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TO OUR SUBSCRIBERS.

DURING the coming year we shall pay especial attention to the architectural features of the World's Fair at Chicago. The gelatine plates of the INTERNATIONAL EDITION in particular will be largely selected from World's-Fair subjects, and subscribers to that edition, will receive also *twelve extra helio-chromes* mainly from the same sources, to be issued at intervals during the year.

All new subscribers for the year 1893, who remit to us direct, in full, before January 1, will receive the remaining numbers of this year from the date of their order.

THE *Engineering News* has done the profession of engineering a service in proposing that a short and simple code of ethics, similar to that in use, for example, in the medical profession, should be drawn up, and, as soon as may be, adopted. It does not, of course, expect the immediate acceptance of a set of rules, but, as it truly says, a code of professional ethics is nothing more than the definite statement of the principles by which honorable members of the profession are already guided; and its value is to be found, not in the novelty of the duties which it imposes, but in the standard which it sets up for guiding, and, perhaps, for criticising, the conduct of persons who either have little experience in professional life, or who might be unable otherwise to resist the temptation to profit by actions which, although of questionable propriety, were not specifically condemned by the profession, and did not involve any loss of professional standing.

THE first rule which it proposes is as follows:

"I. It should be considered unprofessional and dishonorable for any engineer to accept a call in consultation for any work which is already in charge of an engineer, except the call come from or through such engineer in charge. Engagements tendered from principals should be considered or accepted only when there is no engineer already in charge of the work."

We wish we had space enough to quote at length the admirable arguments with which it supports this proposition, but all architects will appreciate the substance of them, which is that, as the calling-in of a consulting expert implies a doubt whether the engineer in charge has done, or will do, the best possible thing for his client, it is due to him that he should have the opportunity to explain his operations to the brother engineer who has been called in to criticise them. If the engineer in charge refuses, at the request of his employers, to call in an expert, his employers are at liberty, if they see fit, to oblige him either to accede to their wishes or resign, and leave them free to do what they think necessary; but, as the *Engineering News* observes, such pressure should come from the employer, not from a fellow-engineer. The second rule proposed runs thus:

"II. It should be considered unprofessional and dishonorable for any engineer to report upon any work which is already in charge of an engineer, except to such engineer in charge. Reports to principals direct should only be made when there is no engineer in charge; nor then when there has been an engineer in charge whose professional acts are impeached in such report, without prior tender of a copy of such parts of the report as may personally concern him for his perusal and response."

THE purpose of both these rules is the same — to prevent men who have probably done their duty with fidelity and skill from being grossly injured, behind their backs, by their fellow professional-men, to whom they should have a right to look for appreciation of their work; but we need hardly point out that the observance of them is quite as much for the advantage of the consulting expert as of the professional man in charge. A physician, called in consultation, who should pronounce judgment on the case without learning all that he could about the symptoms and the treatment from the medical man regularly in charge, would be rated as an ignorant quack, and there is no engineer or architect whose opinion on a work in progress would not be rendered more valuable by consultation with the expert who had been connected with it from the beginning, even though that opinion might be extremely unfavorable to the system according to which the work had been carried on. To learn a man's reasons for doing a thing in a certain way involves no necessary approval of the way in which he has done it, although it is likely to modify very materially a hasty unfavorable judgment; but if the judgment, after the reasons have been heard, must continue to be unfavorable, it gains ten-fold authority from having been prepared with full knowledge of all the circumstances. As the *Engineering News* says, unless the consulting expert "knows at first hands what the engineer's plans and motives were and are . . . he cannot be sure of doing justice either to himself or his employer, or to his fellow-engineer, and certainly not to all three," and most architects can recall instances where a consulting expert has made himself extremely ridiculous in the eyes, even of his employers, by pronouncing judgment upon matters in regard to which he had not been honorable enough to inform himself by application to the person who could have given him the facts required as a basis for an intelligent opinion. It may be imagined that a blunder of this sort does not help a consulting engineer's reputation among owners, most of whom go to experts to get the best information possible, leaving to them the means of obtaining it, while the small minority, who call in experts simply as cat's-paws to help them to play some dirty trick upon a man to whom they are already under obligation, and whom they dare not meddle with unaided, are still less likely to be grateful for a collapse of their plans brought about in such a way.

MR. CARROLL D. WRIGHT, the United States Commissioner of Labor, delivered a lecture a few weeks ago before the School of Applied Ethics, at Plymouth, on the "Statistical Presentation of Industrial Problems," in which he expressed an opinion about compulsory arbitration which, as coming from him, is of great value. In the first place, although compulsory arbitration is put forward by a certain class of labor agitators and muddle-headed sentimentalists as the panacea for all the woes of workingmen, Mr. Wright confessed that he had not yet been able to comprehend the phrase, but he thought that he understood the meaning which those who used it desired to give to it. This meaning he supposed to be that either party in a "labor quarrel" should be entitled to drag the other party before a court, or tribunal of some sort, which should

adjust the difficulty, and should enforce its decision by legal process. "Many people," said the lecturer, "looking no farther than the fact of the difficulty being settled, approve of this method; but the result is nothing less than absolute slavery." This is a rather strong expression for a high officer of the Government to use with regard to a subject at which legislators and politicians sniff, so to speak, with respectful curiosity; but it is obvious enough that Mr. Wright was perfectly justified in using it. "The workmen," said he, "if decided against, are forced by legal process to work for certain wages; if the decision is the other way, the court says that the manager must pay a certain amount for labor. This is slavery in either case." Mr. Wright added that he saw no sense in this sort of tyranny, and we hope that all Americans will agree with him. The way to induce men to avoid quarrelling, and settle their differences quickly and peaceably, is not to put deadly weapons into their hands; and no more effective method could be devised for keeping labor and capital constantly in an uproar than to offer to each party the irresistible power of the law, with which the victor in every squabble could reduce his antagonist to abject submission.

MR. JOHN WARD STIMSON, of New York, the well-known head of the Institute of Artist-Artisans, and his associates in the management of the Institute, have recognized very gracefully the encouragement which the New York *Times* has given to their work by establishing two free four-year scholarships in the Institute, one for men, and the other for women, to be awarded by a jury composed of two members appointed by the *Times*, and two by the Institute. In the letter to the *Times*, making the offer, Mr. Stimson expresses his conviction that young Americans "possess more than average intelligence, ambition, earnestness and adaptability." "Theirs," he says, "is as keen and living an observation of nature as any nation's, as quick a susceptibility to the beautiful, and sensitiveness to the really good in past or present"; "and," he adds, "after twenty years' experience here and abroad, and with many hundreds of students of all nationalities, it is my belief that a far more rapid and generous development, a far more elevated and refined national sentiment, exists in the American character, and is latent for application to American labor." That the native genius has failed to assert itself, he thinks is due partly to its having been led astray by a succession of false systems and fashions, and partly to the persistent neglect of it by the public, which sees no good in anything which has not a foreign stamp; but he hopes that the time has come for the development of an American school of artistic workmanship, and it is certain that whatever earnestness and experience can do toward that end will be done in the school over which he holds control.

HERR CURT MERKEL'S notes on antique engineering, in the *Deutsche Bauzeitung*, close with some observations in regard to house-building, drainage and real-estate speculations in ancient Rome. In all the cities of antiquity, it is certain that house-drainage was imperfectly understood. Rome had the great sewers, built by Etruscan engineers for Tarquinius Priscus, but they were intended originally for draining the marshes which occupied the valleys between the seven hills, and were only incidentally used to convey sewage; and the other sewers that were built emptied into the Tiber within the city limits, so that the vicinity of the river must have been pestilential, and it is doubtful whether any traps were used to keep the stench of the drains out of such buildings as were drained. It was, however, not obligatory upon citizens to drain their houses at all, and the conditions in Rome during the Empire seem to have closely resembled those at present existing in Paris, where few private houses drain into a sewer, most using simply a "fosse," or cesspool. Besides, the frightfully crowded condition of Rome must have had an unfavorable effect upon the health of citizens which even their out-of-door life could hardly counteract.

MOREOVER, besides being unhealthy, the houses of ancient Rome were wretchedly built. It was by no means uncommon to have one fall down, and they seem to have been constructed in the worst style of modern speculative architecture, where not under the restraint of building laws. Wooden studding, lathed with reeds, and plastered, formed the walls and partitions of a large portion of the seven-story tenement-houses of the ancient city, until building was in some degree regulated by Imperial decrees. As to the streets, it is well known that they were so narrow that constant legislation was necessary, under the Empire, to keep them in condition for use. To utilize them for carriages and foot-passengers at the same time, during the busy hours of the day, was out of the question. By Cæsar's municipal regulations, wheeled vehicles were excluded from the streets during the first ten hours of the day, exception being made at ordinary times only in favor of the private carriages of a few eminent persons, and carts conveying materials for public buildings. Materials for private buildings were required to be delivered before sunrise, or during the last two hours of the day. Curiously enough, the days on which public games were to be given were excepted from the regulation, and on those days all vehicles were permitted to use the streets. Whether this indicates that respectable people generally stayed at home on such days, so as to leave the streets more free from foot-passengers than usual, or that the crowd early deserted the streets for the circus, so as to leave room for vehicles, it would be hard to say, but, as a matter of fact, carriages were not much used in any of the antique cities. An edict of Claudius forbade travellers from passing in carriages through any town in Italy, and even the Emperor Aurelian, when he entered Antioch, wounded, felt himself obliged to ride on horseback, because, as the historian says, it was "invidiosum" to use a carriage in a city.

THE natural consequence of the slow and inconvenient locomotion incident to the condition of the streets was, as has been justly pointed out, crowding of the population in the centre of the city, where land soon became extremely dear. Cæsar, in order to make room for the forum which bore his name, bought ninety thousand feet of land, in the heart of the city, for which he paid a hundred million sesterces, or about four and one-half million dollars, making the price per square foot about fifty dollars. Considering the difference in the purchasing power of the precious metals between that time and the present, this would be considered an enormous price for land in London or New York even now; yet Cæsar, not content with his original acquisition, afterwards paid two and one-half millions more for additional land enough to extend his forum to the temple of Liberty. The exorbitant price demanded for land explains why, when the cost of materials was trifling, and that of labor still more so, in comparison with its present rates, such great sums were paid for dwellings by rich citizens. Cicero bought a house which had belonged to Crassus, paying one hundred and fifty thousand dollars for it, while Scaurus, a citizen of doubtful reputation, whose father had risen from poverty, spent four million, four hundred thousand dollars on his house on the Palatine Hill. In such a place, building speculations were by no means unknown, but, as a rule, they were carried on by the rich senators and public officials, who were the only capitalists, instead of by contractors, as with us. One of the most ingenious of these speculations was devised by Crassus. At that time, mechanics were almost exclusively slaves, the free Romans having no taste for laboring with their hands. Crassus quietly bought up all the best building workmen in Rome, about five hundred in number, and, having thus "cornered" the supply, hired them out on his own terms to persons who had houses to finish, and must have men at any cost to do it for them.

THE German *Zeitschrift* of the Engineering Societies gives a rough estimate of the number of locomotives in use in the world, from which it appears that the United States owns thirty-five thousand, or more than Great Britain and Ireland, France and Austria combined. Although Canada has done a great deal of railroad building within the last ten years, it possesses only about two thousand locomotives, or just the same number as Belgium. Australia is given also two thousand, while British India has twenty-five hundred. The whole continent of Africa has seven hundred, or sixty-seven less than Switzerland. The total number in use in the world is estimated to be sixty-three thousand. It will probably occur to some people that, considering that Australia, most of which is an uninhabitable desert, supports two thousand locomotives, seven hundred is a small number for Africa, nearly all of which is comparatively rich and fertile, and that there is likely to be, sooner or later, a great demand for railroads and equipment in that country.

FOUNTAINS.[1] — III.

Fig. 20. Fontaine des Innocents, Paris.

BUT to return to France. In Paris the Fontaine des Innocents (Fig. 20) was erected in 1550 at the corner of the Rue Saint-Denis and the old Rue aux Fers, by Pierre Lescot and Jean Goujon. In 1788 it was transferred to its present position and Pajou was intrusted with the carving of the necessary bas-reliefs for the fourth side. In 1860 it was restored by M. Davioud. The Medici fountain of which we should be glad to give an illustration was removed to its present situation in 1861; it was designed by Jacques de Brosses. The Fontaine du Vertbois, on the north side of the Conservatoire des Arts et Métiers, was constructed in 1712 and restored

Fig. 21. Fontaine Gaillon, Paris.

Fig. 22. Fontaine Louvois, Paris.

in 1866. The Fontaine du Trahoir or of the Rue de l'Arbre-Sec was designed by Soufflot. The Fontaine Gaillon, shown in Figure 21, was erected by Visconti who succeeded in making it a masterpiece and in overcoming the very great difficulty of designing a fountain with but little water at his disposal; the pretty Fontaine Louvois, the silhouette of which is given in Figure 22, is also by Visconti. The fountain of

Fig. 23. Fountain of the Observatory, Paris.

Saint-Michel, by Davioud, is not as good as the one which was erected in 1874 in the Place de l'Observatoire, the sculptures of which are by Carpeaux and Frémiet (Figure 23). The fountains in the Place du Theâtre-Français should also be mentioned.

Passing now to the departments, it would require an entire volume to describe the magnificent water effects that have

Fig. 25. The Buffet, at the Grand Trianon.

been obtained at Versailles. These are not fountains proper, but gigantic compositions comprising extensive groups of fountains: citing haphazard, we note the Basins of Latona and of the Four Seasons, the Bosquet de la Colonnade adorned in

[1] From the French of Léon Benouville, in Planat's *Encyclopédie de l'Architecture et de la Construction*. Continued from No. 881, page 97.

the centre with the Rape of Proserpina, the "Char Embourbé," the Baths of Apollo, the Obelisk or Fountain of a Hundred Jets, the Marmousets and the Basin of Neptune.

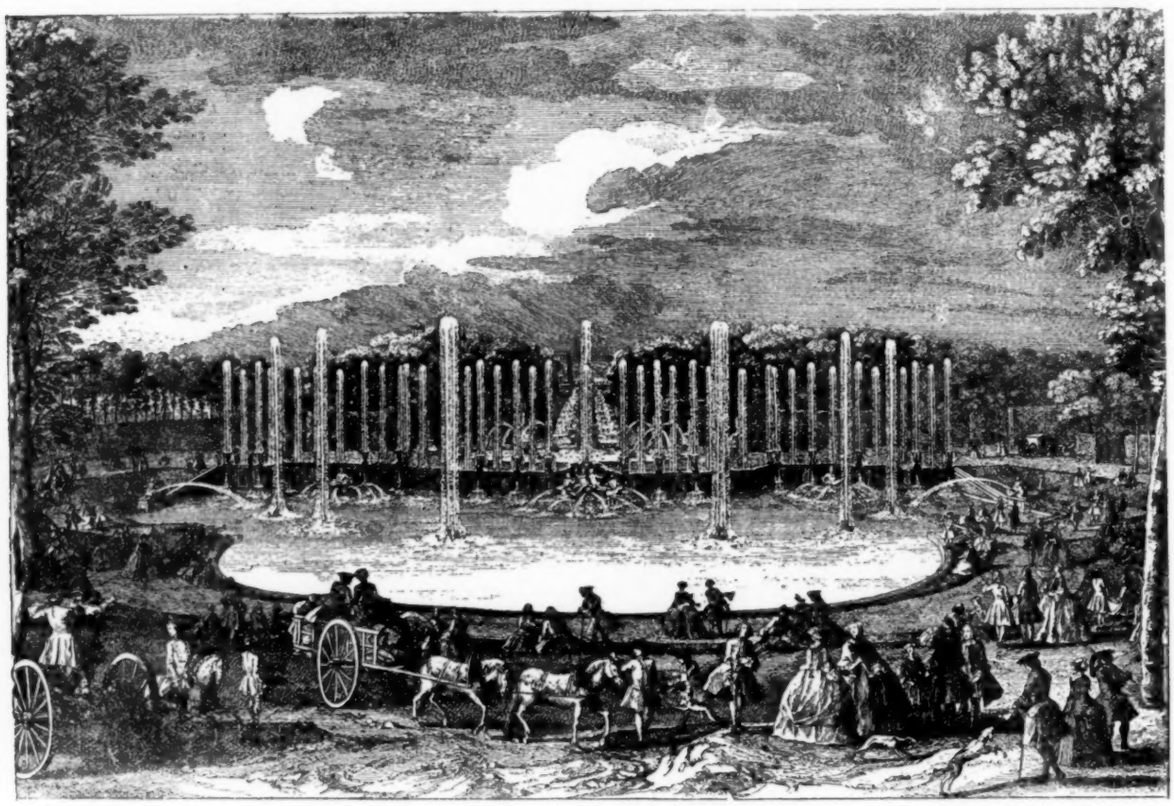


Fig. 24. Basin of Neptune, Versailles (after Rigaud)

Figure 24 presents a fac-simile of an old engraving of this last, an imposing masterpiece; it has been recently restored, but apparently at the time no one thought to consult the engraving, otherwise in repairing the water-jets the serious error might have been avoided of so disposing them that they would, when playing, hide the magnificent central group of Neptune and Amphitrite (by the elder Adam) instead of forming a framework for it.

