the chief Forest officers asking for information with regard to the ironwood tree of Pegu, and the result is an interesting and complete article published as a further contribution to the *Agricultural Ledger*. The tree flourishes in many provinces, particularly in Madras, Bombay and Burma, thriving best in moist localities. It grows to an enormous height and reaches maturity in 60 or 80 years in Madras, but in the Bombay Presidency 100 years is fixed as the commercially-exploitable age. The wood is hard, resinous and dark-colored, and is highly appreciated in localities where it is to be had in fair abundance. It is much stronger than other woods of exceptional strength, and is so hard that a rifle-shot at 20 yards distance will scarcely cause any penetration into it. It seems to be a favorite wood for scaffolding, and lasts well when kept from damp. It is also used for railway-sleepers and telegraph-posts. The Burma State Railway was laid with sleepers of this wood in 1877, and the majority were still good in 1894. A quantity of sleepers was sent from Burma to Madras and Calcutta in 1885-86, and the profit which accrued from the works in the Pegu Circle amounted to 36 per cent. Trees of 3 to 4 feet girth are used as house-posts and bridge-piles in Pegu, and for these purposes it is said to be unequalled for its durability, while one mill in Pegu is supplying planks for paving-blocks in England. The discovery of tannin in the properties of the wood, a year or two back, has imparted new interest to the wood. Mr. H. R. Proctor, of the Yorkshire College, who made the discovery, is of opinion that the new product will prove a valuable tanning material, the color of which is fair and is a satisfactory agent.—*Indian Import and Export Trade Journal*.

KRUPP IRON-WORKS.—A report from Richard Guenther, U. S. Consul-General at Frankfort, describes the vast industries carried on by Frederick Krupp. These comprise the following: Cast-steel works at Essen; Krupp Steel Works, formerly F. Assthuwer & Co., at Annen, in Westphalia; the Gruson Works, at Buckau, near Magdeburg; four blast-furnaces at Duisburg, Neuwied, Engers, and Rheinhausen (this latter consists of three furnaces with a capacity for each of 240 tons per 24 hours); a foundry at Sayn; four coal mines (Hanover, Saelzer, Neuack, and Hannibal), with interest in other coal mines; more than 500 iron mines near Bilbao, in northern Spain; shooting-grounds at Meppen, with a length of 10½ miles and a possibility of extension for 15 miles; three ocean steamers, several stone quarries, clay and sand pits, etc. In addition, the firm of Frederick Krupp operates the Ship and Machine Stock Company Germania at Berlin and Kiel, under contracts. The most important articles of manufacture of the cast-steel works at Essen are cannons [up to the end of 1899, 38,478 had been sold], projectiles, percussion caps, ammunition, etc.; gun-barrels; armor-plates and armor-sheets for all protected parts of men-of-war, as also for fortifications; railroad material, material for ship-builders, parts of machinery of all kinds, steel and iron plates, rollers, steel for tools and other purposes. The steel-works in 1899 operated about 1,700 furnaces, forge fires, etc., about 4,000 tool and work machines, 132 steam-hammers of from 200 pounds to 5,000 metric tons' force, more than 30 hydraulic presses (among them 2 of 5,000 tons each, 1 of 2,000 tons, and 1 of 1,200 tons' pressure), 316 stationary steam-boilers, 497 steam-engines with an aggregate of 41,213 horse-power, 558 cranes of from 400 to 150,000 tons' lifting power. During the last year, the iron mines yielded an aggregate of 1,877 tons of ore per day. The coal production from the mines belonging to the Krupp Company (excepting the Hannibal) amounted, on an average, to about 3,738 tons for each working-day. The consumption of coal and coke in 1899 was as follows: In the cast-steel works at Essen, 952,365 tons; in the other works and on the steamers of the company, 622,118 tons; in all, in round numbers, 5,000 tons per day. The consumption of water at the cast-steel works in 1899 was 15,018,156 cubic metres, which equals about the consumption of the city of Frankfort, with 229,279 inhabitants. The consumption of gas in the steel-works at Essen was 18,836,050 cubic metres in 1899. The electrical-power plant of the works at Essen has three machine-houses, with six distributing stations, and supplies 877 arc-lights, 6,724 incandescent-lamps, and 179 electric-motors. For the traffic of the works, railroad tracks of standard gauge of about 36 miles are laid, which connect with the tracks of the main railroad-station at Essen. Sixteen locomotives and 707 cars are operated on the grounds. In addition, there are narrow-gauge tracks of 28 miles, with 26 locomotives and 1,209 cars. The telegraph system of the steel-works has 31 stations, with 58 Morse telegraphic instruments and 50 miles' circuit. The telephone system has 328 stations, with 335 telephones and a circuit of 200 miles. On April 1, 1900, the total number of persons employed in the different works was 46,679, viz, 27,462 at Essen, 3,475 at the Gruson Works of Buckau, 3,450 at the Germania Works at Berlin and Kiel, 6,164 in the coal mines, and 6,128 at the blast-furnaces and on the testing-grounds at Meppen, etc.—*Exchange*.

THE FATHER OF RAILWAYS.—As George Stephenson never contradicted those who styled him, during his lifetime, "the Father of Railways," it has lately been asserted that he had tacitly permitted an injustice to the memory of William James, a great, if unfortunate, railway projector and pioneer. William James, who was born at Henley-in-Arden, Warwickshire, in 1771, became a successful solicitor, worth £150,000; and he at one time earned £10,000 a year by his practice. Having projected and surveyed over a dozen railways, including the Manchester and Liverpool Railway, principally at his own expense, his affairs fell into confusion; and he died at Bodmin, in 1837, leaving a family unprovided for. Lately it was proposed to erect a monument to the memory of Mr. James, of whom Robert Stephenson—more generous than his father—wrote to Mr. James's eldest son in 1844: "I believe your late father was the original projector of the Liverpool and Manchester Railway." The subject is fully dealt with in the *Railway Magazine* for July and October, 1899, and for May, 1900. It is there stated that when George Stephenson was a lad of eighteen, beginning his education, James was already laying out plans for railroads. In 1821 James paid a visit to Killingworth, and saw Stephenson's steam locomotive-engine, the possibilities of which so impressed him that he entered into a kind of partnership with Stephenson in 1815 and 1816; James on his part promised to give his assistance in using Stephenson's locomotives in all districts where he had influence. Although the route surveyed by James was not that adopted for the Manchester and Liverpool Railway, which was taken up and completed by George Stephenson, there seems no reason to doubt he earned and deserved the title of "Father of Railways" in this country. A grandson of William James—Mr. H. B. James, No. 69 Victoria Street, S. W.—is well known in the railway and engineering world as a contractor and engineer, and has had a varied and successful career. He was responsible for the construction of the sea-defences at Cleethorpe and the marine works at Hythe, and other important undertakings.—*Chambers's Journal*.

