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**AMERICAN ARCHITECT**  
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VOL. XXVIII.

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NO. 753.

ARCHITECTURE

ENGINEERING

DECORATION

TICKNOR & COMPANY

CONSTRUCTION

BOSTON MASS.

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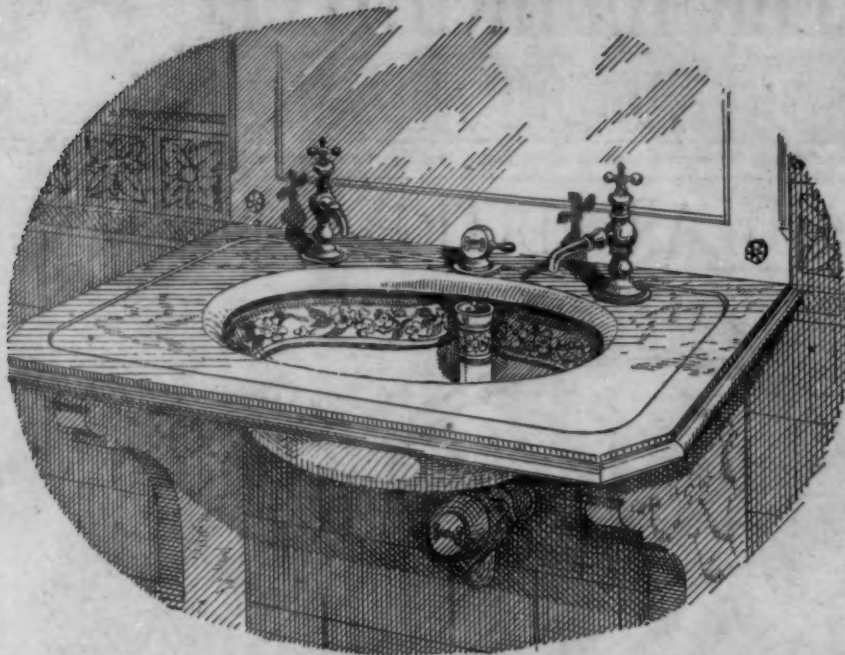
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# THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXVIII.

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MAY 31, 1890.



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THE new building of the American Fine Arts Society, of which the Architectural League is an important portion, is to be situated on West Fifty-seventh Street, between Broadway and Seventh Avenue, immediately adjoining the Osborne apartment-house. The building will have seventy-five feet frontage on Fifty-seventh Street, and will be two hundred feet deep, extending through to Fifty-eighth Street. The site is an excellent one, being very central and accessible. The price paid for the land is said to have been one hundred and fifty-four thousand dollars, or a trifle over ten dollars a square foot. There will probably be a competition for the plans of the building, but excavation is to begin at once, and it is hoped that the rooms will be ready for occupancy before the winter of 1891.

A RATHER important decision has just been rendered by the Supreme Court of Pennsylvania in regard to mechanics' liens. It seems that it is common, in building contracts in that State, for the contractor to agree not to file mechanics' liens against the estate. The question to be decided was whether this prevented sub-contractors, under the general contractor, from filing liens, in case they were afraid that they might not otherwise get their pay. The decision of the Supreme Court is that such a stipulation in the agreement of the general contractor cuts off the right of sub-contractors to enter liens. In the language of the Court, "Sub-contractors are bound to do just what their principal was bound to do, because they assumed to perform his contract with the owner, to the extent of their undertaking, and, of course, they must perform according to his limitation." This is in accordance with the legal principle that sub-contractors "cannot have the benefits of the builder's contract without accepting the conditions upon which those benefits are conferred." No doubt every one will acknowledge the justice of these remarks, but persons of a reflective turn will notice the curious contrast between such legal deductions and the whole system of mechanics' liens, which consists simply in the issuing of a piratical license to carpenters, plumbers, bricklayers and other building workmen, to fall upon an innocent owner, and extort from him money due them from some one else, whenever they take it

into their heads that it would be less troublesome to collect it from him than from the real debtor. As to the sub-contractors, it is likely that they, on the politicians' principle, that a poor man is justified in appropriating what he wants, wherever he sees it, have quite as much right to the help of the lien law as the principal contractors; but the Court says that they "are bound to know, by necessity, all the terms of the contract made by their principal in any event, and they, therefore, know of the prohibition"; and there, is consequently, "no hardship" in "enforcing a provision prohibiting liens against them." In point of fact, sub-contractors probably rarely know the terms of the contract into which their principal has entered, but the building community will not suffer much from a slight restriction of the legalized plundering which persons inexperienced in business dread so much, and which undoubtedly checks the improvement of real-estate.

THE Salt Lake *Herald* ought to have the credit of proposing the application of an old idea to a new purpose. It is well-known to architects that, in Scotland, real-estate may be divided by horizontal, as well as vertical planes, so that a man may be the absolute owner of a given story, or "flat," in an apartment-house. In New York, a somewhat similar plan is made applicable to the "Home Club" apartment-houses, so that a man may be practically the owner of a certain set of rooms in the house, although, if we are not mistaken, the law does not allow him directly to give a deed or a mortgage of his portion. Under the usual arrangement, however, by which each owner's interest is represented by a given number of shares, the shares may be transferred or pledged like any other personal property, so that a proprietor is really quite as free to sell his apartment as if it were an independent house. Until now, this system has, in this country, hardly been adopted outside of New York, and it is there confined to apartment-houses; but the Salt Lake *Herald* proposes to extend it to office-buildings. By a little legislation, or by legal circumlocution, in case the legislation were not readily obtained, a bank, or an insurance company, or a builders' or real-estate exchange, to say nothing of firms of lawyers or architects, ought to be able easily to agree upon the allotments of the different floors of a building, which they could arrange to suit themselves, and thus make sure of permanent quarters, at low rents, and with themselves for landlords, and with only a small investment of capital. As each owner would be responsible for his own portion, there would be no losses from vacant rooms or dishonest tenants, and, as any portion could be transferred, under suitable restrictions, as is usual with the New York Home Clubs, owners who wished to change could readily sell their interest, which, in a well-planned and well-built structure, would often bring a great advance over the original cost. This has been the case with the best of the New York Home Clubs, and the prospect of profit would be still greater with a good office-building in a location judiciously chosen.

THE carpenters' strike in Boston appears to be near its close, and as this and the equally senseless freestone-cutters' strike have nearly put an end to building operations in the city for this season, it is safe to predict that the more obstinate of the strikers will find nothing to do when they come to their senses, and will have leisure during the remainder of the year to reflect upon the advantages of surrendering the direction of one's actions to other people. Of course, the organizers of the strike claim that they are sure of success, but many things show that they are really desperate, and even their valorous protestations begin to grow somewhat faint. The fact is, that they have had no chance of success from the first. The building season in Boston is short, lasting, for outside work, only from April to November; there are a great many carpenters in the city and the neighborhood, and as those who will do the most work in a day are sure to be preferred by the contractors, most of the men have sense enough not to express great enthusiasm for the eight-hour theory, although they may be dragged into a reluctant support of it. In fact, it is openly declared that the strike was promoted, and is kept alive, by the intrigues of a lot of foreigners, who found the Boston carpenters comfortable and

happy, and seized on the idea of an eight-hour agitation for getting the citizens out of their employment, and themselves in. However that may be, the progress of the strike has shown that the men entered it unwillingly, and that the leaders have grown reckless at the evident failure of their plans. In many cases, as the servile organs of the labor tyrants have announced, the men who had struck have obtained employment, with an eight-hours' day, and great jubilation has been raised over each instance; but the fact is that in most, if not all the cases, they have simply agreed to work eight hours a day at the old hourly rates, so that the substance of the matter is that some of the more shrewd of the carpenters, not wishing to remain idle, but not daring to offend the bullies, have gone back to their employers on the old terms, simply docking themselves voluntarily for a time of one-ninth of their pay, to keep on good terms with the Union leaders until the storm blows over.

AS to the leaders, the vehemence of their arguments increases as the number of persons who pay any attention to them diminishes, and they are beginning to make the fatal mistake of trying to coerce the contractors by the means which they find effective with the journeymen. A few days ago, a contractor, an elderly and rather feeble man, whose men found themselves quite contented with their lot, and had turned a deaf ear to the blandishments of the walking-delegates, was visited by an official deputation from the managers of the strike, apparently with the idea of compelling him to assist in inculcating the principles of the International Society of Avengers of Labor, or whatever it may be called, upon his unwilling workmen. The contractor proved less open to argument than the delegates expected, and they began to supplement their appeals to his mind by the application of force to his body; and, after hustling him about for awhile, finally seized him by the collar and threw him down on the floor of his own office, and left him there. It may be imagined that this sort of conduct does not strengthen the cause of the strikers, and a day or two afterward the announcement was made that, "owing to the obstinate refusal of the contractors to pay any attention to the demands of the men," it would have been necessary before long to terminate the strike, but that a scheme had been devised by which it would probably be possible "to protract it indefinitely." This scheme consisted, it appeared, in a plan for the organization of a "coöperative society" of carpenters from among the strikers, who were promised ample capital, and would seriously injure the master-carpenters "by bidding for contracts in competition with them." Unfortunately, this is probably pure "bluff," for a "coöperative society" of men pledged to work only eight hours a day would stand about the same chance "in competition" with men who, like most contracting builders, habitually work sixteen or seventeen hours a day, that a cow would in a race with a horse; but that the idea of forming one of these societies, the destined means, as we think, of putting an end forever to trades-union tyranny and labor troubles, should have been allowed to develop itself under the very noses of the Union leaders is something remarkable.

THE Omaha *Republican* laments what it calls the "carelessness of builders" in furnishing houses with windows of sheet-glass, instead of plate-glass, and wonders why "the plate-glass window" should be an exception among Western dwelling-houses. Of course, the obvious answer is that a plate-glass window, counting the extra expense of weights, cords and sashes, costs in this country just about ten times as much as the common sheet-glass sash, and there are few persons who can afford to use them. To people who have seen the plate-glass so universally employed in England and in the French cities, American windows look poor and cheap; but glass such as the English and French use is out of the question for all but the richest Americans so long as the present tariff system remains unchanged. Failing this, however, we might with advantage try to improve the manufacture of the cheaper sheet-glass. It is certainly discreditable to modern ingenuity that a large sheet of double-thick glass, while clear and smooth, is always wavy and unpleasant to look through. The English have a process of "flattening" such glass, and make excellent qualities of it, and it ought not to be

very difficult to produce a material far superior to that now found in commerce.

THE National Association of Fire Engineers is to hold a convention this year at Detroit, where topics of great interest to architects will be discussed. Among other matters assigned for discussion this year is the question whether it would be practicable or desirable to have a model building law drawn up by a joint committee of the National Association of Master-Builders and the American Institute of Architects. The feeling among fire-engineers seems to be strongly in favor of a uniform law prepared in this way, and there is no doubt that the preparation of a standard form would greatly promote the adoption in cities of better modes of building, while it would save much labor on the part of local committees, who have, wherever building regulations are under consideration, to spend a great deal of time in smoothing over difficulties raised by selfish interests.

WHAT seems to be a reasonable project for a high tower has been formed by some Washington architects, and there is some prospect that it may actually be erected in Chicago within the next two years. The structure is intended to be fifteen hundred feet high, the base being about four hundred feet in diameter, and composed of a mass of domes, pinnacles, towers and so on, out of which rises a cylindrical shaft, braced by lattice-work on all sides. The design, as published in the *Chicago Tribune*, is not entirely beyond criticism, but we can conscientiously say that we like it better than that of the Eiffel tower. Of course, the main object of the structure is to serve as a curiosity, but it will make a good lookout station, and the termination is formed by a glass globe thirty feet in diameter, intended to contain a group of electric-lights, which will be visible for at least fifty miles. The material is, naturally, iron, cast, wrought and corrugated, and the cost is estimated at two million dollars; whether it can be built for this, with structural iron at three cents a pound, remains to be seen, but we should like to have the experiment tried.

THE official *atelier* in the School of Fine Arts in Paris, which was directed by the late Mr. André, has been taken, by appointment from the Government, by M. Moyaux, who is also made Professor in the School. For some unexplained reason, the appointment of M. Moyaux, who is an architect of the highest standing and accomplishment, seems to have upset the rather delicate susceptibilities of the pupils in the André *atelier*, and they went over in a body to M. Laloux, carrying off with them as mementos a large part of the André furniture. This demonstration probably produced less impression than was intended, and the Government of the School simply bought some new furniture, and installed M. Moyaux, with twenty pupils, whom he brought with him.

THE second annual competition in the Ecole des Beaux-Arts for the American prize, the Prix de Reconnaissance, has resulted in the award of the prize to M. Baubain, a pupil of the late M. André. The subject of the contest this year was "A Light-house on Thompson's Reef, in Florida."

ONE of the former pupils of the *Atelier* André addresses to *La Construction Moderne* a correction of the story about the revolt in the *atelier* against M. André's successor, and, with the story, we can hardly do less than publish the correction. It seems that the desertion of the pupils of the *atelier* in a body, on the appearance of their new professor, and their emigration to the *atelier* of M. Laloux, was due to the fact that M. Laloux had for a long time supplied M. André's place during his absences from Paris, and took his pupils during his last illness. He had, therefore, come to know the pupils and their work, while they had become warmly attached to him. On M. André's lamented death, a strong effort was made to have Laloux appointed to succeed him; but it failed, and, after the appointment of another, the pupils decided that it would be better for them to remain under M. Laloux's care, in his private *atelier*, paying for it the usual fees for private instruction, than to take up with a new master, although their tuition would be free, so long as they remained in the official *atelier*.

RELIGIOUS ARCHITECTURE.<sup>1</sup>—VIII.

## IV. RELIGIOUS ARCHITECTURE OF ANTIQUITY.—ROME.



Composed by M. Vignat, Architect.

THE Romans ascribed their initiation into the true appreciation of art wholly to Greece, asserting that, up to the time when they came under Greek influence, they had remained in a rude and uncultured state, and their hands had been trained solely to wield weapons and drive the plough. In these assertions they wronged their real progenitors; modern research has brought to light very clear proofs of Etruscan influence on the development of the arts as well as the civilization of Rome—an influence which the Romans sought to conceal, but which none the less prevailed for centuries.

The walls of primitive Rome, *Roma quadrata*, which were unearthed a few years ago, are Etruscan in the shaping, size and laying of the stone. The cloister or *atrium* of Vesta, constructed under Numa, consisted of a court surrounded by four wooden porticos; this was copied from already existing edifices in the Etruscan city of Adria. To digress for a moment, we may call attention to the fact that these cloisters, with cells all opening on a quadrangular gallery, might be considered as the prototype of similar constructions belonging to Christian art.

The cistern built later at the foot of the Capitoline Hill, which afterwards became the Mamertine prison, still exists in part, and was evidently due to Tuscan workmen.

Rome was then subjugated by the kings of Etruria, and it is this fact that Roman historians desired to efface forever from the annals of history.

The Etruscan rulers surrounded the city with ramparts which may be recognized to-day in the *Vigna Macarona* and beneath the convent of Saint Sabina. The *cloaca maxima* was begun; the two temples of Fortune were reared, as well as the Temple of Diana on the Aventine, the temple of Jupiter Latialis, and, finally, the celebrated sanctuary crowning the Capitoline Hill, which existed down to the time of



Fig. 1. Façade of an Etruscan Temple (6th Century B. C.). After Lubke.

the great fires at Rome. Vitruvius has left us a description of it; it comprised in fact three sanctuaries, dedicated to Jupiter, Minerva and Juno, and surrounded by a common peristyle. Construction, proportion, decoration, everything was Etruscan.

After the fall of the Tarquins, Rome attempted to shake off the yoke of the Etruscan kings, but she was again subdued by Porsena.

Rome's artistic relations with Etruria were not interrupted when she had regained her independence. As is well-known, an important colony of Tuscan artists, including goldsmiths, sculptors, manufacturers of arms, mirrors and candelabra, occupied the street bearing the name of *Tuscus vicus* at the foot of the Capitoline and Palatine hills. It may be said that

during the Republic the manufacture of objects of art remained chiefly in their hands.