Fig. 26. Fontaine Molière, Paris.

Let us note here a fact that may be of some practical use to the architect: in all the old water-jets of Versailles the nozzles are made of lead pipe; this seems to us an excellent idea, for the lead can be pierced and bent and shaped at will; it is therefore possible, with this material, to obtain, by feeling one's way carefully, any desired disposition of the jet; when the proper effect is secured all that is needed is to bind the pipes to iron stays to prevent them from being twisted by the reaction of the water.

Not far from the Palace of Versailles are the two Trianons, in the gardens of which are some very pretty fountains; we reproduce in Figure 25 the principal one from the Grand Trianon; this charming work of art, called the Buffet, is by Mansard. Unfortunately it is in such a state of dilapidation that the government is about to consider the question of subjecting it to a complete restoration.

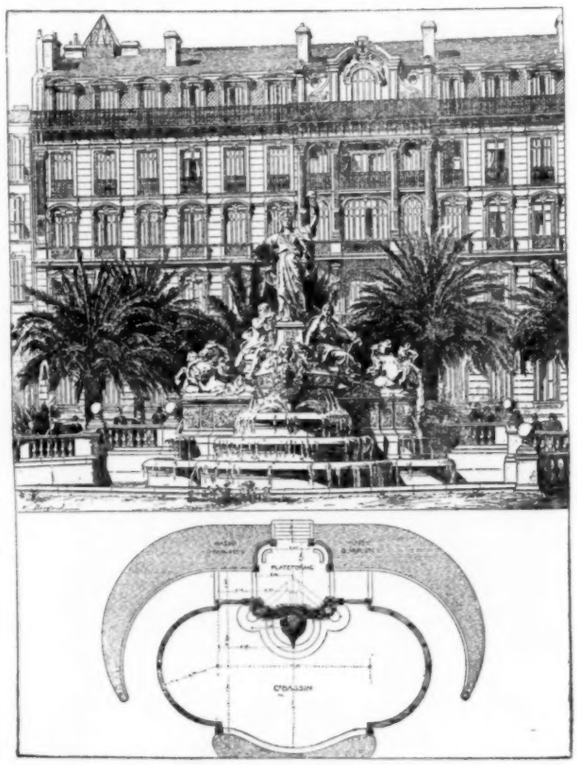


Fig. 27. Fontaine de la Fédération, Toulon.

Many of the other large French towns are embellished with beautiful fountains: at Lyons we may cite those in the Place Bellecour, and, one in the Place des Jacobins, the latter by M. André; at Bordeaux, the fountains of the Three Graces and of Mercury, and the great fountain, all three by Visconti; at Marseilles, the Château d'Eau; at Nancy, the fountains of the Place Stanislas.

Fig. 28. Fountain, Park Lane, London.

Commemorative fountains are at least as numerous as the preceding: at Paris we have the Fontaine Molière (Fig. 26) and the fountain of Saint-Sulpice, erected in 1847, with statues in niches of Bossuet, Fénelon, Massillon and Fléchier; both these are also the work of Visconti. To these may be added the fountain of Victory. At Toulon, there is the new Fontaine de la Fédération (Fig. 27).

Outside of France, we call attention to the fountain of Augustus at Augsburg. We also reproduce (Fig. 28) a puny fountain in Park Lane, London, and Figure 29 gives the monument of Counts Egmont and Hoorn at Brussels.

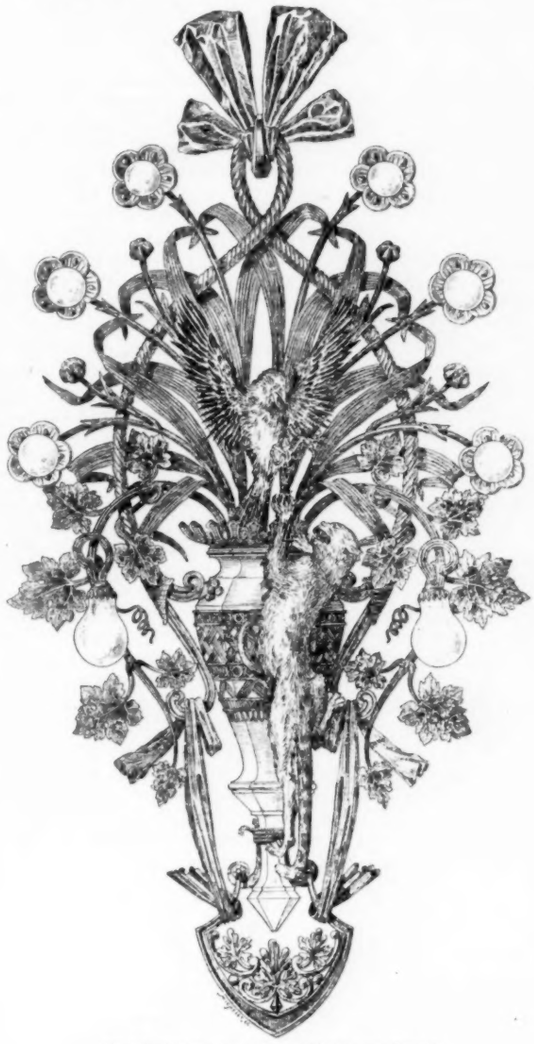
The number of fountains that are at the same time ornamental and commemorative seems to increase as we go farther north; apparently the genius of northern artists demands more precise and more clearly defined subjects; their imagination seems to be less vivid. We are not called upon to decide here the question as to whether a fountain can be properly made a commemorative monument; but we remark in passing that it seems to us useless to have water spouting at the feet of the hero whose memory we desire to perpetuate and also that it is difficult to fancy that one can ever tire of decorative fountains

Fig. 29. Monument of Counts Egmont and Hoorn, Brussels.

in which Neptune, the Naiads, and all the other gods and demi-gods of antiquity figure, when treated in the style seen at Versailles and in the Boboli Garden.

LEON BENOUVILLE.

OFFICE-HELP FOR ARCHITECTS.[1]—III.



Electric-light Lustre. From "*L'Art pour Tous.*"

SECTION VI.—LIMES AND CEMENTS:

§ 73. Kinds:—These are: Common lime, the paste of which hardens only in air; Hydraulic lime, the paste of which hardens under water slowly, slacking when mixed with water; Hydraulic cement which does not slake when mixed with water and hardens promptly under water.

§ 74. Sources:—Practically all of the above are derived by the more or less perfect calcination of limestones of varying composition. Some of the limestones which when thoroughly calcined yield hydraulic lime, yield when partially calcined, hydraulic cement. Generally we may expect the statements in Table I to hold true.

TABLE I.

Parts lime.	Parts clay.	Product.	Characteristics.
100	0	Common lime.	Slakes well and does not harden under water.
90 to 70	10 to 30	Hydraulic lime.	Slakes like lime and hardens under water slowly.
60 to 40	40 to 60	Hydraulic cement	Does not slake and hardens under water rapidly.

§ 75. Common Limes: *Burning:*—Usually done in kilns of an ovoid vertical section and circular horizontal section for small plants, and of a large variety of lay-outs for large plants. The broken stone and fuel (coal preferably) are put in in layers, lighted at the bottom of the kiln, so that as calcination proceeds, the mass may drop down, the lime be removed, and new layers of coal and broken limestone added. This process may be kept up for a long period. The size of lumps, time required for burning for any particular stone, rate of draught, etc., must all be made the subject of experiment, and no data need here be given.

[1] Continued from No. 882, page 114.

Slaking: — Of the various methods, that one is best that is in common use in the locality, unless it is such as to render good results impossible. The lime should be freshly burned, free from all underburnt pieces, and not air-slaked. After slaking, there should be absolutely no hard grains or lumps in it. When there is entire liberty as to methods, spread the lime in a mortar-box, break it up into small lumps, say the size of stove coal, then sprinkle slowly through a rose until about as much water has been added as one-quarter the bulk of the lime; when the lumps have all crumbled, cover with about an equal amount of sand and leave to stand for a couple of days. If slaking is done by throwing in the water in large quantities, it should all be thrown in at once, otherwise a gritty paste will be formed.

Lime intended for plastering should be slaked at least two weeks before using, and during that time should be kept well covered with sand, and in a moist place. Lime for hard finish must be slaked in special boxes, the lime being put in, well-broken up, the proper amount of water being added by emptying barrelsful into the box, and then thoroughly stirring the lime and water with hoes. The paste when drawn off must be passed through a fine strainer.

Setting: — Dry lime when exposed to the air, gradually absorbs water and carbonic acid; it then slowly slakes, and then more slowly hardens. Lime paste gradually absorbs carbonic acid from the air (thereby regaining some of the acid driven out by burning), becoming in time very hard. If permitted to *dry* too quickly, it never attains its proper strength. If frozen, the process of setting is delayed, and if it has progressed to a certain point, the strength is much impaired.

§ 76. **Hydraulic Limes:** *Burning:* — The process is much the same as described for common limes, except that it must be more carefully watched. After burning, the lime must be kept from the air until ready for use.

Slaking: — Is performed in a manner similar to that described for common lime, except that complete slaking must be assured at once, and the paste used before it is twenty-four hours old; otherwise setting commences, and the paste loses all of its value.

Setting: — These pastes reject a portion of their water, thick pastes under water absorb some and then set, a chemical change taking place in each case. All such work when not immersed in water should, therefore, be sprinkled with water, several times daily for a week.

§ 77. **Hydraulic Cements (Portland Cement):** — Takes its name from a natural cement of a very high strength first obtained in England. It is now applied to an artificial mixture of hydraulic lime and clay that gives equally good results. Any artificial cement which shows an average tensile strength neat, after one day in air and twenty-eight days in water, of 400 pounds per square inch, and keeps on increasing in strength for one year — weight 400 pounds per barrel (gross) — may be classed as a Portland cement, although some brands give nearly double this strength and weigh more.

Burning: — The hydraulic lime and clay are mixed intimately in the proper proportions, calcined to the verge of vitrification, and then ground to a powder so fine that all of it will pass through a sieve of 2,500 meshes per square inch. After grinding, it must be kept from air and moisture until used. If kept in dry air, it will keep for a considerable time. If partially set by reason of exposure to moisture, it must either be rejected or re-burned. Rejection is the safer plan.

Slaking: — This does not take place with hydraulic cements.

Setting: — This is a chemical action that occurs in the presence of water. If the cement be not immersed, it must be sprinkled several times a day for a week, to supply the necessary moisture.

The use of salt water, provided it be moderately pure, does not injure the cement in any way. Freezing has only a superficial effect, but alternate freezing and thawing may have a very injurious effect.

Rosendale Cement: — Takes its name from Rosendale, Ulster Co., New York, but is usually applied to a natural hydraulic cement obtained by the calcination of a natural limestone, containing the proper proportion of clay. Neat Rosendale cement, when mixed with water and left one day in air and twenty-eight days in water, should show an average tensile strength of 150 pounds per square inch, though many show more. It usually sets quicker than Portland, attains its full strength sooner, and weighs about 300 pounds per barrel, gross.

Burning: — Is usually done in kilns in manner similar to lime-burning, but the process is not carried quite so far and requires great care in the selection of the stone and the rate of calcination, in order to secure uniform results. After calcination, the cement is ground to a powder so fine that all will pass through a sieve of 2,500 meshes per square inch. It should be kept from all contact with moisture until ready for use. If any portion of a package shows signs of setting, it should be rejected.

Slaking: — Does not take place.

Setting: — Takes place as described for Portland cement. Neither salt water nor freezing injuriously affects the mortar.

§ 78. **Plaster-of-Paris:** — Is found as gypsum, a compound of sulphate of lime with water: usually it is translucent, white or gray, with a pearly lustre and easily scratched with a knife. When calcined, the water is expelled, leaving the sulphate lime as a dry white powder. When this powder is *added to water*, in the proportion of about one volume of powder to one volume of water, the sulphate of lime combines chemically with the water, giving off heat which assists in the evaporation of surplus water, and results in the formation of gypsum again in a compact granular state.

§ 79. **Bituminous Mastic:** — Is a combination of bitumen with quartz and calcareous grains, either natural or artificial. The natural mastics are best known by the names Val de Travers, France, and Seyssel, of which the Seyssel is rather the better.

The natural rock is broken, and then reduced to powder by calcination or by grinding.

In the latter case, the powder is melted and run into moulds to facilitate handling; this is done directly in the first case.

When made artificially, bitumen and powdered limestone are heated together and then run into moulds. For this the Trinidad asphalt is used.

When used, the mastic is usually melted, mixed with a certain proportion of coal-tar and applied hot.

All of these processes require great skill, as the product may be rendered practically worthless by the application of either too much or too little heat. It is therefore desirable to always employ the services of those who make a specialty of applying the material.

§ 80. **Tests:** *Lime:* — Take an average shovelful, put it into a pail and add an equal quantity in bulk of water. Stir with a stick for a time, and then strain through a sieve. If all passes through, the lime has been evenly and thoroughly burned. If there is any residuum, turn quickly into the pail and let the mass stand for twenty-four hours. Then pass through a sieve again, after stirring thoroughly. If all does not pass through, reject as being underburnt, and likely to cause trouble by slaking in the wall.

Cements: — In addition to the tests for weight, fineness, and strength — which take time, but should always be made — take two handfuls of cement and mix with a minimum quantity of water into two cakes — put one in water and the other in air. If the air cake dries of a light color without any particularly well-defined cracks, and the water cake sets with a darker color and without cracks, the cement is probably good. If there is a yellow discoloration, the cement is probably poor. If the cement cracks badly in setting, it is positively poor, and should be rejected, pending the final tests. A number of cakes should be made with cement of known quality to learn to properly manipulate it before using this test to base a decision on.

SECTION VII. — MORTARS.

§ 81. **Composition:** — Mortars may be divided into two general classes:

(*a*) Those intended to bind the several parts of a structure together.

(*b*) Those intended for ornamental purposes.

Under (*a*), we have

- Lime mortar.
- Rosendale-cement-and-lime mortar.
- Rosendale-cement mortar.
- Rosendale-and-Portland-cement mortar.
- Portland-cement mortar.
- Bituminous mastic.