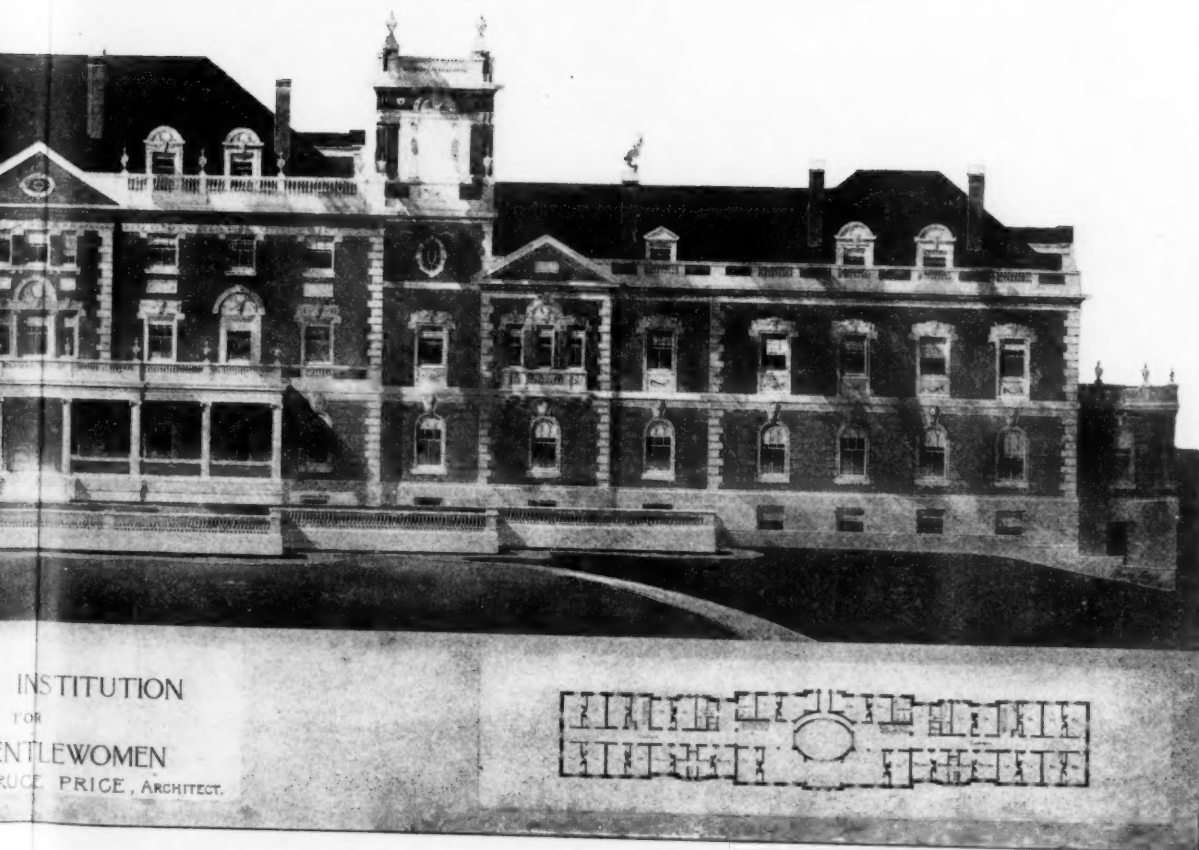
ARCHEOLOGICAL FINDS IN TEXAS.—Images of the gods of the prehistoric inhabitants of the valleys of the Colorado and Rio Grande Rivers have been unearthed recently near Marble Falls, Tex., by Miss Alma Ney, an enthusiastic young explorer and archaeologist of St. Louis. Traces of the existence of at least three different types of men at three different epochs in the world's history have been found there by her, and the sacred images are believed to have belonged to the latest, or about the time of the Aztecs. That these three different types of men existed is shown by the radically different types of abodes that have been unearthed in the explorations. There are some which are entirely subterranean, in ramifying burrows like enlarged rabbit warrens. Others, which were probably the homes of people of Aztec or Toltec blood, were built of sun-dried brick or roughly-dressed stone, and were fairly substantial houses. The third, which are to be found in the greatest numbers—in endless number wherever in the State there is trace of an early watercourse or pond—were built over excavations perhaps 3 feet deep. While making her explorations Miss Ney discovered what is believed to have been the palace of a king and which consisted of a mound nearly 40 feet high. On top of it were oak-trees at least 400 years old. In the mound were many broken dishes, and a number of small images believed to have been gods. They are ugly, repulsive in appearance, and rudely carved from stone. Close at hand was another mound nearly 100 feet high, believed to be a temple. In the top of it was found a room that contained a big sacrificial slab of granite, 7 feet long by 4 wide, lying across an altar 4 feet high. Near at hand lay an image of a god, hook-nosed and with enormous ears. A figure representing the sun was carved on the forehead. Beside this lay a sacrificial knife of pure bronze, and there were stone bowls on the floor, supposed to have been used for catching blood. In another building was a solid gold head, believed by Miss Ney to have been intended to represent Montezuma.—*Chicago Tribune*.

STAND-PIPES IN NEW YORK TO BE UNIFORM.—The rule is to be enforced requiring that all buildings which exceed 150 feet in height be equipped with stand-pipes. Not only will pipes have to be placed in these buildings, but the couplings will have to be of the standard used by the fire-department. It is estimated that sixty per cent of the skyscrapers do not conform to this law and are in the condition of the Wells Building, at 18 Broadway, Manhattan, where when the firemen attempted to couple the hose to the outside street-connections, these were found not to be properly constructed, and the hose had to be dragged up nine floors before the firemen could operate. Another recent fire on Fifth Avenue caused the department much trouble. The description of the pipe as required by the department is as follows: These stand-pipes are to be of a quality sufficient to stand the necessary pressure (not less than 300 pounds to the square inch) to force a stream of water to any of the floors of the building or the roof, and are to extend from the cellar to the roof, with a two-way three-inch fire-department siamese connection placed on the street above the curb level, and connected to said stand-pipe. These stand-pipes are to have valves and two-and-one-half-inch outlets of the regular standard fire-department pattern and thread, and hose attached thereto on each floor; outlets and valves are to be placed as near the stairs as may be practicable, and also in basements and cellars of all such buildings. All stand-pipes, couplings, and other fire-appliances (the order further says) shall be of the regulation fire-department pattern to be approved by the chief of the fire-department, and to be kept in perfect working-order by a person who shall at least once a month make a thorough inspection of the same, and see that they are ready for immediate use by the fire-department. The fire-department has been very lenient so far with owners of buildings who have not complied with the law. In fact, it did not begin to enforce the law until last May. The plan for enforcing the law will be for the captain of each company to report on every building in his district which has not the proper stand-pipes. The owners of such buildings will be given sixty days in which to comply with the law, and then the penalties will be enforced.—*Fire and Water*.