The burning of Rome by the Gauls furnished the occasion for a complete restoration of the city. As yet there was no question of Greek influence; and still, in the fifth century B. C. an already flourishing art, derived from Etruscan sources, was

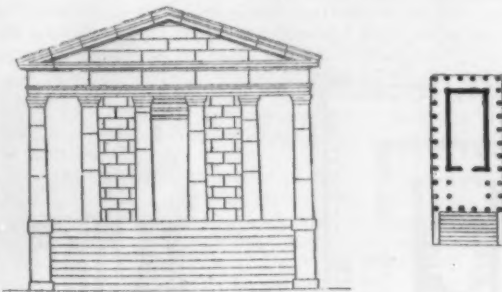


Fig. 2. Plan and Façade of the Temple of Juno Matuta, or of Pietas, at Rome (2d Century B. C.).

rearing the great temple of Jupiter Capitolinus, the temples of Hercules, of Saturn, of the Dioscuri, of Ceres and of Bellona. As for works of public utility—roads, bridges, aqueducts, the forum, circuses and so on—great activity was displayed in their construction.

In entering upon the inheritance left by the Etruscans, as in receiving later that of the Greeks, the Romans put a new and original stamp upon their works. The Etruscans had bequeathed to them the semicircular arch and vault; the Romans

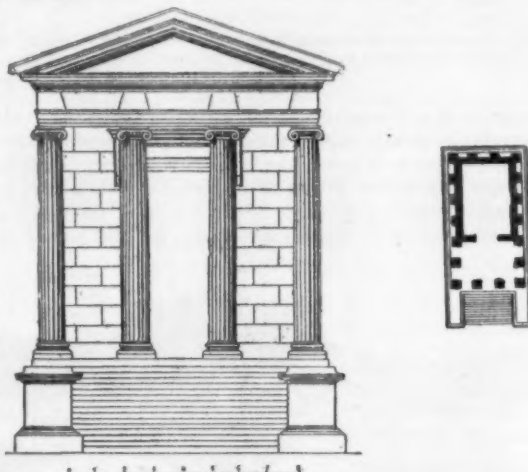


Fig. 3. Plan and Façade of the Temple of Fortuna Virilis, at Rome (1st Century B. C.).

employed it in constructing bridges and aqueducts of several superimposed stories, and of a grandeur and strength which even now powerfully impress us. Their triumphal arches surely exhibit a most characteristic phase of art.

It was after the conquest of Magna Græcia that contact with Greek civilization was established and that Greek influence on art began to be evident. It met, however, with determined resistance; the spirit of the old Romans struggled

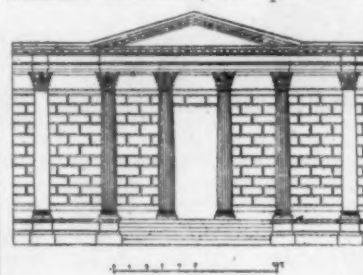


Fig. 4. Façade of the Temple of Jupiter Olympus (2d Century A. D.).

long against this invasion of customs and tastes which seemed to them to form the train of effeminacy and corruption. When Marcellus built the temple of Virtus and Metellus reared the two temples to Jupiter Stator and Juno, the Pontifices and the Senate viewed with an evil eye innovations imitated from Greek art, and they raised difficulties of all sorts to arrest or retard their consecration. When, under Sulla, it became necessary to rebuild the ancient temple of the Capitolium, which had been burned, no thought of change in the original

<sup>1</sup>From the French of P. Planat, in Planat's "Encyclopédie de l'Architecture et de la Construction." Continued from page 112, No. 752.

plan and design, to suit the new forms, could be entertained, and the old dispositions were faithfully reproduced. Cæsar, too, when he erected the temple of Venus Genetrix, conformed to the old style.

Even when Greek influence had thoroughly asserted itself upon Roman art, the latter by no means lost its originality.

must not be considered as mere copyists from the Greeks. Here, too, their work has a grandeur all its own.

"Those who, in thought, subordinate Roman art to the Greek lose sight of the fact that the fundamental principles of construction adopted by the two nations were most dissimilar. One made exclusive use of the beam and of horizontal sup-

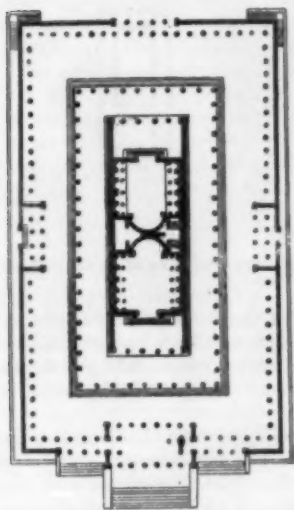


Fig. 5. Plan of the Temple of Venus and Rome, at Rome (2d Century A. D.).



Fig. 6. Ruins of the Temple of the Sun, at Baalbek (2d Century A. D.).

Its most original and most imposing works are without doubt to be sought in public rather than in religious architecture. "When there was a demand for improved sanitary arrangements in the city, when it was to be fortified, when springs and wholesome waters were to be brought thither, when it was necessary to prepare fit assembling places for the people, to

ports, the other preferred the semicircular arch and vault; one chose only massive material, resting the joints on columns or widely spaced pillars, the other employed brick, rubble-work or pozzuolana, casting their structures on gigantic moulds; one levelled the ground and harmonized it with the tranquil lines of the horizon, the other lifted itself boldly toward heaven, or

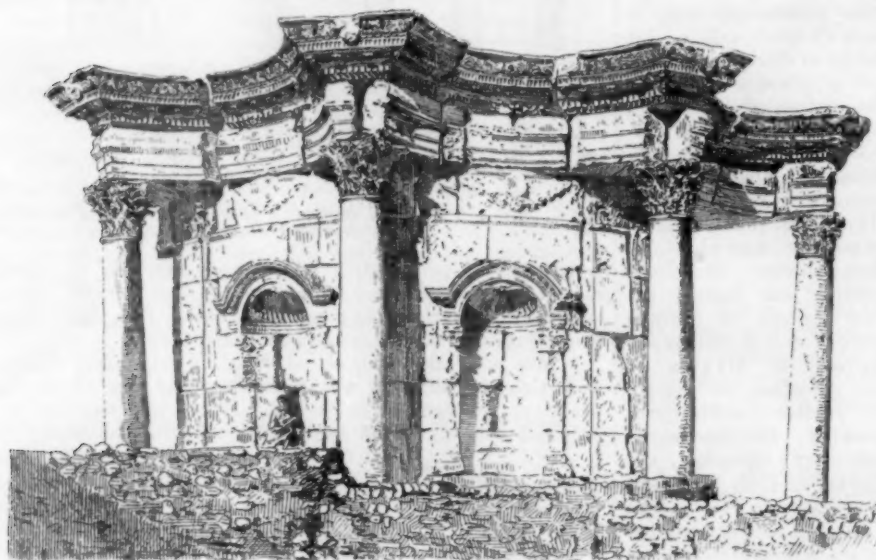


Fig. 7. View of the Circular Temple of Baalbek (2d Century A. D.).

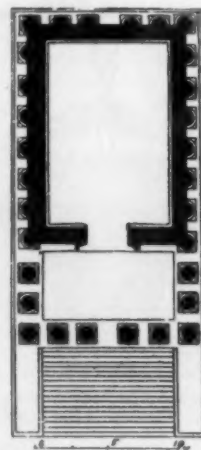


Fig. 8. Plan of the Maison Carrée at Nîmes (2d Century A. D.).

protect political life under all its forms, to dry up the marshes, to fertilize the fields, to build bridges over the most impetuous torrents, and to build roads that would carry their armies to all the borders of Italy, the Romans borrowed nothing from the Greeks, but deserved rather to serve as their masters; they created models which the rest of the world has often despaired of equalling."<sup>1</sup> In monumental architecture even, the Romans

upheld enormous weights on the soil. Let no one believe as many do, that Roman art attained its grandeur only in the Augustan age, because it had been fed from all the marrow of Greek art; it was under the Republic that the most beautiful types were created. The Empire merely enlarged and multiplied the examples which centuries of liberty had bequeathed to it.

"... The Greeks devoted themselves to proportions, and

<sup>1</sup> Boullé. "Préjugés sur l'art Romain."

by their aid they made what was small appear great; the Romans loved material grandeur, and sought not only the impression but the reality of grandeur. The Greeks delighted in exquisite forms and carried delicacy to a marvellous perfection; the Romans looked for strength, character, stability and endurance. For the first, beauty was the supreme end; for the second, utility. The Greeks lived in the ideal world, dreaming new types and holding converse with those charming gods which they were ever creating and ever rejuvenating; the Romans were of practical mind, they struggled with the real world. The State was their god, public interest their dream; their grand poetry was ambition. The Greeks lovingly adorned a little city or a celebrated sanctuary, but they could soon provide for the needs or the decoration of a country which did not reach beyond the walls of fortification; the Romans were preparing for the government of the world, they embellished their city as its capital, they conceived everything on a stupendous scale, as though they were one day to offer hospitality to the universe. To the Romans, art was merely an instrument, a means of securing their empire, a mark of possession, the seal stamped upon conquered lands."

The origin of Roman art is, then, to be sought in Etruscan architecture, at least so far as its early years are concerned. Few traces now remain of Etruscan constructions. We know, from Vitruvius, that the primitive temples of Tuscan Etruria offered nearly the same dispositions as those of Greece. In front, there was a portico of four columns (Figure 1); the cella, made in a rectangular plan, was divided into three naves, or distinct cellæ, the middle one being consecrated to the chief divinity. Thus, in the first temple of Jupiter Capitolinus, at Rome, built in the Etruscan style, the central cella was dedicated to Jupiter, and the two lateral ones to Minerva and Juno. It is, however, possible that what is here given by Vitruvius as a rule was only an exception; the ruins of the temple of Vulci would seem to indicate that such is the case. It is unquestionably true that the entablatures were without exception constructed of wood; and they continued to be so constructed for a long period.

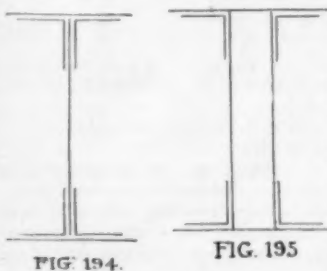
Later, when close relations had been established with Greece, and Rome had come under Grecian influence, which lasted, we may say, in art as in letters and science, as long as the Roman Empire itself, the temples were reared after Greek models.

General dispositions and variations were alike unchanged. The classification set forth by Vitruvius, and borrowed by him from contemporary Alexandrine authors who had reduced the principles of architecture to rules and canons, applies to Greek edifices as well as to Roman.

[To be continued.]

## SAFE BUILDING.<sup>1</sup>—XII.

### CHAPTER X.—PLATE AND BOX GIRDERS.



WHEN it becomes necessary to cover floors or spaces of such large span, or to carry loads so heavy, that rolled-beams will not answer the purpose, girders are made up of plates and angles riveted together, and are known according to their section as "riveted plate girders" with single webs (Figure 194), "or riveted box girders" with two or more webs (Figure 195). As

a rule, too, riveted girders of equal strength can be more cheaply manufactured than the heavier sections of rolled beams.

In the case of the former the vertical plate or web has two angle irons riveted horizontally along its entire top edge and the same along its bottom edge, or four in all. In very light construction the free legs of the angles might answer for the top and bottom flanges, but, as a rule, a plate is riveted to these free legs, at right angles to the web, both top and bottom, thus forming the flanges of the girder. This plate need not necessarily extend the entire length, but it usually does. Where the thickness of flanges required is very great, say one inch or more, each flange is made up of two or more thicknesses or layers of plates.

In such cases only the layer nearest to the web is carried the entire length, the other layers gradually decreasing from the point of greatest bending-moment (usually the centre) towards the ends.

To carry all the layers to the ends in heavy work would be a great extravagance, the only advantage gained being a slight increase in stiffness, which can be very much more readily and economically gained by increasing the depth of web.

In double web box girders only two angles are attached to each web, one at the top and one at the bottom, both on the outside surface of each web. To place angles on the inside surface is impracticable, as webs would have to be placed sufficiently far apart for the "holder-up" to crawl in, and the riveting would not only be weak, having to be done by hand, but it would weaken the flange by just so many additional rivet holes. In short girders with heavy loads, where shearing is the main danger, box girders with three webs are sometimes made; in that case the middle web has the usual four angles, but the two outside webs only two angles each.

Beyond the additional stiffness sideways, in resisting lateral flexure, there is no particular advantage in using a box girder. It is more clumsy to handle and to make, and not readily painted on all exposed surfaces, and besides is more extravagant of material in proportion to its strength. Where the flange is of great breadth and it becomes desirable to have two or more webs, the writer always prefers to use two or more single web plate girders, and to secure them together with bolts and separators, or by latticing the top and bottom flanges, together.

The angles need not necessarily be even-legged; nor need the web necessarily be of same depth throughout, nor of same thickness throughout. It will, however, greatly simplify the calculation to keep the web uniform throughout, and in most cases the extra labor involved in varying the thickness of web, would more than offset the cost of the unnecessary material at the centre.

Where girders are very deep, the web is made in sections or panels, as already explained. In such cases the web can readily and economically be thickened towards the ends.

Whenever possible, the girder should be cambered up at the centre an amount equal to the calculated deflection. But as girders are usually made of straight plates, and machine riveted and punched, the cambering is rarely practicable. Should the girder, however, show any bending or cambering in transportation, the architect should be sure to have the cambered side placed on top.

The calculation of riveted girders is exactly the same as for iron beams, but has the additional element of the number and location of rivets to be looked into, also the stiffness of web and overhang of flanges.

The reactions, vertical shearing, bending-moments, actual and required moments of resistance, deflections, etc., can be calculated arithmetically by the rules given in Chapters I and VI; or graphically by the rules given in Chapter VII.

The rules for calculating riveted work were given in the previous chapter (IX).

The only new matter is to find what the strain on the rivets will be. It will be readily seen that when a plate girder is loaded the tendency of the flanges and angle irons is to slide horizontally past the web (see Figures 120 to 125).

This tendency to slide is called the horizontal flange strain. The rivets connecting angles to web resist this tendency and there must be sufficient rivets to do this safely.

The total amount of this tendency to slide or horizontal flange strain between any selected point of girder and the nearer end of girder, is equal to the bending-moment at the selected point, divided by the depth of web of girder at the point, or

$$s = \frac{m}{d} \quad (121)$$

Where  $s$  = the total strain, in pounds, coming on all the rivets connecting either top or bottom flange to web, between any selected point of girder and the nearer end.

Where  $m$  = the bending-moment in pounds-inch, at the selected point of girder.

Where  $d$  = the total depth, in inches, of the web of girder at the selected point.

The above strain  $s$  will exist in both top and bottom flanges and will be resisted by all the respective rivets in either top or bottom flange that connect the angles to the web.

It should now be ascertained which is the weakest resistance of each rivet, whether it be to bearing (compression), or to shearing, or to bending, and this weakest resistance divided into strain  $s$ , as found by Formula (121) will, of course, give the number of rivets required along each edge of web between the selected point and the nearer end of girder. Frequently many more rivets will have to be used than are required by calculation in order not to exceed the greatest pitch for rivets given in Formula (107).

To ascertain the number of rivets required (along either web edge) between any two points of girder, we will, of course, take the difference between the numbers required from each point to end of girder.

In the flange leg of angles usually fewer rivets can be placed than in the web leg, though many good engineers frequently make them equal in number. But this is really unnecessary, for even if the strains on the flange rivets were the same as those on the web rivets

<sup>1</sup> Continued from page 56, No. 748.