Under (*b*), we have

- Any of the above when used for pointing.
- Lime-and-hair mortar when used for plastering.
- Portland-cement mortar used as a stucco.
- Plaster-of-Paris.

All of the above may be said to be composed of a matrix

and an aggregate, mixed in various proportions as may be necessary to secure the desired results.

The Matrix: — Is lime, cement, or mastic. Its function is to bind together the aggregate so as to convert it into a sandstone, and at the same time bind the minute projections of materials together when placed between them. The addition of the aggregate in all cases weakens the strength of the matrix in almost direct proportion to the amount of the aggregate added.

The Aggregate: — Is almost always a sand. It should be angular in form, of various sizes and absolutely free from all dust, loam, clay or earthy matter, and also from all large stones.

The range in the size of the grains will be determined by the class of work that the aggregate is used for.

For ordinary common brickwork, stucco and masonry, the largest grain should not exceed $\frac{1}{8}''$ in any dimension and they should not form a larger percentage of the mass than ten.

For plastering, pointing, and face brickwork, the largest grain should not exceed $\frac{1}{16}''$ in any dimension, and they should not form more than five per cent of the mass.

To secure these results, the sand should always be taken from a bed, never from the seashore or river bank, unless microscopic examination should show an angular form. The sand should be screened through wire screens having a mesh of the proper size. A sample of it should always be taken, examined under a magnifying-glass, then a handful placed in a quart glass jar, the jar filled with water, shaken, and after standing five minutes, poured off into another glass jar, taking care to keep all of the sand in the first jar. The second jar should then be placed in a quiet place for forty-eight hours and allowed to settle.

If there is a muddy deposit on the bottom of the second jar of appreciable thickness, $\frac{1}{100}$ of an inch or more, the sand should be washed before delivery and then washed again after screening, using a hose and nozzle, throwing a solid stream $\frac{1}{4}''$ in diameter.

If the bottom is only clouded, the sand should be washed after screening as described.

Great care should be exercised to secure absolutely clean sand, since only a very minute amount of dust surrounding each grain, will absolutely prevent the adherence of the matrix.

§ 82. Proportions: — The proportions and the material of which the matrix is to be composed, will depend on the character of the work, entirely.

No mortar will give results as strong as the material used, except Portland cement in the proportion of cement one, sand two, when used with materials having a safe working strength in compression of 800 pounds per square inch or less.

Under § 81 (*a*), the several mortars are arranged in their general order of strength, strongest last, except bituminous mastic, which has peculiar characteristics, which will be given later. Proper proportions for various classes of work will be given in treating of the mortars.

§ 83. Mixing: — Should always be done in special water-tight boxes so as to secure the exclusion of all earthy matter.

Lime should always be slaked separately, and permitted to stand for at least one week before using. This is specially necessary for plaster-work, as otherwise any unslaked portions may slake in the wall and disfigure it.

Cements should be mixed in small quantities, and only as fast as they can be used. Any cement mortar that has been in the mortar box longer than four hours is unfit to use, as it has then begun to set, and will never thereafter develop to full strength.

Mortar that is to be used for pointing or that is required to be waterproof, should have one per cent by weight of powdered alum, mixed with the dry cement and sand, and one per cent of ordinary "soft" soap or any potash soap dissolved in the water used for mixing. When mixed, the alum and potash combine, forming an insoluble compound which renders the mortar non-absorbent. When lime mortar is used in a dry climate, or in very thick masonry walls, add one pound of the coarsest sugar, or the commonest molasses, to each gallon of water intended to be used in mixing, and thoroughly stir the two. This adds to the strength of the mortar, and will cause it to set more quickly. It also prevents injury from freezing to a considerable extent.

In regard to mixing generally, the best results are obtained when the lime is slaked before the sand is added. For cements, the cement and sand should be thoroughly mixed together first and then the water added, with great care, and in small quantities, until the mass is of the consistency of moist brown sugar. The mixing should always be such as to secure as near perfect homogenity in the mass as possible, and for works of any magnitude some one of the mechanical mixers, with provision made for measuring the quantities of the several ingredients, should be used. This will add to the cost of the first large work but will result in ultimately decreasing the cost, and in greatly increasing the strength of the mortar. Continuous mixers should be avoided. The best are those that mix only one batch at a time.

§ 84. Lime Mortar: — Proportions = 1 lime, 5 of sand (by volume). Used for the cheaper class of frame dwellings. The mortar absorbs water and is thrown out by the action of the frost, resists fire well. Limits the strength of wall to three tons per square foot. Should never be used underground.

§ 85. Lime-and-Cement Mortar: — Proportions = 1 Rosendale cement, 2 lime, 6 sand. Used for all works of a fair class. The cement enables the lime to resist the action of frost fairly well, and the lime retards the setting of the cement. In mixing, the lime should be thoroughly slaked first and mixed with sand, and then the cement added as used. Resists fire well. May be used underground for frame structures and the cheaper class of brick dwellings. Strength of wall limited to five and one-half tons per square foot.

§ 86. Rosendale-Cement Mortar: — Usual proportions = 1 cement, 3 sand. Used for all good works below ground, and for first-class works throughout. Resists frost and fire well. Should only be mixed as used. The strength as given below is for walls or piers in compression, in which the strength of the material used is equal to or greater than the strength of the mortar.

TABLE II.

If 1	cement,	1	sand;	strength	15	tons	per	square	foot.
" 1	"	2	"	"	12	"	"	"	"
" 1	"	3	"	"	10	"	"	"	"
" 1	"	4	"	"	8	"	"	"	"
" 1	"	5	"	"	6	"	"	"	"

§ 87. Portland-Cement Mortar: — Proportions vary according to strength needed. Good results for concrete and ordinary work may be had with 1 cement, 3 sand; strength 25 tons per square foot.

Used for footings of heavy structures, chimneys exposed to heavy wind-pressures, heavily loaded piers, etc. Should also be used for vault walls, first-class retaining-walls, sea-walls and concrete. Resists fire and frost well.

TABLE III.

If 1	cement,	1	sand;	strength	40	tons	per	square	foot.
" 1	"	2	"	"	30	"	"	"	"
" 1	"	3	"	"	25	"	"	"	"
" 1	"	4	"	"	20	"	"	"	"
" 1	"	5	"	"	18	"	"	"	"
" 1	"	6	"	"	15	"	"	"	"
" 1	"	7	"	"	13	"	"	"	"
" 1	"	8	"	"	10	"	"	"	"

§ 88. Bituminous Mastic: — Proportions are special and should be determined by actual experiment, as the amount necessary to fill the voids in a cubic yard of stone plus ten per cent. When kept below 150° Fahrenheit, it possesses considerable tensile and compressive strength. Resists frost well. Fuses at 235° Fahrenheit. Its principal use is as a preservative of iron or steel from rust, as a damp-proofing agent, and as a matrix where heavy shocks or vibrations are to be sustained by masonry. Has been used very successfully in laying-up faces of sea-walls where walls composed of the same sized blocks laid in Portland cement were destroyed. Also used very successfully as a matrix in foundation concrete for machinery, where a vibration transmitted to the building, would be objectionable. Its use is described later under § 275 "Machinery Foundations."

§ 89. Lafarge Cement: — Is a patented preparation of cement similar in character to Portland cement, made principally from a natural limestone of hydraulic properties, and itself possessing the property of leaving marble, limestone and other porous stones unstained when used to set them. It is hydraulic in character and should be used for setting any

stone that would be stained by a Portland or Rosendale cement. In setting large stones, mix one part by volume of lime to four parts of the cement to retard the setting of the cement until the large stones are well bedded.

§ 90. Gauged Mortar: — Is a lime-and-sand mortar to which about thirty per cent of plaster-of-Paris is added to make it set quicker; too much plaster will cause it to crack badly and should be avoided.

§ 91. Plaster-work: — For ordinary plastering "sand finish" — the first coat is composed of one barrel lime, two barrels sand, one bushel cattle or goat's hair. Hair should be worked-in after lime is slaked and mixed with sand; second coat, lime and sand in above proportions, no hair; for hard finish, a third coat is put on of pure slaked lime and plaster-of-Paris in nearly equal parts in a pasty form. In addition there is a patented preparation of "rock plaster" on the market which is practically gypsum mixed with certain other ingredients to prevent its crazing when setting.

Also "Windsor Cement" similar in character but susceptible of a very high finish. For all first-class work "Windsor Cement" is recommended as the best plaster finish attainable. When put on wire-lath, it is practically unaffected by fire, retaining its clinch and continuity even when sprayed with water while red hot. The manufacturers give directions for mixing and using which should be rigidly followed.

When it is desired to finish columns and walls up to the wainscot line with a very hard plaster surface "Keene's Cement" is to be used. This cement is similar to the "Windsor Cement," but is as hard as Portland cement.

§ 92. Plaster Boards: — A mixture of gypsum, lime and cork shavings poured over one or more layers of reeds laid longitudinally in moulds. The reeds are depended on for strength and will resist decay for a very long period. Boards 2″ thick are used for suspended ceilings. Boards 1″ thick nailed on two sides of studding, or blocks 4″ and 6″ thick, are used for partitions. They are of service, when a partition or ceiling must be erected in a very short time, as the writer knows of a case where 50,000 square feet were put on, plastered two coats of Windsor cement and kalsomined in three days. Generally not recommended as it is liable to show a multitude of hair cracks, and is easily broken and marred.

§ 93. Papier Mache: — The term is usually applied to a mixture of paper-pulp, plaster-of-Paris, ground cork, fibre and the like cast in moulds or applied to a skeleton of jute bagging; often mixed with plaster and paper-pulp so as to give a better surface when cast. Properly, a mixture of paper-pulp with some dryer, compressed in a mould and then hardened. Tubs, row-boats, pails and a large variety of articles are made in this way.

§ 94. Staff: — A mixture of plaster-of-Paris and New Zealand fibre cast in moulds prepared about twelve per cent too large, to allow for shrinkage: it has been found that the material lasts very well, and could be used extensively in the Southern Middle States for decorative purposes.

§ 95. Cornices: — Are usually run in plaster-of-Paris in which sufficient pure slaked lime has been mixed to prevent it from cracking or crazing. Not more than 2″ of material should be required to support itself, wire nails with large heads, or common nails, or furring being used. Wood, staff, or a variety of similar materials could be used if desired.

[To be continued.]

THE BRICK AND STEEL-FRAME SYSTEM OF BUILDING TESTED IN THE ATHLETIC CLUB FIRE. — THE WORLD'S FAIR DEDICATION, ETC. — THE STATE BUILDINGS. — THE ARCHITECT OF THE WOMAN'S BUILDING.

AT length we have had an opportunity to judge of the actual efficacy of the steel and fireproof construction in the event of its not only being tried by fire, but a hot one. The question has been often discussed as to what would happen should the contents of one of our great buildings get well started into a blaze, and the fear has always been expressed and probably more or less felt by many that an intense heat would crack off portions of the terra-cotta fireproofing, and then columns, beams and girders becoming heated would expand, pushing out walls or else throwing off still larger portions of the fireproofing until eventually all structural work would be exposed. After this in all probability warping, twisting and bending of the metal would cause some parts to give way, and this in its fall would drag down the other parts until finally the whole building would be completely wrecked. There have been several incipient blazes in our fireproof buildings, but up to the past month nothing that could in any way be considered a real test.

The Athletic Club have been recently putting up on Michigan Avenue, a large, expensive and elaborate club-house, which it hoped to occupy the first of the coming year. Already the entire rough work was completed and the finishing was being put into the building. On many of the floors there were piles of hard-wood lumber, while finished material was piled about in every corner; some of the rooms with elaborate wood panelling, etc., were receiving the finish and painters' materials and rags were said to be in many places. Probably never would the inflammable material be more concentrated and easy to burn than at this period, and rarely would any fireproof building have as inflammable contents.

Sunday, November 13, very early in the morning, three stories were discovered completely wrapped in flames, and before the fire-department could get there from only ten blocks distant the interior, according to all reports seems to have been a veritable fiery furnace: so hot a fire had rarely been experienced by the department and really most of the inflammable material was allowed to burn itself out.

The front of the building which has some elaborate Venetian tracery of stone (much of it attached to iron framework) was, between fire and water, most completely ruined, the stone breaking into fragments and falling to the ground while the lighter iron framework was badly twisted. In the interior here and there, patches of fireproofing had fallen exposing structural work resulting in some little bending and warping. From a cursory examination this would not seem to be of a serious nature. In fact the fireproofing stuck remarkably well. So far as could be determined the walls, except the front ones already spoken of, have not suffered in the least and the general result of this unexpected test was more satisfactory for this class of construction than many had dared to hope.

Incidentally there was one question of interest and that is, how did the fire seem to start simultaneously in so many stories, or why did it spread so easily from floor to floor. Suspicion pointed strongly to incendiarism, as a strike had been declared but the day before on account of the employment of some non-union men, and as a matter of fact at least one man has been arrested on the charge and is now in jail, so that there may be interesting developments later.

At last Chicago has seen inaugurated the great Columbian Fair, which it will be her proud honor to see held within her precincts next year. Flags have waved, cannon have boomed, men and women have crowded and jostled each other, and such has been the general enthusiasm that human nature has felt unusually kind, the surging crowd has done but little grumbling and the general optimistic feeling

> "The sun's in the Heaven,
> All's right with the world,"

has prevailed. The decorations used for this gala time certainly were better than those used heretofore on such occasions, one feature noticeable in many of the buildings being the use of shields, with the drapery springing from them as a central point. Of course this method is always much used in foreign cities on such occasions, but has been but little attempted here. Naturally the better class of drapery is much more expensive than the tawdry cotton display used in many places, but the fact that it has been variously estimated that from two million to two million five hundred thousand dollars were expended on decoration and illumination points to the fact that at least good material was used. Much of the ornamentation was carried out from special designs made by artists for the especial time and place, which would, of course, result in much better effect than is often seen. One of the most successfully decorated buildings was one of our large retail dry-goods stores. This arrangement was chiefly of shields and flags, the coat-of-arms of two countries being the central point, around which clustered the flags. The exception to this arrangement was made by two large paintings on the two sides of the building one of America and the other of San Salvador. This exception could hardly be called one either, as around the two pictures larger flags were grouped, after the same manner as the smaller ones around the shields. As the building is a large one, and was entirely covered from the second story to the roof, a very gay and striking effect was produced. The arrangement had not been made by a person knowing nothing of what he was undertaking: the combination of colors had been most carefully considered in the placing of the flags and the coats-of-arms on the shields as well as the two larger paintings were well executed. In this place as in many others the Spanish and American colors held the central and most important position, the old Spanish flag of the time of Columbus, being side by side in many places with the brighter colors of Spain's symbol of to-day. One feature never before used in this city was the introduction of festoons of electric lights, having different colored glass globes. This idea was especially well carried out on the *Inter-Ocean* Building. The corner tower served as the point at which to centre the decoration for both bunting and electric lights. Starting from the upper stories of this part long festoons of bunting and

lights extended across the two sides of the building, terminating at the second, third and fourth stories. In the night this decoration was especially charming, the red, white and blue festoons of swinging lights being a striking feature. The *Tribune* also introduced electricity into its building's festal dress, the shields used on the façade being surrounded with red, white and blue globes, while each flag-staff terminated in a small flame. It is a very noticeable fact in these decorations how much artistic feeling has entered into the plans, and how the better class of arrangements was not represented by long, stringy festoons, dragged across the face of the building. It is a very small feature, but one which indicates what the growth may be in a better artistic feeling here in this city, formerly considered one of low ideals and unlovely surroundings.