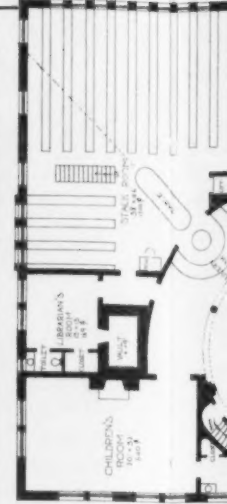
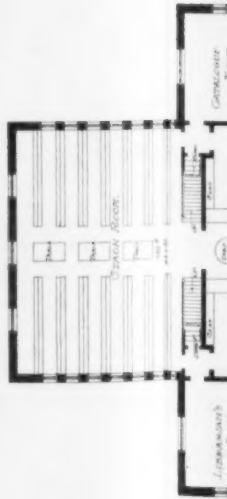
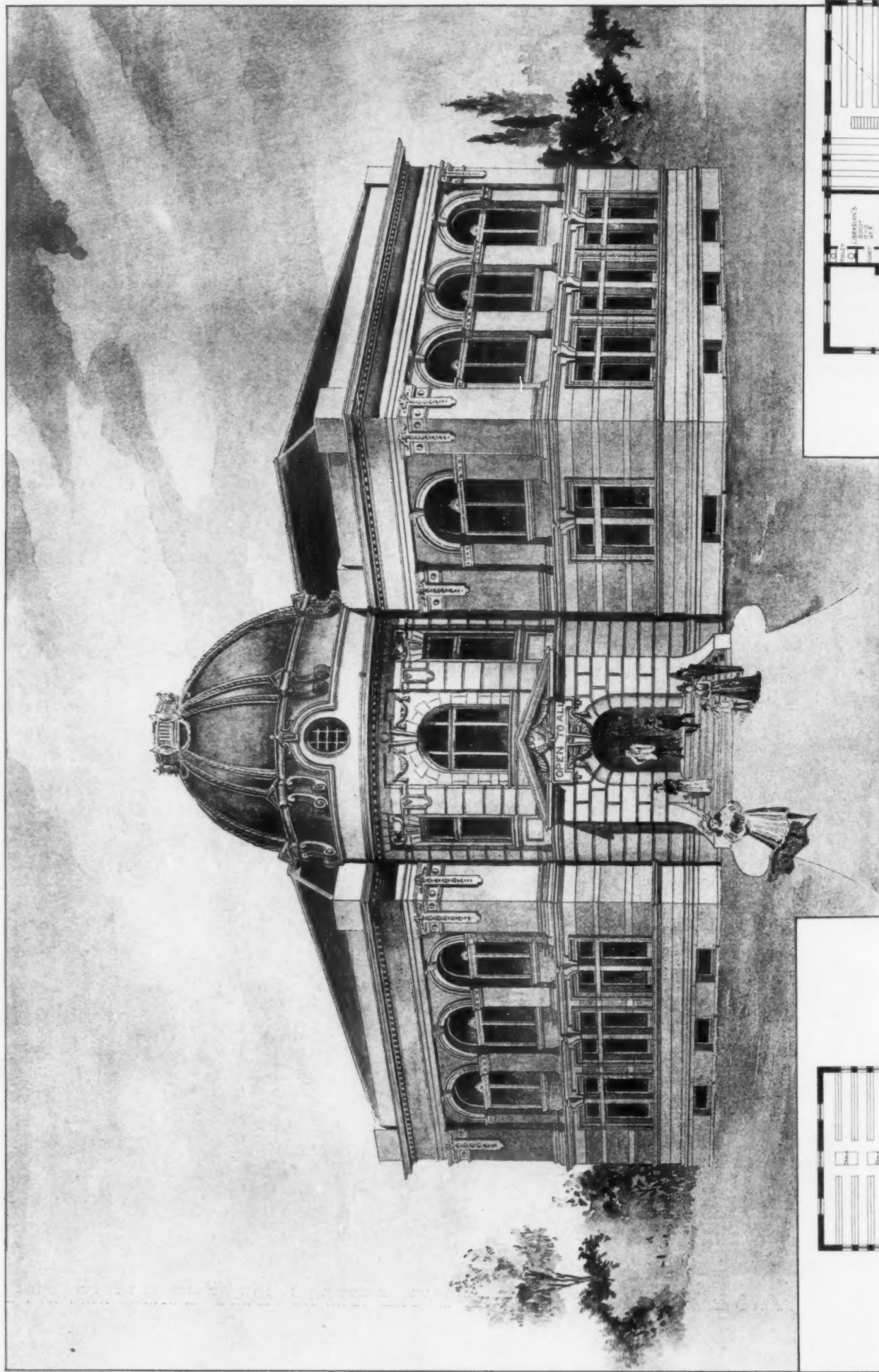
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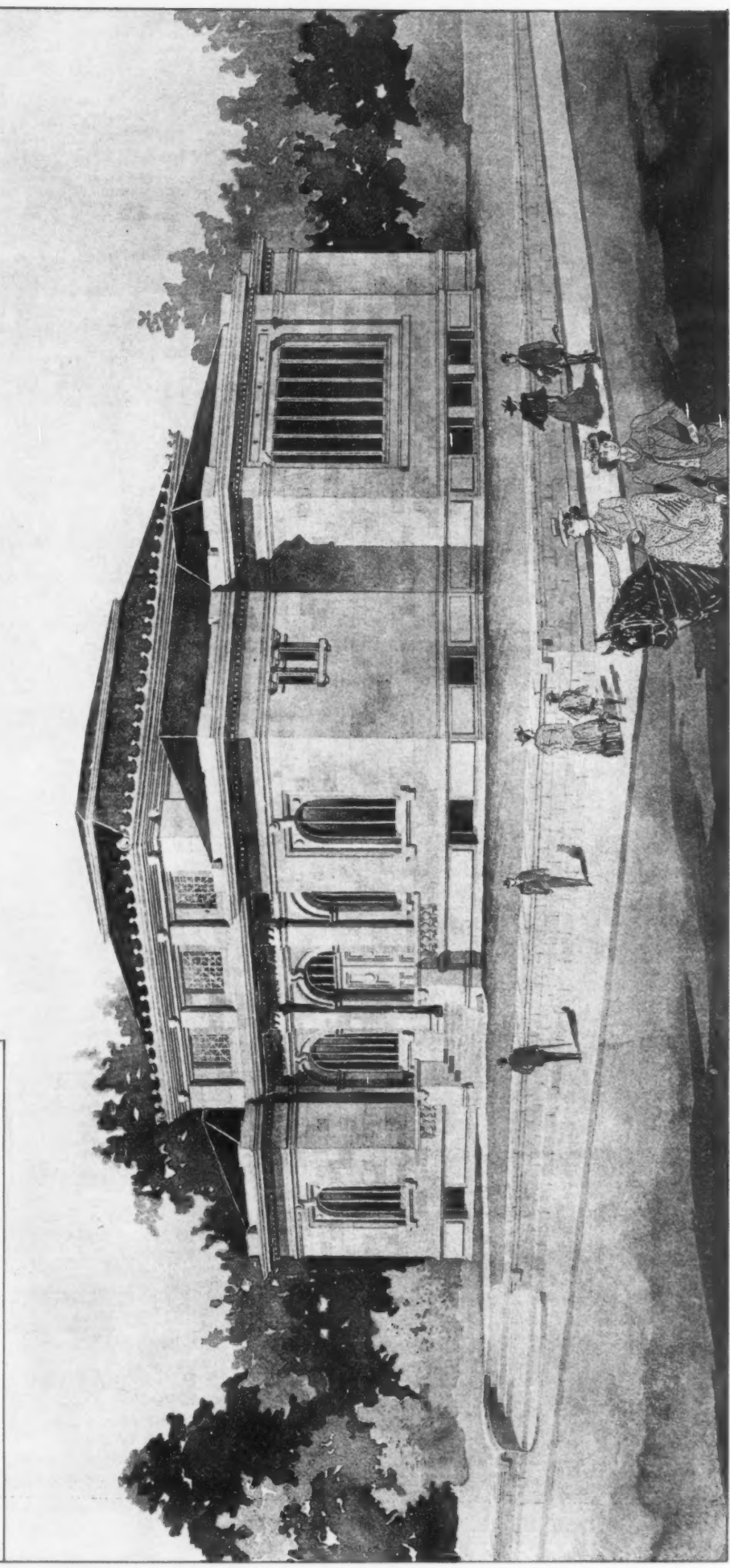