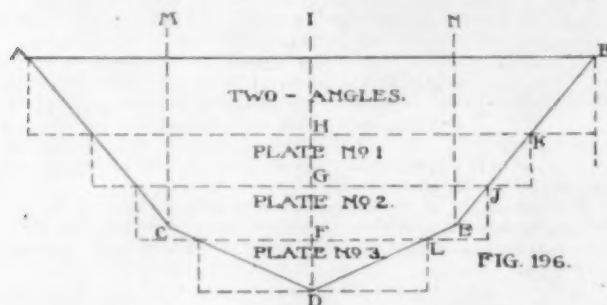
(which they are not) we should still have two rivets in the flange to one in the web on all single plate girders.

There seems to be considerable difference of opinion as to just how to figure the strain on the flange rivets. The best course would seem to the writer to be, to assume that each flange cover plate must transfer at each of its ends, by rivets, to the angle iron and parts of flange plates between it and the angle iron, an amount equal to the safe stress the plate is capable of exerting (that is, net area of cross section of the plate multiplied by either the safe compression stress  $(\frac{c}{f})$  or by the safe tensional stress  $(\frac{t}{f})$  as the case may be).

This amount should be transferred by sufficient rivets, between the end of each plate, and the point of girder at which the full thickness of the plate is required to make up the required moment of resistance. From this point to centre the rivets can be spaced according to the rule for greatest pitch, Formula (107), but when rivets are so spaced the pitch of the rivets immediately nearest the ends of any cover plate should be greatly decreased for a distance of three or four rivets at each end.

By the above method the amount of strain on rivets can be quite accurately computed.

The simplest method of locating rivets is to construct what might be called the curve of moments of resistance. This can be done as shown in Figure 151, Chapter VII (where  $CDEFGC$  is the curve of moments of resistance), or we can calculate arithmetically the required moments of resistance at several points of girder, and lay out the curve as



shown in Figure 196, where  $AB$  represents the length of girder, and  $MC$ ,  $ID$  and  $NE$  the calculated required moments of resistance at points  $M$ ,  $I$  and  $N$ .

The curve of moments of resistance is, of course,  $ACDEB$ , and its axis or base  $BA$ .

We now make  $IH = a$ ,  $d$  see Formula (99);  $a$ , being the net area of cross-section in square inches of two angles, and  $d$  the total depth of girder in inches.

$HD$  will now represent the total required thickness of flange plates, which we can find from Formulae (36) or (98).

We will decide to divide it into three layers  $HG$ ,  $GF$  and  $FD$ . We draw the lines as shown and find that plate No. 1 can stop at  $K$ , though we decide to run it full length, it is, however, needed of full thickness at  $J$ . Again plate No. 2, can stop at  $J$ , but is needed full thickness at  $L$ . The top plate, of course, will run from  $L$  to centre. The left half of girder, will of course be similar, the loads evidently being symmetrical each side of centre. In practice the plates rarely are stopped at the exact points calculated, but are usually extended beyond these points a distance equal to from once to twice the width of plate.

There must now be rivets enough between  $D$  and  $L$  to equal the efficiency of plate No. 3, between  $L$  and  $J$  to equal the efficiency of plate No. 2 and between  $J$  and  $K$  to equal the efficiency of plate No. 1. If there is not room to get them in, the plates must be sufficiently extended to get them in, that is No. 3 must be lengthened beyond  $L$  and towards  $J$ ; No. 2 must be lengthened beyond  $J$  towards  $K$  and No. 1 carried on towards end.

In laying out the rivets they should be as regular as possible, the best method is to lay out the total number of rivets required from centre to end, gradually decreasing the pitch towards ends, and then to make each of the plates No. 3, No. 2 and No. 1 of sufficient length beyond their respective point  $D$  (for No. 3)  $L$  (for No. 2) and  $J$  (for No. 1) to take in the number of rivets required. The length may always be more than shown in Figure 196 without harm, but never less.

We should have then for the bottom flange:

$$\text{Number rivets in end of each flange plate. } x = \frac{a \left( \frac{t}{f} \right)}{v} \quad (122)$$

Where  $x$  = the number of rivets required in each end of each flange plate between its ends and the nearer points to ends at which its full strength is required by the girder.

Where  $a$  = net area of cross-section of the flange plate, in square inches (less rivet holes), at its weakest section.

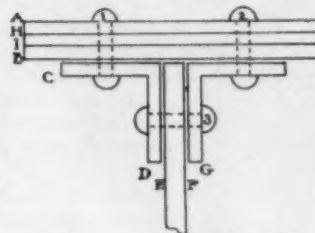
Where  $\left( \frac{t}{f} \right)$  = the safe tensional stress, per square inch of the

material. For top flange use  $\left( \frac{c}{f} \right)$  and look out that rivets are not so far apart as to cause bending or wrinkling of plates.

Where  $v$  = the safe stress, in pounds, or least value of each rivet. That is the bearing, shearing or cross-breaking value of the rivet, whichever is the smaller.

The rivets in the flanges will, of course, be cantilevers, loaded with Value of rivets. their respective amounts of  $a \left( \frac{t}{f} \right)$  or  $a \left( \frac{c}{f} \right)$

respectively,  $a$  being the area as given in Formula (122). The free end of cantilever will be of a length equal to the thickness of the respective flange plate, or equal to the thickness of leg of angle iron, whichever is the smaller should be used.



The bearing area will be the diameter of the rivet multiplied by the same smaller thickness.

In single plate girders the shearing of rivets will rarely determine their number, this will generally be more than the bearing or bending value.

Figure 197 shows clearly the way in which rivets are strained.

The web-rivet, No. 3, is bearing against web on the surface  $EF$ , and against angles on the two surfaces (sum of)  $DE$  and  $FG$ . The rivet has two cross-shearing areas, at  $E$  and  $F$ . This rivet is a beam supported at  $DE$  and  $FG$  and loaded uniformly with its share of horizontal flange strain, which it is transferring to web.

The flange rivets, Nos. 1 and 2, we will suppose are connecting the flange plate  $AH$  to the angle iron. Their bearing then is against  $AH$  and in the opposite direction against  $BC$ , the lesser should be used. Their shearing area is either along the line  $H$  or the line  $B$  according to which end is considered the cantilever, so that they have only one shearing-area practically in the calculation, instead of two as with the web rivets.

Then rivets Nos. 1 and 2 are cantilevers and are built in either from  $H$  to  $C$  and loaded uniformly on the free end  $AH$ , or built in from  $A$  to  $B$  and loaded uniformly on the free end  $BC$ , whichever projection  $AH$  or  $BC$  is smaller should be used. The load on the cantilever being as already explained equal to each rivet's share of an amount equal to the net-area, of top plate  $AH$  multiplied by the safe tensional or compressive stress per square inch of the material.

There is, of course, a tendency of the plates  $HI$ ,  $IB$ , etc., to slide past each other and past angles.

This tendency will exist particularly at the centre of girder and in those parts of rivets which simply tend to hold the plates together after the plates have once transferred their strength and become a permanent part of the flange. But this tendency rarely amounts to much, unless the plates are very thick; and if the rivets are spaced according to rules given can be overlooked. If it is desired to calculate the strain on each rivet, due to this tendency of the flange plates to slide past each other, it can be done by the following formula, which assumes that at any right angled cross-section of flange through rivets there are always two rivet holes.

$$v = \frac{b}{d} (x - y)^2 \left( \frac{k}{f} \right) \quad (123)$$

Where  $v$  = the safe value or stress on any flange rivet, in pounds, to resist the tendency of any two flange plates (or plate and angle leg) to slide past each other.

Where  $b$  = the total breadth of flange plate, in inches.

Where  $d$  = the total depth of girder, in inches.

Where  $x$  = the distance, in inches, from the horizontal neutral axis of girder to centre of flange plate, further from neutral axis.

Where  $y$  = the distance, in inches, from the horizontal neutral axis of girder, to centre of flange plate (or centre of flange leg) immediately next to other plate, but on the neutral axis side of same.

Where  $\left( \frac{k}{f} \right)$  = the safe modulus of rupture, in pounds, of the material.

If any part of a girder, either web or flange, is spliced, made of two parts, the number of rivets each side of splice, and the amount of additional cover plates, etc., should be made sufficient to transfer the full strength of original plate across the joint.

In locating the rivets of a splice care should be taken not to weaken the original plate by holes not allowed for in the original calculation of moment of resistance of the section. There is no difficulty in splicing webs, as cover plates can be put on each side, and the strains in the web are comparatively small.

These (web-splice) plates and their rivets each side of joint should be of sufficient strength to transfer the amount of the vertical shearing strain at the joint from one side of (spliced) web joint to the other side of joint. In the flange, however, it is more troublesome.

In heavy girders, however, (the only one usually, where it is necessary or where it pays to splice the flange plates), it is best to carry the upper or outside layers of flange plates a longer distance from the centre (or point of greatest bending-moment) than required by calculation, thus gaining extra material in the flange, and more than required there by calculation, and then using this extra material to offset the loss suffered by making the additional rivet holes and by cutting or joining one of the flange plates at the point. For instance, Figure 198 represents the side-view of part of the top flange of a plate girder. *AB* is the first flange plate running entire length of girder, *A* being towards end and *B* towards centre.

This plate has to be spliced. We have previously found that we can thin down our flange at the points *F*, *E*, *D* and *C*. We will decide to piece plate *AB* between *D* and *E* say at *G*. Of course the flange will thus be weakened at the point *G* by the entire loss of



FIG. 198.

plate *AB* and if we attempt to regain this by cover-plates it will lose the additional rivet-holes. But by prolonging the upper plates as shown by dotted lines this loss can be made good and without any additional rivet-holes.

For by the time the plate which originally ended at *E* has been extended to *G* the girder is considerably stronger than needed, that is, stronger by the amount of thickness of this extended plate, and the girder can therefore bear the loss suffered by the cutting of the lower plate. Providing, of course, the plates are of equal thickness. If there are not enough rivets between *G* and *D* to take up the strength of the spliced plate, the plate which ends at *D* will also have to be extended, as shown by dotted lines, till the number of rivets desired have been covered.

In many cases the extending of flange plates is sufficient to form the splice, but frequently an additional cover plate over the extended flange plate may simplify and cheapen the cost. The arrangement in each case will depend upon the number of rivets required, the respective thickness of plates and other local circumstances.

As a rule the angles are made in one piece from end to end, as they can easily be obtained of great length, and are awkward to splice. Angles should be used as heavy as possible, but if very thick they are difficult to straighten, and besides reduce greatly the value of flange rivets, owing to the bending-moment.

In determining the thickness of web it has to have sufficient area of vertical cross-section at all points to resist the vertical cross-shearing, and must be stiff enough not to buckle under its load, which will be equal to the vertical cross-shearing at each point of web.

As this vertical cross-shearing is always greatest at one or both supports, we should have for thickness of web:

$$\text{Web-thickness. } b = \frac{p}{d \cdot \left( \frac{g}{f} \right)} \quad (124)$$

Where *b* = the required thickness of web, in inches, (should never be less than  $\frac{1}{4}$ " thick).

Where *d* = the depth of web, in inches, this should be the net depth *d*, that is depth less all rivet-holes coming on any vertical section at or near reaction.

Where *p* = the reaction, in pounds, at either end, (Formulae 14 to 17). The larger reaction should be used, where they are unequal.

Where  $\left( \frac{g}{f} \right)$  = the safe cross-shearing stress of the material, in pounds, per square inch.

If web is not to be of uniform thickness throughout, use, in place of *p*, the amount of vertical shearing-strain, in pounds, at the point for which thickness of web is being calculated.

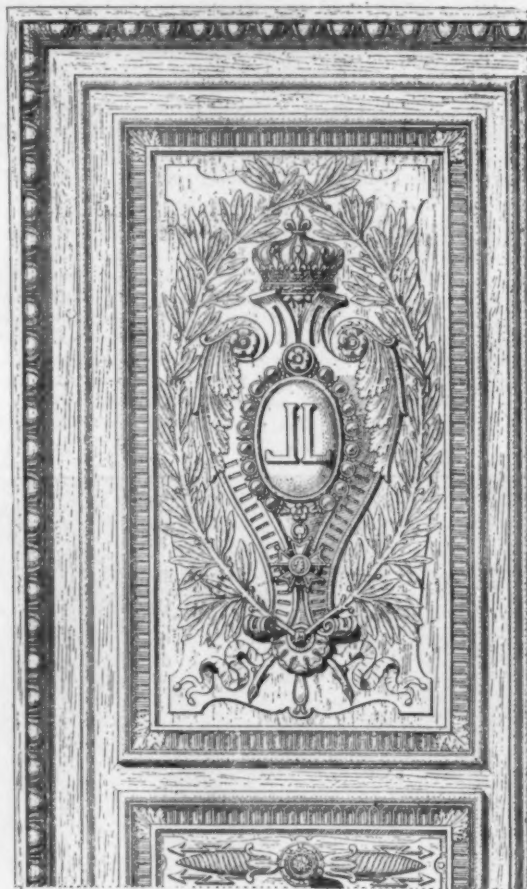
In many plate-girders the web will be so thin in comparison to its depth, that there will be serious danger of the web buckling, particularly towards the ends where the vertical cross-shearing (except in case of single concentrated loads) is always greatest.

To avoid this danger the web is stiffened by riveting upright angle irons, or T-irons to same, between the flanges. The ends of these stiffeners should always be planed and bear truly against each flange.

LOUIS DECOPPET BERG.

[To be continued.]

## COLUMBUS AND HIS CONVENT.



Door Panel, Musée des Antiques, Louvre M. Duban, Architect.

IN the Lonja, containing the royal archives of the Indies, in the city of Seville, is a mass of material pertaining to the conquest of the West Indies and Mexico that has never been exploited. Inaccessible to the ordinary tourist, great bundles and packages of letters and documents lie securely intrenched behind glass doors. But, affixed against the walls, at intervals, are certain letters that bear their history on their faces, that are open and can be read by every passer-by. They are well-nigh priceless; unique, at all events, for most of them are from the great conquistadores themselves. The first of these, in point of years, is one from Magellanes, dated at Seville, 24th October, 1518.

Another, date 12th October, 1519, is from Diego Velasquez, written from La Isla Fernandina (Cuba) giving notice of the disobedience of Cortez, who had taken possession of the ships and armament Velasquez himself had collected, and sailed away to what (as we now know) resulted in the conquest of Mexico.

Less than three years later, a letter is written by the indomitable Cortez himself to Charles V, announcing his great discoveries and acquisitions. It was written from Coyoacan (near the City of Mexico) 15th May, 1522; one of those veritable *Cartas de Cortes* that have proved so valuable to historians.

Bearing date December 13, 1520, is a letter from Diego Colon, son of Columbus, then in San Domingo, as viceroy.

Another, the same year, addressed to the King, Charles I (Charles V of Germany), is from that fiery-hearted monk, Bartholemew de las Casas. Long before that letter was written had the wrongs of the down-trodden Indians begun to cry for redress, through the good Bishop of Chiapas.

Next in sequence, comes a letter from Juan Ponce de Leon, "Puerto Rico, February 10, 1521." He had then, doubtless, given up his search for the Fountain of Youth, and was preparing for that last venture in which he lost his life. A confirmation of the statement by historians that Francisco Pizarro, the conqueror of Peru, could not write his name, is found here, for the letter purporting to be his bears his *sign-mark*, only.

With date 1526, there is a royal cedula of Charles I; and another from the same king, to Don Louis Colon, in 1537; another, by Philip II, in 1560.

A letter written in July, 1539, from Hernando de Soto, touches Americans, surely, for it comes from the Puerto del Espiritu Santo, coast of Florida. Tampa Bay, it is called now, and De Soto was then disembarking his forces, preparatory to that terrible march through the Floridian wilderness, that ended at the Mississippi and brought him to his grave.

In 1556, that stout soldier and truthful historian, Bernal Diaz del Castillo, who fought all through the Mexican wars under Cortez, writes a letter to his sovereign. He was then governor of Guatemala, and his letter comes thence, "Guatemala 10 de Mayo, 1556."

In these documents we have history epitomized and romance condensed, with suggestions enough to keep an elaborator busy for a lifetime.

But one more name, that of Columbus, is necessary to bring before us the conquest and discoveries of that period so rich in barbaric treasure, so red with Indian blood misspilt:

"No hay olla sin tocino  
Ni sermon sin Agostino."