The decoration of the Liberal Arts Building was as would be expected very simple, the huge proportions of the edifice making it impossible to do more than give it a simply festal appearance. The arrangement was chiefly confined to the use of flags of all nations, the American and ancient and modern Spanish ones holding the prominent places. A very beautiful reproduction of the old flag of the expedition of 1492 hung above the grand stand. It is a simple white one with a green border and bears in quaint lettering the initials F and Y. Of course the chief grouping of bunting centered above this point, giving a gay background to the equally gay throng upon the grand stand. Cardinal Gibbon's brilliant robe stood out in striking contrast with the quietly dressed representative of our great Republic, Corean and Japanese Ministers helped to continue the bright line of color, while the staffs of our own governors were not far behind in making the scene a picturesque one.

The size of the great Liberal Arts Building was more than ever impressed upon one on this day than it can ever be on any subsequent occasion. The inaugural ceremonies of the Paris Exhibition of three years ago were held in one of the buildings whose seating capacity was only fifteen hundred, while the number of people who filled this vast auditorium must be represented by the figure one with its five attendant ciphers. Filled is, however, not the word to use, for space was still sufficient around the central mass of human beings for the introduction of bodies of both cavalry and foot soldiers, who formed the escort of the different notables. That the strength of the building had had its utmost test, as far as the floor resistance is concerned will be recognized by those who saw the battalions of soldiers entering and marching through it with unbroken step. The Machinery Palace of the Paris Exposition of '89 was the largest roof ever erected with arches alone, but this building could be set down in the Manufactures Building and occupy so small a portion of it that its area would scarcely be materially diminished.

It seemed a good omen that in the midst of so great a number of American people should come the first public recognition of that artistic ability that has helped to make of the World's Columbian Fair enterprise a success. After the reading of the Dedicatory Ode, came next on the programme the awarding of the special commemorative medal to the master artists. These workers were introduced by Mr. Burnham, Chief of Construction, who on their behalf said:

"In August 1890, the World's Columbian Exposition was to decide upon a site for this great exposition. Without hesitation they promptly invited the most eminent of American landscape architects to join them and give advice. The suggestions of these men were approved and adopted. In December it became necessary to select the architects of the buildings. Again the corporation intrusted the work of choosing an expert, and since that time no single important step of the World's Columbian Exposition has been taken without the advice of an expert man. When before has any community so intrusted its interests to its strongest sons? And what are the results? They lie around you. When this day shall stand in the long perspective of the past and your children read the story it will be called an epoch — one of those rare moments which can only with intervals of centuries come. I congratulate the city upon the devotion and generosity of her sons which have made this day possible. I congratulate the company upon the success it has attained by its wise course in suffering its expert advisers to lead it on and in supporting them so nobly with its millions and its perfect faith. I congratulate the old country in the possession of such a populace, whose spirit has risen to such an occasion. And I congratulate the world upon the result.

"My countrymen, you have freed the arm of the allied arts, which until now has been bound since Columbus day, four hundred years ago: you have bidden architecture, sculpture, painting and music be free, and, as has ever been the case when after many centuries a community shakes off the sordid chain of its spirit, the allied arts have repaid your devotion and have produced this result.

"I now have the honor to present to you the master-artists of the Exposition."

The response of Mr. Higinbotham, President of the Board of Directors was, as follows:

"Mr. Burnham and Gentlemen: It becomes my agreeable duty, on behalf of the Board of Directors of the World's Columbian Exposition, to receive from you these buildings which represent your thoughts and skill and labor as master-artists of construction. It is difficult to command language fully adequate to express our satisfaction with your achievements. We have observed with admiration the rapid developments of your plans until there stands before us today structures that represent the ripest wisdom of the ages.

"Never before have men brought to their task greater knowledge, higher aims or more resolute purpose. Never before have such magnificent fruits been the result of thoughts and toil. The earth and all it contains has been subservient to your will. You have pursued your work loyally, heroically and with an unselfish devotion that commands the applause of the world. Your country and the nations of the south will join us in congratulating you upon the splendid issue of your plans and undertakings.

"We accept these buildings from you, exulting in the belief that these beautiful structures furnish proof to the world that with all our material growth and prosperity since the Columbian discovery of America we have not neglected those civilized arts which minister to a people's refinement and become the chief glory of a nation.

"'Peace hath her victories
No less renowned than war.'

"In this exposition, one of the adorning victories of our age of peace, you take conspicuous part, and the work accomplished reflects, and will continue to reflect, honor alike upon yourselves and upon your country.

"In recognition of your faithful and efficient services, and in order to commemorate more substantially than by mere words the successful termination of your great work as master-artists of construction, the Board of Directors have issued this medal, which I have the honor to present to you. A simple token it is, which finds its real and abiding value not in its intrinsic worth, but rather in the high merit which it receives and the grateful appreciation which bestows it."

Such at least are the two speeches reported to have been made, for not one thousandth of the people present were able to hear anything. At the close of Mr. Higinbotham's speech, medals were presented to nearly eighty architects and artists. The little son of John W. Root received the medal which would have been awarded to his father. During the presentations the five thousand voices of the chorus sang Mendelssohn's "To the Sons of Art." This all seems a little like looking backward to those old days "when art was still religion" and men honored "the nobility of labor the long pedigree of toil."

By means of this dress-rehearsal there have been many things which Chicago has learned. Among other facts she has to recognize the one that to successfully handle the crowds of next summer, her railroad facilities must be much greater than they are at present, and that it will not be for one special holiday that she must be able to take care of nearly an equal number of people but for every day for a number of months. The question of feeding and transporting such numbers is a problem which it is well experience should teach one how to solve. It is an amusing item, that of the lunch served in the Electrical Building: eight tons of ham for sandwiches, three thousand pounds of coffee and two hundred and forty thousand doughnuts figure as part of the provisions consumed.

One group of buildings in the Fair Grounds over which exertions have been made that it should be in a condition bordering on completion by the time of the inauguration ceremonies, has been that of the State and foreign buildings. If one takes this section on a separate day from that on which one visits any of the chief buildings, it will be found that here is a group of structures not by any means devoid of interest. Some are characterized by unaggressive good taste and possible lack of any special character, some are noticeable for their eccentricity and general poorness, while some embody certain ideas characteristic of the Country or State they represent and do it so well that the result is very satisfactory.

It is not with pride that we can point to our own State building, which be it said to our shame, is not only bad, but pretentious in its most forward and conspicuous position. Kansas is represented by a rather questionable structure, while an extremely bad one belongs to Arkansas. This edifice has been so influenced by the prevailing Rococo tendency that it looks like a German wedding-cake with its generous allowance of lace paper and ornamental frosting. The Washington State building is only beginning its upward career, but the foundation, if so we can speak of a structure which has no foundation, is impressive enough, made of huge logs from our most distant State. The advisability of incorporating part of a State exhibit into its building in patches and dabs is very questionable. Several States have attempted this, all with poor result. New Hampshire and Maine have managed to spare a small portion of granite to make up a harlequin suit, of a character somewhat resembling those products of a county fair, which are known by the name of crazy quilts. The granite incorporated into the Maine building is by no means its only bad feature. Something has been attempted, the spectator can hardly tell what, but he is at least certain that the result has been a failure. California's building is not far enough advanced to yet pass judgment on. Idaho is represented by a Swiss châlet, a pretty enough little building, but you wonder why Swiss. A very successful building is that belonging to the State of Iowa. An old pavilion was given to that section to be incorporated into its edifice and the architects recognizing the general French character of the structure have made their additions still more decidedly in that style, and have produced a very charming composition. As far as we can at present judge this is one of the best of the State buildings on the Grounds, although by no means as pretentious as many of the State buildings from the eastern part of the country. In point of picturesqueness, it excels them all though much less money has been spent on it than on many of the others.

New York's building is one of a good deal of dignity and impressiveness. It borrows its style of the Italians on the slight excuse of the nationality of Columbus. It was reported that the old Van Rensselear homestead was to be its model and it is somewhat disappointing to find this one, even though it is much more pretentious.

Two States which vie with each other in point of interesting conception, though from an artistic standpoint the buildings of other sections may excel them, are Massachusetts and Florida, Massachusetts with its reproduction of the old Hancock House, and Florida which gives us a very good imitation of the old fort at St. Augustine.

Many of the buildings are only pleasant-looking houses such as can be seen among the cottages of any summer resort or suburb. As club-houses for headquarters for guests visiting from these sections they seem appropriate enough, but as buildings for an exhibition they hardly meet the requirements. Many of them will undoubtedly only be used as club-houses however. With the exception of the English none of the buildings of foreign nations are far enough along to admit of any decision as to their merits. The English building is at present quite satisfactory. It is of light red brick and terra-cotta of the style so often used in English country houses.

It was with pleasure that those interested in Miss Hayden, the architect of the Woman's building, saw her at the Inaugural Celebration. Reports have been circulated to the effect that as a result of overwork she had broken down mentally, and that grave fears were entertained as to what the outcome might be. The reports have evidently been exaggerated, though the fact that Miss Hayden did break down is undoubtedly true, the state of her health being such that it was a question for some time whether brain fever might not be the result. It is said that Miss Hayden had an especially aggravating experience with her superiors, the "Lady Managers," in their desire to incorporate into her building all sorts of bits of design and work, whether they harmonized in any particular with it or not, simply because they had been the work of women. Many of these designs though good in themselves were totally unfit to be incorporated with Miss Hayden's composition. It is reported that the Lady President has been of all others especially trying in this respect, forgetting in her zeal for women in general, what was due to the architect as an architect. It may be that Miss Hayden's experience has been unusual, but the planning and construction of any building with the accompanying dealing with clients is always liable to be "especially trying" and it seems as if it was a question not yet answered how successfully a woman with her physical limitations can enter and engage in the work of a profession which is a very wearing one. If this building of which the women seem to be so proud, whether justly or unjustly need not be discussed here, is to mark the physical ruin of its architect, it will be a much more telling argument against the wisdom of women entering this especial profession than anything else could be. This may, however, as before stated, be an exceptional case. The provocation for worry may have been great, or this especial woman may have been exceptionally weak and nervous.

Much of expected building activity has had a check this fall in the unexpected and sudden rise of building material and consequently the corresponding high figures of contractors. During the last month brick as only one item has advanced to ten dollars a thousand, which with an increase in other materials, makes the cost of building fully twenty-five per cent greater that it was the first of the season. Consequently plans that have been maturing during the summer and on which bids were taken in the early fall with the intention of pushing the work ahead before the beginning of cold weather, have been laid aside to see what will be the condition of things next spring and whether prices will not regain their usual places. Everything in this section of the country is either laid to the wet spring, Mr. McKinley or the World's Fair, so fortunately people have three causes to swear at, as it may best suit their inclination.

BUCRANIA.[1]—III.

Fig. 16. From the Tomb of the Sassetti, Florence, Italy.

AFTER the years of transformation, after the period of the Precursors, and especially at the very beginning of the great Italian Renaissance, during the fifteenth century, when the study of the Classical authors and antiquities was pursued with the greatest zeal and every one was eagerly looking for all relics and even for the smallest bits or scraps of the productions of Greece and Rome; then all at once, flowers and fruits, which had been used everywhere to form ornaments, were put aside, and were replaced in the decoration by ancient elements recently discovered.

The decorators even went so far as to give the first place to decoration of such kinds, without reference either to their true meaning, the symbolization which belonged to them, the rank they ought to occupy, or the surroundings in which they were placed.

There was a boundless fancy for all these elegant, fanciful or picturesque discoveries. All artists vied with each other in the use of garlands, posts, meanders, sphinxes, dolphins, attributes and arabesques, in short, all those thousand fanciful creations of Greco-Roman art.

As a matter of course the bucranium, like its congeners, was heartily welcomed

Fig. 17. From an Italian Manuscript.

Fig. 18. Italian Headpiece.

and was spread right and left, almost everywhere, most often without any care as to its proper place: we see it in cemeteries, churches, palaces, upon doors and columns, frames, frontispieces to books, on chinaware, bronzes, capitals, etc.

Almost always in the hands of imaginative artists the bucranium is nothing but a common and simple ornament, with no symbolization or signification whatever, and one that is used at every turn: it is familiar to every ornamentist, and is used in the same way as roses, acanthus leaves, masks or chimeras, although one sometimes remembers that it belongs to certain friezes and that it would be wise to place it there; when the Via Appia was pillaged in order to give the ancient tombs to some more recent dead, people were reminded that it was the decoration, obligatory as it were, of the sarcophagus, and it was so used by Giuliano da San Gallo for the tombs of the Sasseti in the Church of the Trinity at Florence (Fig. 16).

Fig. 19.

Fig. 20. Spanish Tile.

One is supposed to know this much by heart, and the result is often something conventional, as the one shown on the inferior band of an Italian manuscript belonging to the Bibliothèque Nationale (Fig. 17). If its aspect is too severe or too sharp, it is adorned with light ornamentation; it is decorated with sprigs (Fig. 18, head of page of the Italian edition of Polyphides' dream), with trinkets, pearls, flowers, leaves or stuffs; elsewhere it is a little ornamented in order to render it more attractive. Sometimes being a true realist, the ornamentist adds some serpents to lend horror to his subject (Fig. 19, design of Nicoleto of Modena). Finally, in many cases, the greatest freedom is allowed to the imagination, and its nature is perverted by more or less numerous accessories or by queer additions until it becomes a fantastic and impossible thing, reminding one only of an extant or vanished being, when seen from a distance.

From that time onward this decorative motive was used by all those who followed Italy in her first movement of renovation and

Fig. 21. From a "*Book of Hours.*"

Fig. 23. Border by Ducerceau.

Fig. 22. A Book-border by Holbein.

who were inspired by her fanciful and novel productions. With many elementary types, saved like itself from everlasting oblivion, the bucranium spread itself all over the world; we see it in Spain, France and Germany: everywhere it is welcomed with great delight by sculptors, painters, ceramic-makers, designers, especially during the sixteenth century.

[1] Continued from No. 876, page 26.

Moreover, it was used everywhere under the same circumstances, in the same manner, and even with the same little ornaments which formerly decorated it.

As numerous specimens will be shown later on, we shall limit ourselves to the three following examples: the first is a facing tile coming from Spain (Fig. 20) from Mr. Guillon's work on pictured tiles; the second is borrowed from a "*Book of Hours*," by Geoffroy Tory (Fig. 21); and the third comes from a book-border composed by Hans Holbein (Fig. 22).

Fig. 24. From a Mantelpiece by Philibert Delorme.

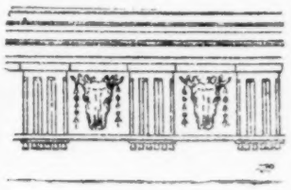


Fig. 25. Doric Frieze.

Fig. 26. From the Chateau de Bornazel.

After this artistic and imaginative epoch vanished, the bucranium is very seldom seen: it comes back from time to time like a reminiscence under the hand of some artist. Moreover it is quite out of

Fig. 27. From a Mantelpiece in the Musee de Cluny.

fashion in the seventeenth and eighteenth centuries. What proper place has this melancholy figure amidst the wealth and magnificence of a Louis XIV, or among the beribboned delicacies and the thousands of gay flowers scattered in profusion during the coquettish triumphs of a Pompadour and Duthé or amid the refined elegancies of the Court of Marie Antoinette.

Its antique severity compels it to be put aside, its frightful and out-of-date aspect seems to demand its abandonment. It is almost forsaken and it is by exception that we see it in some creations which pretend to be Greek or Roman, or which an antiquarian artist like Sir William Chambers introduces in plans for monumental pavilions, for gardens or cemeteries — perhaps the last attempt to maintain in the decoration of edifices this declining ornament.

To-day its symbolism is a matter of very little importance to us. Times have changed everywhere. Unless in works of reconstruction, or in designs made to accompany a text having relation to the past and aiming at an antique effect, we cannot see where it can be placed.