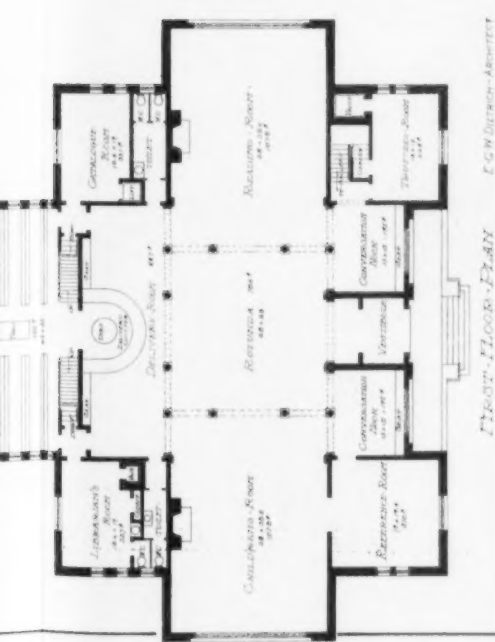
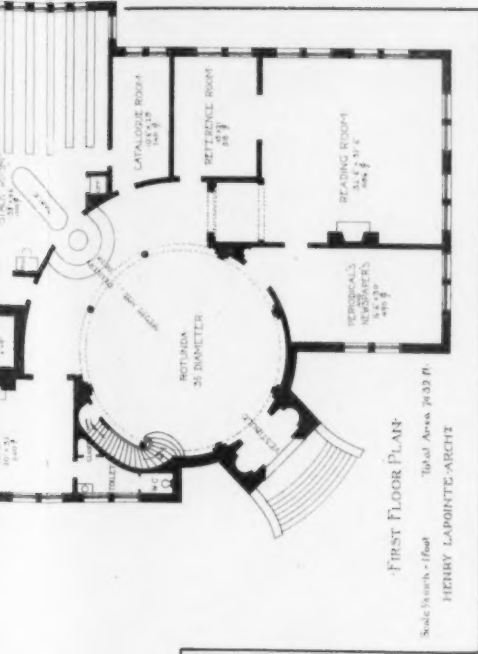
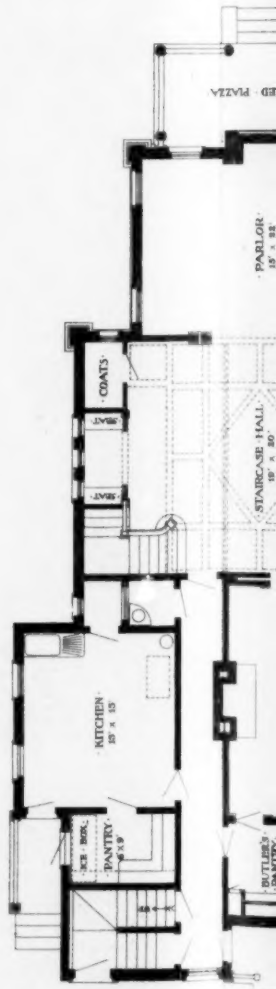
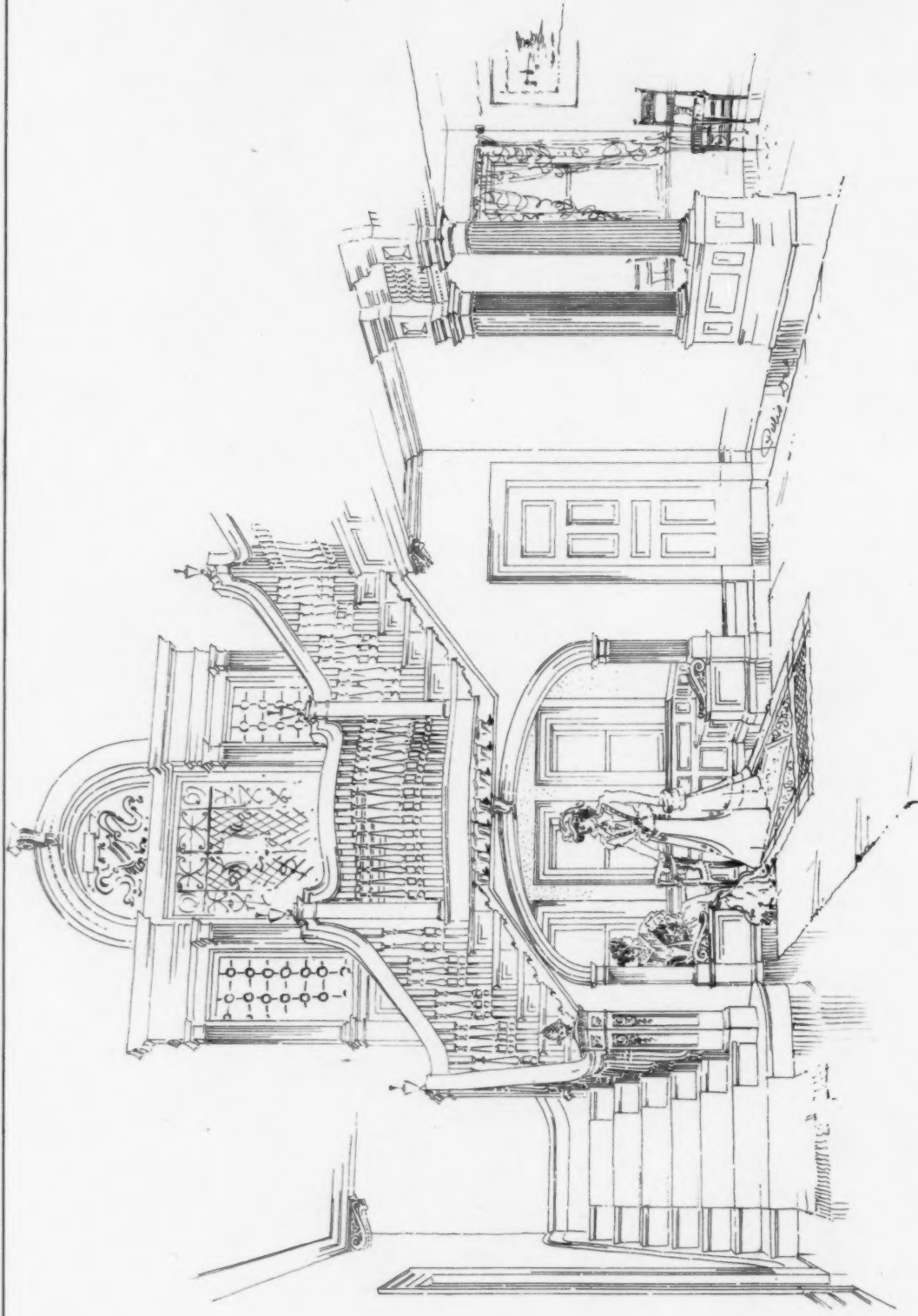