No olla without its pork, no sermon without its saint, says the Spanish proverb. The saint in my sermon, these days, when the near approach of the quadri-centennial lends an interest to everything American and Columbian, is Saint Colon. He, then, is the "pork" in this olla podrida, and it was to obtain information regarding his voyages that I visited the Lonja and Columbian Library, at Seville, and later the port of Palos<sup>1</sup> and Convent of La Rabida.

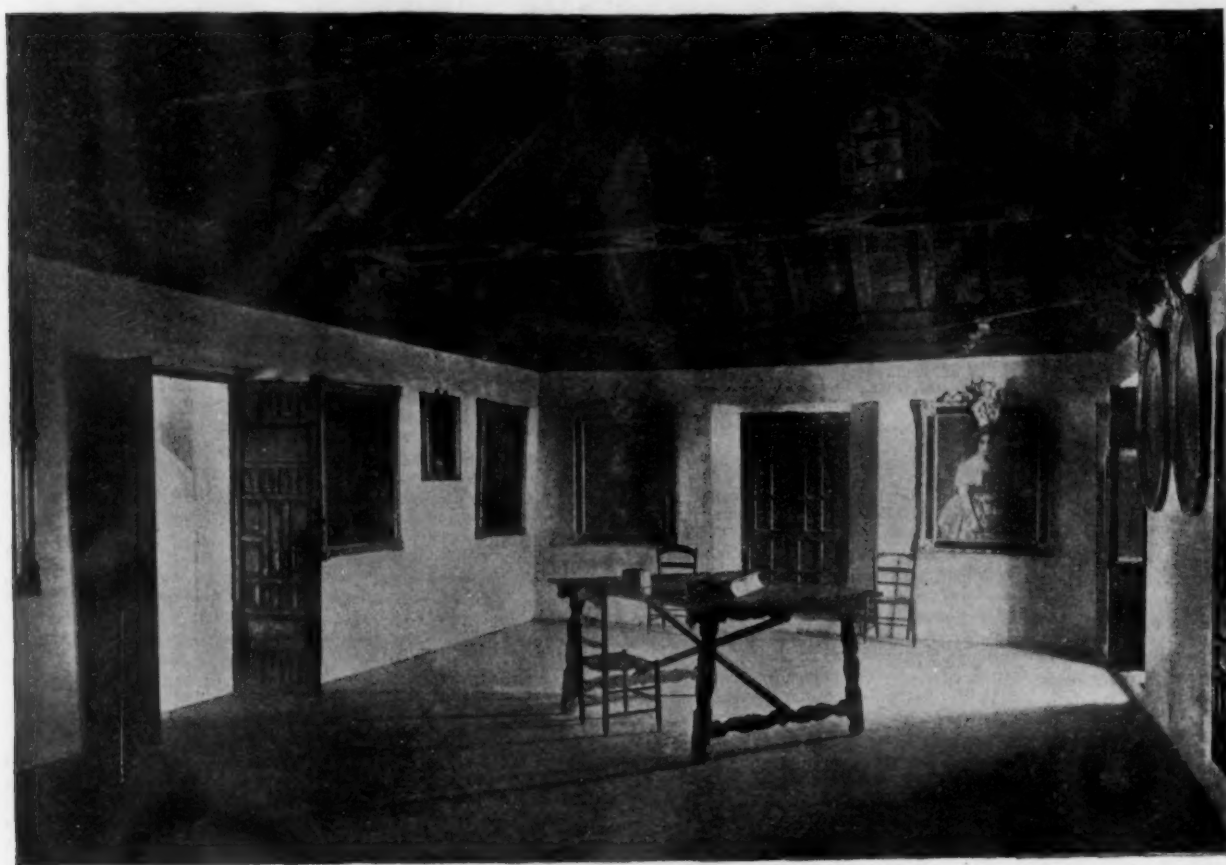
It was the day following my donkey-trip to Palos that, having returned to Moguer for shelter and food, I essayed another little journey in the same direction. A sturdy donkey-boy attended

explained. But he probably made for the coast of Spain, thinking, perhaps, to obtain a vessel at Huelva, then, as now, a shipping-port for copper ore to foreign parts. Indeed, this very spot is the ancient Tarshish of the Bible, and the Phenicians came here, more than two thousand years ago; those men of Tyre, who discovered the passage between the Pillars of Hercules.

But, Columbus came here, halted at the gate (the arched entrance at the right) and craved refreshment, in the name of God. The prior of the convent, the good Prior Marchena, chanced to see him, and to enter into conversation with him.

Struck by his dignified appearance, and also by his evident learning, the prior invited him to tarry a while, and soon he had his visitor's story: of long-deferred plans, of wearisome waiting and of heart-crushing defeat.

Prior Marchena, it so chanced, had been confessor to Isabella, before retiring to this convent, and, as he became impressed with the stranger's story, his heart was fired with zeal, and he resolved to make the cause of Columbus his own. That very night, the historians tell us, he caused his mule to be saddled and started for Granada. At midnight, he left the convent, pursuing the same weary road, through Palos and Moguer, that I have traversed (only he was not favored by steam or stage) to Granada, perhaps two hundred miles away.



The "Columbus Room."

me; not the one-armed, one-ideal brute of the day before, and we made the distance merrily, halting at Palos only for a lunch.

The proprietor of the one-armed boy came early that morning to threaten all sorts of vengeance if I did not again hire him and his beast; but I got away in safety, though having some misgivings as to a happy return.

About three miles beyond Palos, passing through scenery unattractive and sad, you sight some clumps of trees, and a hill rises against the sky. Then, slowly climbing, you bring the roofs and cupolas of a lone white building into view, which you find, as you gain the upper slope, pertain to a convent structure of the olden style. It is rambling, yet compactly enclosed within a high wall, and it is extremely picturesque.

I was very fortunate, later on, in securing a fine photograph of it, as clouds lay massed about it and a flock of sheep slowly grazed before it. And it was thus I found it, this convent of La Rabida, at the gate of which Columbus halted, to beg for water for his son. You know, of course, the story: Columbus, wearied with waiting on the Spanish court, where he had dangled attendant for years, at last set out for Portugal, taking with him his little son.

How he came to such a secluded spot as La Rabida, no one has

Meanwhile, Columbus waited, resting in the cool corridors, walking meditatively along the shore, and gazing wistfully out upon the sea, from the arched and sheltered *mirador*.

The convent, to-day, is in excellent preservation, having been carefully restored and placed in the care of a faithful old soldier. I found the family in possession so simple and kindly-disposed, that I craved permission to pass the day and night there, which they readily granted. So, paying my *mulero* double wages, and sending him back to Moguer with a kind message for the friendly landlord, I was soon placed in possession of the convent, isolate from all the world. Not Fray Perez himself could have possessed it more completely. I wandered at will through its corridors, its cloisters and vacant refectory. I rambled over the hills, back and beyond the convent, covered with thorn-bushes, artemisia and stunted pines, and indulged in solitary reverie to my heart's content.

Climbing the winding stairway to the *mirador*, I had before me broad vistas, through the arched openings, of the river and the sea. Directly beneath, the hill sloped rapidly to the half-submerged lands of the river and the sound. Half-way down its slope is a date-palm, said to date from the time of Columbus; perhaps equally old are a gnarled and twisted fig-tree and two gray-green olives that keep it company. Across the lowlands, a dry roadway extends to

<sup>1</sup> American Architect, Nov. 16, 1889.

the deserted mole, whence one may embark for Huelva, or for other ports farther along the coast. Extending southward, even to the mouth of the Guadalquivir, are the Arenas Gordas, the great sands, that make this coast a solitary waste. Truly, it is a lonesome spot, this upon which the convent is perched, and the soul of Columbus must have been awary as he drew near the convent-portal.

The Domingo Rubio, a sluggish stream tributary to the Tinto, separates from Rabida a sandy island, where there is an ancient watch-tower (mentioned by Irving) and a camp of *carabineros* on the watch for *contrabandistas*. A little to the west, the Domingo Rubio meets with and is lost in the Rio Tinto, and the two join with the Odiel and flow tranquilly on to the ocean, where the foaming breakers roar with a sound that reaches even to La Rabida.

Beyond their united waters, again, is another sandy island, and another distant watch-tower, till the low coast fades away in the distance.

Down this channel sailed, or floated, Columbus, bringing his boats from Palos, on his way to the sea. The landscape is of a dreary kind, flat, with distant woods, and farther a hint of purple hills. Opposite, across the broad bay, reposes Huelva, where great steamers can be seen lying at its long mole, taking in copper ore for England. It lies like a snow-drift, white, upon a tongue of land, between copper-colored hills and the sea. It is a sad landscape — *muy triste* — yet a bright sun, in its setting, might make it transiently glorious.

The old soldier in charge of the convent, Don Cristobal Garcia, the "*conceger*," was evidently in very straitened circumstances, yet he was cheerful, and his hospitality shone forth resplendently.

He laughingly informed me that he rejoiced in the same name as Columbus: Cristobal; but, he added, he had never done anything to make it illustrious. He and his family lived in a primitive, even pitiful state. At meal-times they gathered around a common platter, set upon a table some two feet square. But my own meals they served me upon snowy linen, at a table apart.

There were six of them: the old man, his wife; Isabel, a little girl twelve years old, and three boys. One of the little boys was very bright, learning readily some English words, pronouncing them with that delightful accent of the Castilian. Isabel, poor child, pattered about the stone pavement with bare feet, but they were pretty feet, and her little brown ankles neatly turned.

Another member of the family, evidently an intruder, I had forgotten to mention: a little chap clad solely in a short shirt, who had squint eyes, and a great shock of bristly black hair. Don Cristobal told me that he was a descendant of one of the Indians Columbus brought to Spain from America, on his return from the first voyage. This he told me with a serious countenance, and as the child's face was certainly that of an Indian, I am more than half inclined to believe the story.

The little people were delighted with the peeps I gave them through my camera, and capered about with delight at the sight of the court and its flowers spread out before them in miniature, and nearly jumped out of their skins at a view of the grave old *conceger* standing on his head. "*Mira! Mira!*" they exclaimed, and gazed at me with awe and wonder.

They gave me a good bed in one of the cloister-cells; the very one Columbus slept in, Cristobal assured me, and I slept well through the night. I was disappointed that I did not dream, and receive a visitation from some steel-clad hidalgo, or from a girdled monk or two. But, of dreams I had none worth preserving, and at six in the morning I was awakened by the good *conceger*, who inquired if Don Federico would not taste a little *aguardiente*. Don Federico would, and well he did, for it was three or four hours before he received a hint of breakfast. The poverty of my hosts was apparent when they dispatched the oldest boy to Palos for twenty cents' worth of meat and two eggs. While he was away I went with the old man into the *huerta*, an enclosed garden, where he had planted "*alea*," peas, vines, maize, pear and fig trees. As it rained, I sheltered myself in a grove of slender pines and watched my good friend toiling at his vines. The rain fell in torrents, and the boy sent to Palos did not return till half-past ten. Then we had breakfast, the others waiting till I had done. There were the two eggs, which the mistress could not have regarded more proudly had they been golden, for they were very scarce, eggs were, at Palos, and it was waiting on a hen's pleasure that caused the boy's delay. He had been told to bring back two eggs, and if that hen hadn't have happened along I might have been awaiting that boy's return at this day.

And *carne* — meat, *pan* — bread — and golden wine. That wine! The product of Don Cristobal's own vineyard, true *vino de Palos*, sweet, yet sparkling. The rain outside had made the convent cold and cheerless, so a fire was built in the fireplace of the ancient monks, and, as it crackled and leaped up the huge chimney-throat, we were warmed to our very hearts. The old soldier told me bits of his past history and legends of the place, while the chubby children gathered round, chins on their hands, stretched before the fire like kittens, regarding us with wide-open, wondering eyes. I said we had meat; it was not flesh of lamb or sheep, but of goat. It was old and it was tough. Don Cristobal remarked my desperate efforts to carve it, and observed that the market of Palos was never supplied with other than goat-meat, and that, he doubted not, it was very old.

Now, Don Cristobal had a way of ascribing everything ancient to the time of Columbus.

"Is this old?" I would inquire.

"*Si, Señor, es tiempo de Colon.*" "Yes sir, surely, of the time of Columbus."

So I said, pointing to the goat-meat: "This is very old?" "*Es muy viejo, no es verdad?*"

"*Si, señor, me parece muy viejo.*"

"*Muy viejo?*"

"*Si, señor.*"

"*Tiempo de Colon?*"

The old man was slow at digesting this at first, but when he did he nearly exploded with laughter, and hobbled outside to tell the American's joke to some old cronies who were sunning themselves at the door.

By this time the rain had ceased, and the sun was struggling fiercely with the clouds. We ate our meals in the corridor, which ran around a court, or *patio*, open to the sky. This court was filled with flowers, vines crept up the pillars, figs and oranges had possessed themselves of space enough for luxuriant growth, and it was indeed an attractive spot. From this court opened out many cloisters, but there was another, farther in, where the chamber-cells of the monks were very numerous. Vacant now, with doors ajar, and no one there to inhale the fragrance of oranges and roses luxuriating in this inner court. Off at one side was the chapel where, it is said, Columbus knelt in prayer, and on the opposite side a passage led to the refectory, where the stone benches on which the good monks sat are seen to-day, empty and chill. Climbing a narrow stairway, you come to a corner-room looking out over the Rio Tinto — a large, square room, with floor of earthen tiles and ceiling of cedar, with carved beams, rich and dark.

This is the "Columbus Room," where the great admiral, the prior and the learned doctor had their famous consultation, which resulted in their embracing the cause of Columbus and in the monk's intercession with Isabella. Many a painting has represented this historic scene, perhaps none more faithfully than the one hung in the room itself. An immense table, old, but sturdy still, and around which the great men are said to have gathered, occupies the centre of the room, and on it is a *tintero*, or inkstand, said to have once belonged to Columbus himself. Around the walls are hung several excellent pictures. First, a grand painting representing the discovery of land by Columbus; also five others, painted in Seville. One of the best shows Columbus at the convent-gate; another, the consultation between the sailor, the monk and the doctor; the embarkation at Palos; the final departure from La Rabida; the publication of the king's commands in the Church of San George, at Palos; portraits of Columbus, of Juan Perez the monk, of Isabella the Catholic, of the last Isabella and the Duke and Duchess of Montpensier. These last, sister and brother-in-law to the late queen, Isabella, are said to have taken a great interest in the preservation of the convent and its contents.

I had often thought that to be a monk, cloistered in cool corridors, would be an ambition it were well to gratify, and I must confess to a feeling of pity for the poor *frailes* who were turned loose from these quiet retreats and set adrift upon an unfeeling world.

I wonder if they enjoyed as I did the seclusion of the place, and the sunset view from the *mirador*? In pleasant weather, when the hot sun shines, this *mirador* must be supremely attractive to one sitting in the shade and looking forth upon the sea. Drowsy insects hum outside, the half-suppressed sounds of maritime life float in on the breeze, and lively swallows fly in and out, twittering to one another as they seek their nests. Ah! pleasant *mirador*, overlooking the historic river and the sea; soon I must leave it, for a *mystick* is lading in the Rubio which offers the sole conveyance to Huelva for the day. Even as I write, I see Don Cristobal going down the hill to engage passage for me in the *mystick*, the sand-sloop, lying at the river-bank. Down the stream beyond the Tinto, glide lateen sails, toward the bar which Columbus crossed in 1492.

Don Cristobal returned with the information that the *barquero* on the sands would sail within the hour. Paying him for his trouble (though it was a small sum he demanded), I took leave of Señora and the children and followed him to the mole, where a *carabinero* rowed me across the inlet. Once there, I found that Don Cristobal was mistaken, and that the *mystick* would not leave till night. The men at work lading her insisted that I should take a drink of wine with them, and so I stayed awhile and chatted cheerfully.

It was near this very spot, on the banks of the Domingo Rubio, that Columbus careened his vessels and took aboard his final cargo, just before setting sail on his eventful voyage. Somewhere near the mole itself he took his final farewell of the good prior, the last, best friend he had in Spain.