At the best it can but be used in the decoration of a butcher-shop or slaughter-house; still even here one would rightly prefer natural heads or even whole beasts.

Even if one would look upon it as a fanciful motive of decoration, an original invention as it was considered by the Italians in the fifteenth century, it is not at all united in style, it in no way answers to our modern aspirations, to our need of suppleness and charm, not to speak of our constant search for the new and beautiful at any price.

I declare that I am hardly satisfied (and many like me have the same feeling) when I look upon a frieze composed of bucrania alternating with heavy roses, the whole decorating a money-box, as was attempted by a Stuttgart professor. However, we do not intend to strike it out forever from the list of ancient ornaments which can be used again; on the contrary we would like very much to see this ancient type restored, with modern improvements if possible. But we are very doubtful of its success, and until proof to the contrary can be shown, we may say that the reign of this ornament, formerly so flourishing, is over, and that now it belongs to the domain of archæology.

When one tries to take account of the different ways in which the bucranium was formerly introduced by artists in their different reproductions, finished or only outlined, during the course of its history, we notice that they used it either *alone* or *alternated* with a motive more or less important, or, finally, as *support* and *lien d' attache*.

Painted or sculptured upon a tombstone, altar or temple in Athens and Rome the bucranium is a remembrance of sacrifice; therefore it becomes an emblem and a symbol. We see it figured upon numerous funeral *stèles*, sacrificial stones, sacred instruments for sacrifices, taurobolic altars, etc., which things it consecrates by indicating their purpose or function and also serves as a sober and sufficient decoration. It is thus also that it will be the complement of a design sometimes religious, sometimes funereal, or even allegorical, as upon the Vase of Darius (Museum of Naples). Later on, when the decoration does not require its presence, the artist will use it to fill an empty space, to mark a centre, to call the attention to the middle of a composition, as for instance the middle part of a border by Ducerceau (Fig. 23); or the median part of a bandeau of a mantelpiece composed by Philibert Delorme (Fig. 24).

Although the victim's head when placed in full sight spoke fully enough to the eye and its meaning was well understood by all, ancient artists thought best to repeat it several times in order to impress more strongly the represented idea, to give it more weight and to impress more deeply the mind of the spectator. With these artists the repetition is not an uninterrupted series, a tiresome succession of the same subject without improvements, but it is a well-learned repetition intermingled with the regular return of another motive which sets the mind at rest while it gives more value to the ornamentation, thanks to the alternation. So did the Egyptians on the ceilings of their hypogea where bucrania alternated with varied scrollings and the bright flowers of the lotus; likewise did the Greeks and Romans on the friezes of certain Doric temples where sculptured bucrania in the metopes alternated with triglyphs (Fig. 25); it is thus that the decorator of the Etruscan tomb dei Rilievi at Cervetri seems to conform to the established custom when, over the entrance door, he separated two bull's heads by a circular ornament resembling the dish used to complete the sacrifice at the funeral. In some cases this alternation is complicated: instead of being made of two elements, it gives rise to three different motives, and sometimes more. Very often we find among the ancients and during the period of the Renaissance a frieze divided by triglyphs and in the metopes bucrania alternating with roses (Fig. 26, Crowning of a door in the Chateau de Bornazel, Aveyron), or with ornamented cartouches (Fig. 27, Henri III mantlepiece in the Musée de Cluny), and other ornamentations; even sometimes among works in which simplicity and harmony in the construction are the main object, the bucranium without any pretension to showiness alternates with a polished metope.

This freedom in the presentation of details, in the placing of accessories, freedom so well understood by Greek architects, has allowed Hittorff in his restoration of the Temple of Empedocles at Selinuntum to remain absolutely within the antique plan and to work like an ancient master, although only two metopes of the main front have been decorated with bucrania.

It is always with the aim of satisfying this insatiable craving for variety in unity that, when monuments of Ionic or Corinthian style were to be ornamented with bucrania, they usually were decorated by a double repetition, by an alternation more refined than the first and more in conformity with the magnificence of the edifice. Then bucrania were regularly distributed in the friezes of temples or placed at the angles of altars, and the triglyphs of a more severe order, having become useless, were replaced by elegant and well rounded garlands of flowers and fruits, the supple and wavy festoons of which gracefully bound together all the heads. In this case the victims' heads were playing a double part; they became not only true intersecant supporters, perfectly appropriate and resisting, but also by their coolness, rigidity and triangular form, they marvellously

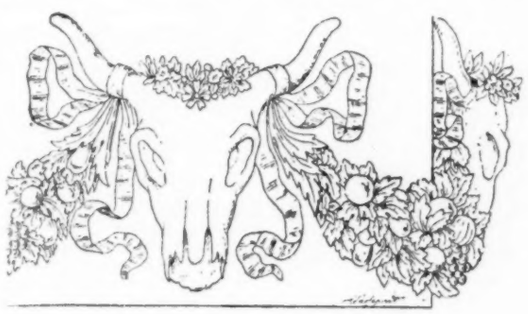


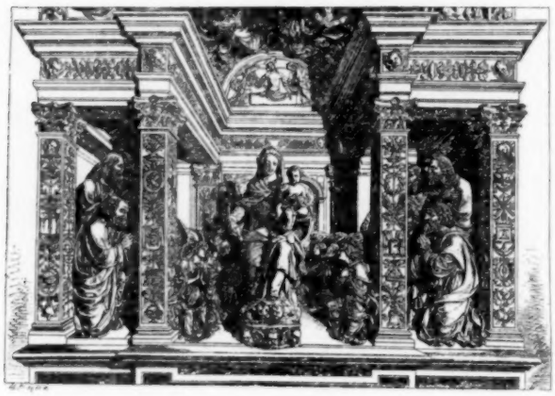
Fig. 28. From the Sanctuary of Balbec.

contrasted with the movement, with the *laisser-aller* and the undulating movement of the secondary motive. This kind of ornamentation, much admired, is represented in numerous and varied examples which belong to all the types now known of the bronze tripod and Roman *stèle*, to which a fragment of the beautiful frieze of the sanctuary of Balbec (Fig. 28) may be added.

JULES PASSEPONT.

[To be continued.]

EXTRACTS FROM THE PRESIDENTIAL ADDRESS TO THE INSTITUTE OF ARCHITECTS OF NEW SOUTH WALES.[1]



The Adoration of the Shepherds: Sculpture by Stefano da Sesto, in the Certosa, Pavia. From *Der Formenschatz.*

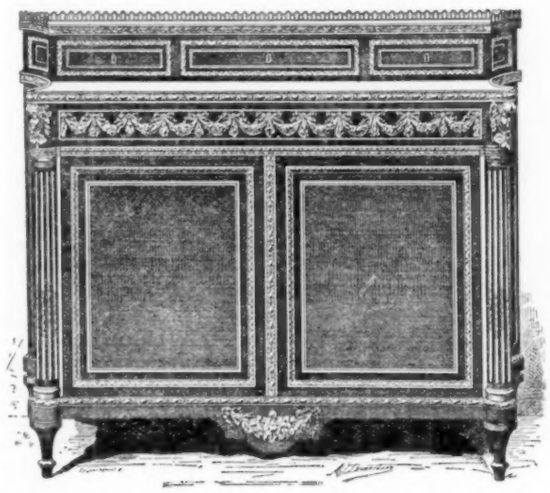
IT is held to be wise in young men to give attention to the written or spoken words of prominent men in the profession. Rondelet wrote thus: "Most modern architects are rather decorative than constructive aiming like the painter and sculptor chiefly to please, indulging in captivating but often impracticable designs induced by their association with the imaginative arts of painting and sculpture"; while Whichcord spoke thus: "Has not the tendency in England of late years been to unduly exalt the art at the expense of architecture; so that architectural science is gradually becoming the specialty of men who are not and do not pretend to be architects." Monsieur Cæsar Daly while acknowledging the honor recently conferred upon him by the Royal Institute of British Architects said: "Architecture is the art of composing and executing buildings and all their surroundings, streets, public places, gardens, parks, so as to answer to the wants, the feelings, the science and the technical knowledge of the society in which the architect is at work. In the world in general you see that one man takes to industry or commerce, another to science, a third to art and so forth, the modes of activity vary, but nature has given to every man a head, a heart and hands, that is to say, thought, feeling and industry, and as the grandeur of architecture is the faithful reflection of human nature and human society, let us not mutilate architecture more than we would mutilate nature." Here are the words of one not an architect, viz., Doctor Tatham. "Fine drawing, fine shading are eye-traps, to flatter and deceive too frequently, and successfully employed by modern architects, to the loss and disappointment of their employers, for the elevation exhibited for show will generally be found deceitful when the edifice is built. The true architect possessed of genius will see the full effect of a projected edifice before he puts pen to paper, or a line be drawn. . . . Building is a most expensive thing, and he who intends to build can hardly buy an able architect at too high a price." In this way my young friends I could go to any length in bringing before you other men's minds in support of my views and in trying to satisfy my desire to inspire you with zeal for our profession's work. I commend to your notice that little pamphlet "*The Architect and his Artists*," by William H. White. Of you, my senior colleagues, let me ask these questions: Do we by example teach and encourage the junior men, how to strive to hold their proper position so that in due season when coming to practice our profession, they shall feel their responsibility and know their duty? Or do we encourage them to aim at holding their position with that firmness and dignity, and self-respect, due to the practise of one of the most "liberal and enlightened and useful of our professions." Are not the words of Waterhouse deserving of most serious consideration by our students, and should we not impress their full meaning on their minds? These are his words: — "The dignity, the greatness of our profession arises from its responsibilities, and in this it differs from all other artistic vocations. The painter has only to please himself in the subject, the inception and execution of his work. If when finished it is a thoroughly successful work in all likelihood it will find a purchaser. The architect, on the other hand, can find nothing to do, can give no satisfactory proof of his capacity until somebody comes to him who is willing to trust him. Consider what that trust is; not only is he entrusted with the expenditure of large sums of money, expended in such a way as to effect the comfort, the happiness, often the whole tone of the existence of those who employ him." To admonish our young men, and take no heed of the conduct of the elders of our profession, would be not only a wrong, but an insult to those preparing to practise. We are at best but students of an older growth. It would be folly to attempt to deny the fact that some of the senior men of the profession exhibit a cunning willingness to give up their true position, to cringe and fawn to patronage in their greed to gain business — with what result? Certainly, in one serious respect, the loss, sooner or later, of the client's reliance in that man's business integrity — a feature in the architect's conduct of such great importance to the client's interest — for, depend on it, he who will place to one side his self-respect will as quickly place to one side the welfare of those associated with him to that extent and in that order as may best suit his selfish purposes. Then, again, in another and not less important respect, that healthy business discipline, so necessary for the mutual good of all employed on that man's work, will be speedily wiped out, thus sacrificing the best results from the combined efforts of capital and labor. There should be from start to finish mutual respect and confidence one for the other, and it should increase as the architect's conception unfolds to the client's view. . . .

The pleasurable, the creditable, and I might truly say the profitable practice of our profession as we have to practise it at the present time, has two deterring influences acting at times directly but more often indirectly, which is more dangerous from its insidiousness. First we have this wretched degrading influence of present day "trades-unionism" over our workmen. Second, the effeminate gentleman-artist element. While one destroys our reliance in our workmen the other cuts up the reliance of the general public in our profession, who are showing in far too many cases preference to place their interests and reliance directly in the hands of some tradesman well-known for his integrity, who in turn is dominated in the execution of his work by the influence of "trades-unionism," all eventually recoiling on the welfare of our profession. Our tradesmen are fast loosing that good old spirit of "Excelsior," which was at one time the pride of the British workman; they who at one period were our most trusted and powerful auxiliaries, and in whom we placed reliance for the true and masterly execution of our conceptions, are now becoming a source of much trouble to us. That relation once existing between our profession and that true and loyal army of skilled workmen of old is now year by year becoming less and less recognized by both parties, doubt and suspicion has pushed out confidence and respect. These two elements of dilettanteism and trades-unionism are increasing the indifference and want of mutual confidence between the workman and the master-of-the-works. I fear there are many rising young architects who appear so deeply and profoundly engaged with the art element and small features of architecture, as to have no time to interest themselves with the doings of their workmen. I say their workmen, in the full meaning of, that to us, important word. How many times when the workmen seeks from this type of man, assistance and information on some important point, is he told "Oh, do it in the usual way, do not trouble me with such common-place matters," while on the other hand, the modern trades-union workman is so absorbed in trying to solve the important problem of the times, viz.: "how not do it" that he has no time to devote to the study of his craft. What is the result of all this to our profession? Why, in addition to the meddling of the expert-specialists, and work being placed in the hands of respectable tradesmen independent of us, we have that most powerful and respected (and deservedly so) profession of Civil Engineering taking advantage of our inattention to the constructive part of our profession. Then with that force of character which is the main-spring in the life of a civil engineer he makes himself more independent than we do of the unreliable character of present manual labor, by the introduction of machinery, which not only lends accuracy to his work but certainty of completion, while with us much of the life and bone is taken out of our work by machinery. The ideal workman of the civil engineer and the ideal workman of the architect have not at present things in common as would be the case if our profession took more heed of scientific construction, and encouraged our men therein, making the civil engineer yield more to the dictation of architecture without losing effect in any of its great scientific achievements. The subject of the modern workman and his position with our profession is one of grave importance to us as architects, and one which we shall be forced ere long to take heed of as much as educating our own men; for without able and skilled workmen where shall we be? There are two classes of the bone and muscular order of men I have always had sympathy with and admiration for, and I trust it may be so till the end of my life. They are the Blue-jackets of our Navy, who, in the past, by discipline and indomitable courage, have secured to us the mastery of the world; and our skilled workmen, who by their skill and muscular energy have accomplished engineering and architectural works of such character as have helped to place the British Empire in its present proud position. Is not this something to prompt the true British workman to halt and contemplate with pride the past, while looking forward and considering that which is, and should be, sacred to every independent able-bodied man, namely, the free exercise of his skill to his own advantage, and jealously repel any attempt to keep all men within some common arbitrary line of efficiency, and worse, dictated to by men unworthy to be classed as their equals? Should not this be looked upon by our workmen as so tyrannical — yes, degrading — as to be beyond endurance? I fear some of our intelligent workmen may retort, and say we, as a profession, are much to blame for the present state of things, as we do not give that heed to, or encourage those upon whom we are solely dependent for the execution of the conception of our designs, for on the workmen we have to depend for fashioning the rough and raw material to such shapes, that when brought into their several places, soundness of

[1] Read at the Annual Meeting held on the 31st of August, by Mr. J. Horbury Hunt, President, F. R. I. B. A., Hon. M. A. I. A.

construction and beauty of design are then — and only then — made manifest. I think we would have to confess we do not give that cheering word or flash of countenance indicating pleasure and satisfaction so often as we might do (even under the present state of things) by way of encouraging those who labor for and with us. We leave our workmen by far too much to the mercy and influence of those who have but a very temporary interest in the result of their craftsmanship. I will here use the words of Blondel. Changing his expression "builder" for "workman," then they read: — "There are three leading points in every fine building — its execution, its magnificence, its conception. The glory of the first is due to the workman, of the second to the owner, of the third to the architect." I am not unmindful that in our profession much careful study and skilful management of labor and materials can be pointed to with just pride and, further, that our profession has made great strides along the smooth and pleasant path of art and up the rugged way of science. While the true masterful architect must be a man of science, he must observe and obey the old canons of architectural taste, and to do this he must have the feelings and aspirations of an artist. In these days of dash and swagger the functions of the true artist are as imperfectly understood as those of the architect. Is it not degrading to see huge signboards stuck up on our buildings, and vans drawn along our streets with the word "Art" painted and gilded on their sides, proclaiming the existence of some dealer or meddler in art. It would be well to coin some other word as the definition now attached to art, and leave the present term to go by the board among those gentlemen-artists I have referred to, and such-like presumptuous pretenders. If we are true to our calling, our sympathies will be with our real brother-artists. Then let us by our own great muscular strength help them to fight the common enemy. I repeat that no other profession is so interested in and connected with all the other arts and sciences. No other conduces so much to the happiness and welfare of a nation. No other provides a home for so many of the sister-arts, no other is subject to such free and unrestrained criticism. The concluding words which I have chosen will I am certain be re-echoed by you all. Sir Digby Wyatt, when speaking to the students at Cambridge University on the subject of architecture, said: "What a nation energetically and with due deliberation wills to have good, it will have good; and we have only, I believe, at this time to will wisely, and with due deliberation, for the arts of this, our native land, to reach a position which may be honorable in the eyes of our contemporaries and descendants."