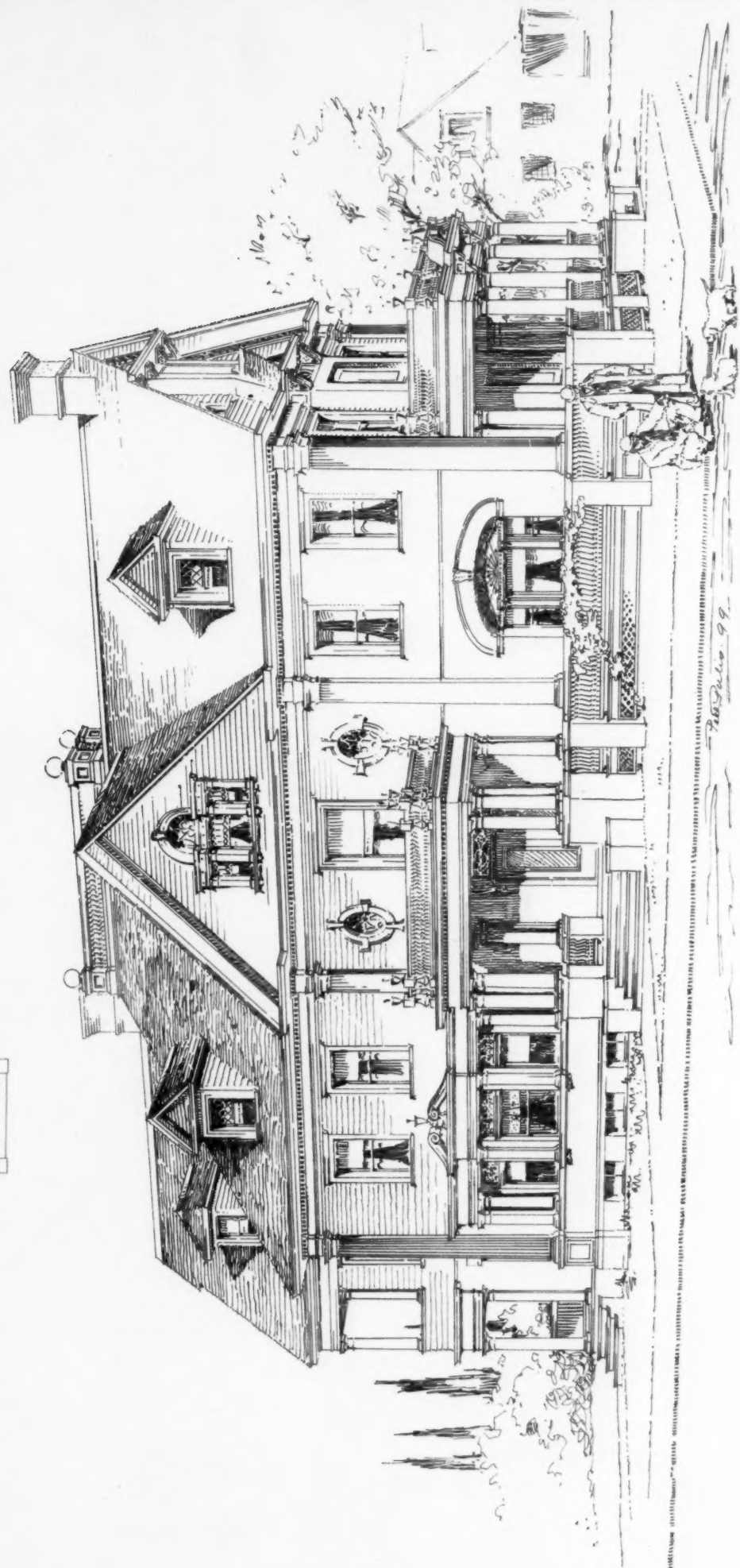
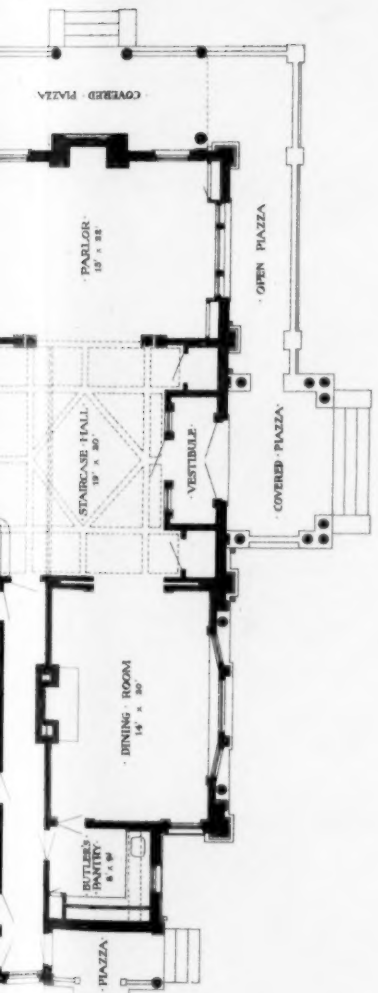
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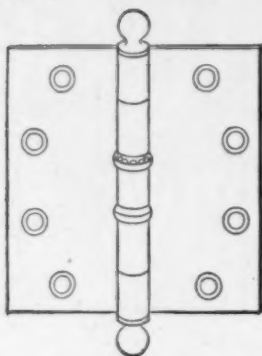
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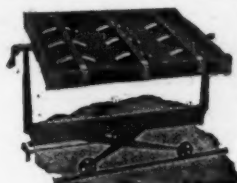
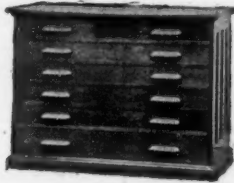
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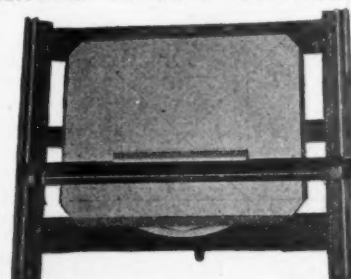
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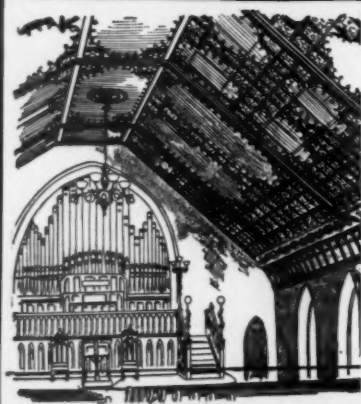
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City Hall, New York, N. Y.	Date 1803-12
Old State House, Boston, Mass.	" 1748
Pennsylvania Hospital, Philadelphia, Pa.	" 1755
Carpenters' Hall, Philadelphia, Pa.	" 1770
Independence Hall, Philadelphia, Pa.	" 1729
Faneuil Hall, Boston, Mass.	" 1741
and others.	