These thoughts filled my mind as I chatted with the men on the *barquero*, but not a thought had they of Colon, or of anything, indeed, beyond their sand. The sand was for ballast, and they would take it to Huelva and sell it for a trifle at the rising of the tide.

If I would wait, I was welcome to a passage; but they thought that, by cutting across the sands, I could hail a fisherman in the main channel as he came in from the sea. The *carabinero* thought likewise, and guided me to the ancient tower, where two of his companions took me in a small boat to mid-channel, where I had the good luck to catch a fisherman bound for Huelva. He took me willingly, and we sailed away, with a spanking breeze behind us. Two men and a boy comprised the crew, and three immense fish the cargo. Half-an-hour of sailing, and we drew near the great mole

at Huelva, where large steamers lay loading for France and England. As we neared the quay, a boy drove down a mule-cart into the water, backed it up to the boat, and we were all loaded into it, fish and men.

On shore, a little urchin with wide-extended mouth seized upon my camera and gripsack and led the way to the railway station. I was forty minutes ahead of time, but that was nothing; the train was in waiting, and I bought my ticket and got on board.

I spent those forty minutes gazing wistfully at Palos and La Rabida, the latter shining like silver against a bank of clouds. Palos, also, and Moguer gleamed white against the hills. Two leagues away lay the sea, and I had just ploughed the channel Columbus followed with his *caravels* in 1492.

Sad and solitary convent, poor and lonely Palos, ye both have survived your time, and nevermore will ye witness great deeds done! Nevermore will joyous crews here bring *caravels* to port from distant strands!

Of all my little journeys in Spain, this one to Palos touches tenderest chords; and I left the scene behind me with regret.

FREDERICK A. OBER.

#### THE EXHIBITION OF THE BOSTON ARCHITECTURAL CLUB.



"All the Modern Improvements."—No. 10.

THE Boston Architectural Club has spent a great deal of time, and no small amount of money, in getting together what is certainly the best collection of architectural drawings ever shown in this country. The New York League exhibitions have surpassed it in the interest of what may be called the accessory attractions, such as the displays of bric-a-brac and furniture, and, of course, the drawings shown by the Boston Club are no better than the best shown by the League; but the League exhibitions admit some very poor work, both in design and drawing, which attracts the critical eye at once, and reduces the average effect below that which has been obtained in Boston by a rigid selection from the works offered.

The Boston Club has hit upon, or, more probably, has fallen into, a peculiar method of announcing its entertainment to the public. It seems that one of the "side-shows" of the affair is a group of clocks with "patent chimes," consisting of metallic cylinders; and a set of the chiming cylinders, of immense size, is placed on the balcony outside the exhibition hall, and is played at intervals by a robust person, whose hymns and patriotic melodies are audible for about half a mile, and collect a crowd in front of the building. Whether the innovation deserves to be followed in future is doubtful. Even if the chiming cylinders were in perfect tune, it is a little embarrassing to modest professional men to force their way to the exhibition rooms through a wondering crowd, with "God Save the Queen" resounding over their heads; and in the hall, where most people wish either to talk, or at least, to think, the noise is a positive nuisance.

Barring this, however, the exhibition is very attractively managed and arranged. Entering the main room, we find the place of honor occupied by a fine water-color drawing of the new Boston Court-house, by Mr. T. O. Langerfeldt. Beneath this is one of the French competing designs for the Prix de Reconnaissance, instituted in the Ecole des Beaux-Arts by former American pupils of the School. The drawing is marked, "Second Mention," but, although interesting from its subject, and cleverly rendered in the French manner, it is thin and unstudied, and is surpassed, both in design and rendering, by several of the designs shown by students in American schools of architecture. On the right of these drawings are shown, as if to prove what Americans can do, when they try, what seem to us the most beautiful drawings in the whole collection. Both are "envois," from the Rotch Travelling-scholar of 1889, Mr. Henry Bacon. One is an elevation of the court-yard front of the Hotel Cluny in Paris, fully rendered in water-color, and the other is a line-drawing, in pen-and-ink, of the monument of the Margrave Hugo, in the Badia at Florence, by Mino da Fiesole. Both are measured drawings, and for effective delicacy and precision of hand they are unequalled by anything else, either American or foreign, in the exhibition.

On the right and left of the alcove containing these conspicuous examples of how much credit a Rotch Scholar may do himself and his profession hang four of the designs made by the competitors for the Rotch Scholarship of 1890. Two of these, by "Sans Souci" and

"Fleur-de-Lis," show excellent plans, well studied and well rendered. The elevations are not so good, the time allowed being, perhaps, rather short for developing with complete success a design on a theme so extremely difficult as a five-story hotel; but both are accompanied by very clever and skilful sketch perspectives. The two sets of drawings on the opposite side show much less successful planning, but the elevations are tolerable, and the perspectives also very good. It is evident enough, in fact, from all recent exhibitions, that perspective sketching in pen-and-ink is the strongest point of American draughtsmen, and they might with advantage afford now to devote a little more time to improving themselves in planning, and to designing and modelling detail, in which we are still woefully deficient, as compared with the French, or English or German architects. We will not mention any names, especially as we are all sinners together; but no one can look at the beautiful sketches made by American architects of foreign detail, and then at the drawings or photographs of the idiotic, sprawling, spiky "Romanesque" sculpture with which the same architects allow their buildings to be disfigured, without wondering how long it will be before architectural sculpture in America will be, as it is elsewhere, the work of the architect instead of the stone-cutter. It is not always the stone-cutter, either, who deforms our buildings with his crude, unfeeling devices. There is a drawing shown, of what purports to be a "decoration" for a church, which consists entirely in a mass of incoherent convolutions, mingled with spikes, and conveying as much idea of beauty or intelligent design, as would be afforded by a group of earthworms, squirming in a measure of oats. Such work is simply sickening. If architects cannot take the trouble to invent something pretty to put on their buildings, they can at least copy good examples; or, if they cannot find appropriate ones, they can leave the building unadorned.

Near this end of the room is a group of measured drawings from Coutances Cathedral, by Mr. A. S. F. Kirby, of Boston, carefully done on a large scale. We are very glad to see, year by year, an increasing number of measured drawings, done by our architects in their vacation travels. However fascinating it may be to make clever sketches, the solid work of measuring and drawing to scale is much more useful to the student in the end, and we shall never advance far in an art until the practice becomes general. Beyond the Coutances drawings is an alcove of photographs of interesting work. The most strikingly good of these is a beautiful bromide print of Messrs. Cabot, Everett & Mead's Hastings Hall, at Cambridge. The building itself is simple and charming, and the photograph, which appears to be a solar enlargement from a small negative, is so soft and full of half-tint as to look more like a beautifully-finished India-ink sketch than a photograph. Near these is a very interesting set of photographs of rooms in Colonel North's magnificent mansion at Avery Hill, by Mr. Thomas W. Cutler, F. R. I. B. A., besides more modest interiors of American houses. Among the latter we notice a rather questionable innovation, in the shape of photographs highly colored after nature. The effect is, in most cases, staring and disagreeable. It should never be forgotten that in photographs made by the usual processes the shadows are far darker, in proportion to the lights, than in nature, and, while we can forgive the want of roundness in the print of one color, for the sake of the brilliancy which the exaggerated contrast gives, the addition of other colors gives a staring and unnatural look, unless the photograph is made very faint, for the purpose of coloring.

Besides the English photographs, a very fine collection of the best English architectural drawings is shown, in pen-and-ink, sepia and water-color. A large part of them are by Mr. Raffles Davison, and are well-known to our readers by the reproductions in the *British Architect*; but there are some very beautiful water-color drawings by Alfred Waterhouse, R. Phené Spiers and others, and one or two most lovely drawings in sepia by Ernest George. It will be remembered that Ernest George won distinction as an artist and etcher before he was heard of as an architect, and his charming work as an architect becomes still more attractive when shown by his skilful and loving hand.

We have said a good deal about the smallest part of the exhibition, and very little about the largest part, the collection of work by contemporary American architects; but it is hard to know where to begin treating of that subject, and where to leave off. One thing, however, struck us: that nearly all the architects who pretend to draw at all showed something very good, and most of them, also, something not so good; but those who have exhibited before have generally sent something new of their best work, and many who have not been known as exhibitors have shown extremely creditable designs and drawings. As to the furniture show, which is in the lower hall, we can find nothing better to say of it than that it is languidly interesting, containing some good rugs, tapestries, furniture, hardware and gas-fixtures, but nothing, so far as we could see, of extreme artistic value.

THE PROPOSED SIMPLON TUNNEL.—The Simplon tunnel seems likely to be the next important engineering achievement on the Continent. As Italy disproved of the former plans, which in her opinion gave France too great an advantage, an entirely fresh scheme is now proposed, comprising a tunnel some eighteen miles long, of which eight would be in Italian territory. In this case, however, the Italian Government must grant a subsidy of 600,000 pounds sterling.—*Louisville Courier-Journal*.

ENGRAVING IN WOOD; OLD AND NEW.<sup>1</sup>

CONCERNING THE USE OF LINES IN ENGRAVING.



Staircase, Rue du Faubourg-St. Antoine, Paris.

**M**Y argument is concerning the use of lines in line engraving. Of what use and of what value are lines in engravings which are altogether done in lines?

I confine myself to my own art, engraving in wood; but my argument may be also applicable to engraving in steel or copper, and not without interest as regards art in general. To show the use and value of lines in a line engraving may at first appear unnecessary, but indeed there are engravers and critics who seem to require some teaching.

Not certainly the inventors of line engraving, but the beginners of the art of line engraving in wood, were Thomas Bewick and Robert Branstons. Branstons died in 1827, Bewick died a year later, in which year I was apprenticed to Bonner, a nephew and a pupil of Branstons. Better engravers than even Bewick himself were two of his pupils, Nesbit and the painter Clennell. And Branstons's greatest pupil, John Thompson, we have always recognized as the master of our art. These are the old engravers of whose work I have to speak. Passing over my own period of half a century, it is their work which I would compare, or contrast, with what has been called a new departure, recent work in America, coming into fashion also here. I do this in the interest of art generally, especially in the interest of my own branch of art, engraving on wood. I am sorry that I can bring only statement and argument to bear upon the question, as it is impossible to exhibit specimens showing the differences of old and new. I can only endeavor by description to make the matter clear to you.

I mean to speak of the old work, that of the men I have named (named as representatives) as good work; of the new work (notably American) as bad. Good or bad in this: the old work was characterized by the expressiveness and beauty of its lines; the new work is remarkable for the absence and neglect of beauty or expression.

Bewick's line was not always good; but you cannot look at an engraving by Clennell or Thompson without seeing at once that the engraver was an artist. Forgive so broad an assertion. There are eyes which cannot see, and not a few professed critics are really purblind, some sightless. Let me say only that any one qualified to judge of an engraving would not fail to see in the work of Clennell or Thompson that the engraver was an artist; that is to say, that he had knowledge and purpose in his work, that he used his brain as well as his hand, that every touch or line of his graver was governed by thought, was as purposeful and sure as if he had drawn it with a pencil; that he did indeed draw it with a graver. I want you to understand this as the primary essential, the one necessary qualification of good engraving; this as absolutely required, that the engraver in every line—aye! in every line—shall have forethought and intention, and (making allowance for some inefficiency in all men) that he shall do what he intended. I think this holds good in

all art, whether the graver, the pencil, or the brush be the instrument in the artist's hand. On this principle the old men worked. They had some inkling of what may perhaps be asserted without fear of cavil, that a work of art should be artistic throughout. As their work had to be done in lines, they perceived that it might be worth while to consider with what lines, so finding that some lines were fit for certain purposes or for parts of an engraving, and some not fit, so reaching at last to a preference of beautiful and harmonious lines and the avoidance of lines ugly and offensive. And this seems to me the singular ground upon which all good line engraving in wood or copper has been and must be based. So based, I find in the engraving of the old time to which I refer, that the lines were well considered, showing that the engraver always deemed them of importance. Differences of line there were; white line characterized the Bewick school. What may be called the drawing of the subject—bird, landscape, figures—was rendered by white lines, the graver incisions in the wood, the black surface of the block from which the print was taken being as it were a blackboard on which the picture was by the graver expressed and drawn in white. Thompson's work rather imitated copper, he—if a broad distinction had to be made—thinking and caring more for the black lines he left on the surface than for the lines he cut, but caring for both.

There, I take it, is the peculiar excellence of that old-time work; the full understanding that a good line engraving is the representation of a picture—a portrait, a landscape, or anything else—by beautiful lines, lines chosen and well adapted to give the forms, the lights and shadows, the perspectives, and in some cases the very substances, of the picture represented. I regret that I cannot show you examples in proof; you must seek them for yourselves in such books as you can get opportunity to examine. You need such examination to enable you to understand what good engraving is.

Do not make the common mistake of supposing an engraving must be good because you like the subject and find the general effect to your mind. If you would know what engraving is, you must judge of it quite independently of the subject or the designer. You may be satisfied with the picture before you in this month's magazine and not care anything about the technical excellence of the engraving. If so I have nothing to say to you except this—Do not talk about it as an engraving!

I gather this from my experience as an engraver: that certain lines are more fit than others, consequently that a consideration of fitness is of importance. A rough line will better represent a rough surface; delicate contours should be modelled by smooth and flowing lines. Also there is a perspective in the use of lines. And I dare to assert as beyond controversy that fitness and beauty are requisites of art. I know that all forms, all rules, have a tendency to become only formal, conventional; but that is no reason for not considering and determining their worth; and conventionalism may not be best avoided by merely running away from it. I am not insisting upon certain set lines, nor indeed on any lines at all. I can be content without lines. I admire mezzotint and aquatint, and also some new photogravures of a similar character. Only, when we must have lines let them be good lines! (As an artist, can I demand less?) good lines, well considered, fit, expressive, and (may I not add?) pleasant to look at; lines that will tempt a second glance, lines to satisfy the learned lover of engraving as a distinct art, lines such as I find in the works of my old wood-engravers, such as I find also in the best works in copper, such works as those of Sebald Beham of old time, and Milton and Sharp (landscape and portraiture) of a later period.

Coming now to the new style of engraving, I quarrel with it for its want of art. The engravers, being only line-engravers, do not appear to know or to care anything about lines. They neglect the study of line, and show an utter indifference to line-values. Take the two most notable magazines which brought into vogue this now much-admired and much-praised kind of work, admired by an ignorant public and praised by professed critics, who ought to know better: I refer to the *Century* and *Harper* for my examples. I dare to say that, with few occasional exceptions, there is no art in them. Generally clever and pleasing pictures, well-designed, effective and nearly as good as photographs. Pure photographs, if to be had, would, however, well replace them, and we should then escape the infliction of linear ugliness, and be no longer annoyed and insulted with the pretence of engraving. Do I judge these pseudo-engravings too severely? Once you may look at them, and, not noticing the lines, be satisfied with the general effect; but will any intelligent person look at them a second time to admire the engraver's workmanship? I do not deny their cleverness even as engraving, but the cleverness, the very great cleverness, is only mechanical; there is no art in it. There is no artistic taste nor judgment in the employment of lines; there is no expression in a single line. Colors may be kept; but form is lost; distances are mixed and confused; substances are unnoticed; the combinations of line are ugly and offensive. I speak without the works before me in proof, but they are in every one's hands. Think of what I say when you look at your next number. Try if you can discover, except in the portraits (strangely engraved by the same men with real regard for fitness and beauty of line)—try if you can discover any lines that have beauty or expression, or giving any sign of intelligence. There is wonderful delicacy; that is, delicacy of tone, fineness, thinness of line; the often useless, sometimes most unhappy, minuteness is astonishing. I have been surprised at these accomplishments, exceeding

<sup>1</sup>A paper read before the Society of Arts, London, March 25, 1890, by W. J. Linton, and published in the Journal of the Society.

sometimes anything I have thought possible in wood-engraving. It is the triumphant assertion of mechanical skill. What eyes these men must have! What nicety of hand! But then—I am speaking as an engraver—in the prettiest and most successful of these engravings I seek in vain for evidence that the engraver had any brains, that he could have known or understood the forms he was engraving, that he had any thought of perspective, any perception of differences of substance. In nearly all these cuts foreground objects are on the same plane as those in the background; there is neither air nor distance; sky may be wall, and water may be folds of drapery, for any distinction of linear treatment; and the lines throughout are laid with utter disregard of the things supposed to be represented by them, in seeming ignorance or wilful rejection of all the laws of linear beauty and perspective recognized and cared for by the masters of engraving both in wood and copper. Horizontal lines of a sky are crossed perpendicularly; the rough bark of a tree, a woman's delicate cheek or bosom, a sheep's woolly back, have no distinction of line to denote difference of substance; foreground and extremest distances are cut with the same unvarying fineness; all things stick together, all things are undefined, muddled, confused. Color and tone may be excellently kept, and the first impression, not noticing the lines, taking the picture only as a clever and tolerably fair imitation of a photograph, may strike one pleasantly; but returning to it, examining it, there will be no satisfaction. It will never give the enduring pleasure of a beautiful engraving. Forgetting the lines altogether, it may be possible to like it, but one will not care to look at it again and again. The more closely it is examined, the greater will be the disappointment. Does not that of itself condemn it?