TREES IN FRENCH CITIES.[1]



Eighteenth-Century Commode, in the Garde-Meuble. From "*L'Art pour Tous.*"

ONE of the chief beauties of the larger French cities and second only to their magnificent edifices and monuments are the trees. The almost interminable vistas of chestnuts and acacias stretching along the broad and superbly-paved avenues as far as the eye can reach, their bending branches almost touching one another in one endless arch of verdure, form not only a delightful perspective for the eye of resident and visitor alike, but serve to add beauty to cities already beautiful and grace and symmetry to whatever might be harsh and forbidding.

It must not be presumed, however, that the existence of this veritable *rus in urbe* is the result of nature's handiwork alone, for science and art have each in turn lent their aid in converting these great centres into tremendous forest gardens.

In short, the planting as well as the maintenance of the trees in French cities is an item of no little import in the annual budget prepared by the municipal council. Nor does this body look upon their preservation as a matter of less consequence than the repairing of its roadways or the lighting of its streets.

[1] Report by United States Consul Horace G. Knowles, of Bordeaux.

The climate and soil of France are not suited to the nurture and growth of every sort of tree, so that those chosen to line the avenues and boulevards of her cities must be selected with no little judgment.

Chestnuts thrive wondrously. They grow well on a not too rich or generous soil, but require at the same time frequent watering at the roots. The elm is also a favorite tree with the professional landscape gardeners, though they are, unfortunately, extremely susceptible to the destructive work of worms and insects. Maples grow slowly, but they are hardy and strong in the end. Add to these the acacia, the linden, the sycamore, the oak and the buttonwood, and the list of trees that live and thrive to advantage in the great Continental cities approaches completion.

France imports a great many of her fruit, as well as shade, trees, and the utmost precaution is taken as to where these shall be planted. Handfuls of earth from each and every spot where a tree is to be placed are carefully examined and analyzed. Upon ground rich and moist the trees from the United States grow best. A sandy soil is most favorable to resinous trunks, and so on in proportion to the teachings of science and arboriculture.

In squares and parks, though more especially along the principal thoroughfares, where the trees are planted about twenty feet apart, particular attention is given to the replacing of the dead or dying by healthy trees of the same species. In this way the line of perspective is never broken, nor is the vision repelled by the absence of a single trunk.

It would seem that a great many American cities, with their tremendous expanse of stone, brick and iron façades, might profit in the provision of shade and verdure by the example set by the cities of France. Sidewalk locomotion would be facilitated in the summer months by equal protection from the sun's rays on both sides of the street, while grace combined with genuine utility would serve to make the avenues as attractive, perhaps, as some of them are now forbidding.

An excellent reason may be ascribed for the excessive care which the French bestow upon their arteries of metropolitan traffic. The nation, as a whole, spends (whenever temperature and the elements permit) the best part of its leisure time in the open air. Home life, in the true Anglo-Saxon acceptation of the term, is something that has, in this land of sunshine and outdoor pleasure, an existence in name only. The Frenchman looks upon the streets of his native city and the adornment of the same much as an American does upon the decoration of his domicile. Hence the attraction of the former and the indifference sometimes displayed in the artistic arrangement of the latter.

Charles Kingsley, the great essayist, if I mistake not, is authority for the statement that verdure is just as essential to life as air itself, and that the kitchen garden of the laborer goes as much to add a touch of sunshine to his moral being as a bunch of roses to an invalid or the Royal Park to the Queen of England. The proof of the theory, which is a truer one than may at first appear, is in the witnessing of the crowds of poor that flock in summer time to any spot where grass and foliage exist. The French know this. They plant trees and lay out flower-beds in every available corner within their cities' boundaries, while the benefit wrought thereby is too self-evident to demand interpretation.

THE ILLUSTRATIONS

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

BUILDING OF THE CHICAGO TELEPHONE COMPANY, WASHINGTON ST., CHICAGO, ILL. MR. J. L. SILSBEE, ARCHITECT, CHICAGO, ILL.

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

SKETCH FOR A METROPOLITAN RAILWAY STATION. DESIGNED BY MR. MAX SCHULZE, CHICAGO, ILL.

HOUSE FOR R. MCK. JONES, ESQ., ST. LOUIS, MO. MESSRS. EAMES & YOUNG, ARCHITECTS, ST. LOUIS, MO.

CALVARY P. E. CHURCH, GERMANTOWN, PA. MR. ISAAC PURSELL, ARCHITECT, PHILADELPHIA, PA.

PUBLIC SCHOOL BUILDING, COLUMBUS, GA. MR. G. L. NORRMAN, ARCHITECT, ATLANTA, GA.

FONTANA DI TREVI, ROME, ITALY.

A DINING-ROOM INTERIOR. DESIGNED BY MR. G. C. TIDDEN, NEW YORK, N. Y.

[Additional Illustrations in the International Edition.]

THE TRUSSES OF THE LIBERAL ARTS BUILDING FOR THE WORLD'S FAIR, CHICAGO, ILL.

ALTHOUGH all the buildings of the Columbian Exposition are of interest, as examples of the way in which the Americans attack the problem of providing structures of great size to serve a temporary

purpose without betraying their transient character, yet none of them possesses the importance from an engineering standpoint of that devoted to the industrial arts. But, although this forms part of the exhibition, it is on such an immense scale that it has, necessarily, the solidity of a permanent structure. In point of span, it has only one rival in the world, the Machinery Hall of the Paris Exhibition. The exact figures are as follows: the Paris Machinery Hall, length, 1,380 feet; span, centre to centre of piers, 363 feet; area, 900,000 square feet; the Industrial Art Building, length, 1,268 feet; span, centre to centre of piers, 368 feet; height to under side of girders, 206 feet 4 inches; height to the top of the ventilating lantern, 245 feet 6 inches. The next largest building is the St. Pancras Station, London, of which the span is 239 feet 6 inches. The time available between the inception and the opening of an exhibition is so short that manufacturers have to pay great attention to the question of erecting these large structures in order to complete the work in the period allowed. In this case, the Edge Moor Bridge-Works signed the contract on December 24, 1891, and undertook to complete the work before August 15, 1892, so that they had only seven and one-half months for this immense undertaking.

Our two-page plate this week illustrates the method of erecting the roof. Each span is pivoted at three points — at the springings and at the apex — to simplify the calculation of the strains, and in this respect follows the example set at Paris. In other points there is a great divergence between the two designs, the Paris arch being a plate girder with a spandrel filling (see *Engineering*, Vol. XLVII, page 461), instead of the light, braced structure which we illustrate. The methods of erection were also dissimilar, as might have been expected from the genius of the two nations. In the matter of dealing with large pieces of framed work, the Americans have nothing to learn from the rest of the world, and it is not surprising that they should have reduced the time of erecting a span to one-half of that which was thought wonderfully short in France. The general plan which was followed is comprehended by a glance at our illustration. Each half of each arch was built in two sections: from the ground to the point *A* was erected in place, and from the point *A* to the apex was put together on a false work erected on a movable stage, and was afterwards hoisted into position and connected to its fellow. The movable staging, or traveller, was constructed of three towers, braced together to form one structure. The two side towers were each 134 feet high and 50 feet wide, centre to centre of the timbers, measured longitudinally of the building. The central tower was in two stories; the lower part was 134 feet high, like the side towers, but extended to a width of 80 feet by raking side struts. The summit of the second story was 222 feet 6 inches high, its upper platform being capable of being lowered when the staging had to be moved. The sizes of the principal members are given on the engravings. The whole structure was mounted on twenty-eight heavy wheels, 20 inches in diameter, running on eight lines of rails, carried on false work erected after the floor had been completed. It contained about 190,000 feet (B. M.) of Oregon fir lumber, and 75,000 pounds of iron; its weight was estimated at about 700,000 pounds.

The width of the traveller, centre to centre, was the same as the distance between the arches, 50 feet, and hence it provided for two of them being built at once. To allow of it being moved, its greatest dimensions fell within the lower boom of the arch, except in the case of the upper deck, which, as we have said, could be lowered. This necessitated the use of very long jibs or booms for erecting the outer portions of the upright part of the arch. Four booms of 62 feet length projected from each end of the traveller, and were served by two hoisting-engines of 24 horse-power, each having six independent drums. The material was run into the building by temporary tracks laid parallel to the traveller, and was lifted by these booms and built into place, the side-pieces of the arch being meanwhile steadied by shores from the traveller. On reaching the point *A* another system of construction was adopted. The part already completed was firmly connected to the scaffold by means of adjustable loop rods and hydraulic jacks, as shown in Figures 5 and 6.

On the upper section of the central tower were four booms, each 36 feet long, worked by a 24-horse-power engine, with six winding-drums at the ground level. These booms were employed to lift the material for the upper part of the arch, and to lay it on trucks. From these it was taken by two smaller travellers running on the main traveller deck, and laid on the curved false work ready for erection. To facilitate this, the pins *A* were worked into the arch; they formed a pivot and starting-point for the new pieces. The comparatively light character of the upper part of the arch enabled the halves to be rapidly completed. Two adjoining half-arches were then connected together by the purlins and sway rods and hoisted into position from the central tower. As the half-arches overlapped on the false work, one had to be lifted before the other was completed. When this latter came to be raised, it would have fouled its companion just as it was attaining its highest position, and, to prevent this, the pins *A* were forced apart from one another by the hydraulic jacks through an additional three feet. This allowed ample clearance space to get the half-arches into position, and then to allow them to come together to meet on the pin *C*. The jacks were then slacked back until the joints at *B* closed, and were secured by bolts. The pair of arches then stood firm and safe. Each pair of arches, when completed, weighed about 430 tons, while the weight of each piece lifted from the central tower was 32 tons, except in the case of the end arches, when it was 40 tons.

To move the traveller, ready for the next pair of arches, the end booms were swung round and the central tower lowered. Three 24-horse-power hoisting-engines, each having six drums, were set to work, and the structure drawn forward through one hundred feet. This occupied forty-five to sixty minutes, while lifting and raising the tower and the miscellaneous work of getting into position lengthened the time to half a day. The lantern frames, jack-rafters, etc., were put in place subsequently by the aid of small travellers running on the purlins.

It will be readily conceived that the method of working, which was devised by Mr. S. P. Mitchell, assistant-manager of the Edge Moor Bridge-Works, enabled the erection to be carried out very rapidly, since two arches were always in hand at one time. The first pair of arches occupied nine days of ten hours, the second pair eight days and the fourth pair five days. It will be interesting to compare these times with those occupied in the erection of the spans in the Machinery Hall at Paris. The work was there divided between the Fives Lille Company and MM. Cail & Co. The former put the ironwork together on the ground for each span in four separate pieces, and then raised them into place. The scaffolding consisted of a tall, central gantry, as high as the middle of the roof, and of two side platforms. These three structures were independent of each other, and ran on rails. The central tower was 72 feet long, 62 feet wide and 144 feet high. The width of one bay being 70 feet 6 inches, the gantry was wide enough to include two consecutive girders, while its upper part was formed to the same contour as the under side of the roof. The side scaffolds were also formed to the same contour as the roof, and covered with planking. The side of the arch, nearly up to the point *A* on our two-page plate, was built on the ground. Its lower end was then engaged with the bottom pivot, and it was raised into position about that centre. The remaining portion of the half-span was also built on the ground, and then lifted bodily until one end rested over the central structure, and the other end over one of the side structures. The pieces were then riveted together. The first bay was completed in twenty-three days, the second in sixteen days, the third in twelve days, and the rest in ten days each. The Cail Company followed quite a different plan. It consisted in constructing a narrow scaffolding, the top of which was the same form as the inner side of the arch. Portions of the girder, not exceeding three tons in weight, were riveted-up on the ground, and then raised and put together on the staging. The scaffolding consisted of five stages, 52 feet 6 inches, 59 feet 6 inches and 65 feet 7 inches long, and 26 feet 3 inches wide. At a height of 33 feet from the ground these were strongly connected by braced timbers, and over the top of the stagings a continuous planking was laid, corresponding in outline to the form of the roof. There was a second platform at a height of 114 feet from the ground. There were also two independent movable stagings running on rails outside the spans. The first girder and bay were completed on May 24, 1888; the second girder and bay were finished in thirteen days, as were also the third; the fourth and fifth were completed in twelve days; the remainder took ten days each on the average.

It will thus be seen that the work at Chicago has been done with unprecedented rapidity. In seven and a half months detail-drawings were made, material ordered, 6,000 tons of work executed, delivered from Wilmington, Del., and erected on the Exhibition grounds. The plate and the foregoing description are copied from *Engineering*.

APARTMENT HOUSE, MUNICH, BAVARIA.

This plate is copied from *Architektonische Rundschau*.

"LULULUND," THE HOUSE OF PROF. HUBERT HERKOMER, BUSHEY, ENGLAND.

This plate, copied from the *Art Journal*, represents, we believe, the design which Mr. Richardson made for the exterior of the building whose interior in all its parts had already been designed and the decorative treatment of which had already been actually executed by the gifted owner, his father and brothers. In exchange for the design the artist painted the architect's portrait.

ST. JOHN'S CHURCH, CALCUTTA, INDIA.

The Church of St. John, in the city of Calcutta, is the original parish church of the whole Presidency of Bengal. The present building was consecrated in 1787, and is the sixth edifice in succession that has, since the time when Hooghly was the company's capital in "The Bay of Bengal," held the rank of sole Presidency church.

The traditions of the parish, together with a growing series of parish registers and other records (commencing 1713), have been handed down to the present time through a line of thirty-eight incumbents of the senior and thirty-eight of the junior chaplaincy (not reckoning officiating appointments) from the first Bengal chaplain who came out in the reign of King Charles II.

1. The earliest in the succession of Presidency churches was the factory chapel at Hooghly, to which allusion is found as early as 1679.

2. The next was some "decent and convenient place" devoted to divine worship within the original Fort William, of which nothing is

yet known; but where the chaplains ministered until the consecration of St. Anne's.

3. The third was the small but beautiful church of St. Anne, built by public subscription, and consecrated, by commission of the Bishop of London, on June 5, 1709. This church was destroyed in 1756.

4. The fourth was the old Portuguese church seized for Anglican use on the recovery of Calcutta, but restored in 1760 to the Portuguese.

5. The fifth was St. John's Chapel, built within the ruined Fort William, which continued to be the Presidency Church, from July 1760 to the consecration of the present building.

6. The latest of the series, the present noble basilica, was, like St. Anne's, built by public subscription. It cost Rs. 1,84,136–14–11, and was consecrated on St. John the Baptist's day 1787, by commission of the Archbishop of Canterbury. Governors-General Warren Hastings and Lord Cornwallis each took an active interest in its building; and Lord Minto, in its improvement in 1811. In 1814, December 2d, Bishop Middleton was inducted within its walls into possession of the See of Calcutta as its first occupant. St. John's then, as being the chief church of the Presidency, became the cathedral of the diocese until St. Paul's was consecrated in 1847. Here five bishops were enthroned, and two of them buried. The chair in which they were all enthroned is preserved in the church, and within the walls hang the funeral hatchments of four of them.