CHURCHES

King's Chapel, Boston, Mass.	Date 1749
Seventh-day Baptist Church, Newport, R. I.	" 1729
Christ Church, Alexandria, Va.	" 1767
Christ Church, Philadelphia, Pa.	" 1727
St. Paul's Chapel, New York, N. Y.	" 1764
Old South Church, Boston, Mass.	" 1729
First Church, Hingham, Mass.	" 1681
St. John's Chapel, New York, N. Y.	" 1803
First Congregational Church, Canandaigua, N. Y.	" 1812
St. Peter's P. E. Church, Philadelphia, Pa.	" 1758
Gloria Dei Church, Philadelphia, Pa.	" 1700
and others.	

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Royall Mansion, Dedham, Mass.	" 1737
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Oak Park, Ill. — F. D. Thompson is drawing plans for a brick and stone residence near Melrose Park; cost, about \$8,000.

Pawtucket, R. I. — Architect J. A. Roberts has prepared plans for a three-story brick and stone building to be built for Armour & Co.

Philadelphia, Pa. — Frank Furness, of this city, and A. W. Brunner, of New York, are preparing plans for a stone and marble synagogue, to cost about \$30,000.

Portage, Wis. — H. A. Foeller, architect, of Green Bay, Wis., has prepared plans for a city-hall and armory. It will be two-story, 75' x 127', of pressed-brick, with gravel roof; cost, \$20,000.

Rye, N. Y. — Ludlow & Valentine, architects, New York City, are preparing plans for a two-story shingle cottage for Wm. Porter Allen.

Scrannton, Pa. — Relling, David & Shoen will build a \$12,000 addition to their silk-mill. Plans by Architect E. H. Davis.

Sea Gate, L. I., N. Y. — Ludlow & Valentine, New York City, are drawing plans for a brick and frame cottage for Col. C. F. James.

Sharon, Pa. — Oscar Boyer, Chicago, Ill., is preparing plans for a new brewery for the Union Brewing

BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

Co. The building will be of steel construction; cost, \$100,000.

Sioux City, Ia. — The Union Terminal Railway Co. is having plans prepared by Wilfred W. Beach for a two-story brick commission warehouse, 50' x 134', to cost \$25,000.

Sleepy Eye, Minn. — Anton Dohmen, architect, Milwaukee, Wis., has completed plans for a modern brick church to be erected by St. Mary's Catholic congregation. It will be about 40 feet high, 74' x 175', on a stone foundation, with slate roof; cost, \$40,000.

Springfield, Mass. — S. E. Seymour has plans for a substantial brick block to be erected on Dwight St. for the occupancy of the Hitchcock Plumbing Supply Co. It will be four stories, 44' x 82', costing \$30,000.

St. Paul, Minn. — The Norwegian Lutheran synod contemplates erecting a hospital in this city. About \$35,000 is to be raised to begin the work. Rev. Thomas Nilsson, of St. Paul, chairman.

York, Pa. — W. L. Bean and others have organized a corporation with a capital stock of \$100,000 to erect factory buildings of the manufacture of all kinds of silk goods.

Uniontown, Pa. — The Fayette Brewing Co. is having plans prepared by Frederick Rautert, Metropolitan Block, Chicago, Ill., for a brewery and bottling house, to cost \$50,000.