And yet in these same magazines are heads engraved by the same men, engraved with singular appreciation of the beauty of line, and with close attention to that, portraits which, by their juxtaposition, only make the unredeemed ugliness of figures and landscape the more conspicuous. I can hardly overpraise some of these heads. The drawing is firm and definite, the modelling is good, the flesh does not want for fleshiness, the lines are laid harmoniously, so that in themselves they are a delight to see. Why should this be thought necessary or worth doing in a portrait, and yet be altogether neglected or despised in everything else? I cannot answer why; but I know that the attention in one case rebukes the inattention in the other.

The laws of line in engraving are not merely the pedantry of the schools. They have arisen out of the very nature of art, and are as absolute and incontrovertible as any other of artistic principles. That every drawn or engraved line should be beautiful is involved in the assertion that art is the expression of beauty. Good work is thorough. To say that a picture should be beautiful is but to say that it should be beautifully done. And, however unaware we may be of the origin of those beautiful fitnesses of line which characterize the works of the greatest engravers, however conventional and arbitrary they may appear, nay, however tiresomely-mannered they may sometimes become in the formality of inferior practitioners, they are yet rules for our guidance, which we cannot neglect or violate with impunity. Haste may excuse departure from them, as in the slighter studies of the great painters we see shadow-lines put in merely as memoranda, scribbled in without heed or need of better forming. If the engraver, on whom I am desirous of impressing this law of form, will for himself attempt not a hasty sketch, but a careful drawing, such as I will now suggest to him, he will, I think, better understand the matter. Let him draw a hand, a finger, or only the end of a finger-bone; let him draw it with lines only, fine lines, but quickly and freely, without scumbling. The first line he draws (or I am much mistaken) will be a circular line, some indication of the round outer form of the bone. Not perfectly accurate in his first line, he will correct it with other lines, also circular. As he goes on shadowing and perfecting his drawing, he will observe that, without intention, the general direction of his lines has always had relation to the forms of the bone. In other trials, he will find that he can express forms, convexity or concavity, absolutely by direction of lines, and without color. The law here asserted rules everything. In a face or in a tree, in a cloud or in mountain character, the same law obtains.

Color alone (I mean mere light and shadow) can also represent form, but, if that color has to be got by lines, the law of line comes

in absolutely. I do not mean to depreciate the value of tone or of delicacy where wanted. I only contend against exclusive attention to color and tone, and insist that, when you must use lines, those lines shall have meaning. An engraving in wood is producible only by lines, and you cannot by any excess of fineness get rid of the lines. Is it not well, therefore, that what must be seen should be good, or, say, at least agreeable? Is it not clear that, as all your work is done in lines, the more these lines express or indicate, the more complete and satisfactory will be your work? Shall they not, even by their direction, rather explain, or help to explain, the shape or substance you have to represent with them than distort or hide it? In the photographic imitations in the *Century* and *Harper*, and elsewhere, all thought of the values of line is abandoned. Whatever the value of color, of tone, of fineness, does that necessitate an absolute disuse of line? Disuse, for in the cuts I condemn line is not used; it is only put up with; its real use is avoided. It may be that this is wilful. There may be engravers who prefer to have no differential intelligence in their lines. I would still ask them to care a little for some pleasantness of beauty, confessing, however, that I have not much hope of beauty without intelligence.

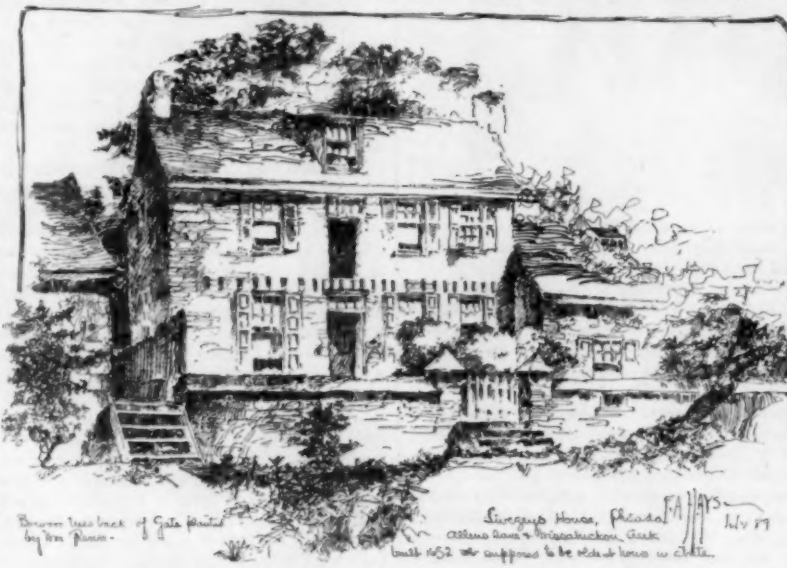
What is beauty as regards line? To point to examples may be better than to attempt any accurate definition in precise words. Look at free tree-growth, the natural, untrained interlacing of the boughs and twigs; examine a bird's wing, noting not only the outer form and inner central line of each feather, but also the arrangement of lines throughout; remark that same beautiful line of the feather and the wing, the line ever departing from the confinement of the mere circle in all mountain form. Watch the play and change of line in the stirred sea-waves, or, at your own hearths, observe the varying forms of flame. You will then see, if your eyes have vision, what the lines of beauty are, and learn something of those underlying principles on which, consciously or unconsciously, the lines of great artists have been founded.

I have referred to engravings in copper as examples of line. But it is in the white, the incised line of the wood engraver, that his process is identified with that in copper. White line in wood takes the place of black line in copper. I think that even our great engraver, John Thompson, for all his mastery of line, lost sight of the true principle of work in wood when he departed from the white line of Bewick. In that direction only are we able to show the full capability of

wood engraving, in that only can we fully earn the distinctive name of artists.

But the engraver's lines, those recommended for study, are so conventional. The very language of art is conventional. Are we, therefore, to be content with the mere ejaculations (not to be called speech) of the careless impressionist? Grammar is conventional, based, however, on certain laws of language, studied, and to some extent known, if not always absolutely determined. The laws of poetry are conventional. Men may eccentrically escape from them, but it is not given to every one to invent a new rhythmic system; and so, though I or any other engraver may be free to try any experiments in line, it may not be certain, it is not perhaps likely, that we shall altogether supersede the collective results of the many quite as clever experimenters whose rules (I will not say laws) have been codified for our following. The traditions of earlier time, the records of others' opinions have some worth in them, whatever the acknowledged right of individual judgment. It is not by ignoring the past that the world progresses. But the question here is not of conventionality, but whether, in a line engraving, lines are worth consideration at all.

Let me make one brief remark on the misuse of certain words relating to engraving, "fineness" and "finish." They are anything but synonymous. Fineness, meaning only closeness and littleness of line, indicates no advance in art. The true artist will not employ two lines when one line will serve his purpose as well, or better. Nor will he for any consideration consent to unmeaning lines. It is altogether a mistake to suppose that a work cannot be too fine, fine sometimes meaning finical. There is such a thing as propriety, suitability not only to size but to subject, in the treatment of an engraving. A work may be bold, yet quite fine enough for its purpose. Also it may be finished and refined however bold, in which case to call it coarse, simply because the lines may be large and wide apart would be only a misuse of words. Fineness



Reverend Mrs. back of Gate Street by Mrs. Hays.

Singapore House, Philadelphia, July 17  
C. H. Hays & Co. Engravers, New York  
built 1852. The engraving is by the artist's house in 1852.

(meaning minuteness), as an artist's word, is not the same as in the proverb, "Fine feathers make fine birds." "Fine" (minute) lines will not make a "fine" (that is a good) engraving. An engraving is fine (meaning good) only so far as art, as distinguished from mechanism, is employed upon it and is visible in the result, visible I would say further to the uneducated if not already vitiated by the words of misleading critics. The art of an engraving is discoverable, even by the uninitiated, in the intention of the lines. You may not have an artist's quickness of perception, nor his mature judgment; but if you see an engraving in which the parts, any of them taken separately, are unintelligible, you will rightly conclude that the engraver did not know what he was doing or how to do it. Do not believe that such a work is a fine work, however close the lines may be together. Art is an intelligent power, designing always. If you can find no proof of that, reject the work as bad.

Every line should be chosen and expressive. When I look at an engraving of a head, and find that the flesh is not distinguishable from the hair; that part of a smooth cheek might be a piece of cloth, engraved in precisely the same line as the cloth in the same engraving (an engraving large enough to admit varieties of texture); when I find face and hair, and what should be aerial background, all of the same substance; when I find an eye formless, a nose of wood or plaster, shapes and contours everywhere undefined and confused, I can but say—despite the admiration of my friend the art critic, and my own general acknowledgment at first sight of much effectiveness, I can but say—"The engraver of this has not learned to engrave, or having learned, has been disloyal to his art; I must condemn the engraving."

Or when I see a landscape, very excellent in light and shadow, in effect and in tone, or, even more, most carefully preservative of the very brush marks of the original painting; but in which also the sky is as woolly as a sheep's back, and the sheep cut with the same line as the water, and the water with the same line as the grass; what must be my judgment of this as an engraving? An engraving in wood is always a picture represented by lines. Shall I call a picture represented by inappropriate, uncertain, inexpressive lines a fine engraving? The lines are very close together. If there is no beauty in them even only as lines, shall I call that ugly engraving beautiful? As an engraver, I can only condemn it for inefficiency.

Granted, that to know a good engraving from a bad one requires some education, some few hints may be of service. To begin, do not be beguiled by the first look and appearance of the woodcut before you. Your premature satisfaction may be partly owing to the pleasantness of subject or else to the cunning of the draughtsman who knew how to make a good and effective drawing which not even the engraver could destroy. That nice picture may be very badly engraved. Examine it! Do you find any marks of engraving intelligence? If a landscape, does the engraver appear to have had any notion of the growth of a tree, the formation of a mountain, the roundness and lightness of a cloud? Or is it all one flat unvarying set of monotonous and unmeaning lines, so that the treatment of one part would do just as well for any other part. In this first case you have an artist's work, in the second a mechanic's. Examine a figure subject in the same manner. You will not all at once become a judge of engraving, time and study are both needful. But the one clue to guide you out of the labyrinth of erroneous judgments is the constant recollection of the meaning of expression. Expressive work is artistic, inexpressive work is mechanical. The one is good, the other is bad.

## DISCUSSION.

Mr. Fagan (British Museum) said he was not able to express any opinion on the particular point on which the paper turned, except to say that he agreed with Mr. Linton in his description of what wood-engraving ought to be. He did not see any art at all in those American illustrations which he was sorry to find were being imitated in this country. He was a great admirer of the old styles of engraving, for instance, those engraved after the beautiful designs of Albert Dürer and Hans Burgkmair which were incomparable in charm, not only in line, but in precision of drawing.

Mr. Quaritch said he understood very little of the technique of wood-engraving, his knowledge being rather historical. The most recent period in his mind, for he hardly knew anything of the New World, was that of Bewick, whose work had lived now for 100 years, and would still be admired for countless generations. At first he was employed on little children's books, which were sold for a penny or two, but now they were worth their weight in silver certainly, and were the admiration of collectors. When he became more accomplished he brought out his "Quadrupeds," in 1789, but that book never attained the popularity of the "Birds," the first volume of which appeared in 1797, and the second in 1804. Into that work he put all his artistic skill, so that even at the present day ornithologists said there had never been birds better designed than by this wood-engraver. Not only was his artistic skill very great, but his technique also was excellent, and even in recent editions the impressions were as good as in the first. His own predilections were in favor of early art, for now-a-days the printer was in such a hurry for the design that the artist was unable to do justice to his own genius, if he had it. The work of the present day corresponded very much with that of the *Nuremberg Chronicle*, which came out in 1493, the cuts being by Wohlgemuth, the master of Albert Dürer; it was a stout folio volume, with nearly 2,000 engravings, and must

have been one of the most popular works of the day, large editions being printed in both German and Latin. This chronicle was produced for the same purpose as much of our own modern work, simply to amuse the people, but while the former would last for thousands of years, modern art would find its way to the waste-paper dealer.

Mr. W. Biscoe Gardner said he quite endorsed everything Mr. Linton had said.

Mr. Forbes Robertson said it was a great satisfaction to listen to one who was the living authority on his art, and who in his own work showed that he inherited all the best traditions of Bewick, the father of wood-engraving. He went with him entirely in his enthusiasm for the beauty of line, when the line was the creation of a master. He did well to mark the change introduced by Thompson when he adopted the black, instead of the white line, a change which was apt to escape notice. He should have liked Mr. Linton to have gone from the period of Bewick and his immediate disciples to note the change that had come over not only the practice of wood-engraving, but the tastes of the people. Line engraving in England, not only on wood but on copper, was, perhaps, the finest in Europe. Why was line engraving so much admired? Because you could go back to it again and again; because the line was full of thought and intention. And why had the other style come in? Because, as Mr. Quaritch had said, people had not time to wait for other. He was as great an admirer of line as any one, and was proud of his collection of Sharp, Strange, and other engravers; but the new style, the mixed style, came in fifty or sixty years ago, when Robinson, Doo, and others began to use line only in parts. At the International Exhibition in Black and White, in Vienna, a few years ago, he was much struck with the picturesque look of this new school, which had chiefly arisen in America, though it was taken there by foreigners, and he thought Mr. Linton had rather underrated that mixed style. It commended itself to the eye at once by this quality of picturesqueness. They went in for values, tone, light, and shade, immediate effects, as was done by the French school, in contradiction to the more painful stippling and line work to be seen at the schools of the Royal Academy. It was the drift of the age, and it commended itself to a far larger *cléientele* than the other, because it addressed the eye at once, whilst line required time, not only to do it but to appreciate it. He was glad to hear Mr. Linton say that there were some of these engravings which were pleasant to look at, but as far as art, *per se*, went, every word he had said was pure artistic gospel. Nothing could exceed the beauty of line, and when it came to the expression of the softer tissues of the human form, some of the works of Sharp and Strange were to the man who had an eye to see, a joy forever.