St. John's is a comprehensive monument of the history of the British in Bengal. Within or without her walls are memorials of an illustrious line of Indian worthies beginning with the mausoleum of the father of Calcutta himself. Every generation is visibly represented in some manner or another. Among the earlier tombs and memorials are those of Job Charnock (1693), the founder of Calcutta, Surgeon William Hamilton (1717), the author of her commercial prosperity, and Vice-Admiral Charles Watson (1757), her liberator from Mahomedan occupation.

The church is an imposing edifice in a Greek style, but with a steeple; this latter is the only stone building in Calcutta. Within the church are several paintings and pieces of marble sculpture of great merit. Among these are Zoffany's famous altar-piece and two monuments of remarkable beauty to Lieutenant-Colonel James-Achilles Kilpatrick (1805) and Alexander Colvin (1818).

The area of the parish, which originally embraced the whole Presidency of Bengal, has been retrenched by successive enactments, until in 1869 its present limits were assigned. These practically make the parish to be now but the strip extending through the middle of the town, between Esplanade and Hare Street, and the roads extending eastwards from them as far as Wellington Square.

The parish is the only one in Bengal constituted legally after the English model; its ancient select vestry of chaplains and churchwardens having been reorganized as at present by the Governor-General in Council in 1835. This select vestry has perpetual legal succession, and forms a body of trustees of many charitable endowments and governors of the free school.

COMPOSITE CAPITALS DRAWN BY INIGO JONES.

THE Duke of Devonshire kindly lent to the *Building News*, from which this plate is copied, several of the original studies belonging to his famous collection of Inigo Jones's drawings, now at Chatsworth, and in the first instance brought together by the architect Lord Burlington, aided by Kent the architect. A few months ago a large number of these designs and drawings, on being removed from Chiswick House, were exhibited in the galleries of the Royal Institute of British Architects, thus directing public attention to the subject, which cannot fail to be of interest to architects, particularly those who value their calling as an art, and to-day we print a double-page plate of some more studies of the same character; but no two are exactly alike. Jones won the credit of being the first to introduce the Palladian style, though his earlier efforts, before he became Royal Surveyor, were in the direction of the Gothic manner then in vogue. None of his drawings of this earlier period of his career now exist seemingly, for, being unknown and comparatively obscure, no value was set upon his studies. Many of his drawings later in life were devoted to wild and fanciful conceptions for the scenery of Court plays at the time Jones held the appointment of Master of the Court Revels. They show, at any rate, the brilliant imagination of Jones, and in the actual construction of the scenery he must have exercised considerable ingenuity. The talent for variety and freedom from the restrictions of Classical models evinced by these theatrical drawings is conspicuous also in the sketches for composite caps, which we have chosen for illustration to-day. They are all refined, and none are coarse or vulgar or commonplace, and must be taken as an honest attempt on the part of a master hand to get away from the limits of past examples, though none can deny the purer beauty of the Grecian types, so dear to the purist. Such purity is out of place in the multiform needs of much modern building.

THE ETON MISSION CHURCH, HACKNEY, WICK, ENG. MESSRS. BODLEY & GARNER, ARCHITECTS.

CATHEDRAL COURT, GLASGOW, SCOTLAND. MESSRS. BURNET, SON & CAMPBELL, ARCHITECTS.

CHURCH OF ST. PIERRE, LISIEUX.

THE view of the north transept of the Church of St. Pierre (which is supposed to have been built in atonement by a bishop for his participation in the trial of Joan of Arc) is taken from a drawing by Mr. Bartlett, which was seen in this year's exhibition of the Royal Academy.

SHOPS, OXFORD STREET, LONDON, ENG. MR. CHAS. FORSTER HAYWARD, F. S. A., ARCHITECT, LONDON, ENG.

THE buildings which we illustrate to-day are in Oxford Street, with the corner block extending in Princes Street. Having the Circus in full view, they occupy a commanding position, and so are designed with special care; and there are more projections, etc., to break the monotony of the street-line than usually can be obtained. The construction is chiefly of Portland stone. It seems a pity that the exigencies of trade and the fancied requirements of business tend to hide, if not disfigure, the most careful work of the architect, and that balconies only carry large advertisement boards, while enormous letters run across mouldings, strings and even window-openings. To the ordinary mind it would seem that the outward form of the building ought to be sometimes considered as well as the style of advertisement employed to get the best effect.

FISHING LODGE, TILFORD, SURREY. MR. RALPH NEVILL, F. S. A., ARCHITECT.

THIS lodge has been built for Colonel Davis, F. S. A., at Witmead, near Farnham, and is intended to furnish quarters for the owner pending the completion of a mansion, the plans for which are in preparation. The walls up to the plinth and six inches of concrete under the floor clear of the ground are formed of selenitic concrete of gravel, dug on the property, and the upper part is of Burnettized timber filled-in with concrete, the internal and external timbers being fastened with staples to one-half-inch iron rods in the middle of walls. The roofs are of local tiles, fixed into selenitic plaster.

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.*]

WHO WAS THE EMPLOYER?

NEW YORK, N. Y., November 14, 1892.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Could you kindly give me through the columns of your paper, your opinion on the following case.

By so doing you will greatly oblige, Yours truly, X. Y.

A restaurant-keeper, Mr. A. asks a contractor to give him the cost of a proposed extension to his place. The contractor not being able to tell, calls me to the premises where we happen to meet Mr. A. and to whom I am introduced as the architect. Both explain to me what the requirements are.

I prepare a set of plans and see Mr. A. who suggests some changes. Another set of drawings is made and I submit them to Mr. A. who says it is just what he wants. Notice that during these two visits to Mr. A. I never saw the contractor. I obtain different estimates and report to Mr. A who thinks it is more than he cares to spend.

A few weeks after in speaking of bill for my services Mr. A. says he had nothing to do with me but asked the contractor to give him an estimate and that is all.

Can this Mr. A. be compelled to pay my bill? Could I easily obtain judgment from any court?

Or is the contractor the only one to have to pay for my services?

X. Y.

[IT does not seem to us that the facts, as described, indicate any intentional employment of X. Y. by A. So far as we can see, A. was justified in supposing that X. Y. was brought in by the contractor, to help him to get the job of alteration, by making an acceptable plan, and it does not appear that A. did anything more than give the architect information as to what he would like. We are inclined to think that all the parties, including the contractor, himself, thought at the time that the work was being done for the contractor, and we cannot see how any one else can be expected to pay for it. — EDS. AMERICAN ARCHITECT.]

ELIGIBILITY TO MEMBERSHIP IN THE A. I. A.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — A firm of contractors A. & Co., have two departments, viz., "Building Department", and "Architectural Department."

This latter department is now entirely independent of the other department, in fact, does considerable work that is executed by outside contractors.

The Architectural Department is in charge of an architect who employs the draughtsmen, and he really does the whole business yet the work goes out as A. & Co., "*Architects and Builders.*"

Now, from a professional point of view, how is Mr. Architect considered, is his business strictly legitimate as an architect?

Would he be recognized by the American Institute of Architects?

What is your idea of this way of conducting business?

Please publish answer in next week's *American Architect*, and oblige,

ARCHITECT.

[Such an arrangement as the one described is not very uncommon, either here or in England, and, while it is certainly desirable, on many accounts, that architects should not be dependent upon builders, we see no reason why a skilful young architect, who does his work with perfect fidelity to those who trust him, should be cut off from earning a living, if he wishes to do so, as a recognized subordinate in the employ of a firm of builders; or why his professional brethren should refuse to associate with him. If his work goes out under the name of his employers, we suppose that he would not be regarded as "practising independently," and would therefore not be eligible as a member of the Institute of Architects, any more than a draughtsman or other assistant would be; but this fact would not imply any reflection on the professional character of either. — Eds. American Architect.]

NOTES AND CLIPPINGS

Lamination in Stone. — All sandstones may be grouped in three ways: (1) Those that are very hard, very compact, very fine in grain and, generally speaking, of a pale color; (2) those that are durable but costly; (3) those that are hard and laminated. That is the character which belongs to almost all rocks that have been found in water, but in some it shows itself more markedly than in others. In stones which are completely laminated, the appearance is like sheets of paper placed one over the other, and you can almost separate them. Those stones are easily perishable. There are, however, laminated stones of good quality. These are generally not of very fine grain, although they may be so. They are most frequently of a mixed grain, made up of particles of sand and small pebbles of different sizes. Very often they have reddish tints of color, owing to the presence of iron, and they are often very irregular in their character. There are also some soft stones which are laminated, and generally red, but soft and bad. These are the three kinds of sandstone. They are subject to decay in this way: First, from the lamination. Having been formed in water, they have been deposited in beds one over the other, and never become entirely free from water, and when exposed to the air are liable to give off the water by evaporation, and take it in again by absorption when rain comes or when the atmosphere is damp. After this, if a change of temperature follows, and a severe cold sets in, the temperature of the stone passing below the point of the extreme density of water, the water begins to expand. Then, again, water contains foreign substances floating in the atmosphere which are soluble in water. These substances include a large number of gases, acid gases for the most part, but some others. For example, they include carbonic-acid gas, and carbonic acid dissolves in water; they include also sulphurous acid, passing into sulphuric acid, and this is taken up by the water. They include also sulphate of ammonia, all these substances being produced in the atmosphere of large towns. These substances entering into the body of the stone begin to act upon the cementing medium. If the cementing medium is easily acted on chemically by these substances, it is, of course, very soon removed. If it is not easily affected by them, then the stone remains unaltered; but, generally speaking, it is the case that sandstones that have either lime or clay as their cementing medium are more or less affected by foreign substances entering into them through the atmosphere. There is then a cause of decay in the sandstones, and the sandstones, when they are very absorbent, generally become readily disintegrated in this manner. Sandstones are not extensively used in London for building, but they are very much employed in many parts of the country. — *The Architect.*

An Experiment in Heating and Ventilating. — An interesting experiment in heating and ventilating a private house is described in the *Popular Science* for October. In a house built on marsh land, with a river on either side, and surrounded by houses, some of them stained with damp to the height of six or seven feet, this house of fourteen rooms was kept both warm and dry by the use of "ten tons of English household coals per annum." Indeed, so extreme was the dryness that it became necessary to place a large number of plants in different parts of the house to afford moisture and prevent the furniture from cracking. The entire house was so thoroughly warmed that doors and windows were constantly opened, "and this in spite of the exceptionally cold and damp nature of the surrounding soil, and the exposed condition of the house." The walls of the house are made of porous bricks, and these walls are double, with a space between them, "like one box inside another box, with a space of four to five inches between the two boxes." The furnace is placed outside the cellar, at the back of the house, and the heat and smoke from it "pass into a chamber, built in the cellar." "From this cellar and going all round the outer walls of it there is an enclosed passage," in the centre of which is suspended a "metallic flue" that answers as a chimney and warms the air in the passage. In order to retain the heat the walls of the passage are covered with "sluck wood," which is well known as a non-conductor. The ten inlets for fresh air are covered with "metallic gauze." The air warmed in the passage described, which is kept at a temperature of between 114 degrees and 122 degrees Fahrenheit, rises between the openings in the wall and comes out in the large attic under the roof of the house. The success of this system of ventilation is dependent in a large measure on the porousness of the walls, and for this reason they are neither papered, painted nor plastered, but hung with woollen tapestries tacked on wooden frames. It is claimed that such a covering maintains the warmth of the walls, and that the disagreeable sensations we sometimes experience when it rains are the result of moisture "blocking up the pores of the walls." Contrary to the usual theory that worsted wall-coverings are a menace to health, M. Somesco, the owner of the house, calls them his "microbe-traps," and adds: "If I have any reason to believe that injurious microbes have been introduced into my house, I know pretty well where to find them. It would take but little time or trouble to unhook all this drapery, to put it into the disinfecting oven, and there superheated steam under pressure, without injuring the cloth, would assuredly kill the microbes."

A New Peal of Bells for London. — A complete peal of bells, which will be excelled in the Metropolis only by the great peal of St. Paul's Cathedral, is to be placed in the central or "Queen's" tower of the Imperial Institute, South Kensington. The bells are to be ten in number and will be known as the "Alexandra" peal. The tenor will be two tons in weight, the total weight of the ten bells being over eight tons. When placed, the peal will be the highest in the country, as the bells are to swing in a chamber 200 feet above the level of the ground-floor of the main building. The bells are the gift of an Australian lady to the heir to the throne, and the only condition specified by the donor is that they shall be rung on the birthday and accession day of the Sovereign and on the birthdays of the Prince and Princess of Wales. They are to be fully completed and will be rung on the occasion of the inauguration of the Institute by the Queen next year. — *Invention.*

TRADE SURVEYS

Business is better in many respects than a month ago. One reason for this, but not a sufficient one, is that buyers in nearly all avenues have been buying only what was absolutely necessary. Imports for October were about one-fifth larger than same month last year, and exports almost one-fifth less. Speculative movements are unimportant. Railroad net earnings for the year show a moderate increase over last. Sharp competition continues to be the feature, and managers see no relief. A slight advance in cotton last week resulted in the selling of half the entire crop on futures. This was due to the disappearance of last year's excess. Prices are singularly strong everywhere. Profits are necessarily lower, and no wise man can honestly foresee any early improvement. Stock reports and financial reviews are just now poor material out of which to weave a review of future probabilities. It is at the other end of the line that information is to be sought and gained. The iron trade is gaining in strength through a decrease in stocks and a broadening consumption. There is an enormous amount of bridge-work, car-building, locomotive construction, boat construction, besides great activity in the smaller and usually unnoticed industries that flourish in the smaller, seldom-heard-of towns. There is the best of authority for saying that the smaller industries are on a more solid footing than for a long time, a result which may be safely ascribed to the years of almost unbroken activity in house and shop building, and in the erecting of large plants for manufacturing purposes. Much more money has gone in these directions than writers on current affairs have any conception of. Pessimists fear this tendency may be arrested by the possible adoption of a reactionary economic policy. The conditions cannot be so easily unsettled. Shop activity will continue, doubtless, and further expansions will characterize our smaller industries in the near future as in the past. Incomplete but valuable statistics of manufacturing growth in seven or eight Northwestern States during the past two years show a condition of things that are certainly encouraging. The features shown are: the multiplication of little industries, the growing diversification of the same, the gathering-together of industrial workers, and the creation of little markets for agricultural products. This is more marked in these newer than in the older States. Commercial reports also show that small traders multiply much faster in these States. Railroad managers say their evidence of this growth is found in the demands for more small spurs of road. Banking interests note the tendency in an increased demand for funds. Real-estate authorities say there is a perceptible but not rapid improvement in real estate. Perhaps a similar process of industrial transformation is going on in the Southern States, but the movement is not so noticeable. The best statistics for the year will not appear until January 15th, but it is known already that in several sections of the South a fresh activity has developed in the smaller industries. In the aggregate, this activity can be measured only by a production amounting to hundreds of millions of dollars in value. The impetus that has been given to this decentralization has imparted a momentum that cannot be easily checked. The cotton-goods manufacturers, for instance, according to the latest tabulated returns, show an increase in profits, an expansion of business and a wider range of markets at home and abroad. The makers of textile machinery have shipped large quantities of machinery South. Workers in wood and iron have been busy. There is less pledging of crops to cover loans. Small store-keepers are selling more goods for cash. On the other hand, the past four months exhibit a falling off in the projection of new enterprises. The greatest gain to small producers and business men in the near future will be in lopping off unnecessary charges, high rates of interest and transportation, high prices for goods bought on credit, and long hauls to market. If it were possible to ascertain the distance each average ton of freight is hauled to market, it would appear that that distance has been greatly reduced within the past few years. The influences at work are still further reducing the distance by the building up of so many petty markets through industrial development. Iron and steel formerly hauled a thousand miles is now hauled perhaps a hundred or less. New means of distributing merchandise may also creep in. In England, road-engines are disputing to some extent with railroads in the distribution of merchandise, and it only requires good roads in this country to bring about innovations of this character. The whole tendency is to draw the farmer and mechanic closer together in reduced freight charges and shorter hauls. Still another healthful influence is at work to equalize production, so that accumulations of goods and merchandise will not be only unnecessary, but commercially impossible. There is also a cheapening tendency at work for money, but obstacles are likely to arise because of the gold-grabbing policy of foreign houses. Theories which in times past were discussed with greater or less stupidity in books are now being quietly and practically worked out by the common people in their ordinary pursuit of bread. Foreign financiers have recently served notice upon the financiers on this side that they want gold, and they will soon begin to draw it, notwithstanding a favorable balance of trade of not far from two hundred million dollars. This struggle, most selfishly conducted, of each nation for itself, must of necessity run its course, and be supplanted by a policy based upon a federation of commercial and financial interests.