Washington, D. C. — Plans have been prepared for a new police-station for the 10th precinct. The

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(Advance Rumors Continued.)

proposed structure is to be built of brick with terra-cotta trimmings, and will be two stories in height. The style will be Italian Renaissance; cost, about \$20,000.

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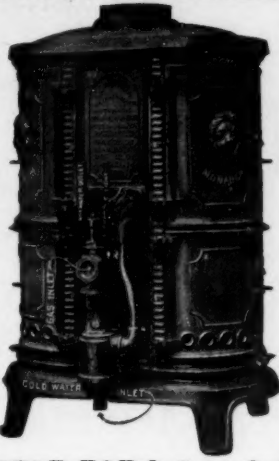
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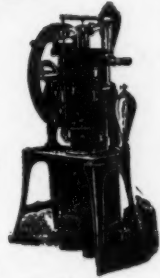
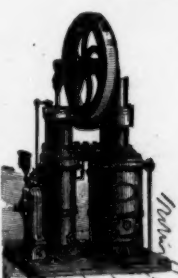
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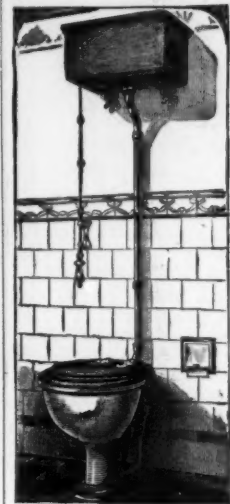
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Brooklyn, N. Y.—Bridge St., nr. York St., six-sty bk. factory, 31' x 31' 3/4', gravel roof, steam; \$25,000; o., Boorum & Pease Co., Bridge & Front Sts.; a., G. H. Gresham, 140 W. 127th St., N. Y.

Chicago, Ill.—Bk. factory, 200' x 300', gravel roof, steam; \$25,000; o., Chicago Writing Machine Co. and Sterlin Copper, Brass & Bronze Co.

Cleveland, O.—Broadway and Brunner St., four-sty bk. & st. factory, 48' x 100', gravel roof, steam; \$25,000; o., H. D. Marble; a., Steffens, Searles & Hirsch.

New York, N. Y.—Bowery, seven-sty st., bk. & iron factory, 126' x 171', concrete roof, steam; \$230,000; o., Browning, King & Co.; a., John E. Nitchie.

Philadelphia, Pa.—Mifflin and Meadow Sts., one-sty bk. & iron construction machine-shop, 100' x 200'; \$10,000; o., Niles, Bement Pond Co.; b., Fort Bridge Iron Works.

Rock Island, Ill.—Four-sty bk. with st. trimmings factory, 75' x 80', gravel roof; \$40,000; o., Rock Island Brewing Co.; a., Fred Rantert, Chicago.

HOSPITALS.

Cambridge, Mass.—Mt. Auburn St., No. 340, four-sty bk. & limestone infirmary, 45' x 74'; o., Harvard University; b., Norcross Bros.; a., Shepley, Rutan & Coolidge.

HOTELS.

Allegheny, Pa.—North Ave., Palo and Otto Sts., twelve-sty bk. & terra-cotta hotel & aparts., 60' x 180', slate roof, steam; \$500,000; a., William A. Enrick, 326 Fourth Ave., Pittsburgh.

Buffalo, N. Y.—Clinton and Washington Sts., nine-sty st., terra-cotta & bk. fireproof const. hotel, 160' x 178', flat roof, steam; \$1,250,000; o., Hotel Lafayette; a., Henry Ives Cobb, Chicago, Ill.

Marion, Ind.—Three-sty bk. hotel, 132' x 132';

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(Hotels Continued.)

gravel roof, steam; o., Mrs. Elizabeth Winchell; a., Burt L. French.

Springfield, Mo.—Four-sty bk. & st. hotel, 38' x 74', comp. roof, steam; \$20,000; o., Col. John O'Day; a., J. L. Heckenlively.

Worcester, Mass.—Vernon Sq., four-sty bk. hotel, 60' x 70'; \$20,000; o., M. E. McGady; a., Barker & Nourse; not let.

HOUSES.

Boston, Mass.—Wensley St., nr. Old Heath St., three-sty fr. dwell, 33' x 52', flat roof, stoves; \$5,000; o. & a., Frederick S. Bennett; b., C. Lamont. Liverpool St., cor. Decatur St., three-sty bk. dwell. & store, 23' x 47', flat roof, stoves; \$6,500; o., John Sweeney; a. & b., W. W. McKie.

Brooklyn, N. Y.—Sterling Pl., nr. Brooklyn Ave., 8 two-sty & base, bk. dwells, 19' x 45'; \$44,000; o., C. G. Reynolds, 558 Decatur St.; a., A. S. Hedman, 371 Fulton St.

Cleveland, O.—Bellflower Ave., bk. & st. dwell, 40' x 70', slate roof, hot water; \$7,000; a., Frank D. Skeel.

Columbus, O.—Three-sty bk. dwell, 40' x 50', tile roof, hot water; \$25,000; o., Edward Johnson; a., H. A. Linthwaite.

Eighth Ave., two-sty bk. dwell, 34' x 38', slate roof, furnace; \$8,000; o., Cyrus Courtwright, Circleville; a., C. A. Stribling & Co.

Two-sty bk. dwell, 38' x 40', slate roof, furnace; \$8,000; o., W. S. Connor; a., J. A. Jones.

Dayton, O.—Two-sty fr. dwell, 38' x 40', furnace; \$5,000; o., Geo. M. Fair; a., E. L. Acton.

Detroit, Mich.—West Fort St., bk. dwell, 48' x 68'; slate roof, furnace; \$8,000; o., Henry B. Brevoort, a., H. C. Varney & Co.

Forest Ave., three-sty bk. double dwell, 36' x 40', comp. roof, furnace; \$5,000 a., Joseph E. Mills.

Fairfield, Ia.—Bk. & st. dwell, 38' x 76', steam; \$12,000; o., Parsons College; a., H. K. Halsman, 1118 Association Building, Chicago, Ill.

Madison, Wis.—Fourth Lake, 2-sty bk. & fr. dwell, 42' x 48', hot water; \$14,000; o., T. E. Brittingham; a., Handy & Cady, 172 Washington St., Chicago, Ill.

Newton, Mass.—Commonwealth Ave., two-sty dwell, 35' x 38', hot air; \$12,000; o., M. H. Galeston; b., J. N. Pickett; a., Geo. A. Clough.