Mr. Stannus expressed the pleasure with which they had listened to Mr. Linton, whom they all looked up to as the patriarch of the art. The white line might be called the negative effect and the black line the positive; and it would be seen that the positive was the first system employed. The old wood-engravings referred to by Mr. Quaritch were all positive; and so were steel and copper engravings, the effect being obtained by black line, though on these latter there were often little stipples between. There was also another kind of engraving which obtained about 30 or 40 years ago, practised by Roffe, in which the effect was obtained not by line but by dot. There were thus two positive forms—the positive line and the positive dot, and also two negative forms, the white line introduced by Bewick, and of late years the negative form of the dot, little white dots being chipped out, of which Timothy Cole's work was an example. Line was exceptionally admirable for showing form; a shadow cast by a straight edge against a moulding would give the shape of the moulding, and a limb might be so perfectly indicated that a sculptor might model from it. He was much interested in what was said about texture, which could best be shown by line unquestionably, by the direction, thickness and quality of the line, whether smooth and sweeping, or a cramped and scrabby line, but he would not like to say that line was the only means; but Mr. Linton had said nothing about line as regards color, and it was in this direction that the new engravers had developed. Color was equally an art effect, and one to which more attention was paid than formerly. We no longer had the almost colorless pictures of Fuseli, West and Opie, but the full-blooded pictures of the present day, and line engraving was scarcely adapted in all cases to give this quality. He was in hopes Mr. Linton would have brought some examples of wood-engraving, and he believed that most of the audience were equally expecting to see the two schools, the old and the new, contrasted; and were equally disappointed as himself. He hoped that Mr. Linton would favor them with an exhibition of his work on some future occasion; and he begged to move a hearty vote of thanks to Mr. Linton, whom he hoped would long be spared to enrich English art by his productions.

Mr. H. Trueman Wood thought the recent school of wood-engraving in great measure owed its faults and merits alike to photography and the public taste as influenced by photography. In that very room he had heard a lecturer on photography holding up an excellent old woodcut and a modern one by the side of it, point out that by means of photography the public taste had been educated to look for something better than they were satisfied with twenty years ago. The public had got to look for minute detail, and the exquisite rendering of tone and color effect which they found in photography, and hence were not satisfied with the semi-conventionalized older forms of wood-engraving; but this public taste for photography

had somewhat avenged itself, for the recent school had succeeded mainly in copying the faults of photography, so that many of their engravings looked like badly exposed photographs. It seemed to be much easier to copy photographic faults, flatness and absence of vigor, than to render that microscopic minuteness of detail, which was in part one of the beauties and in part one of the greatest defects of photography. On the other hand, some of the more recent school of photographers—the impressionist or naturalistic school as they were called—tended to imitate inferior wood-engraving, to strive after effects which photography was not capable of rendering, whilst dispensing with those which it would render most satisfactorily. Possibly by means of photographic methods they might get back again to a more vigorous style of work. The modern periodical press, which now depended for its illustrations to a large extent on photographic methods, demanded a rapidity which was incompatible with the finer quality of work, and consequently a bolder and more vigorous style of work was inevitable, and a tendency in this direction could already be traced in periodical illustrations. He should like to know if much of the very fine work in the modern style was not first drawn on a larger scale and then reproduced on a small scale by means of photography, so that the fineness was to a great extent artificial.

Mr. G. Bernard Shaw wished to say a word on behalf of art critics, who had been rather roughly handled in the paper. In the first place the notices in the press, which approved of these engravings in *Harper* and the rest, were not contributed by art critics at all, but by reviewers. Still he admitted that the art critic was often more favorable to this style of engraving than Mr. Linton thought he ought to be. Art critics were much more in communication with artists than with engravers; and the one thing above all which an artist resented was that knowledge on the part of the engraver of which Mr. Linton had so well spoken; for to the artist a great deal of that knowledge was altogether intolerable. The worst possible landscape painter was the man who knew that a tree was green, because, as a matter-of-fact, for artistic purposes a tree was very seldom green. A painter of the impressionist school put into his picture a number of conditions which you saw in nature which used not to be put in pictures at all except by the men of genius. Suppose an impressionist made a drawing in black-and-white of a scene such as you might often see in England, say a bit of rising ground on a Surrey common on a gray day, with a couple of figures just coming into sight over the brow of the rise. He would draw what he saw, not what he knew to be there; he might know that the man had two buttons on the back of his coat, but he would not draw them because he could not see them. But when that drawing went into the hands of an engraver who had this theory of representing what he knew by appropriate lines, he would not produce what the artist had really seen on the brow of the hill, which would be simply a couple of flat dark tones against another lighter tone representing the sky, but he would want to represent the modelling of the figures' arms and the roundness of the tall hats, and all the rest of it, which he knew were there, and the result was that he produced an entirely false picture and made the artist furious. In the old schools of engraving there was too much of this knowledge expressed by lines. It seemed to him that the modern school of engraving aimed at representing tone correctly, and what was actually seen; though he quite admitted that in many of these engravings there was a deplorable lack of the forms which were seen, and which ought to be represented by line, but were not. Nothing was much more unlike the surface of the human hand than the side of a block of wood-paving, and yet he had seen in magazine illustrations these two things represented in exactly the same manner. There the knowledge of which Mr. Linton spoke ought to have come in. Still, modern engraving, with all its defects and omissions, was not more offensive than the old-fashioned engraving in which you missed tone and atmosphere. In some of the best work of Mr. Gardner you had the combination of the two. Mr. Linton's thoroughly good and fruitful lecturing work would recall the men who had educated themselves in tone to the work they could do in the way of line. If they would learn this lesson without losing their command of tone, there would be an enormous advance on the old school of engraving.

The Chairman (Mr. William Simpson) said he was not an engraver, and could not, therefore, give an expert opinion on the question raised; but he was inclined to agree with the view put forward in the paper. He was at one time a lithographer, and in drawing on stone, the grain on it produced small dots, but even there it was usual to indicate lines by a stroke of the chalk, for the best work. A very good illustration of Mr. Linton's theory might be found in a comparison between the line engraving and mezzotint; every one knew how much superior a line engraving was to a mezzotint. He felt that this question of the two different ways of producing an effect had a broader relation to art than to the mere question of this paper. It reminded him about the question of legitimate and illegitimate water-color, as if there were only one school and one line of art to follow. He was rather inclined to allow of various ways, not only in water-color, but in oil painting, and in every branch of art. Still in the main he agreed with Mr. Linton as to the value of line in wood-engraving. He concluded by putting the vote of thanks, which was carried unanimously.

Mr. W. J. Linton, in response, said he had unfortunately failed to hear what was said by Mr. Bernard Shaw, but he agreed with what had been said by Mr. Wood about borrowing from photography, and the endeavor to do by woodcuts what was much better done by

photography, and also the endeavor to obtain certain effects in a way which had misled engravers very much. The specimens which Mr. Stannus had brought were quite sufficient to prove his case. He would take the one by Timothy Cole, because he knew him personally, and when he first made his onslaught on this new system Mr. Cole called upon him, and said he perfectly agreed with him. Since then, however, he had to some extent changed his methods. The engraver of the "Sower," which Mr. Stannus had brought, would perfectly exemplify every fault he had mentioned in the paper; the hand and foot were badly drawn, there was no form represented and no perspective. Color could be given without line, but color did not represent form, and he was speaking of form and the varieties of form. He could not see the distinction between positive and negative which had been attempted. If he drew an object with white chalk on a black board, or drew the same thing with the same lines in black on a white surface, why should one be called positive and the other negative? He did not object to dots, or anything which might be brought into use, only, if you had lines, was it not as well to consider whether you could not make them beautiful and expressive.



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

DOORWAY TO HOUSE OF MRS. CHARLES BLAKE, BEACON ST., BOSTON, MASS. MESSRS. STURGIS & CABOT, ARCHITECTS, BOSTON, MASS.

[Heliochrome issued only with the International and Imperial Editions.]

A GENERAL view of this house was published in our issue of January 4th last.

APARTMENT-HOUSE ON CLARK ST., NEAR FULTON ST., BROOKLYN, N. Y. MR. CHARLES P. H. GILBERT, ARCHITECT, NEW YORK, N. Y.

BUILDING FOR THE CENTRAL RAILROAD OF NEW JERSEY, CORNER OF WEST AND LIBERTY STS., NEW YORK, N. Y. MESSRS. PEABODY & STEARNS, ARCHITECTS, BOSTON, MASS.

BANK AND OFFICE BUILDING FOR WILLIAM M. DUNCAN, ESQ., NASHVILLE, TENN. MESSRS. THOMPSON & GIBEL, ARCHITECTS, NASHVILLE, TENN.

STATIONS AT GRAHAM AND SALEM, VA., ON THE NORFOLK AND WESTERN R. R. MR. GEORGE T. PEARSON, ARCHITECT, PHILADELPHIA, PA.

ALLEGORICAL RELIEF: THE UNITED STATES OF AMERICA. MR. CHARLES LAWES, SCULPTOR, LONDON, ENG.

A FEW words as to the significance of the various figures represented may not be superfluous. The United States holds aloft the torch of progress; Liberty bears the star-spangled banner aloft near Commerce with the caduceus; and Peace presents the olive. Below are Indians, two figures representing abundance, and an expiring form which typifies the extinction of slavery.

This work, which Mr. Lawes, an English sculptor, intends for the World's Fair at Chicago, is now in the exhibition of the Royal Academy.

[Additional Illustrations in the International Edition]

CLOCK-TOWER AT BERNE, SWITZERLAND.

[Copper-plate Etching.]

LIKE bell-towers, which were once the sign of the independence of a city, clock-towers take a prominent place in municipal life, and, as the *Moniteur des Architectes* says, it is desirable to revive the taste which, during the Renaissance, supplied nearly every town of importance with them.

SAVINGS BANK BUILDING IN BUDA-PESTH, AUSTRIA. HERR NIC. VON YBL, ARCHITECT.

[Gelatine Print.]

BUDA-PESTH is noted for its splendid bank-buildings. The fountain in front of the one illustrated, which bears on its top a figure of Neptune, was erected as a memorial of the first savings-bank in the city, and is modelled after the fountains in the Place de la Concorde in Paris. The sculptor was Leo Fessler.

HOUSE IN THE KOLOWRAT-RING, VIENNA, AUSTRIA. HERREN  
FELLNER & HELMER, ARCHITECTS.

[Gelatine Print.]

PRESTON ABBEY, SOMERSET, ENG. DRAWN BY MR. E. J. DODG-  
SHUN.

GIGGLESWICK, YORKS, ENG. DRAWN BY MR. E. J. DODGSHUN.

ST. JOHN'S CHURCH, WATFORD, ENG. MESSRS. CHRISTOPHER  
& WHITE, ARCHITECTS, LONDON, ENG.

WE publish a general view of the proposed church of St. John the Evangelist, which is to be erected at an early date on the site of the present iron church in the Sotheron Road, Watford, Herts. It will accommodate when completed nearly 700 people. Owing to the shape of the site the nave of the church is nearly a square on plan, and contains a morning chapel in the south aisle and a baptistery apse at the west end. The church will be a lofty structure of a simple early Gothic type. The walling will be of Kentish rag facings, Box ground stone dressings, and will be roofed in with stone slates.

ST. MATTHEW'S CHURCH, GRANDPONT, OXFORD, ENG. MESSRS.  
CHRISTOPHER & WHITE, ARCHITECTS, LONDON, ENG.

This church is being erected in the Marlborough Road, Grandpont, as a chapel of ease to the parish church of St. Aldate, Oxford, on a site given by the Fellows of Brasenose College. It contains 560 sittings. The design of the church is Perpendicular, and is of simple character. It was felt that a tower was hardly in keeping with a chapel of ease, and, therefore, a somewhat unusual feature has been adopted, viz., a belfry over the porch, it being separated from the church and porch entrance by vaulting so as to deaden the sound of the bells inside the building. The external walling is of Gibraltar stone, with Box ground stone dressings, and the roof is to be covered with Colley Weston stone slates with stone ridges.

## BOOKS AND PAPERS

WE do not have much faith in the advantages of ready-made specifications to the practising architects.<sup>1</sup> If they are full enough to be used for any given building without much change, they need a great deal of scratching out and changing to adapt them to another building; and if they are made so general as to suit the average building, they need so much filling out for each particular case that it is not much more trouble to write the specifications from the beginning, and the result is usually better. Where such documents are really serviceable is in the library of the draughtsman and young architect, who find it of the greatest benefit to compare specifications, and thereby improve their own form. No matter how much pains an architect may take to draw up a perfect set of such documents, he will always find something in the work of others from which he can get a useful suggestion for his own; and he should be ready to impart to his brethren any valuable points which may have occurred to him. Mr. Cooper has fulfilled his duty in the latter respect by publishing the forms used in his own practice, and these, being unusually clear and full, will furnish many hints, even to experienced architects, while, on account of their completeness, they will answer well for a second duty, that of serving as a standard with which the younger men can compare their own productions, to see if anything is left out.

Occasionally, without doubt, these specifications will serve a good purpose by simply filling in the blanks, and they have the advantage, for this purpose, of being printed in aniline ink so that they can be copied entire in an ordinary press copybook.

## 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.]

### TO ARREST DECAY IN SANDSTONE.

NASHVILLE, TENN., May 19, 1890.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—Will you kindly inform us, if you know of any preparation that will arrest decay in sandstone, and oblige,  
Truly yours, THOMPSON & GIBEL.

[The best ordinary process consists in saturating the stone as deeply as possible with a solution of silicate of soda, followed by a solution of chloride

<sup>1</sup> Specifications for Mason-work, Carpenter-work, Painting, Plumbing, etc., by G. Edward Cooper, Utica, N. Y. 1890.

of calcium. The double decomposition leaves the pores of the stone filled with silicate of lime, the chloride of sodium washing out. The application of the process requires care, and some experience. The solutions should be applied very weak, and several times, at intervals, alternating the soda and lime solutions. If the silicate of soda solution is too strong, it will form a gummy coating, which will prevent the penetration of the subsequent solutions, and will effloresce later, spoiling the appearance of the stone.—Eds. AMERICAN ARCHITECT.]

### MANNESMANN STEEL.

WATERBURY, CONN., May 20, 1890.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs.—Is there not some mistake in the article which appears in No. 751 (May 17) of the *American Architect*, headed "Mannesmann Steel in Germany,"—we quote the portion to which we refer, as the measurements given when reduced to inches would seem to indicate a thickness of metal for the walls which would be impracticable for the process referred to.

"Near giants of from 200–375 mm., diameter there are dwarfs of a pencil-like size, and under tubes of from fifty (19 $\frac{1}{4}$ ") to sixty (23 $\frac{1}{4}$ ") centimetres thickness of wall, hang others of less than 1 mm., thickness."

Then again the length given of ninety English feet as that of a tube which has been rolled by this process would seem to require modification or would admit of a most interesting explanation.

If any correction is to be made we would be glad to see it appear.

Yours with respect,

RANDOLPH & CLOWES.

[For centimetres, in the paragraph referred to, should evidently be read millimetres. As to the other questions, we must rely on our German correspondent for explanation.—Eds. AMERICAN ARCHITECT.]

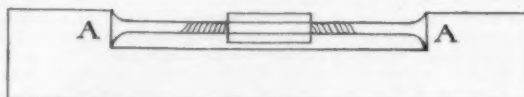
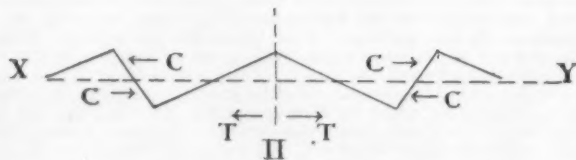
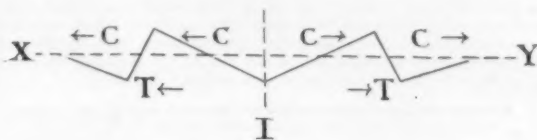
### BEAMS.

CLEVELAND, OHIO, May 13, 1890.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—Having just read in the last number of the *American Architect*, Mr. Louis De Coppet Berg's answer to your editorial remarks on the compound beam, I was struck with the peculiarity of Mr. Berg's argument; namely, that first he assumes that the beam is acting as a whole, and then by a course of reasoning, apparently proves that the strains are reversed under these conditions, so that the construction of the bevels must be reversed, which consequently makes the beam into two parts, so that it is not acting as a whole and the premise is disproved: *reductio ad absurdum*.