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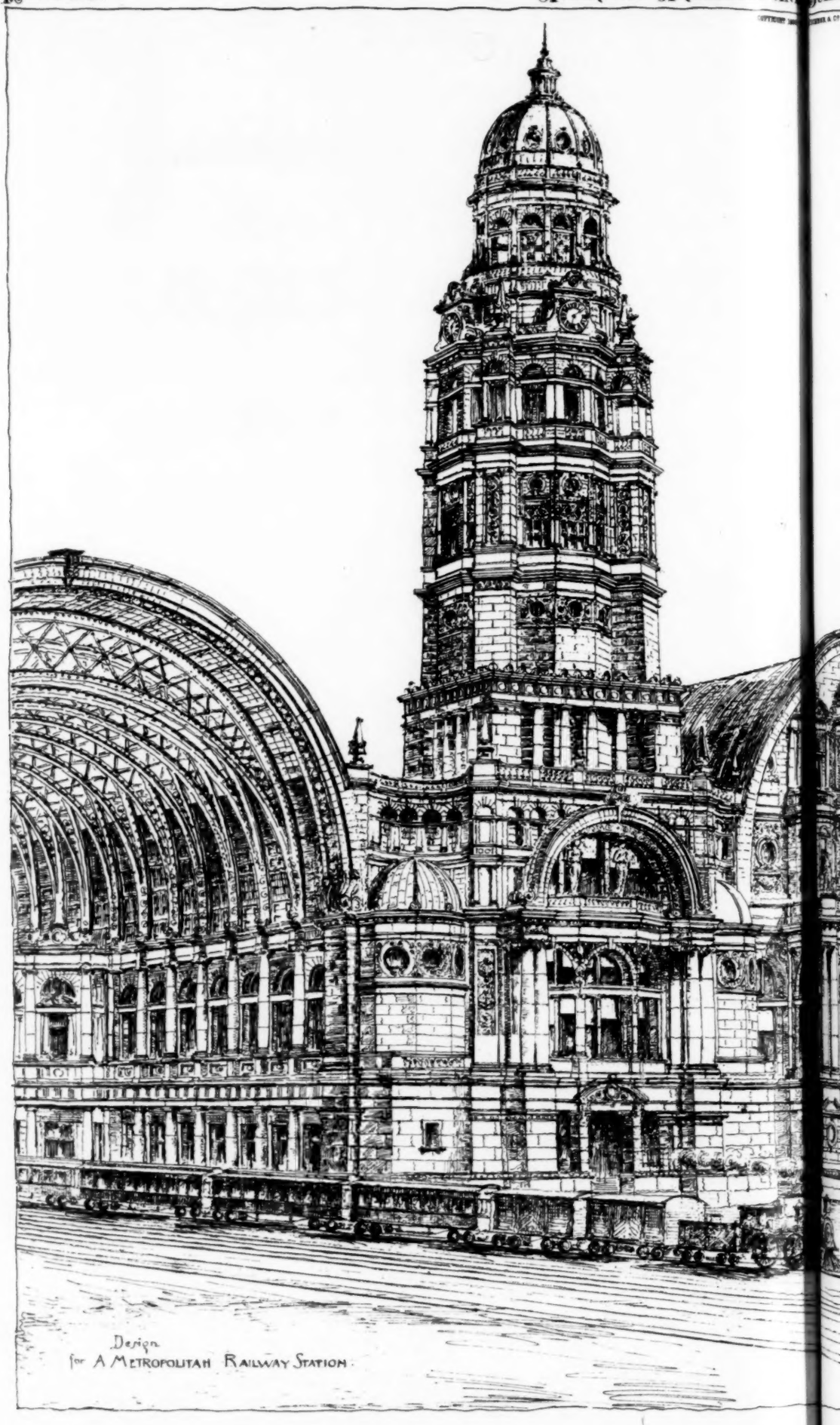

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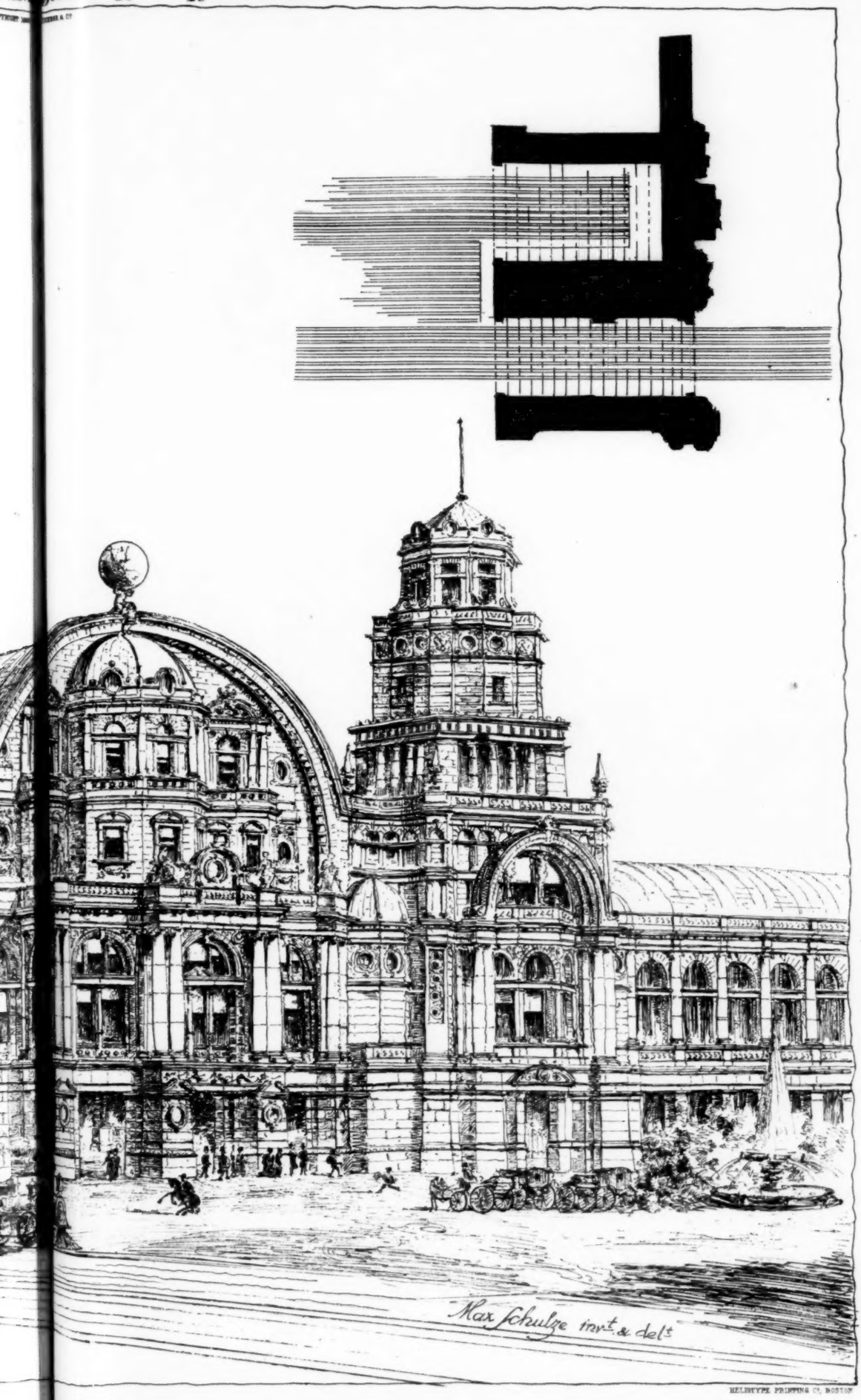

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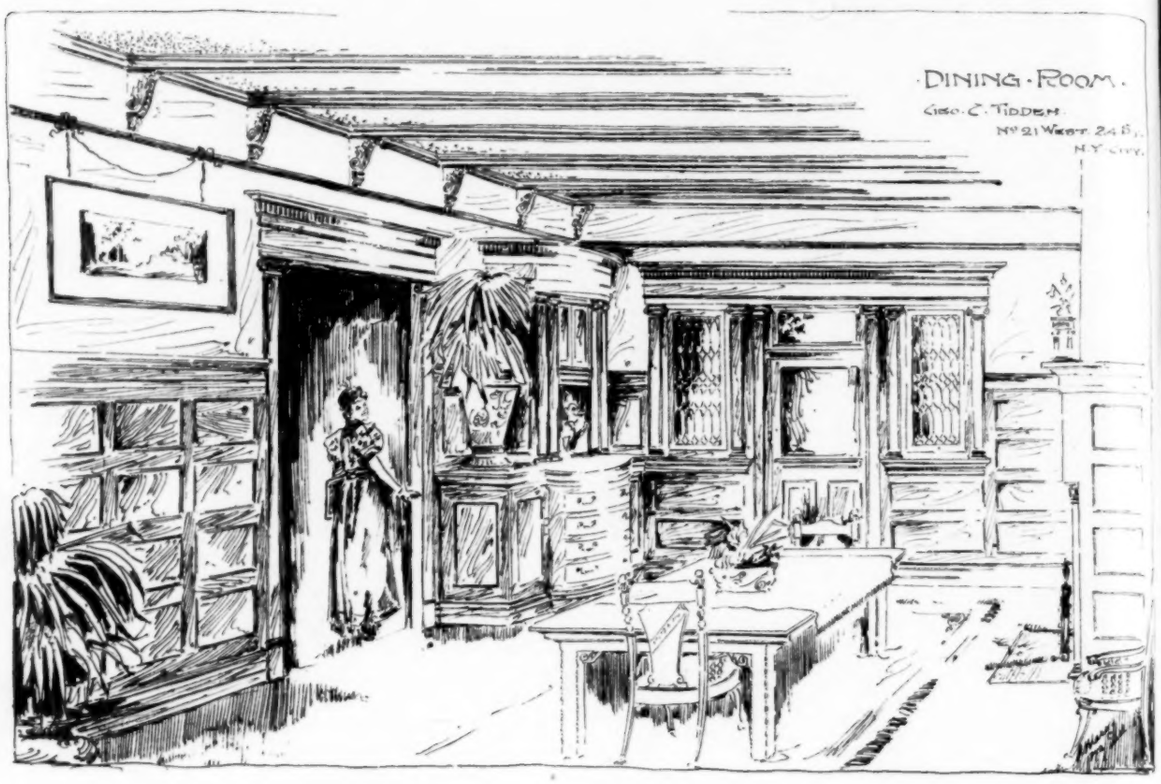

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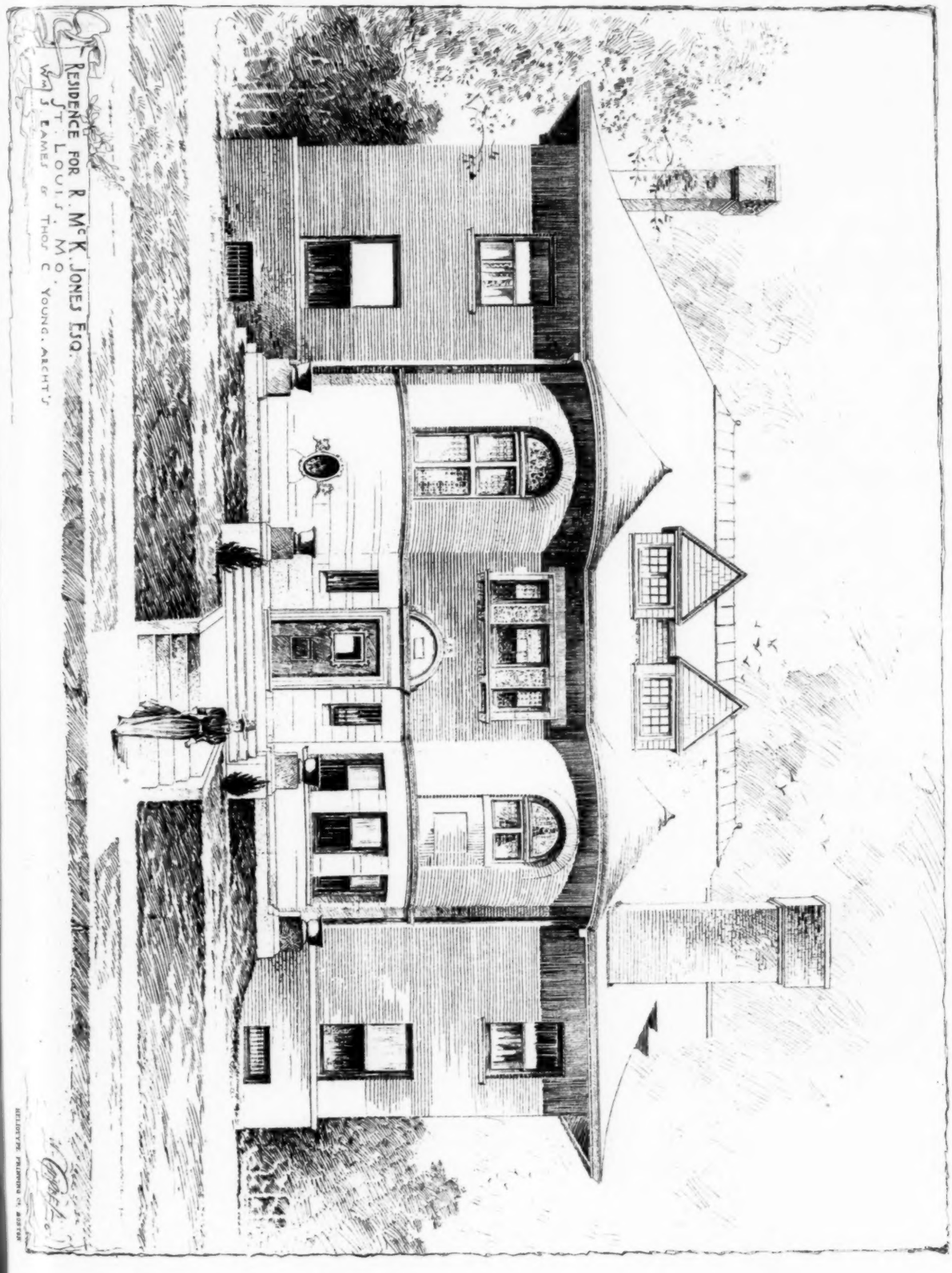

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