New York, N. Y.—One Hundred and Forty-seventh St., nr. Broadway, 2 three-sty & base, bk. & st. dwells, 12' 9" x 51' 4"; \$20,000; o., Annie F. Raymond, 611 W. 147th St.; a., Henri Fouchaux, Broadway and 162d St.

Prospect Ave., nr. 187th St., 2-sty fr. dwell, 21' x 48'; \$5,000; o., George Maurer, 2794 Beaumont Ave.; a., William Guggolz, 2307 Bathgate Ave.

Roselle St., nr. Poplar St., three-sty fr. dwell, 38' 6" x 48'; \$6,500; o., Thomas Watson, Westchester; a., T. W. Ringrose, 142d St. & 3d Ave.

OFFICE-BUILDINGS.

Boston, Mass.—Milk St., cor. Batterymarch St., eight-sty bk. office & store building, 52' x 65' x 98', flat roof, steam; \$75,000; o., Frost Bros.; b., Mack & Moore; a., J. M. Brown.

Waterloo, Ia.—Bridge St., four-sty bk. & st. office-building, 75' x 80', gravel roof; \$35,000; o. & b., Waterloo Building Co.; a., Murphy & Ralston.

TENEMENT-HOUSES.

New York, N. Y.—Allen St., Nos. 187-191, 2 seven-sty bk. tenements with store, 37' 8" x 74' & 25' x 76'; \$50,000; o., H. J. Wirth, 145 Delancey St.; a., Kurtzer & Rohl, 190 Bowery.

One Hundred and Seventieth St., nr. Franklin Ave., five-sty bk. tenement 43' 6" x 102'; \$25,000;

PROPOSALS.

Treasury Department, Office Supervising Architect, Washington, D. C., September 10th, 1900. Sealed proposals will be received at this office until 2 o'clock P. M. on the 17th day of October, 1900, and then opened, for the interior finish, etc., of the U. S. Custom-house, Portland, Oregon, in accordance with the drawings and specification, copies of which may be had at this office, or the office of the Superintendent at Portland, Oregon, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1291

Treasury Department, Office Supervising Architect, Washington, D. C., September 10th, 1900. Sealed proposals will be received at this office until 2 o'clock P. M. on the 17th day of October, 1900, and then opened, for the low pressure, steam heating and mechanical ventilating apparatus, etc., for the U. S. Custom-house building at Portland, Oregon, in accordance with the drawings and specification, which will be furnished at the discretion of the Supervising Architect on application at this office, or at the office of the Superintendent of the building at Portland, Oregon. JAMES KNOX TAYLOR, Supervising Architect. 1291

HOSPITAL BUILDINGS.

[At Gallipolis, O.]

Sealed proposals will be received until September 25 for the erection of an administration building and a cottage for Ohio Hospital for Epileptics. H. C. RUTTER, sec. bd. trustees. 1291

EXPOSITION BUILDING.

[At Buffalo, N. Y.]

Sealed proposals will be received by the Ohio commission to the Pan-American Exposition until September 25 for the erection of the Ohio State Buildings upon the Pan-American Exposition grounds. JOHN EISENMANN, architect and superintendent, 489 The Arcade, Cleveland, O. 1291

FIRE STATION.

[At Cleveland, O.]

Sealed bids will be received until September 24 for a fire station and telegraph headquarters. WM. E. SAGE, clerk. 1290

HOSPITAL.

[At Fort Keogh, Mont.]

Sealed bids will be received in triplicate until September 25 for the construction, heating, plumbing and gas-piping of a hospital. GEORGE E. POND, C. O. M. 1291

HOTEL.

[At Memphis, Tenn.]

Sealed bids will be received until September 24 for the construction of the proposed Hotel Gayoso. MEMPHIS HOTEL CO. 1290

COURT-HOUSE.

[At Xenia, O.]

Sealed proposals will be received by the building commission of Greene County until September 18 for the erection of a new court-house. JOHN W. FUDGE, chairman. 1290

FURNITURE.

[At San Juan, P. R.]

Sealed proposals, in duplicate, will be received at this office until September 20, 1900, for supplying furniture, etc., for use by the Legislature of Porto Rico. WM. H. HUNT, secretary. 1290

TRAINING-SCHOOL.

[At Washington, D. C.]

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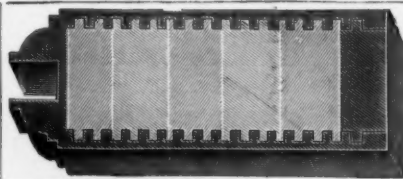
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SECTION 1. No Member should enter into
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builder, contractor, or manufacturer.

SECTION 2. A Member having any ownership
in any building material, device or invention,
proposed to be used on work for which he is
architect, should inform his employer of the
fact of such ownership.

SECTION 3. No Member should be a party to
a building contract except as "owner."

SECTION 4. No Member should guarantee an
estimate or contract by personal bond.

SECTION 5. It is unprofessional to offer draw-
ings or other services "on approval" and
without adequate pecuniary compensation.

SECTION 6. It is unprofessional to advertise in
any other way than by a notice giving name,
address, profession, and office hours, and
special branch (if such) of practice.

SECTION 7. It is unprofessional to make altera-
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tect, within ten years of its completion,
without ascertaining that the owner refuses
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out due notice to the said designer.

SECTION 8. It is unprofessional to attempt
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have been taken toward his employment.

SECTION 9. It is unprofessional for a Member
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conduct or work of another architect except
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a professional journal.

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and unless a competent professional adviser
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assist in the award.

SECTION 11. No Member should submit draw-
ings except as an original contributor in any
duly instituted competition, or attempt to
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remains undecided.

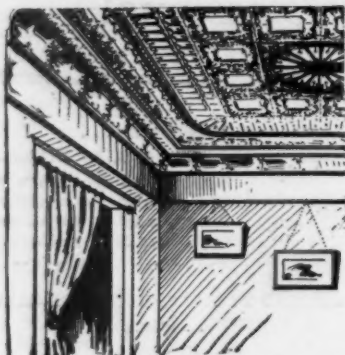
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tects' "schedule of charges" represents mini-
mum rates for full, faithful and competent
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proper personal attention.

SECTION 13. No Member shall compete in
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tect who has been dishonorably expelled from
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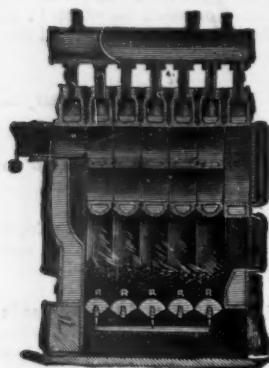
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