What seems to me to be the fault of the argument consists, first, in the fact that Mr. Berg makes his neutral axis follow the zig-zag course of the splicing, and second, that the direction of the forces is not considered. If the beam is acting as a whole, the division line between the particles that are in compression and those that are in tension, would be exactly along the centre of the beam parallel to its top and bottom surfaces, and if the beam is composed of two equal halves, it would be half-way between the top and bottom points of the splices, and both the compressive and tensile strains would be away from the centre of the span of the beam, as indicated in the accompanying sketches I and II. In what seems to me to be the proper construction—Sketch II—there would be a



III

point, in the lower piece in each abutting surface that would be in compression, as indicated by the arrow heads. Sketch III, showing a piece of wood, as a whole in tension, from the action of a screw, illustrates this, as the points A A would be in compression.

If Mr. Berg's theory and construction is correct, the small triangles of the lower beam above the neutral axis  $X Y$ , being in tension would be useless and might as well be cut out.

Very respectfully yours, CLARENCE O. AREY.

[This is quite an interesting point. We do not think, however, that Mr. Arey states Mr. Berg's position quite fairly. Mr. Berg thinks that in the compound beam there is practically but one neutral axis; all the fibres above this being in compression, and all below in tension. Rankine and his followers think there are two, which without bolting and notching, would be in the middle of the two portions of the beam, but which can be made to approach each other by the bolting and notching, the strength of the compound beam increasing as the neutral axes are brought nearer together; and the question is by what mode of notching can they be best made to approach. — EDS. AMERICAN ARCHITECT.]

NEW YORK, N. Y., May 23, 1890.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—Mr. Clarence O. Arey has evidently not read my letter very carefully, or he would not make the above statement. Instead of claiming that strains are reversed in compound girders, what I did claim was that the theory of strains would have to be reversed if beams are notched in the manner which seems to meet with Mr. Arey's approval, while if they are notched in the way I have shown them in my book, there is no necessity for us to go out of our way to get up new theories of transverse strains.

In regard to the statement in the last three lines. This is, of course, obvious. The neutral axis, theoretically, would be along the exact centre of the beam, in which case the small triangular ends of the notches would have no duty to perform; their resistance, however, would be but trifling at best; I prefer, therefore, to rely upon the broader trapezoid-shaped parts of the wedge to do the work; but, even if these triangles were useless, it would not be necessary to cut them out (as suggested by Mr. Arey), because the neutral axis will never be in the exact centre when the beam is strained transversely, but will vary more or less in its position according to the difference in the resistance capacity of the beam fibres to compression and tension.

By referring to page 211 of my book, Mr. Arey will find the manner in which I calculate the keys in key girders, and I state on page 216 that the same method is to be used in calculating the notched girders. If he will take the trouble to read these parts, he will see that I allow only the respective compression or tension on each key above or below the neutral axis; and I think that each wedge-shaped piece in the notched beam can safely be similarly calculated.

Very respectfully yours,

LOUIS DE COPPET BERG.

## NOTES AND CLIPPINGS

**AN HISTORIC MANSION BURNED.**—An interesting old mansion was destroyed by fire in Claverack, N. Y., on March 26 last, a mansion whose history dates back beyond the Revolutionary war. To the present generation it was known as the "Watson Webb house," from the name of its owner in the early part of the present century. Although the old mansion was the scene of many a merry-making in colonial days, and saw many a bloody affray in the Revolutionary war, being on debatable ground when the British were trying to cut their way through to New York from Lake Champlain and Saratoga, and, although General Lafayette was sheltered under its roof, it is, perhaps, best remembered as the spot where the verses were written beginning:

"'T was the night before Christmas, when all through the house  
Not a creature was stirring, not even a mouse."

It was in 1704 when Kiliaen Hogeboom left Amsterdam, to take possession of a tract of land eight miles square, now including Claverack, three miles from the Hudson River and to the east of the city of Hudson. It was purchased from Chancellor Livingston. Kiliaen Hogeboom's son Jacobus began building the old mansion in 1727. It had generous halls and big rooms and had a frontage of 63 feet, along which ran a capacious porch. Over the porch clambered an ivy, which, as years rolled by, stuck its roots deeper and wider into the soil, and extended its shade over portico and mansion. The interior was finished in the highest style of Dutch art. The fireplaces were of tiles illustrating Scriptural subjects, and were brought from Amsterdam. The mantels were of wood and were quaintly and curiously carved, and mural paintings served for a picture-gallery. It is said that the furniture and expensive bric-à-brac brought from the old country made the mansion one of the most delightful places to be seen at that time in the Hudson River valley, and that Dutch hospitality made the spot famous for good living up and down the river. It was during the Revolutionary war that the house was most famous for its hospitality. The property had descended to General Samuel Webb, an officer in the Continental army. General Webb had married the granddaughter of Jacobus Hogeboom. It was when Lafayette was on a visit to General Webb that Lafayette etched on a window-pane with his diamond ring his name and the date of his visit. — *N. Y. Sun.*

**DRAINING THE VALLEY OF MEXICO.**—The drainage of the great valley of Mexico, which has at last been definitely undertaken, will be one of the most interesting works in the history of engineering, whether

we look at the stupendous proportions of the project, or at the magnitude of the sanitary advantages which will accrue from its completion. A sanitary engineer would say that the capacious valley, in the middle of which lies the city of Mexico, was, notwithstanding its fertile soil and admirable climate, not intended by nature for the habitation of a teeming population. It is a deep cup-like depression, surrounded by a mountain rampart and possessing no natural outlet for water or sewerage. Nevertheless, for many centuries, not only since the Spanish conquest but in Aztec and the still remoter Toltec times, the valley has been densely peopled. The result is that the ground on which the large cities stand reeks with corruption, and the adjacent stagnant lakes are clogged with age-long accumulations of filth, engendering the most dangerous miasmatic and typhoidal conditions. If the masses of the Mexican people were not in the habit of drinking pulque instead of water, they would be continually decimated, for it is impossible in the city of Mexico to procure pure drinking water except by distillation. Under the Spanish viceroys, an attempt was made to drain the valley, and a tunnel for that purpose was driven through one of the rocky walls that hem it in. But through some miscalculation of the constructors, the opening was begun at too high a point and is now useless. The new boring will be made at a level low enough to effectually drain the lakes. — *N. Y. Ledger.*

## TRADE SURVEYS

The centralizing tendencies in trade, commerce and in manufacturing are being strengthened by a host of influences acting far beneath the surface. Investors, stockholders in all kinds of corporations and companies, promoters of new enterprises, speculators and schemers seeking opportunities for fortune-making, and all of that vast class of persons who live by the exercise of their wits, energy, capital and enterprise, are lending their influence in this direction. They are tired of old conditions, desire to see a newer regime, and establish, if possible, a broader platform on which to do business. They are quite willing that even higher tariff duties should be established, if they will help business; that a radical silver law should be agreed upon and immediately enacted, and that schemes of internal improvement should be adopted and pushed by the Government; and, in fact, anything done that will arouse confidence and stimulate energy in every department of trade and industry. There is no organized cohesion among all of these varied interests, but they are working in the same direction, and their interests are one. Railroad presidents, the presidents of manufacturing corporations, and active agencies in a host of smaller concerns are all seeking for and lending their influence, great or small, in the direction of an expansion of capacity and enlargement of trade. On the other hand, capital is being organized to prosecute schemes for stimulating the exportation of American products, and those who are at the head of these enterprises think that in certain lines our exportations can be within a short time quadrupled; they entertain rather extreme views as to the possibilities in this direction, and are backing up these views with promises of heavy investments of capital. All these people, who are at the head of existing or projected enterprises, desire to be perfectly free to act, and clear from entanglements which would result from a monetary stringency. The money-lending interests have withdrawn almost all their opposition to this new and mighty factor; they instinctively feel that it is bound to have its way, and they propose to make the best of it. It is just possible that a presidential veto may be interposed at the last, but the power behind the throne will, no doubt, express itself in political directions in no undecided manner. The spirit of organization and expansion is being rapidly developed in the South and Southwest; conventions of one kind or another are being held; new political movements are gaining unexpected strength; new leaders and agitators and exponents of new ideas are coming to the front.

The old political element in these States is just now discovering that the industrial and commercial spirit diffusing itself everywhere, is about to effect a genuine and lasting revolution in these sections. In other words, a harmonizing movement is going on in all sections of the country, as a general outgrowth of the diversification of industries which has been in progress since the war. Only now are the fruits of this movement being manifested in a manner that we can understand. Until within a recent period the country was united only politically; it is now becoming energized and solidified by the same industrial, economic and commercial ideas, so to speak. An identity of interests is being manifested in all sections; this has long been merely a theory; now it is a reality. This result has been due, as stated, to the diversification of industries; and this has been made possible by the enormous investments of capital in manufacturing enterprises of a thousand kinds, the construction of railroads, the infusion of new blood. Every week exhibits an increase in the volume of business as compared to the corresponding week last year. For three months past margins have been rather close, and still are narrow, but the summer and fall requirements which have just been presented have allowed a little improvement. The manufacturers of textile goods are encouraged. The industries of New England are thriving; wages are settling down to a fixed basis, and all elements of cost can be counted upon with far more certainty than was possible five years ago. The industries of the Middle States are prosperous; the iron trade is very active. Mills are working double turn in all sections of the country. The production of coal is slightly greater than up to this time last year, and the opening of new mines, reported in so many States, is evidence that the present supply is not in excess of the demand. The rapid spread of little industries into new sections is stimulating the building of new coke-ovens in several States. The manufacturers of building material, builders' hardware, and construction material of every kind, have as much work as their present capacity can conveniently take care of. Throughout the West there is a spirit of confidence which manifests itself in the projection and promotion of a multitude of new enterprises. Throughout the far Northwest agricultural lands are improving in value, first, because of the increasing demand for good land, and second, because of the fair markets for agricultural products which, in spite of all assertions to the contrary, still exist. The farmers are prospering and making money, after all said and done. Their condition is gradually improving, and the railroad companies are treating them with more consideration and a clearer recognition of those rights which are not clearly definable by law.

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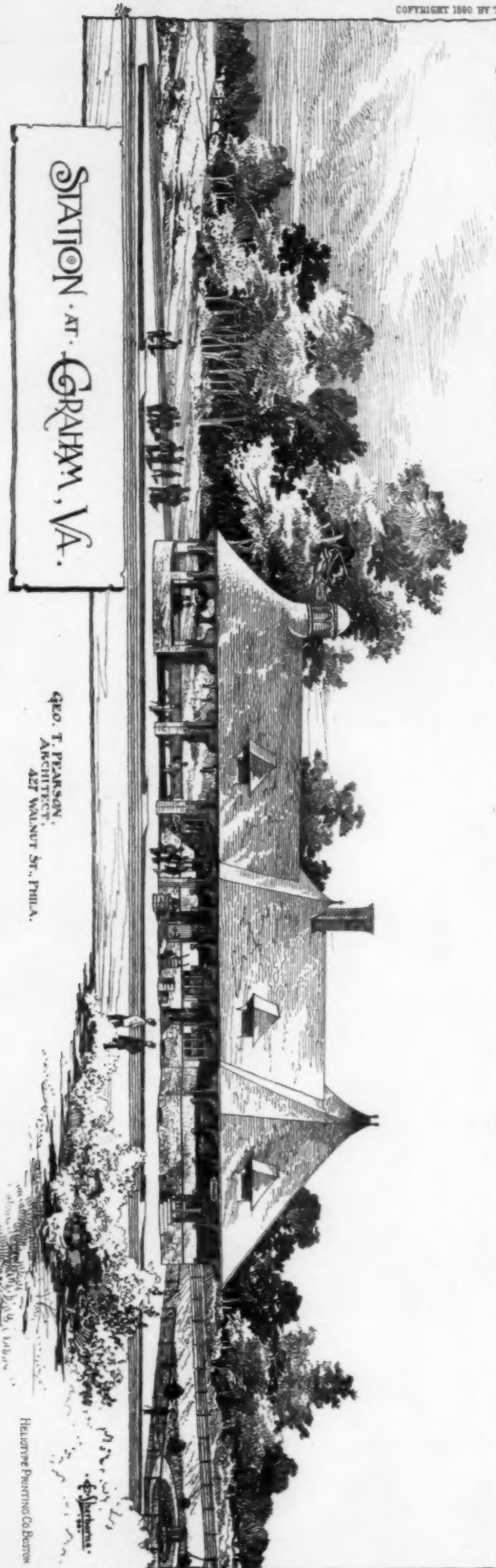
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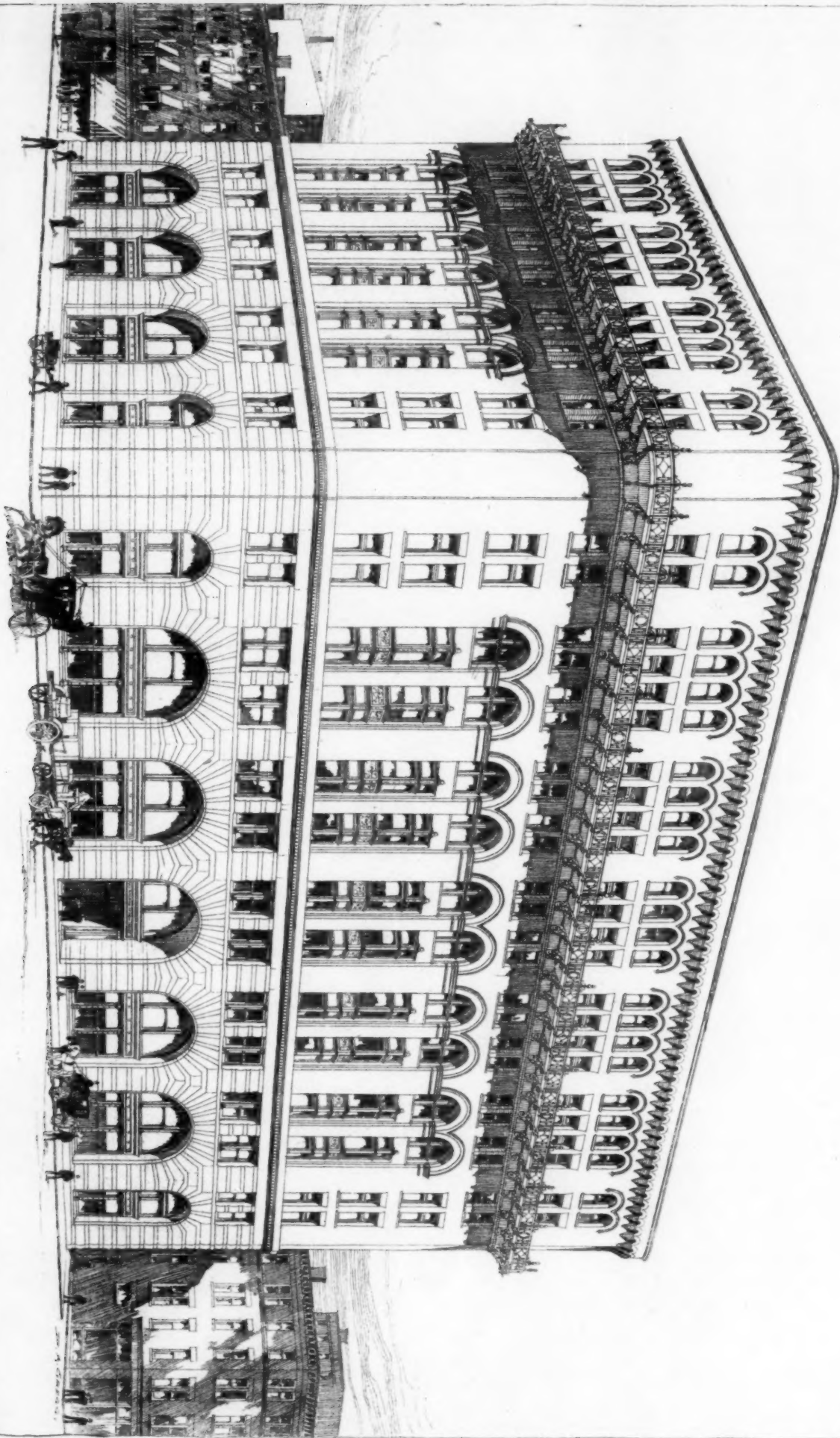


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